

Out-of-the-Money CEOs:
Inferring Private Control Premium from CEO Option
Exercise[☆]

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Abstract

This study explores how CEOs' private benefits of control manifest themselves in option exercises. We document two salient patterns: The rate at which CEOs exercise vested options in order to sell (or hold) the resulting shares slows down by 80% (or accelerates by 50%) when a proxy contest is looming, both consistent with CEOs' desire to maintain or strengthen their voting rights when facing control challenge. In extreme cases, the presence of a proxy contest triples the probability that an insider exercises call options out-of-the money, a strategy deemed unambiguously irrational under the conventional models. Various forms of distortions imply sizable incumbents' private control premium on the order of 3.4% to over 20% of stock price. Additional tests affirm the connection between the deviations from normal exercise behavior and a control motive, which is distinct from other motives documented in the literature including diversification, inside information about future stock prices, and behavioral factors such as overconfidence.

1. Introduction

On August 13, 2010, Leonard Riggio, Chairman of the Board and former CEO of the New York-based bookseller Barnes & Noble, Inc (ticker: BKS) exercised option to acquire 990,740 shares at a price of \$16.96 a piece. The stock's closing price on that day was \$14.46, and the daily high was \$15.00. That is, Riggio paid a premium of \$1.96 for each share or 13.1% over the then market value for the purchase. Moreover, the expiration date of this option package was eight months away. Why? Apparently the company was facing a proxy battle from Ronald Burkle, an activist investor. Riggio was one of the current directors up for re-election and the extra 1.7% of the votes could matter in an expected close contest. Riggio held 29.9% of stake in the company, including vested options; Burkle was the second largest shareholder of the company with a 19.2% stake.

The incidence exposes an intriguing phenomenon: A CEO's (or other insiders with some control power) option exercise could be distorted by a "private control premium," which we define as the incremental value of shares perceived by the insider relative to that by the investor public. The latter is presumably summarized in the market price of the stock. From Riggio's decision to acquire shares via an option exercise we can infer that his willingness to pay (i.e., private valuation) was at least as high as the exercise price of the option, and the premium was associated with his desire to reinforce control. Therefore, 13.1% is a lower-bound estimate for Riggio's marginal private valuation that incorporates his control premium.

The case described above might appear extreme, but exemplifies how private benefits of control manifest themselves in insiders' option exercise behavior precisely when control is under contest. Under the hypothesis that some CEOs (who face restrictions in open-market buy/sell due to their insider status) assign a value premium for the shares in their own companies when their control is under contest, they should also exercise vested in-the-money options in a way that is different from what benchmark models without private control premium would predict. After controlling for the standard variables documented by the literature as affecting early exercises, we find that the presence of proxy contests decelerates exercises of options for the purpose to sell the shares by 80%, and accelerates exercises for the purpose to hold the resulting shares by 50-60%. Both phenomena support

a positive private control premium: valuing the shares higher than the market, an insider is less willing to sell shares at the market price, keeping constant other motives to sell such as liquidity needs and diversification. A weakened incentive to sell slows down option exercises when the purpose is to sell the resulting shares. In contrast, the insider is more likely to exercise an option early with an intention to hold the stock when the voting rights which could help defend the contest serve the equivalent role of a lumpy dividend.

Several additional tests help establish a sharper connection between deviation from normal exercises by CEOs and proxy contests. First, we show that deceleration (acceleration) of exercise-and-sell (exercise-and-hold) is more pronounced before a proxy contest reaches a resolution (in the form of an actual vote, a settlement, or withdrawal by the dissident), and especially before the record date (by which the share ownership is entitled to the voting rights). Equally interestingly, unusually high rates of exercise-and-hold by CEOs mostly stop at the record date, that is, CEOs attempt to acquire shares precisely for the additional voting rights. On the other hand, the unusually low rates of exercise-and-sell last beyond that point but in waning magnitude post record/outcome date, that is, CEOs maintain the option to acquire more voting rights as long as the proxy contest is still looming. The fact that the exercise patterns are closely entwined with the evolution of individual proxy contest events leaves control challenge to be the most plausible explanation for CEOs' deviation from their "normal" option exercises.

The second test further validates the premise that the deviations from normal exercises we uncover are indeed driven by circumstances (i.e., control contests) rather than by unobserved firm or CEO characteristics. We confirm that the qualitative and quantitative nature of the relation between option exercises and proxy contests survives the inclusion of a CEO/firm fixed effect. Previous literature (Malmendier and Tate, 2005a,b) argues that overconfident CEOs are reluctant to exercise-and-sell – a pattern observationally equivalent to their behavior under proxy contests. To distinguish the two causes, we focus on the subsample of "overconfident" CEOs (following the same classification algorithm as in the references herein) to confirm that the rate of exercise-and-sell drops by the same amount during proxy fight seasons as the full sample. While overconfidence may well affect CEOs' propensity to exercise options, what we uncover is clearly a force that is distinct from CEO overconfidence or any other CEO inherent traits.

Last, we conduct a systematic analysis on the 1,497 out-of-the-money option exercises by insiders between 1996 and 2012. Any option model that assumes a common valuation of the underlying security prescribes that out-of-the-money options never be exercised. For this reason, out-of-the-money option exercise by executives has not been empirically analyzed. A substantial proportion of such events involve price spreads that were too large to be justified by transaction cost or anticipated price impact. Instead, the Riggio/Barnes & Noble story turns out to be a common theme among the “out-of-the-money” CEOs: we find that the presence of a proxy contest during the current year triples the probability of out-of-the-money exercises. In fact, the concurrence of a proxy contest is the single most powerful explanatory variable for out-of-the-money exercises among a list of firm and CEO characteristics variables including CEO/firm fixed effects. To the extent that a valuation wedge between the insider and the outside market is a necessary condition for out-of-the-money exercise to occur in a rational model, the extreme form of deviation-from-normal provides a unique identification for the private control premium.

This paper contributes to several strands of literature. First, the paper builds on and extends the literature on the value of corporate control and the value of the voting rights. Several studies have estimated the value of voting rights in US using dual class shares (Lease et al., 1983; Zingales, 1995; Nenova, 2003), controlling block sales (Barclay and Holderness, 1989), security lending (Christoffersen et al., 2007; Aggarwal et al., 2012), and put-call-parity violations (Kalay et al., 2013). International evidence also abounds (Levy, 1983; Zingales, 1994; Dyck and Zingales, 2004; Hauser and Lauterbach, 2004). Our estimates isolates the private value accrued to agents in control that is incremental to the “fair market value” where the latter could contain the value of voting rights to the outside shareholders. That is, rather than identifying the value of control to the marginal traders in the market which tends to be small and may not bear a direct relation to the “private benefits of control,” our method offers a more direct estimate of the latter by extracting their private valuation of the stocks from their option exercises. Calibrated to option valuation models, the abnormal patterns (from decelerating the exercise-and-sell of in-the-money options to exercising out-of-the-money options) we uncover suggest that insiders value the shares at 3.4-20% above the market value. Our estimates of the value of voting rights to the insiders is greater than what has been shown in the literature using the U.S. data.

Second, this study expands our understanding of the motives underlying option exercises by executives. A full understanding of the mechanism would be crucial in designing efficient incentive schemes given the importance of options grants in executive compensation.¹ Prior work has explored the diversification motive based on the utility theory (e.g., earlier work by Huddart and Lang (1996, 2003), and more recent work by Carpenter et al. (2010)), behavioral factors such as CEO overconfidence (Heath et al., 1999; Malmendier and Tate, 2005a,b), and inside information about future stock returns (Carpenter and Remmers, 2001; Bartov and Mohanram, 2004; Cicero, 2009). Klein and Maug (2011) conducted a thorough empirical study nesting all these hypotheses. However, none of these earlier studies has considered the impact of private benefits of control either theoretically or empirically, though option compensation is meant to be an important mechanism to align the executives' interest with that of the shareholders. Not only we document distinct option exercise patterns that are directly attributable to proxy contests, we are also able to justify certain exercising behaviors that were deemed as irrational by previous studies (e.g., Poteshman and Serbin, 2003).

Third, the paper contributes to the corporate governance literature in general and in particular the sub-literature on shareholder activism in the form of proxy contests. Our study indicates that proxy contests exerts real pressure on the insiders, confirming the findings from earlier studies (e.g., Fos, 2013; Fos and Tsoutsoura, 2013). Moreover, the private control premium implied in the distortion of insider option exercise suggests that dissidents indeed target companies with meaningful value of private benefits of control. As such, our study supports the significant role of aggressive shareholder activism in market-based corporate governance.

¹Data from Execucomp indicate that option grants accounted for about half of the total CEO compensation in the 1990s and early 2000s. The percentage decreased in mid-2000s but continued to be significant at about one-quarter by 2011. Also see Frydman and Jenter (2010) for a review on CEO compensation.

2. Hypotheses Development

2.1. General Setup

We start with the following standard setting and notation. A CEO receives packages of American call options on the firm's stock as a form of compensation. S_t is stock price at time t , T is the expiration date of the option, X is the exercise price of the option, and $C(S_t, T - t, X)$ is the value of the option. Under these assumptions and perfect markets, it is not profitable to exercise the option prior to maturity and the value of the option is equal to the value of the European call option with the same parameters if the stock pays no dividends.

Under more realistic assumptions fitted to the CEO (or any insider who benefits from control of the firm by the incumbent board and management) setting, CEOs should exercise options before expiration when they are sufficiently in the money (Detemple and Sundaresan, 1999; Hall and Murphy, 2002; Sircar and Xiong, 2007). Conditions contributing to the early exercise include CEOs' lack of diversification due to concentrated exposure in their own companies, and the fact that they can only reduce exposure by selling shares resulting from exercise, rather than selling options directly. We take the optimal exercise without private control premium as given.

We now introduce proxy contests and isolate its incremental impact on option exercises. In a proxy contest, dissident shareholders challenge the control by incumbents by seeking the right to vote other shareholders' shares in favor of the directors nominated by the dissident group. When the control of a firm is under contest, there might be a date τ by which an extra share of ownership brings the CEO additional control premium in the amount of b . One can think about the following situation: A CEO derives private benefit of control from staying in her position that is equivalent to a pecuniary benefit of B . If her control is not challenged, she can continue to receive the benefit without distorting her option exercise and share holding. However, when her control is under contest and the outcome depends on shareholder votes, then additional shares held could increase the probability that the incumbents win the proxy contest by λ . Under such parameterization b is just proportional to λB . The date τ could correspond to the record date for shareholder voting, but is not necessarily limited to a particular fixed date. This is because a proxy

contest often lasts beyond the first-set meeting date (Kalay et al., 2013); and indirectly, a proxy contest event is an explicit manifestation of but not the only cause of the challenges to incumbent’s control.

Under this scenario, the insider’s valuation of the stock is higher than the market price (which is the value of the stock to the marginal trader) by an amount of b . Note that stock price S_t may already embed a control premium as perceived by outside blockholders (Barclay and Holderness, 1989; Dyck and Zingales, 2004) or to the marginal trader in the market for whom the value of votes may also increase when control is under contest (Kalay et al., 2013; Aggarwal et al., 2012). In contrast to the previous studies, we focus on the incremental control premium accrued to the incumbent relative to the outsiders. This becomes our Condition 1.

Condition 1. The CEO’s valuation of the stock is $S_t^* = S_t + b$, where $b > 0$ is the per-share value the insider assigns as the private benefits of control.

