Out-of-the-Money CEOs:
Private Control Premium and Option Exercises[☆]

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Abstract

When a proxy contest is looming, the rate at which CEOs exercise options in order to sell (hold) the resulting shares slows down by 80% (accelerates by 60%), consistent with their desire to maintain or strengthen voting rights when facing challenges. Such deviations are closely aligned with features unique to proxy contests, such as the record dates and nomination status, and are more pronounced when the private benefits are higher or when the voting rights are more crucial. The distortions suggest that incumbents value their stocks higher than the market price when voting rights are valuable for defending control.

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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 his 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 at least $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 proxy contest that everyone anticipated to be close.[1]

The anecdote exposes an intriguing phenomenon: The option exercise behavior of CEOs (or other insiders with control power) could be affected by a desire to maintain control, which in turn reflects a "private control premium." Such a premium is broadly defined as the incremental value of shares to an insider relative to the value public investors assign to the shares when the shares carry the voting rights needed to reinforce control. Based on Riggio's action, we can infer that his willingness to pay (i.e., his private valuation) for the marginal share was at least $16.96, while the market valued the stock no more than $15.00 on that day, and around $15 in the following days, presumably after digesting the public disclosure of Riggio's share acquisition. Therefore, 13.1% premium Riggio paid over the market price reflects the lower bound of the valuation wedge between an insider and public investors.

The case described above might appear extreme, but it exemplifies how challenges to control distort insiders' option exercise behavior because they drive a spread in firm's valuation to insiders and outsiders. A proxy contest reveals that at least some shareholders consider the incumbent CEOs or directors to be "out-of-the-money," i.e., their value to

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[1]Riggio held a 29.9% stake in the company, including vested options; Burkle was the second largest shareholder with a 19.2% stake.

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the firm is lower than what they cost the firm. As such, the out-of-the-money CEOs may exercise vested options (including in-the-money options) in a way that differs from what the benchmark models that do not account for a private control premium would predict. The emergence of a proxy contest, usually after more moderate and negotiations-based forms of activism failed to accomplish a resolution, indicates that the voting powers of the two opponents are similar *ex ante*. Hence, changes in insider ownership via option exercises are, *a priori*, a meaningful supplement to other tactics the incumbents deploy to enhance voting power or to influence voting outcomes.

Indeed, after controlling for the standard variables that prior literature has shown to affect early exercises of insider options, we find that the presence of proxy contests reduces the frequency of exercise-and-sell transactions by 80%, and increases the frequency of exercise-and-hold transactions by about 60%. These phenomena represent two sides of the same coin: Because she values the shares higher than the market, an insider is less willing to sell shares at the market price, keeping other motives such as liquidity needs and diversification constant. On the other side, the insider is more likely to exercise the option with the intention to hold the shares because the voting rights are equivalent to a lumpy dividend. If the difference in valuation is high enough, an insider may even exercise options that are out-of-the-money relative to the market price (but presumably still in-the-money relative to his private valuation), as Riggio did, if there are no easier ways to acquire the shares promptly.

A battery of tests affirm the connection between proxy contests and abnormalities in CEO exercise behavior. First, we show that the demonstrated deviations from normal exercises are indeed driven by circumstances (i.e., proxy contests) rather than by unobserved firm or CEO characteristics (such as CEO overconfidence[2]).

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[2]Malmendier and Tate (2005a,b) argue that overconfident CEOs are reluctant to exercise-and-sell—a pattern observationally equivalent to their behavior when facing proxy contests.

Next, we explore within- and cross-firm heterogeneity based on two pre-determined (and hence exogenous) institutional arrangements that are unique to the proxy process: the record date (the date used to determine which shareholders are entitled to voting rights) and the term of a staggered board. First, we show that deceleration (acceleration) of exercise-and-sell (exercise-and-hold) is more pronounced before the first record date of a proxy season. Moreover, the unusually high rates of exercise-and-hold by CEOs stop mostly at the record date, while the unusually low rates of exercise-and-sell continue beyond that point but in decreasing magnitude until resolution. Thus, CEOs attempt to gain additional votes just in time, and to maintain the option to acquire more voting rights as long as the proxy contest is still looming. Second, to the extent that nominated directors suffer more negative career outcomes from proxy contests (Fos and Tsoutsoura, 2014), we find that nominated directors are more eager to preserve voting rights to defend their own board seats (as opposed to those of their fellow directors).

We then affirm that CEOs are indeed more likely to refrain from exercise-and-sell in order to preserve their voting power when such additional voting power is deemed more important, and when the private benefits endangered by the contest are larger. We proxy for the importance of incremental voting rights using both *ex ante* measures— whether the market responds positively to the announced proxy contest and whether proxy advisory firms endorse dissidents—and two *ex post* measures—whether the announced contest goes into the voting stage rather than being settled/withdrawn and whether the shareholder meeting is delayed. We proxy for the size of private benefits with the standard "entrenchment index" (Bebchuk et al. (2009)) as well as the residual CEO compensation from a standard prediction model. All results are highly consistent with the hypothesis.