Moreover, there is a probability $1 \geq \eta > 0$ that the insider is restricted from trading shares of the company in the open market. Such restrictions are quite common for insiders who are usually prohibited from trading in the open market during informationally sensitive periods, such as announcement of earnings and events of material importance (such as M&As). Even outside these restricted windows, insiders bear potential legal risk if their buying or selling coincides with large imminent stock price movements and if the transactions were not pre-committed. Given that proxy contests are highly informationally sensitive events, it is reasonable to assume that insiders face additional restrictions in trading compared to “peace” times. We model the restriction as being prohibited from trading with a positive probability.

In contrast, exercise of vested options by insiders incurs little restrictions. The most important insider trading rule – Section 16 of the Securities Exchange Act of 1934 (and its most recent important amendment under the Sarbanes-Oxley Act of 2002) exempt transactions that involves a grant or award under quite lenient conditions. Specifically, option exercises by insiders are exempt from the rule as long as the exercise is not accompanied by an imminent sale of shares. The basic rationale behind the exemption

is that the purchasing of shares due to option exercise is made from the corporation (as opposed to the shareholding public). The case law and SEC rule recognize that there is no insider trading violation when the counterparty (here, the corporation) has equal knowledge. This becomes our Condition 2.

Condition 2. The insider is restricted from trading (including purchasing) shares of the stock in the open market around date τ with a positive probability η . However, the insider is not restricted from exercising her vested options during the same time.

Based on the setup, we make predictions regarding option exercises that serve as hypotheses for testing. On the surface, the behavior might be construed as a form of “takeover defense” in that the CEO takes an action in order to maintain control. Then it begs the question whether manipulating option exercises is as cost effective as popular takeover defenses such as poison pills. There is a subtle but substantive difference between the two: while they can deter a change in majority control, takeover defenses are not necessarily effective in fending off aggressive shareholder activism often aiming at minority board representation or just influence.² For example, a poison pill effectively puts a limit on a dissidents stock ownership, but does not increase the votes supporting an incumbent. Similarly, while a staggered board structure can prevent dissidents from seeking board control, it cannot shield a particular incumbent from being voted out. This is why strategic option exercises by insiders enhance incumbent voting power in a way not accomplishable by the common takeover defenses.

2.2. Hypotheses about early exercises

Private benefits of control affect a CEO’s incentive to exercise options prior to maturity. We consider two types of early exercises: an early exercise with an intention to sell the resulting shares and an early exercise with an intention to hold the resulting shares.

²Most of proxy contests are not control contests but rather “short slate” contests. In a short slate contest dissident shareholders nominate an alternative slate of directors that competes with the incumbent slate for board seats. It is called “short” if the number of dissident nominees is smaller than the number of seats required to control the board.

We relegate the formal proofs to Appendix A, but explain the intuitions following each hypothesis.

Hypothesis 1. *When control is under contest, a CEO who enjoys private benefits of control is less likely to exercise an option and sell the shares.*

The main intuition underlying Hypothesis 1 is that a CEO will find it not profitable to sell the shares at the market price if his personal valuation of the stock exceeds the market price.

Hypothesis 2. *A CEO who enjoys private benefits of control is more likely to exercise an option with an intention to hold the stock prior to the date $\tau < T$ (when voting rights are needed) with an intention to hold the stock if $\tau < T$ (the maturity date).*

Hypothesis 2 suggests that if a CEO is expected to receive a payoff before expiration date in form of voting rights that help maintaining private benefits of control, an early exercise of the option with the purpose to hold the stock becomes more likely. For example, consider a case of a continuous dividend. If a stock pays a continuous dividend, it is optimal to exercise a call option early if the stock price exceeds a threshold. Condition 1 implies that the insider's valuation of the stock is higher around proxy contests, therefore from the insider's perspective the stock value will be more likely to exceed the threshold. When the stock does not pay a dividend, the voting rights play a similar role as dividends. By both forces, proxy contests can have an accelerating impact on exercise-and-hold by the CEO.

2.3. Hypotheses about out-of-the-money exercises

We next consider the unusual case of an out-of-the-money exercise because this represents unambiguous irrational behavior under any conventional model that rules out trading frictions and private valuation. As we described in the example in the Introduction, an out-of-the-money exercise may happen when there is a wedge between the valuation to the insider and that to the investor public.

Hypothesis 3. *A CEO might exercise a call option out-of-the-money when control is under contest. Moreover, such exercise should happen either at option maturity T or right before the date τ (when voting rights are needed).*

A CEO can find it profitable to exercise a call option out-of-the-money if her private valuation exceeds the market stock price (Condition 1) and if she faces restrictions on purchasing shares in the open market (Condition 2). Condition 1 implies that whereas paying the exercise price in excess of the market price is not profitable for market participants (this is why the option is defined as out-of-the-money), the options may well be in-the-money relative to the insider’s private valuation. Condition 2 implies that in some states of the world the insider is not able to purchase shares in the open market hence exercising the options is the only way to obtain shares. In the absence of this condition, the CEO would always prefer to purchase shares in the open market, avoiding paying the exercise price that exceeds the market price.

We next consider a situation when a stock pays a discrete dividend prior to the maturity date of the option. We show that if a stock pays a dividend, it makes an out-of-the-money exercise even more likely in the presence of a proxy contest.

Hypothesis 4. *The CEO is more likely to exercise a call option out-of-the-money prior to maturity if the dividend record date is prior to the maturity date of the option.*

If the difference between the CEO’s own valuation and the market price of the stock is sufficiently large (Condition 1), the option may well be in-the-money relative to the insider’s private valuation. In this case the CEO will exercise the option if the dividend exceeds the option’s time value. Please note that Condition 2 is necessary because otherwise the CEO would instead purchase shares at the market price.

3. Option Exercises and Proxy Contests: Empirical Evidence

This section provides empirical evidence on distortions in option exercises by CEOs in firms under proxy contests. The main analysis is conducted at the option package-month level to examine how proxy contests affect CEO’s propensity to exercise their vested options, either to sell or to hold the resulting shares.

3.1. Data overview

Our analyses build on four main data sources. First, information about CEO options and their exercises comes from the Thomson Reuters Insider Filings Data (“TIF” henceforth),

accessible through WRDS. The data source captures all U.S. insider trading activities as reported on Forms 3, 4, 5, and 144.³ The coverage of the TIF database restricts our sample to starting from 1996. Form 4 is the most important document for our purpose because it contains information on both stock (or non-derivative) transactions and that on derivative securities including options.⁴ When options are exercised, filers must report the type of option involved, number of shares involved, strike price (how much it costs the insider to exercise each option), date the options vest, date the options expire, and holdings for that particular series of options.

For our research purpose, we focus exclusively on CEOs, and the unit for analysis is an option package belonging to a CEO at a given month between vesting and expiration. The construction of the data mostly follows the methods in Klein and Maug (2011). An option package is defined as options awarded to an CEO with the same vesting and expiration dates. For all 14,014 option packages vested between 1995 and early 2013, we track their exercise status from the vesting date (which is the starting date for our hazard analysis) to the date of exercise, expiration, or the end of sample (January 2013). The end date of a package is either the first date when at least three-quarters of the options in the package have been exercised (which is the exit date in the hazard analysis) or the date of expiration or the last month of our sample period if more than a quarter remain unexercised (which is the censoring date in hazard analysis). This results in 997,034 observations. The average in-sample duration of an option package is about 71 months.

We analyze two key action variables and relate them to proxy contests as well as firm/CEO characteristics. We first define *Exercise* as an exercise of at least a quarter of an option package. The one-quarter filter follows the default parameter used in Klein and Maug (2011), the exact magnitude is non-crucial to the results. The first action variable is *Exercise&sell*, defined as an exercise followed by a sale of shares for at least 25% of that

³Form 3 records initial statement of beneficial ownership for all officers. Form 4 reports changes in an insider's ownership position due to purchase, sale, option grant/exercise, gift or any other transactions. Form 5 is the annual statement of changes in beneficial ownership which includes exempt transactions not required on a Form 4. Finally, Form 144 is registration of proposed transactions, or an insider's declaration of intention to sell restricted stock.

⁴We include the following derivative securities as "options:" Employee stock option (TIF coding: EMPO), non-qualified stock option (NONQ), warrants (WT), call options (CALL), rights (RIGHTS), incentive stock options (ISO), directors' stock options (DIRO), and convertible preferred (CVP).

amount within the ensuing three months. Again, the exact magnitude of the 25% filter for the “sale” classification is not crucial for the results. The second variable, *Exercise&hold* is an exercise that is not followed by a sale of stocks. Unconditionally, the probability of exercise-and-sell is 0.46%, and that of exercise-and-hold is 0.28%, both at the package-month level. These figures are on par with those in Cicero (2009).

Second, information about the key independent variable of interest, proxy contests, was hand-collected from SEC filings PREC14C (a preliminary proxy statement in connection with contested solicitations) and DEFC14A (a definitive proxy statement in connection with contested solicitations) from the EDGAR. This piece of data is updated from Fos (2013) which contains more details about the institutional background about proxy contests as well as the detailed construction of the event variables. There are 1,029 announced proxy contests between 1996 and 2012, with annual incidences range from 33 (in 1996) to 89 (in 2008). We construct a dummy variable *Contest* to be one if there was a proxy contest announcement during the current or past 12 months. At monthly frequency, the sample average of *Contest* is 0.42%.

Among the dissidents, a slight majority (51%) are hedge funds. The next biggest players are corporations (19%) and individual shareholders (16%). Fos (2013) documents that whereas in the 1980s dissident shareholders more often relied on hostile tender offers, during the last decade they have resorted more to proxy contests in order to exert control or influence. The widespread adoption of anti-takeover provisions and the enactment of state-level antitakeover laws sheltering management have increased the cost of a hostile tender offer and have therefore contributed to the decrease in the frequency of hostile tender offers (Karpoff and Malatesta, 1989; Bertrand and Mullainathan, 2003; Cremers and Ferrell, 2010). In contrast, the 1992 proxy reform, which allowed independent shareholders to more freely engage in communication without a heightened legal risk, is an important contributor for the increasing frequency of proxy contests (Sharara and Hoke-Witherspoon, 1993; Bradley et al., 2010; Fos, 2013).

Third, the transactions from TIF are matched to the CRSP/Compustat merged databases for standard stock and company level information at the firm-year or firm-month level. The following variables are imputed at the monthly level with the corresponding values recorded at the previous year-end or during the previous year: *Market cap*, the

market capitalization of a company (which enters regressions in log values); *Book/market*, the book to market ratio of equity; *Growth*, the average annual sales growth for the last three years (or for as many years as available during the three-year period); *Idiosyncratic vol* is the stock’s annualized residual return from a regression of daily stock returns on Fama-French three factors; *Dividend yld* is the ratio of common dividends to market capitalization; and *Illiquidity* is the Amihud (2002) illiquidity measure, or the yearly average of the daily square root of $(Price \times Volume)/|Return|$. The following variable is recorded at the monthly level: *Stock ret* is the twelve-month stock return on the monthly rolling window using data from the past 12 months.

Finally, we match our sample to the Execucomp database to retrieve and construct CEO characteristics, compensation, and wealth, some of which serve as proxies for their risk aversion and incentives to diversify. The granular information comes at the cost of losing about three-quarters of the sample. More specifically, we construct the following variables at the annual frequency (and impute to the monthly frequency): *CEO tot wealth* is the proxy for total wealth of CEO estimated from previous years’ compensation covered by the Execucomp using the procedure pioneered by Dittmann and Maug (2007); *% CEO wealth in firm* is the percentage of total wealth that is in the form of unsold shares and unexercised options (including both vested and unvested); *CEO age* is the age of the CEO. Finally, *% Own top 5* is the percentage of outstanding shares held by the top five executives. The following variables are constructed at the monthly level: *Earnings month* is a dummy variable equal to one if the firm announces quarterly earnings during the month. Corporate insiders are restricted to trade stocks during informationally sensitive time windows (the “blackout period”), of which earnings announcement is a premier example. *New grant* is a dummy variable equal to one if the CEO receives new option or stock grants in the month. A CEO who targets a particular level of company exposure should be motivated to exercise and sell some vested options when they receive new grants (which are usually not vested). The last two variables are identified by Klein and Maug (2011) as being important determinants for CEO option exercises.

Definitions of the main variables are listed in Appendix B. The summary statistics for option, firm and CEO variables at the option package-month level (the unit for most regression analyses) are reported in Table 1. The table encompasses two panels

corresponding to the CRSP/Compustat merged sample and the Execucomp sample as our main analyses will be conducted separately on the two samples with the trade-off between sample coverage and additional CEO information.

[Insert Table 1 here]

3.2. Proxy contests as a determinants of CEO option exercises

The goal of this section is to study how proxy contests affect CEO option exercise policies in general. Section 2 predicts that proxy contests should have a negative impact on the probability of early exercise with an intention to sell the stock. This is because if the control premium is positive, the insider values the stock above its market price and therefore is less likely to sell the stock at market price. On the other hand, exercise-and-hold is usually not predicted by models for insider option exercises for diversification/liquidity motives; instead it is potentially driven by other motives such as taxation (Cicero, 2009). We show that enhancing voting rights constitute a motive to exercise-and-hold, which has not been analyzed before.

3.2.1. Hazard analysis with competing risk

Given the nature of the data structure (records of option packages over their “life time”) and the research question (what motivate CEOs to exercise their options before maturity), the appropriate estimation method is a hazard analysis, for which the Cox proportional hazards model is among the most popular in finance research (e.g., Klein and Maug, 2011) due to its flexibility on the base hazard functions. We make two major changes from Klein and Maug (2011) framework. First, we incorporate proxy contests as an explanatory variable of key interest. Second, we explicitly differentiate exercise-and-sell from exercise-and-hold because they are driven by different motives when control is at stake. As a result, each option package is subject to two types of “risk” of “exiting” before expiration: exercise for the purpose to sell the stocks and exercise in order to hold the shares. Moreover, taking one exit “impedes” the other. That is, the two exit strategies are mutually exclusive but are not necessarily independent from each other (and if they are dependent, the sign of their dependence is *a priori* unclear). The right model for such a situation is the Cox proportional hazards model with competing risks that are “unordered failure types” developed by Fine and Gray (1999).

Using the language from the Fine and Gray (1999) model, we have $K = 2$ causes of exit, where $k = \{Exercise\&sell(E\&S), Exercise\&hold(E\&H)\}$. The “cause-specific” hazard function $h_{E\&S}(t)$ is:

$$h_{E\&S}(X, t) = \lim_{\Delta \rightarrow 0} \left\{ \frac{\Pr(E\&S \text{ during } (t, t + \Delta) | X, \text{No } E\&S \text{ till } t)}{\Delta} \right\}. \quad (1)$$

The competing risk model acknowledges that there is no longer a direct relationship between cause-specific (e.g., exercise-and-sell) hazard rate and the probability of “survival” (i.e., no exit) due to the possibility of an exit due to the other risk (i.e., exercise-and-hold). The Fine and Gray model resorts to a “subdistribution hazards” which is the instantaneous risk of exiting to exercise-and-sell given that the option package has not been exercised for the purpose of holding the resulting shares. The function $\lambda(t)$ can be expressed as:

$$\lambda_{E\&S}(X, t) = \lim_{\Delta \rightarrow 0} \left\{ \frac{\Pr_k(E\&S \text{ during } (t, t + \Delta) | X, (No \text{ Exercise till } t) \cup (E\&H \text{ before } t))}{\Delta} \right\}. \quad (2)$$

The key difference between (1) and (2) is that when a CEO exercises an option package and holds the resulting shares, the standard hazard model analyzing exercise-and-sell would record the observation as being censored. In contrast, the competing risk model keeps the observation in the “risk set” and treats it as being censored only at the end of the sample.

Most relevantly, the coefficients on X is related to the subdistribution hazards by the following relation:

$$\ln \frac{\lambda_{i,E\&S}}{\lambda_{i',E\&S}} = (X_i - X_{i'}) \beta, \quad (3)$$

for any two observations i and i' . This leads to the following interpretation of coefficient β^j on the j -th element in $k \times 1$ vector $X = [X^1, \dots, X^j, \dots, X^k]'$:

$$\partial \ln \left(\frac{\Pr(E\&S_{i,t} = 1 | X^{-j}, X^j + \Delta)}{\Pr(E\&S_{i,t} = 1 | X^{-j}, X_j)} \right) \partial \Delta = \beta^j, \quad (4)$$

. That is, β^j measures the effect of increasing the j -th covariate by an infinitesimal amount on the log ratio of subdistribution hazard rates associated with the covariates after and before the perturbation.

Given that neither the direction nor the extent of dependence between *Exercise&sell* and *Exercise&hold* is ex ante clear, the relation between *Exercise&sell* and the explanatory variables is not informative about the latter’s relation to *Exercise&hold*. We thus estimate the relation between the subdistribution hazard rates and covariates for *Exercise&sell* as the main risk and *Exercise&hold* as competing risk; and then reverse the order. The parameters associated with the subdistribution hazards of exercise-and-hold are analogous those described in equations (1) to (4) for exercise-and-sell. To facilitate interpretation, we report in tables the exponentiated coefficients e^{β_j} , which are the approximate multiples of the odds ratio $Pr(E\&S)/[1 - Pr(E\&S)]$ associated with a one-unit change in the covariate X^j .

There is one last technical issue. *Exercise* is defined as an exercise of at least 25% of the shares in an option package. Therefore, a package could incur up to four exercises in its life. Because of the “repeated risks,” we let an option package “start anew” right after a major but partial exercise until there are fewer than 25% left relative to the original grant.

3.2.2. Determinants of exercise-and-sell and exercise-and-hold as competing risks

Results from the competing risk model are reported in Table 2. We conduct regressions on three decreasingly nested samples: (1) the full universe of CRSP/Compustat public companies that award CEOs options; (2) A sub-sample of (1) with non-missing firm characteristic variables; (3) A sub-sample of (2) that are covered by the Execucomp database so as to have CEO personal and wealth information. All regressions include yearly dummies and report exponentiated coefficients or odds ratios. The neutral value of an odds ratio is one, which indicates that the variation in the covariate does not change the rate at which options are exercised. Due to the small value of exercise probabilities at the monthly frequency, odds ratios are indistinguishable from the multiples on instantaneous probabilities. The t-statistics are associated with the difference between original (unexponentiated) coefficients and zero, and are indicative of whether the reported odds ratios are significantly different from unit. The t-statistics are based on standard errors clustered at the option package level.

[Insert Table 2 here]

The pattern revealed from Table 2 is highly consistent. First and most important, proxy contests significantly deter exercise-and-sell. The coefficients are stable with progressive inclusion of control variables. The presence of a proxy contest during the past 12 months reduces the incidences of exercise-and-sell to about one-fifth (0.16 to 0.23) of the normal level. The log odds ratios (the original coefficients) are significantly different from zero at the 1% level for the CRSP/Compustat samples and at the 10% level for the much smaller Execucomp sample. In contrast, the presence of contests does not prevent CEOs from exercising the options and holding the resulting shares. In fact, the probability to exercise-and-hold increases significantly (at the 5% level) in the full sample, but exhibit no significant change for the Execucomp sample. The combination indicates that CEOs of smaller firms actually accelerate option exercises in order to own more shares; but the effect does not prevail among Execucomp firms which tend to be bigger. The combined results from the exercise-and-sell and exercise-and-hold indicate that proxy contests motivate CEOs to acquire more shares or to maintain the option to do so.

Second, the coefficients on the control variables are mostly consistent with standard theories predicting option exercises, but overall predicts exercise-and-sell more strongly than exercise-and-hold. This is not surprisingly given that the option exercise models implicitly assume that the purpose to exercise is to sell in the absence of transaction frictions. The only major explanation for exercise-and-hold is tax minimization (Cicero, 2009) which is mostly orthogonal to the diversification motives for option exercise. Table 2 shows that variables that indicate high time value of options (*Months to maturity* and *Idio volatility*) are associated with significantly lower incidences of option exercise-and-sell, and much less significantly so for exercise-and-hold. On the other hand, variable that proxies for higher fundamental value (*Stock ret*) predicts significantly more exercises, and also more so for exercise-and-sell. *%CEO firm wealth* is significantly and positive (negatively) related to exercise-and-hold (exercise-and-sell). The relations are exactly opposite the predictions from diversification motives. We should interpret the results as saying that some CEOs desire to accumulate shares in their firms, and such traits are highly persistent.

Finally, *Earnings month* and *New grant* have the expected effects. Due to prevalent blackout periods for insider trading around the earnings announcement window, CEOs reduce their exercise-and-sell during the earnings announcement month by about one

quarter (corresponding to the odds ratio of 0.74-0.76 in columns (2) and (3) in Table 2), and reduction is significant at the 1% level. The earnings month has no effect on exercise-and-hold, presumably because no open-market transaction is involved. New grants prompt CEOs to exercise more (significant at the 1% level), presumably to maintain a target portfolio of unexercised options. The effect on exercise-and-sell is twice as strong as exercise-and-hold. The odds ratio associated with new grants is 15-17 times, raising the exercise probability of 0.44% in a typical month to 7-8% during the month with new grants. Such actions manifest diversification motives in the form of a target level for option holdings.

3.3. Attributing exercise behavior to proxy contests

3.3.1. Option exercises within proxy contest evolution

To form a sharper connection between option exercise patterns and proxy contests, we explore the dynamics of a proxy contest especially two important dates, the record date and the outcome date. Proxy contests typically occur in connection with the companies' annual meeting of stockholders, in which case the record date is the company's official date before which one must be an owner on record in order to participate in the annual meeting and corporate election. In other cases, the manner of fixing a record date is determined by the bylaws of a corporation. The typical time interval between a record date and meeting date is around 50 days. Given that the significance of ownership as actual voting power is more relevant before the record date, we expect the exercise patterns documented in Section 3.2.2 to be more pronounced in the pre-record date period. Kalay et al. (2013) found that record dates may be subject to change. We use the first record date so as to alleviate endogeneity concerns.

The second milestone is the outcome date where we define an outcome to be one following: the date of an actual voting (about 45% of the events persist to a voting), the date of a settlement between the dissidents and incumbents (about 20% of the events), the date of withdrawal by the dissidents (about 15%), and other (about 20%).⁵ The outcome date signifies the resolution of the contest for the season, though it does not necessarily

⁵Examples of 'other' outcomes are proxy contests that are terminated when firms are delisted, taken over, or sued by dissident shareholders.

bring the control contest to an end. In our sample, 20% of the event companies were repeated proxy contest targets; moreover, dissidents may well continue their endeavor to seek board representation through non-contested routes after the initial confrontation.