Lastly, we conduct the first systematic analysis of out-of-the-money option exercises by insiders. 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 occurrence of a proxy contest is the

single most powerful explanatory variable for out-of-the-money exercises among the usual list of variables reflecting firm and CEO characteristics and when 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 exercises to occur in a rational model, such extreme deviations from normality provide an informative testing case for the valuation wedge between the insiders and the market when control is contested.

Our paper extends the literature on the private value of corporate control and the value of voting rights.[3] The earlier studies mostly attempt to identify the value of control to a marginal trader in the market, who tends to be small and may not bear a direct relation to the value of control to insiders. In comparison, this study focuses on the private value accruing to agents in control that is incremental to the "fair market value," where the latter could already include the value of voting rights to outside shareholders. Calibrated to option valuation models, the abnormal patterns suggest that insiders facing control challenges value the marginal shares above the market price by 5% to 10%.

It is an immediate goal of the study to expand our understanding of the motives underlying option exercises by executives. A full understanding of CEOs' motivations for exercising option grants is crucial in any effort to design efficient incentive schemes given the importance of option grants in executive compensation.[4] Prior work has explored the diversification motive based on the utility theory (e.g., Huddart and Lang (1996); Carpenter (1998); Huddart and Lang (2003); Hall and Murphy (2002); 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,

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[3]Several studies have estimated the value of voting rights in the U.S. using dual class shares (Lease et al., 1983; Zingales, 1995; Nenova, 2003), controlling block sales (Barclay and Holderness, 1989; Albuquerque and Schroth, 2010), security lending (Christoffersen et al., 2007; Aggarwal et al., 2012), and put-call-parity violations (Kalay et al., 2014). International evidence also abounds (Levy, 1983; Zingales, 1994; Dyck and Zingales, 2004; Hauser and Lauterbach, 2004).

[4]Data from Execucomp indicate that option grants accounted for about half of total CEO compensation in the 1990s and early 2000s. The percentage decreased in the mid-2000s, but continued to be significant at about one-quarter in 2011. See Frydman and Jenter (2009) for a review on CEO compensation.

2001; Bartov and Mohanram, 2004; Cicero, 2009). Recent work by Klein and Maug (2011) and Carpenter et al. (2014) conducted a thorough empirical study nesting all of these hypotheses. However, none of these earlier studies has considered the impact of private benefits of control either theoretically or empirically, even though option compensation is meant to be an important mechanism for aligning the executives' interests with those of shareholders.

More generally, our study sheds light on how far insiders are willing to go to maintain control, and on the role that insider ownership could potentially play as a defensive tactic against control challenges.[5] Importantly, we show that CEOs are more likely to distort their exercise behavior when their firms already deploy strong defenses (e.g., staggered boards) and insiders already resort to alternative tactics (e.g., postponing shareholder meetings). The combined evidence thus supports the view that aggressive shareholder activism serves an important role in market-based corporate governance.

1. Hypotheses Development

1.1. General setup: Valuation of Stocks and Options

We follow the standard settings and notations. 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 in a perfect market, it is not profitable to exercise the option prior to maturity. Thus, the value of the option is equal to the value of a European call with the same parameters if the stock pays no dividends.

Under more realistic assumptions fitted to the CEO (or other key insiders in the firm), a CEO should exercise options before expiration when they are sufficiently in the money

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[5]Distorting option exercises in order to preserve/obtain more voting rights naturally mirrors findings in earlier studies (Cheng et al., 2004; Rauh, 2006) that insider and employee ownership dropped after the validation of state-law takeover defenses.

(Detemple and Sundaresan, 1999; Hall and Murphy, 2002; Sircar and Xiong, 2007). Factors contributing to early exercise include CEOs' lack of diversification due to concentrated exposure in their own companies, and their inability to reduce exposure by selling options directly. We take the optimal exercise behavior with no private control premium as given.

We now introduce proxy contests and isolate their incremental impact on option exercises. In a proxy contest, dissident shareholders challenge incumbent control 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 increases the CEO's additional control premium by the amount b. Consider the following situation: By staying in her position, a CEO derives private benefits of control equivalent to a pecuniary benefit of B.[6] When her control is contested and the outcome depends on shareholder votes, then additional shares held could increase the probability that the incumbents win the proxy contest and thus retain control by λ. Under such parameterization, b is just proportional to λB. The date τ naturally corresponds 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., 2014), and because a proxy contest represents only one type of challenge to an 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 amount 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 the marginal trader in the market for whom the value of votes may also increase when control is under contest (Kalay et al., 2014; Aggarwal et al., 2012). Hence b is the incremental control

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[6]We interpret private benefits broadly to include both financial (e.g., high compensation and perks) and non-financial (e.g., stature and the satisfaction from carrying out one's own agenda) gains.

premium accruing to the incumbent relative to the outsiders. This leads to our Condition 1.