We repeat the analyses in Table 2 with the same firm-level controls except replacing the single variable *Contest* with a pair of disjoint variables: *Before record (outcome) date* and *After record (outcome) date*. In table 3, we report only the coefficients on these new variables because the coefficients on the control variables are nearly identical to those in Table 2 and do not add insights.

[Insert Table 3 here]

Results in Table 3 are highly informative. Indeed, the deceleration (acceleration) of exercise-and-sell (exercise-and-hold) is more pronounced before a proxy contest reaches a resolution, and especially before the record date where the differences in the before-and-after exercise behavior is significant for both exercise-and-sell and exercise-and-hold (see the “Test of equality” which tests the equality of the coefficients associated with *Before record (outcome) date* and *After record (outcome) date*). Equally interestingly, unusually high rates of exercise-and-hold by CEOs mostly stop at the record date, consistent with the needs to have shares by that time in order to boost actual voting power. Similarly, exercise-and-sell virtually comes to a halt before the record date (as indicated by the coefficient of zero); however, the unusually low rates of exercise-and-sell last beyond that point though in less extreme contrast with the normal rate of exercise. It thus appears that exercise-and-sell and exercise-and-hold serve somewhat different purposes: while the latter is about acquiring actual voting rights, the former is about maintaining the option to do so. As long as the proxy contest is still looming, the CEOs are on the defensive mode to avoid selling shares from option exercises. The fact that the exercise patterns are closely entwined with the evolvement of individual proxy contest events renders control contest to be the most plausible explanation for the deviation from CEOs’ “normal” option exercises.

3.3.2. CEO fixed effects and CEO overconfidence

Specification in Table 2 pool cross-sectional and time-series relations. A main concern that impedes a causality interpretation is that there could be common causes for both

abnormal exercises and proxy contests. One possibility for such a common cause is CEO-specific characteristics such as overconfidence. In fact, overconfidence has been a leading explanation for CEOs' reluctance in reducing their personal exposure to company-specific risk. Moreover, a popular CEO overconfidence measure (Malmendier and Tate, 2005a) is constructed based on a lower-than-normal level of exercise-and-sell, an outcome observationally equivalent to our finding. The same literature documents that CEO overconfidence leads to suboptimal capital structure and over investment, whereas the latter could also attract shareholder activism (Brav, Jiang, and Kim, 2010; Fos, 2013).

To demonstrate that the force of proxy contest is distinct from CEO overconfidence in affecting option exercises, we augment the regressions with CEO fixed effects. Unfortunately, the existent competing risk models do not deliver consistent estimates when fixed effects are incorporated. We thus resort to the conditional logit model with fixed effects which identifies how the variance in characteristics affect different outcomes within the same fixed-effect cohort. In our content, the method addresses the question whether the same CEO is less (or more) likely to exercise-and-sell (or exercise-and-hold) right after a proxy contest announcement, compared to the "peace" time of her own reign. By design, only observations associated with CEOs that ever experience a proxy contest and exercises options at least once are included in the analysis.

The logit model is different from the hazard model with competing risk in the following different ways. First, we treat each firm-month as a parallel observation without incorporating the information of its conditional "survival." Second, in the logit model, all exercise-and-buy (exercise-and-sell) observations are excluded from the analysis for exercise-and-sell (exercise-and-buy), rather than treated as competing risk with unknown correlations. Needless to say, the hazard model with competing risk is better specified for the situation, but the logit model allows us to identify relations between proxy contests and the propensity to exercise-and-sell (or -hold) from within-CEO variations. Results are reported in Table 4, where reported coefficients are odds ratios (or exponentiated coefficients). To make sure that the results are comparable across specifications, we repeat the analyses in Table 2 using the logit model, and then compare the results from the fixed effect model.

[Insert Table 4 here]

Columns (1)-(2) and (5)-(6) more or less replicate the analyses in columns (2)-(3) and (5)-(6) in Table 2 for the purpose of comparing results from different model specifications so as to make sure that any different inference from the fixed effects models is not driven by the different underlying estimation models. The coefficients on *Contest* where *Exercise&sell* is the dependent variable are highly consistent between the hazard model and the logit model, that is, the presence of a contest reduces the probability of exercise-and-sell to one-fifth of its normal level. Once we incorporate the CEO fixed effects, results in columns (3)-(4) indicate that the effects of a proxy contest, as well as other firm/stock level characteristics, are very close to those from the corresponding sample but without fixed effects. This suggests that the determinants for exercise operate cross-sectionally and within CEO in very similar ways due to the common economic motives. In other words, the relation between option exercises and proxy contests are driven by circumstances, rather by CEO inherent traits.

The only difference is that with CEO fixed effects, *CEO tot wealth* is now significantly positive, suggesting that when a CEO receives more cumulative compensation (recall that the proxy for CEO wealth is the accumulated compensation from the Execucomp database), she also becomes more prone to exercising. This is consistent with the diversification motive. Moreover, *%CEO wealth in firm* loses its significance when analyzed within-CEO, indicating that the same CEO's propensity to exercise is not related to her existing exposure to the firm. Combined with a significantly negative relation between firm-specific exposure and exercise-and-sell in the cross section, we learn that some CEOs desire to maintain and accumulate high exposure in their own companies and this desire is highly persistent. That is, the heterogeneity comes from the cross-section and not from within a CEO.

A more direct test reconciling the effects of proxy contests and overconfidence on CEO option exercises is to analyze the relation between option exercises and proxy contests on a focused sample where CEOs exhibit "overconfidence" as classified by the established measure. We define an "overconfidence" sample to including package-month observations where the options are at least 67% in the money and are at least five years old from the vesting date, following Malmendier and Tate (2005) who classify overconfident CEOs by

a lack of exercises under such parameterized circumstances. We find that this subsample has an average exercise-and-sell rate of 46 basis points, about 20% higher than the full sample average. However, when firms are experiencing proxy contests, the incidence of exercise-and-sell in this sample of old and deeply-in-the-money options goes down to zero.⁶ Therefore, a CEO under contest might appear overconfident in the cross section, however, we are able to show that our key result relating a lack of exercise-and-sell to proxy contests holds within a subsample of potentially overconfident CEOs.

We would like to emphasize that our analysis does not rule out that overconfidence affects CEO option exercise behavior; instead, we establish that the proxy contests are a distinct force that could otherwise leads to observational similar outcomes.

3.4. Out-of-the-money exercises

Motivated by the Riggio/Barnes & Noble story introduced at the beginning of the paper, we conduct a systematic analysis of the 1,497 out-of-the-money option exercises between 1996 and 2012. Any option model that assumes a common valuation of the underlying security prescribes that out-of-the-money options never be exercised because the same shares could be acquired at the fair market price which is lower than the strike price of the options. For this reason, out-of-the-money option exercises by insiders epitomize the valuation wedge between insiders and the outside market. This section analyzes the relation between out-of-the-money exercises and proxy contests. The main analysis is conducted at the firm-year level to uncover the determinants for out-of-the-money excises.

3.4.1. Data on out-of-the-money exercises

The main data source to analyze out-of-the-money exercise remains the Thomson Reuters Insider Filing. To identify out-of-the-money exercise, we do not exclusively rely on the transaction code in TIF where “O” is coded for exercise of out-of-the-money derivative securities defined by the SEC because the coding severely under-classify.⁷ In order to link option exercise with the resulting simultaneous stock purchase we require both a

⁶Because the incidence of exercise-and-sell is zero in the subsample of firm-months facing proxy contests, a hazard or logit analysis is not feasible because proxy contests perfectly predict no exercise-and-sell in sample. An effective in-sample odds ratio is zero—implying the original coefficient to be negative infinite.

⁷We find that most of out-of-money exercise cases were coded into the “other” category which is meant to be a catch-all category.

“Disposition” coding of the options (in Table 2 of Form 4) and an “Acquisition” coding of the stocks (in Table 1 of Form 4), with matched prices and number of shares.⁸ Our baseline definition of out-of-the-money exercise is that the strike price exceeds the daily high price so as to be on the conservative side. The results are robust to using daily close price as the market price, or requiring the price spread to be at least 1% of the market close price.

For the initially identified out-of-the-money exercise cases, we cross-check the strike price recorded in TIF with the original records in Form 4; and the stock price recorded in CRSP with another source such as Yahoo Finance or Bloomberg. We declassify a case if any information source indicates that the exercise was in the money, or if there is a stock split around the time. Moreover, we further require a minimum exercise of 100 shares and the stock price to be below \$200. Using these filters, we uncover 1,497 out-of-the-money option exercises between 1996 and 2012. The firm/CEO variables are defined in the same way as in Section 3.1 except they are now recorded at the firm-year level.

The time series distributions of out-of-the-money option exercises and of proxy contests are plotted in Figure 1. At a first approximation, the two time series processes co-move. For example, local peaks of the annual incidences of out-of-the-money option exercises during 1999 and 2008 coincide with peaks of proxy contests. The correlation between two time series is 35%, indicating a strong concurrence of the two types of events.

[Insert Figure 1 here]

To assess the direct costs insiders incurred in exercising out-of-the-money, we compute the premium which is defined as the difference between the exercise price and the daily high price, scaled by the latter. Whereas the median premium is 13%, the average premium reaches 37%. The interquartile range is 4% to 43%. Thus, the implied average value of private benefits among this sample is economically significant. This result is consistent with a hypothesis that large private benefits of control attracts shareholder activism. Importantly, this estimate is a lower bound on the willingness to pay, hence the value of private benefits of control, for these cases. This is because an insider usually has more cost-effective way to acquire shares, such as buying at the open market or exercising options

⁸This procedure is to avoid misclassification due to coincidence, for example, when a CEO is awarded options while at the same time buy the same amount of stocks at the same price.

that are in-the-money. In those cases the wedge of insider’s private valuation and the stock’s market valuation is not directly observed.

3.4.2. Determinants of out-of-the-money option exercise

We use a variety of specifications to explore the determinants of out-of-the-money option exercises. Two dependent variables capture the intensity of such events in a firm-year. The first, OTM , is a dummy variable for the occurrence of any out-of-the-money option exercises of at least 100 shares, where these events are classified by requiring the exercise price to be higher than the daily high price. We use the logit model for this specification. The second dependent variable, $\#OTM$, is the number of such incidences during the firm-year, which is a non-negative count number. Hence we use the negative binomial model which is suitable for count data with unidentified correlation.

The key independent variable is $Contest$, a dummy variable equal to one if there is an announcement of a proxy contest for the same firm-year. Control variables include firm and CEO characteristics. As in Table 2, we examine the relations using three nested samples with varying coverage by CRSP/Compustat and Compustat. The two by three sorting yields six specifications, results of which are reported in Table 5.

[Insert Table 5 here]

In columns (1) to (3) of Table 5, we report the exponentiated coefficients which represent multiples of “odds ratios” associated with a one-unit change in an independent variable. More specifically, the coefficient on $Contest$ indicates by how much the odds ratio $\Pr(OTM)/[1 - \Pr(OTM)]$ will multiply when there is a proxy contest for the firm in the same year, relative to the odds ratio in a non-contest firm-year. Given that $\Pr(OTM)$ is unconditionally very small (0.4% for the full sample), the odds ratio is virtually indistinguishable from $\Pr(OTM)$. Hence, for simplicity we will just interpret this coefficient as how the probability of out-of-the-money exercise will multiply when the control for the firm is under contest. The results in the first two columns of Table 5 indicate that the probability of out-of-the-money exercise increases by 2.6-2.8 times (i.e., from about 0.4% to 1.1%). The effect is stable over including firm-level controls, and is significant at the 1% level in both specifications. When retreating to the sample covered by Execucomp,

the coefficient on *Contest* becomes even larger to 3.5, and is significant at the 5% level. Overall, proxy contests are positively and significantly associated with the incidences of out-of-the-money option exercises.

Moreover, most firm and CEO characteristics variables do not predict out-of-the-money exercises. This is not surprising as the conventional model would predict no such events regardless of the conditions of the firm and the CEO. Section 2 points out that trading friction could make out-of-the-money (with moderate negative premium) exercises rational if buying shares from the spot market incurs high transaction cost or is restricted due to insider trading rules. Therefore, a priori we expect out-of-the-money exercises to be more likely among less liquid stocks. Somewhat surprisingly, the Amihud illiquidity measure (*Amihud illiq*) is not significant. *Amihud illiq* turns out to be highly correlated (with a correlation coefficient of 0.6) with idiosyncratic volatility (*Idiosyncratic vol*), but *Amihud illiq* remains insignificant even when we exclude *Idiosyncratic vol* from the regression. Therefore, trading restrictions, rather than the conventional transaction cost in buying shares from the stock market, is more likely to be a factor in prompting out-of-the-money exercises.

On the other hand, *Idiosyncratic vol* is significant at the 5% level with an economically meaningful magnitude: An interquartile change in the variable leads to a 1.2-1.7 times increase in the probability of out-of-the-money exercise (imputed from the coefficients reported in columns (2) and (3)). Given that high idiosyncratic volatility indicates a higher need for the CEO to diversify, such a CEO should be discouraged from acquiring more shares (and even more so at an unfavorable price). Another proxy for diversification motive is the proportion of a CEO's wealth that is tied with the firm (*CEO % wealth in firm*). The coefficient on the variable is significantly negative in one (column (6)) out of six specifications. These two facts combined suggest that the diversification motive does not play a clear role in explaining out-of-the-money exercises.

In addition, none of the other CEO characteristics, such as CEO wealth (estimated), CEO age, and total ownership by the top five executives, explain out-of-the-money exercises with any significance. In sum, the presence of a proxy contest seems to be a dominant determinant for out-of-the-money exercises. For the next strongest predictive variable, *Idiosyncratic vol*, it would require a four standard-deviation change to generate

the same effect on the odds ratio as a proxy contest.

The second dependent variable we analyze, $\#OTM$, is the number of incidences of out-of-the-money exercises for the firm-year, which is a non-negative integer number. The appropriate estimation model is the negative binomial model which assumes that the count variable is generated by Poisson processes with dispersed mean arrival rates that are proportional to an exponentiated linear function of the covariates. Columns (4)-(6) of Table 5 report estimates of the negative binomial model. The key coefficient on *Contest*, ranging between 2.49 and 3.40, indicates the magnitude of semi-elasticity, or $\partial \ln(\#OTM) / \partial Contest$. Approximately, the number of out-of-the-money exercises more than double (in the Compustat sample) or even triple (in the Execucomp sample) the normal incidences when proxy contests are looming, all significant at the 1% level. The magnitude of the coefficient is in close synchronicity with that from the logit analysis (columns (1) to (3)). Therefore, we conclude that proxy contests are positively and significantly associated with the number of out-of-the-money option exercises.

In this context, a reverse causality (that is, shareholders are more likely to launch proxy contests when the insiders acquire shares out-of-the-money) is implausible. However, it is possible that some unobserved factors (such as CEO characteristics) could drive both option exercise patterns and the firm's vulnerability to proxy contests. As we discussed in Section 3.3.2, one such characteristics is CEO overconfidence. Though the literature on CEO overconfidence does not predict any out-of-the-money exercise, it is perceivable that a CEO who is overly confident about the future returns of her company's stock would be willing to acquire additional shares at a price that appears unfavorable to outside investors. At the same time, shareholder dissidents target over-investment.

To assess the importance of this hypothesis, we re-estimate the models in columns (1) to (3) of Table 5 except using the conditional logit model with CEO (or firm) fixed effects, based on the presumption commonly adopted by the literature that CEO personal traits (including overconfidence) are person specific and time invariant. Results are reported in Table 6. In column (3) where the Execucomp is in consideration, we apply the CEO fixed effects. In the first two columns data on CEOs are not available for most CRSP/Compustat firms, and therefore we use firm fixed effects to approximate CEO traits. The odds ratios associated with *Contest* are stable across three specifications, and become even

stronger (than those in Panel A) to 4.4-5.5, all significant at the 10% level or better.⁹ We therefore infer from Table 6 that circumstances, rather than unobserved personal (or firm) characteristics, lead to out-of-the-money exercises.

[Insert Table 6 here]

3.4.3. Are out-of-the-money exercises driven by superior information?

We have thus far established a significant and robust relation between proxy contests and the propensity of CEOs to exercise options out-of-the-money where the latter remains a rare event unconditionally (about 0.4% of all firm-years) and conditionally (about 1.2% of firm-years with proxy contests). Needless to say, a majority of the out-of-the-money exercises do have proxy contests in sight, though one can always argue that incumbents may face the threat of a control change for which the actual occurrence of a proxy contest is an informative but incomplete proxy. Hence, the incumbents may resort to out-of-the-money exercise as a defense against control threat that is not directly observed by us.

Though not the focus of this paper, we remain curious for other rational explanations for the seemingly irrational behavior given that this is the first study documenting out-of-the-money option exercises. An alternative explanation is private information. That is, an insider who anticipates the stock price to rise substantially would like to exercise at the lowest possible price (given the future price) for tax reasons. Most (about three-quarters) CEO options are “nonqualified stock options” (as opposed to “incentive stock options”) for tax purposes, that is, an exercise results in a taxable ordinary income for the insider at the time of exercise equal to the difference between the market value of the underlying share and the exercise price. A further increase in the value of the shares that is realized upon an eventual sale could be taxed at a lower rate as capital gains. Hence both the tax rate and the time value of money favor shifting the gain to post-exercise. To the extent that insiders have private and informative information about their own company stocks, they could exercise early—including exercising moderately out-of-the-money (as long as they anticipate a gain at the eventual sale of the stock). Indeed, Cicero (2009) shows that an

⁹If CEO fixed effects are used in the first two columns, restricting the sample to Execucomp coverage, the odds ratios associated with *Contest* are 3.93 and 3.33, comparable to the numbers reported in columns (1) and (2).

average abnormal return of 2-3% follows executive option exercises that are not followed by near-term disposition.

We thus conduct an event-based return analysis where the event date is the date of an out-of-the-money exercise. We trace the underlying stocks from ten days before to ten days after the exercise, and benchmark the buy-and-hold return from day 10 against the market (CRSP value weighted index) returns. Results are shown in Figure 2. The figure shows no directional price movement pre-exercise, but a steady run-up to about 1.7% ten days afterwards. The magnitude is comparable to Cicero's (2009) finding on in-the-money exercises without disposition.

[Insert Figure 2 here]

Such a pattern seems to indicate that insiders are savvy—relative to the market—about the future returns of the stocks of their own companies. It suggests both a significant level of information asymmetry and a grey area in the regulation of insider trading. While the Securities Exchange Act Section 16 and the SEC Rule 10b-5 impose restrictions on when and how a corporate insider may buy and sell shares, compensation-related acquisitions have been largely exempted from the most important rules governing insider trading. Basically insiders' acquisitions of shares by exercising options granted/awarded by the company are exempt as long as there is no accompanying sale of the stocks. Even more critically, option exercise is allowed during a blackout period, provided it is not a “cashless” exercise¹⁰ and the insider does not sell the shares received upon the exercise. Our analysis confirms Cicero's (2009) finding that insiders resort to option exercise to trade on their (positive) private information.¹¹

Back to our main story, it remains to be shown that the motive to combat contests is distinct from the motive to game tax brackets in the context of out-of-the-money exercises.

¹⁰In a cashless exercise, the insider borrows from a stockbroker the money needed to exercise the options and, simultaneously, sells shares to cover all or part of the costs, including the strike price, taxes and broker's commissions. The insider receives the balance in cash or stock.

¹¹A recent case illustrates the nature of such unconventional informed trading by insiders. In January 5, 2010, the CEO of Airgas, Peter McCausaland, exercised stock options to acquire 300,00 shares at \$5.5 and another 150,000 shares at \$8.99 after the company rejected a hostile takeover offer and right before a sweetened offer came by. The transaction resulted in a near-term gain of more than \$16 million, to be taxed as capital gains rather than ordinary income. He withstood a legal challenge because the current case law and SEC rule recognize that there is no insider trading violation when the counterparty has equal knowledge. Here the counterparty is the firm.

To validate this, we conduct an additional event study which restricts to the sample of out-of-the-money exercises during the firm-years with proxy contexts. The result is plotted in Panel B of Figure 2. Though the pattern is noisy due to a very small sample, there is no evidence for a positive drift post exercise, indicating that superior information about future stock returns is not present in the out-of-the-money exercises when in confrontation with dissidents.

4. Inferring Private Control Premium from Distortions in Option Exercises

The previous sections demonstrated robust patterns of option exercise anomalies when proxy contests are in sight. A natural question follows as how large the private control premium would have to be in order to generate the distortions reported in this study. In this section we structurally calibrate CEOs' private valuation of the stocks based on the observed behavior.

4.1. Calibrating private valuation from deceleration of exercise-and-sell

Data indicated that the presence of a proxy contest is associated with a reduction in the annual rate of exercise-and-sell from a normal level of 5.3% to close to zero (0.8%). The Hypothesis 1 discussed in Section 2.2 indicates that a deceleration in of exercise-&-sell could be generated by a valuation wedge between the insider and the market place.

To calibrate the implied parameter b (the incremental private valuation), we apply the “random exercise” approach borrowed from Carpenter (1998) and Detemple and Sundaresan (1999).¹² The intuition of the procedure is as follows: The probability of an early exercise by an insider is typically greater than zero in the absence of a proxy contest. We take it as given and calculate the value of a call option assuming that it is “randomly” exercised at such a rate. The presumed “exogenous” exercise rate may well reflect an insider’s endogenous decision; in fact, it is better perceived as a reduced-form proxy for all motives that trigger early exercise (including, for example, the desire for liquidity, and voluntary or involuntary employment termination) as long as the motives or restrictions are applicable to insiders but not to the unrestricted option holders in the market place.

¹²Because these models implicitly assume that insiders exercise options for the sole purpose to sell, we do not have a structural procedure to infer private control premium from exercise-and-hold.

Obviously, the value of the call option that is randomly exercised is lower than that under an optimal exercise policy of an unrestricted option holder. The reduced value becomes our starting point as it is a best approximation of the value of the non-tradeable and not fully portable options to an ill-diversified insider.

Consider a call option with the following characteristics: the value of the underlying stock is \$100, the annual volatility is 50%, the annual risk-free rate is 5%, time-to-maturity is four years, and the option is currently 50% in the money in proportion to the current stock price. These parameters are set to reflect the conditions of a typical option package in our sample. The value of the option is calculated using a binomial model that takes into account the exogenous exercise rate of 8.2%—the average annual rate of exercise-and-sell for the subsample of option packages with moneyness between 40% and 60% and without proxy contests. The value of the option under such conditions is \$62.7.

Next we consider that the presence of a proxy contest stops exercise-and-sell – the empirical frequency of exercise-and-sell is zero for options option packages with moneyness between 40% and 60% and with proxy contests. The drop in the “random” exercise rate leads to an increase in the value of the option to \$65.8. To generate a gain of \$3.1 in the option value under the parameterization, the required equivalent incremental stock price would be \$3.43, or 3.43% of the underlying stock price. Therefore, the proxy contest impacts in a way that is equivalent to an increment of 3.43% of the stock value added to the insider’s private valuation.

It is worth noting that the estimates for the incremental stock valuation is a lower-bound value because the best an insider can do is to stop exercise-and-sell – but she cannot reduce the rate of exercise to lower than zero. For an insider who completely stops exercise-and-sell during the proxy contest season (which is true in data for most CEOs), she is likely taking a corner solution which censors the incremental stock price estimate.

4.2. Inferring private control premium from out-of-the-money exercises

The inferred private control premium from exercise-and-sell deceleration is modest because it is probably the least costly way for the CEO to defend a proxy contest. On the other hand, exercising options out-of-the-money is probably the most costly (among all distortions to option exercises). Therefore, we expect the value premium implied by the

latter to be higher.

To form an estimate, we adopt the same regressions as in Table 5 except changing the dependent variable to *Premium*, the negative of the out-of-the-money exercise premium, that is, $(\text{Strike price} - \text{Daily high price})/\text{Daily high price}$, averaged over all out-of-the-money exercise incidences in the firm-year; and is recorded as zero if there is no such incidence. The tobit model is adopted for the last specification. Results reported in Table 7 indicate that the premium increases by 23-26 percentage points when a proxy contest takes place. The effect is stable over including firm-level and executive-level controls, and is significant at the 5% (10%) level in the first two (last one) specifications. Overall, proxy contests are positively and significantly associated with the out-of-the-money exercise premium, suggesting a sizable private control premium among the cases where insiders resort to this costly way for voting rights.

[Insert Table 7 here]

5. Conclusion

This study explores how CEOs' (and insiders') private benefits of control are reflected in their option exercise behavior. We document two salient patterns. First, we show that CEOs are significantly less (more) likely to exercise options in order to sell (hold) the resulting shares when a proxy contest is looming. Second, the presence of a proxy contest triples the probability that an insider exercises call options out-of-the money, a strategy deemed unambiguously irrational under the conventional models without control premium. These findings are consistent with the hypothesis that CEOs' valuation of their stocks exceed that of the market price by the amount of their private control premium. When such benefits from control are at risk, combined with restrictions on trading in stocks by insiders, CEOs distort their option exercises in order to boost their voting power.

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Appendix A. Proofs for Hypotheses Development

Assume the following standard setting and notation: S_t is stock price at time t , T is the expiration date of an American call option, X is the exercise price of the option, and $C(S_t, T - t, X)$ is the value of option. The stock pays no dividends. The two Conditions are the same as stated in Section 2.1.

We first show formally how the private benefits of control affect an insider's incentive to exercise in-the-money options prior to maturity. We consider two types of early exercises: an early exercise with an intention to sell the stock and an early exercise with an intention to hold the stock.

Proposition 1. *If the insider's personal valuation (S_t^*) is higher than the market price of the stock (S_t), the insider is less likely to exercise an option in order to sell the stock.*

Proof. If the insider holds the stock, his personal valuation of the stock is higher than the market price, $S_t^* > S_t$. Therefore, the insider finds selling the stock not profitable. \square

Proposition 1 leads to Hypothesis 1.

On the other hand, the proxy-contest record date might trigger an early exercise of a call option, and so does the dividend record date. Below we provide two that can facilitate early exercises of call options for the purpose of holding the resulting shares.

Proposition 2. *Under Condition 1, the insider is more likely exercise an option prior to maturity with an intention to hold the stock if the stock pays a constant dividend yield $q_d > 0$, compared to the situation where the private control premium is zero ($b = 0$).*

Proof. When a stock pays a constant dividend yield, an early exercise takes place if stock price exceeds a threshold. A positive private benefit ($b > 0$) has a positive impact on the insider's valuation and therefore makes an early exercise more likely. \square

Proposition 3. *Under Conditions 1 and 2, the insider is more likely to exercise an option prior to maturity with an intention to hold the stock, compared to the situation where $b = 0$.*

Proof. Holding the stock delivers a convenient yield $q_c > 0$ because it reduces the potential constraint the insider faces when open market purchases are prohibited. The effect of the convenient yield q_c on the early exercise policy is similar the effect of the dividend yield. \square

Propositions 2 and 3 lead to Hypothesis 2.

We next discuss the conditions under which an insider exercises an option out-of-the-money.

Proposition 4. *If Conditions 1 and 2 are satisfied, the insider might exercise a call option out-of-the-money at maturity. The insider might also exercise a call option out-of-the-money prior to maturity if date τ is before the maturity date of the option ($\tau < T$), and the insider assigns a positive value (from voting rights) to holding the shares on date τ (e.g., the proxy contest record date).*

Proof. If the insider exercises a call option at maturity, his payoff is $S_T^* - X > S_T - X$ (Condition 1). If b is sufficiently large, $S_T^* - X > 0 > S_T - X$. That is, the insider can find it profitable to exercise a call option out-of-the-money. Condition 2 is necessary because if $S_T - X < 0$, the insider prefers to purchase shares in the open market at cost S_T instead of paying the exercise price X .

Let G be the value the insider assigns to holding a share of the stock on date τ , the value G is related to the private benefits of control b because the voting rights from holding the shares are helpful to rectify the control. The insider will exercise a call option out-of-the-money (i.e., $S_\tau - X < 0$) if $S_{\tau+}^* + G - X > C(S_{\tau+}^*, T - \tau +, X)$. Therefore, an out-of-the-money exercise is possible for a sufficiently high G . Because a call option's delta is less than unit, the effect of b on $S_{\tau+}^*$ is larger than its effect on $C(S_{\tau+}^*, T - \tau +, X)$, making early exercise more likely. Again Condition 2 is necessary because the insider would otherwise prefer to purchase shares in the open market at cost $S_{\tau+}$ instead of paying the exercise price X . \square

Propositions 4 lead to Hypothesis 3. Last, we show that if a stock pays a dividend, it makes an out-of-the-money exercise even more likely in the presence of a proxy contest.

Proposition 5. *The insider is more likely to exercise a call option out-of-the-money prior to maturity if Conditions 1 and 2 hold and the dividend record date is prior to the maturity date of the option.*

Proof. On the dividend record date the insider will exercise a call option out-of-the-money (i.e., $S_{\tau+} + D - X < 0$) if $S_{\tau+}^* + D - X > C(S_{\tau+}^*, T - \tau +, X)$. Higher b will make option

exercises more likely because its impact on $S_{\tau+}^* + D - X$ is higher than its impact on the time value (because the delta of a call option is below unity). Condition 2 is necessary because the insider would otherwise prefer to purchase shares in the open market at cost $S_{\tau+} + D$ instead of paying the exercise price X . \square

Proposition 5 leads to Hypothesis 4.

Appendix B. Variable Definitions

Variable	Definition
<i>Exercise</i>	An indicator of an exercise of at least a quarter of an option package.
<i>Exercise&sell</i>	An indicator of an exercise followed by a sale of shares for at least 25% of that amount within the ensuing three months.
<i>Exercise&hold</i>	An indicator of an exercise that is not followed by such a sale of stocks.
<i>Contest</i>	A dummy variable equal to one if there was a proxy contest announcement during the current or past 12 months.
<i>Years to maturity</i>	The number of years between the current month and option expiration.
<i>Market cap</i>	The firm's market capitalization at the last year-end.
<i>BM</i>	The firm's equity market-to-book ratio at the last year-end.
<i>Growth</i>	The average annual sales growth for the last three years (or for as many years as available during the three-year period).
<i>Stock ret</i>	Twelve-month stock return on the monthly rolling window using data from the past 12 months.
<i>Idiosyncratic vol</i>	The stock's annualized residual return from a regression of daily stock returns on Fama-French three factors during the past year.
<i>Illiquidity</i>	The Amihud (2002) illiquidity measure, or the yearly average of the daily square root of (Price x Volume)/ Return .
<i>Dividend yld</i>	The ratio of common dividends to market capitalization.
<i>Earnings month</i>	A dummy variable equal to one if the firm announces quarterly earnings during the month.
<i>New grant</i>	A dummy variable equal to one if the CEO receives new option or stock grants in the month.
<i>CEO age</i>	The age of the CEO.
<i>CEO tot wealth</i>	The proxy for total wealth of CEO estimated from previous years' compensation covered by the Execucomp using the procedure of Dittmann and Maug (2007).
<i>% CEO wealth in firm</i>	The percentage of total wealth that is in the form of unsold shares and unexercised options (including both vested and unvested).
<i>% Own top 5</i>	The percentage of outstanding shares held by the top five executives.

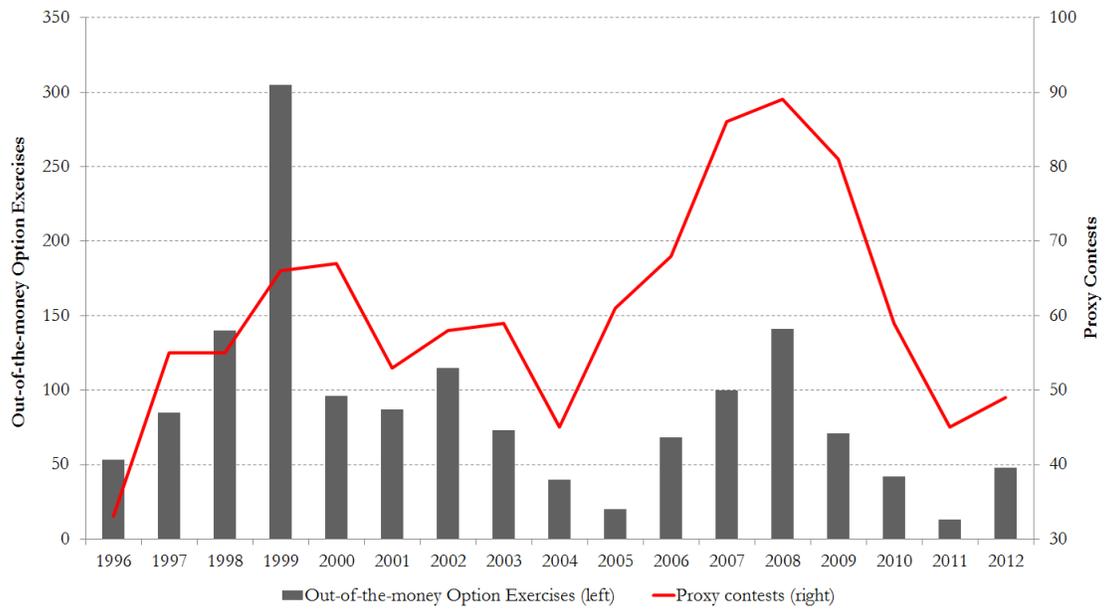
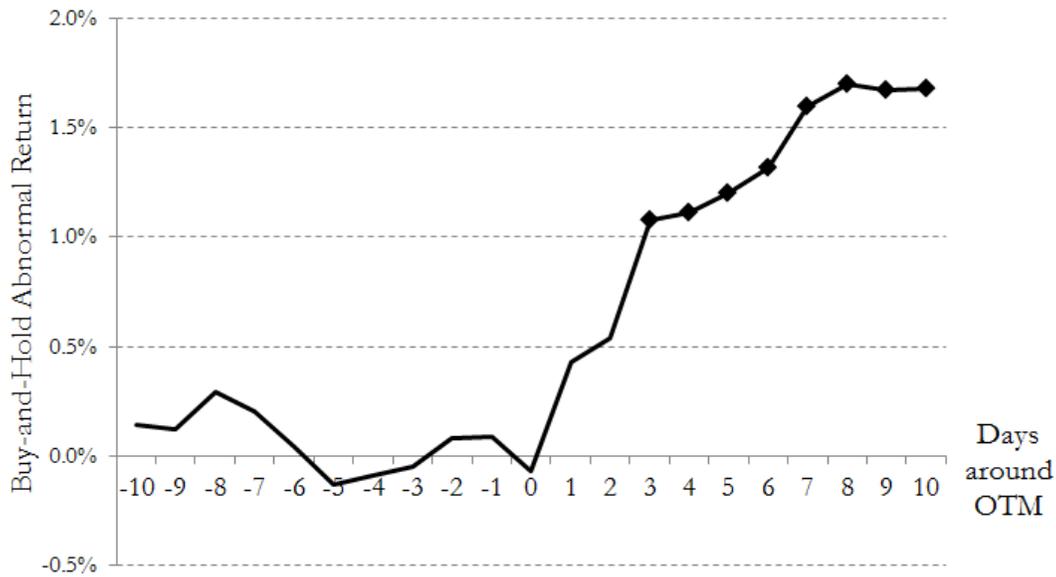
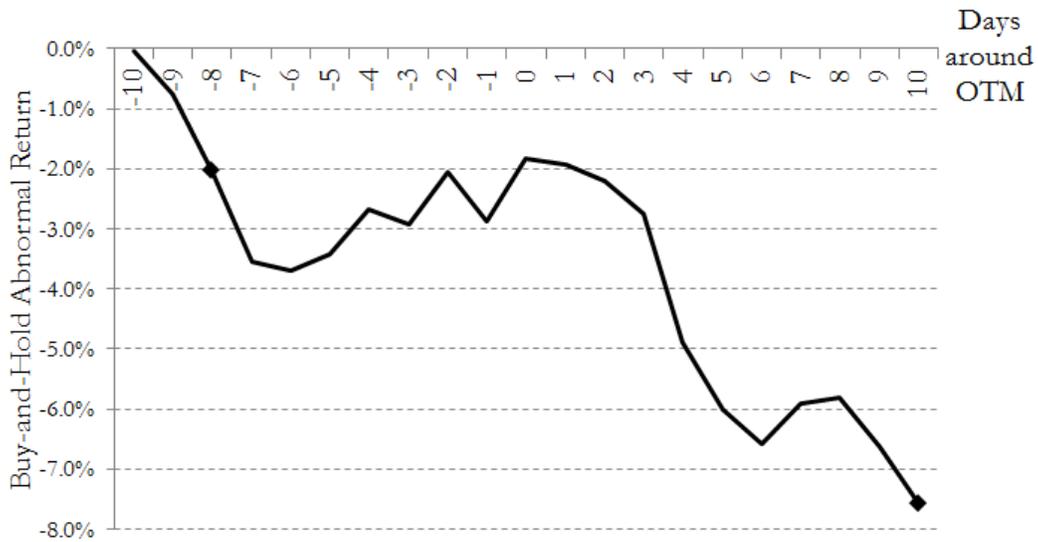


Figure 1: **Proxy contests and out-of-the-money exercises.** The dark bars plots the number of out-of-the-money option exercises and the solid line plots the number of proxy contests in each year. An out-of-the-money option exercise is an event when a CEO exercises an option for at least 100 shares with the exercise price above the daily high price.



(a) Panel A: Full sample



(b) Panel B: Proxy contest sample

Figure 2: **Abnormal stock returns around out-of-the-money exercises.** This figure presents the abnormal buy-and-hold return from 10 days prior to an out-of-the-money exercise to 10 days afterwards using the CRSP value-weighted returns as the benchmark. Panel A reports the results in the full sample of out-of-the-money exercises. Panel B reports the results for the subsample of out-of-the-money exercises that are accompanied by proxy contests in the same firm-year. A diamond mark on each graph indicates that the buy-and-hold abnormal return on the event date is significantly different from zero at the 5% level.

Table 1: **Summary statistics.** This table reports summary statistics for option, firm, and CEO variables recorded at the option package-month level (the unit of observation for our main regression analysis), and separately for the full Compustat/CRSP and the Execucomp samples. All variables are defined in Appendix B. All potentially unbounded variables are pre-winsorized at the 1% and 99% extremes. Columns (1) and (2) report mean and standard deviation of each variable. Columns (3)-(5) report their values at the 25th, 50th, and 75th percentiles.

	Mean (1)	Std Dev (2)	25% (3)	Median (50%) (4)	75% (5)
Full Sample					
<i>Exercise&sell</i>	0.0046	0.0679	0.0	0.0	0.0
<i>Exercise&hold</i>	0.0027	0.0524	0.0	0.0	0.0
<i>Contest</i>	0.0042	0.0648	0.0	0.0	0.0
<i>Years to maturity</i>	3.94	2.62	1.75	3.67	5.92
<i>Market cap</i> (\$ mil)	4,180	11,129	184	705	2,672
<i>BM</i>	0.51	0.41	0.25	0.42	0.66
<i>Growth</i>	0.20	0.35	0.04	0.12	0.24
<i>Stock ret</i>	0.14	0.60	-0.20	0.04	0.32
<i>Idiosyncratic vol</i>	0.45	0.26	0.26	0.37	0.56
<i>Illiquidity</i>	0.33	0.36	0.04	0.16	0.61
<i>Dividend yld</i>	0.02	0.04	0.00	0.00	0.03
<i>Earnings month</i>	0.33	0.47	0.00	0.00	1.00
<i>New grant</i>	0.01	0.09	0.00	0.00	0.00
Execucomp Sample					
<i>Exercise&sell</i>	0.0055	0.0742	0.0	0.0	0.0
<i>Exercise&hold</i>	0.0018	0.0426	0.0	0.0	0.0
<i>Contest</i>	0.0041	0.0637	0.0	0.0	0.0
<i>Years to maturity</i>	3.66	2.46	1.58	3.33	5.42
<i>Market cap</i> (\$ mil)	5,149	12,583	285	1,011	3,646
<i>BM</i>	0.50	0.39	0.25	0.42	0.65
<i>Growth</i>	0.17	0.30	0.03	0.11	0.21
<i>Stock ret</i>	0.15	0.57	-0.17	0.05	0.31
<i>Idiosyncratic vol</i>	0.41	0.24	0.25	0.35	0.50
<i>Illiquidity</i>	0.21	0.33	0.02	0.06	0.24
<i>Dividend yld</i>	0.03	0.04	0.00	0.01	0.04
<i>Earnings month</i>	0.33	0.47	0.00	0.00	1.00
<i>New grant</i>	0.01	0.10	0.00	0.00	0.00
<i>CEO age</i>	55.26	6.79	51.00	55.00	60.00
<i>CEO tot wealth</i> (\$ mil)	10.71	1.35	9.78	10.70	11.63
<i>% CEO wealth in firm</i>	0.58	0.27	0.37	0.58	0.81
<i>% Own Top 5</i>	0.14	14.83	0.01	0.03	0.12

Table 2: Option exercises and proxy contests: Hazard model with Competing Risk. Results in this table illustrates the determinants of CEO option exercises at the option package-month level using the Cox proportional hazards model with competing risks (Fine and Gray, 1999). All independent variables are defined in Section 3.4.1. The empirical methodology is described in Section 3.2.1. In columns (1)-(3), we estimate the relation between the subdistribution hazard rates and covariates for Exercise&sell as the main risk and Exercise&hold as competing risk. In columns (4)-(6), we estimate the relation between the subdistribution hazard rates and covariates for Exercise&sell as the main risk and Exercise&hold as competing risk. All regressions include yearly dummies, report exponentiated coefficients or odds ratios. The t -statistics are associated with the original (unexponentiated) coefficients, and are indicative of whether the reported odds ratios are significantly different from unit. The t -statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable:	Exercise&sell (1)	Exercise&sell (2)	Exercise&sell (3)	Exercise&hold (4)	Exercise&hold (5)	Exercise&hold (6)
Contest	0.1807*** [-3.05]	0.1631*** [-3.48]	0.2330* [-1.87]	1.7346** [2.19]	1.8572** [2.11]	0.5804 [-0.55]
Year to maturity		0.9964 [-0.34]	1.0245* [1.69]		0.8827*** [-10.91]	0.9041*** [-5.41]
Market Cap		1.0495*** [2.78]	0.9760 [-0.79]		0.7564*** [-10.09]	0.8223*** [-3.72]
B/M		0.8341** [-2.42]	0.8586 [-1.40]		0.8334** [-2.09]	1.1898 [0.97]
Growth		0.9342 [-1.02]	1.1975* [1.79]		1.5746*** [7.27]	1.6073*** [2.87]
Stock ret		1.9321*** [23.84]	2.1219*** [19.02]		0.9418 [-1.21]	0.8183* [-1.95]
Idio volatility		0.3175*** [-7.60]	0.2812*** [-5.48]		0.9465 [-0.34]	0.6751 [-0.97]
Illiquidity		0.5231*** [-4.97]	0.0464*** [-4.14]		1.0289 [0.27]	1.7502 [1.04]
Dividend yld		0.2967* [-1.84]	0.4954 [-0.87]		0.2142* [-1.80]	0.0250** [-2.50]
Earnings month		0.7636*** [-5.20]	0.7434*** [-4.44]		1.0703 [1.04]	1.1637 [1.44]
New grant		14.8447*** [37.05]	17.1500*** [32.71]		8.8380*** [21.88]	7.6537*** [14.33]
CEO age			1.0035 [0.77]			0.9984 [-0.20]
CEO tot wealth			1.0203 [0.74]			1.0792 [1.43]
% CEO wealth in firm			0.6133*** [-4.17]			3.3911*** [5.23]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,024,673	643,958	356,882	1,024,673	643,958	356,882
Average duration (months)	48.52	47.14	49.02	48.52	47.14	49.02

Table 3: **Option exercises before and after record/outcome dates.** This table follows the same regression specifications as in the columns (2) and (5) in Table 2 except that the key variable *Contest* is broken down into a pair of disjoint variables, *Before record (outcome) date* and *After record (outcome) date* to indicate that the announced proxy contest is in the pre- or post the date of ownership record that is entitled to voting rights at the upcoming meeting, or the date of the resolution of the proxy contest. Firm-level control variables and yearly dummies are included in the regressions but not reported. “Test of joint significance” tests the joint significance of the two coefficients while “Test of equality” tests their equality, both using chi-tests. The table reports exponentiated coefficients or odds ratios. The *t*-statistics are associated with the original (unexponentiated) coefficients, and are indicative of whether the reported odds ratios are significantly different from unit. The *t*-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Record Date		Outcome Date	
	Exercise & Sell (1)	Exercise & Hold (2)	Exercise & Sell (3)	Exercise & Hold (4)
Before Record/Outcome Date	0.0000*** [-33.53]	5.0098*** [4.56]	0.2072* [-1.95]	2.9097*** [3.00]
After Record/Outcome Date	0.2499*** [-2.95]	1.1054 [0.21]	0.2066** [-2.04]	0.851 [-0.24]
Firm Controls	Y	Y	Y	Y
Observations	643,958	643,958	643,958	643,958
Test of joint significance				
chi2(2)	112.88***	21.43***	11.45***	9.02**
p-val	0.00	0.00	0.003	0.011
Test of equality				
chi2(1)	41.37***	5.69**	0.00	2.46
p-val	0.00	0.0171	0.998	0.1171

Table 4: **Option exercises: Logit and conditional logit with CEO fixed effects.** This table reports estimates of logit and conditional logit (with CEO fixed effects) regressions, analyzing the determinants of CEO option exercises at the package-month level. The conditional logit model relies on within-CEO variations and include only observations associated with CEOs that ever experience a proxy contest and exercise options at least once. In columns (1)-(4) the dependent variable is Exercise&sell. In columns (5)-(8) the dependent variable is Exercise&hold. All independent variables are defined in Section 3.4.1. The reported coefficients are odds ratios (or exponentiated coefficients). The t -statistics are associated with the original (unexponentiated) coefficients, and are indicative of whether the reported odds ratios are significantly different from unit. The t -statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable:	Exercise&sell (1)	Exercise&sell (2)	Exercise&sell (3)	Exercise&sell (4)	Exercise&hold (5)	Exercise&hold (6)	Exercise&hold (7)	Exercise&hold (8)
Contest	0.2009*** [-2.86]	0.1926** [-2.40]	0.1930*** [-2.68]	0.1611** [-2.42]	1.2528 [0.69]	0.3661 [-1.04]	1.2759 [0.54]	0.7029 [-0.31]
Year to maturity	0.8994*** [-12.16]	0.9037*** [-9.50]	0.8515*** [-14.01]	0.8511*** [-11.16]	0.8863*** [-10.30]	0.9066*** [-4.86]	0.91791*** [-4.92]	0.9159*** [-3.16]
Market Cap	1.0591*** [4.07]	0.9746 [-1.13]	1.2414*** [4.07]	1.1468 [1.56]	0.8292*** [-8.16]	0.8596*** [-3.25]	1.3550*** [4.19]	0.8586 [-0.95]
B/M	0.8570*** [-2.58]	0.8412** [-2.16]	0.5952*** [-4.27]	0.8035 [-1.24]	0.9106 [-1.27]	1.5091*** [2.94]	0.9535 [-0.33]	0.5515* [-1.77]
Growth	1.0677 [1.12]	1.2747** [2.50]	1.4160*** [3.29]	1.7124*** [2.84]	1.5858*** [8.57]	1.9991*** [5.53]	1.4959*** [3.49]	2.7871*** [2.96]
Stock ret	1.9645*** [26.70]	2.2014*** [22.64]	2.2101*** [25.31]	2.3658*** [19.20]	1.0845** [2.02]	1.0259 [0.32]	1.2385*** [4.78]	1.1640* [1.71]
Idio volatility	0.3626*** [-7.47]	0.2435*** [-7.13]	0.4840*** [-3.49]	0.3136*** [-3.58]	1.0614 [0.43]	0.7513 [-0.81]	1.5388* [1.75]	0.4466 [-1.31]
Illiquidity	0.5565*** [-4.94]	0.0986*** [-4.19]	0.4097*** [-4.36]	0.0260*** [-3.77]	1.0869 [0.94]	1.4887 [0.81]	0.5258*** [-3.53]	0.7469 [-0.21]
Dividend yld	0.5141 [-1.33]	0.5579 [-0.93]	0.1536*** [-2.92]	0.2003* [-2.08]	0.2298** [-1.98]	0.0550** [-2.28]	0.1514* [-1.79]	0.3974 [-0.54]
Earnings month	0.8392*** [-4.63]	0.8284*** [-3.96]	0.8478*** [-4.18]	0.8338*** [-3.68]	1.0747 [1.32]	1.1357 [1.41]	1.1153* [1.89]	1.1710 [1.61]
New grant	55.8975*** [84.73]	66.4913*** [74.97]	72.4611*** [81.76]	84.9521*** [70.79]	48.6222*** [58.99]	54.5394*** [39.18]	68.6316*** [49.38]	84.0671*** [33.98]
CEO age		1.0078** [2.12]		1.0170** [2.49]		1.0095 [1.33]		1.0230 [1.64]
CEO tot wealth		1.0053 [0.24]		1.1892*** [3.59]		1.1383*** [2.77]		1.2460** [2.02]
% CEO wealth in firm		0.7158*** [-3.51]		1.0657 [0.42]		3.3871*** [6.14]		1.6563 [1.49]
CEO FE	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	Yes							
Observations	645,632	356,946	382,274	238,365	645,632	356,946	188,849	81,146
Pseudo R^2	15.6%	18.1%	18.3%	21.4%	12.3%	14.8%	15.4%	19.2%
E(Y)	0.56%	0.67%	0.93%	1.00%	0.24%	0.16%	0.79%	0.67%

Table 5: **Determinants of out-of-the-money (OTM) exercise.** This table reports determinants of the out-of-the-money exercise with three specifications at the firm-year level. All independent variables are defined in Section 3.4.1. In columns (1)-(3) the dependent variable is OTM – a dummy variable for the occurrence of out-of-the-money option exercises, and reports odds ratios from the logit model and the t -statistics associated with the original (unexponentiated) coefficients, and are indicative of whether the reported odds ratios are significantly different from unit. In columns (4)-(6), the dependent variable is #OTM – the number of occurrences of out-of-the-money option exercises for the firm-year, and reports estimated coefficients from the negative binomial model and the corresponding t -statistics. The coefficients represent the change in $\ln(\#OTM)$ associated with a unit change in a covariate. All t -statistics in this table are calculated using heteroscedasticity robust standard errors and are clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

model	Logit	Logit	Logit	Negative Binomial	Negative Binomial	Negative Binomial
VARIABLES	OTM	OTM	OTM	# of OTMs	# of OTMs	# of OTMs
	(1)	(2)	(3)	(4)	(5)	(6)
Contest	2.6450*** [2.68]	2.7851*** [2.81]	3.4840** [2.09]	2.4859*** [3.79]	2.6612*** [3.88]	3.4032*** [4.65]
log(Market cap)		0.9578 [-0.85]	1.0156 [0.11]		0.0115 [0.15]	-0.0571 [-0.50]
Book-to-Market		1.0392 [0.35]	0.9554 [-0.26]		0.2788* [1.87]	-0.8589** [-2.40]
Growth		1.1264 [1.16]	0.2873* [-1.72]		0.0071 [0.06]	-2.4525*** [-3.27]
Stock return (Size decile adj)		1.0812 [0.07]	0.6396 [-0.19]		-1.8594 [-1.25]	1.7641 [0.42]
Idiosyncratic volatility		1.5380** [2.39]	3.3490** [2.11]		0.8263*** [2.79]	1.9022** [2.27]
Illiquidity		0.8475 [-1.30]	0.9140 [-0.11]		-0.0939 [-0.48]	0.0338 [0.03]
CEO total wealth			1.1267 [1.02]			0.1290 [1.11]
% CEO firm wealth			0.5298 [-1.18]			-1.5842*** [-2.74]
CEO Age			1.0004 [0.02]			0.0161 [0.83]
% Own Top 5			0.4153 [-0.40]			-0.9684 [-0.53]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	90,341	83,834	25,594	90,341	83,834	25,594
Pseudo R^2	0.88%	1.02%	3.52%	–	–	–
E(Y)	0.37%	0.38%	0.31%	0.0133	0.0133	0.0097

Table 6: **Out-of-the-money exercises: Conditional logit with CEO/firm fixed effects.** The dependent variable is OTM – a dummy variable for the occurrence of out-of-the-money option exercises in a firm-year. All independent variables are defined in Section 3.4.1. We use the conditional logit model with firm (columns (1) and (2)) or CEO (column (3)) fix effects. The table reports odds ratios and the t -statistics associated with the original (unexponentiated) coefficients, and are indicative of whether the reported odds ratios are significantly different from unit. The t -statistics are calculated using heteroscedasticity robust standard errors and are clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable:	OTM (1)	OTM (2)	OTM (3)
Contest	4.4005*** [3.16]	4.5251*** [3.20]	5.4833* [1.72]
log(Market cap)		0.9474 [-0.42]	0.5502 [-1.40]
Book-to-Market		0.8794 [-0.87]	1.0635 [0.12]
Growth		1.1010 [0.71]	0.3611 [-1.25]
stock return (Size decile adj)		1.0330 [0.02]	5.5923 [0.37]
Idiosyncratic volatility		1.1638 [0.48]	8.2129* [1.86]
Illiquidity		0.8599 [-0.85]	0.3428 [-0.52]
CEO total wealth			1.4847 [1.25]
% CEO firm wealth			1.2281 [0.22]
CEO Age			1.0126 [0.20]
% Own Top 5			1.4285 [0.07]
Year dummies	Y	Y	Y
Firm/CEO fixed effects	Firm	Firm	CEO
Pseudo R^2	0.0276	0.0258	0.147
E(Y)	0.103	0.106	0.136
Observations	3,238	2,922	509
# Firms/CEOs	286	270	70

Table 7: **Out-of-the-money (OTM) exercise and private control premium.** This table reports determinants of the out-of-the-money exercise premium at the firm-year level. All independent variables are defined in Section 3.4.1. The dependent variable is Premium – the negative of the out-of-the-money exercise premium, that is, $(Strike\ price - Daily\ high\ price)/Daily\ high\ price$, averaged (using value weights) over all out-of-the-money exercises in the firm-year; and is recorded as zero if there is no such incidence. The table reports estimate coefficients from the tobit model and the corresponding t -statistics. All t -statistics in this table are calculated using heteroscedasticity robust standard errors and are clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Contest	0.2399** [2.32]	0.2291** [2.33]	0.2624* [1.84]
log(Market cap)		0.0150 [1.46]	0.0088 [0.43]
Book-to-Market		-0.0114 [-0.47]	-0.0193 [-0.52]
Growth		0.0224 [0.93]	-0.0999 [-1.49]
stock return (Size decile adj)		-0.0326 [-0.14]	0.2609 [0.62]
Idiosyncratic volatility		0.1863*** [4.16]	0.2284* [1.69]
Illiquidity		-0.0709** [-2.36]	-0.1474 [-0.78]
CEO total wealth			0.0139 [0.80]
% CEO firm wealth			-0.0329 [-0.42]
CEO Age			-0.0017 [-0.60]
% Own Top 5			-0.3019 [-0.97]
Year dummies	Yes	Yes	Yes
Observations	90,341	83,834	25,594
Pseudo R^2	0.52%	1.02%	2.20%
E(Y)	0.15%	0.15%	0.13%