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

Moreover, there is a strictly positive probability $0 < \eta \leq 1$ that the insider is restricted from trading shares of the company in the open market (see Section 1.3 for justification). This becomes our Condition 2.

Condition 2. The insider is restricted from 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.

1.2. 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 exercise: an early exercise with an intention to sell the resulting shares and an early exercise with an intention to hold the resulting shares. We relegate the formal proofs to Appendix A, but explain the intuitions as follows.

Hypothesis 1. *When control is contested, a CEO who enjoys private benefits of control is less likely to exercise an option and sell stock.*

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

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 date τ (when voting rights are needed) if $\tau < T$ (the maturity date).*

Hypothesis 2 suggests that if a CEO expects to receive a payoff in the form of voting rights that help to maintain private benefits of control, she is more likely to exercise the option early to hold the stock. The intuition here is similar to that associated with exercising an option prior to a dividend record date.

Finally, if the private benefit b is large enough then an out-of-the-money option relative to the market price S_t may become in the money relative to S_t^*. Thus Hypothesis 2 could be extended to out-of-the-money exercises when insider trading restrictions prevent the CEO from transacting directly in the market.

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

1.3. Institutional background

The law and rules regarding insiders' transactions in stocks and options produce the two necessary elements underlying our hypotheses. First, insiders may face trading restrictions when a proxy contest is under way. Second, deviations from the normal course of option exercises are not subject to the same restrictions.

The two legal pillars governing insider trading are Section 16 of the Securities Exchange Act of 1934 (and various amendments) and SEC Rule 10b-5. The law prohibits anyone from trading while "aware" of material nonpublic information. Insiders thus face various restrictions during informationally sensitive periods, such as earnings announcements or events of material importance (e.g., M&As). Although proxy contests do not usually entail strict "black-out" periods, insiders face potential legal risk if their transactions (those that were not pre-committed) cause or coincide with imminent significant stock price movements. Therefore, it is reasonable to assume that insiders face trading restrictions they would not face in times of "peace," corresponding to the first part of Condition 1 in Section 1.1.

In contrast, Section 16 provides lenient exemptions for transactions that involve grants or awards. Specifically, option exercises initiated by insiders are exempt from the rule as long as the exercise is not "cashless" and is not accompanied by an imminent sale of shares. Therefore, insiders can accelerate option exercises to acquire additional shares even while possessing sensitive information, corresponding to the second part of Condition 1 in Section 1.1.[7] In addition, the "Safe Harbor" included in Rule 10b-5 allows an insider to cancel a planned trade (usually a sell), even when possessing inside information, without it constituting insider trading, allowing insiders to suspend an option exercise-and-sell that was part of a pre-committed plan during proxy contests without incurring additional legal liability.[8]

2. Option Exercises and Proxy Contests: Empirical Evidence

2.1. Data overview

We build our sample from five main data sources. First, information about CEO options and 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, especially Form 4.[9] Due to the coverage of the TIF database, we restrict our sample to 1996 and beyond.

For our research, we focus exclusively on CEOs, and the unit of analysis is an option package belonging to a CEO in a given month between vesting and expiration. The construction of the data follows primary the methods of Klein and Maug (2011). We include the following derivative securities as "options:" Employee stock options (TIF coding:

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[7]The rationale behind the exemption is that shares acquired due to option exercises are purchased from a corporation as opposed to the shareholding public.

[8]The Safe Harbor clause reflects the U.S. Supreme Court's holding that there can be no liability for insider trading without an actual securities transaction.

[9]Form 3 records initial 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 and includes exempt transactions not required on Form 4. Finally, Form 144 reports proposed sales of restricted stock.

EMPO), non-qualified stock options (NONQ), warrants (WT), call options (CALL), rights (RGHTS), incentive stock options (ISO), directors' stock options (DIRO), and convertible preferred stocks (CVP). An option package is defined as options awarded to a 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 to the date of exercise, expiration, or the end of the sample period (January 2013).

An option exercise is defined as an exericse of at least a quarter of an option package, but the results are not sensitive to the exact magnitude chosen.[10] The end date of a package (or the exit date in the hazard analysis) is either the first date of an exhaustive exercise, the date of expiration, or the last month of our sample period if the package remains available at that time (the censoring date in the hazard analysis). This results in 997,034 observations at the option package-month level. The average in-sample duration of an option package is about 71 months. Importantly, we distinguish two purposes for option exercises: we divide *Exercise* into *Exercise&sell* and *Exercise&hold*. *Exercise&sell* is defined as an exercise followed by a sale of at least 25% of the initial number of shares within the ensuing three months. Again, results are consistent if we alter the 25% filter used in our "sale" classification. The second variable, *Exercise&hold*, is an exercise that is not followed by such a sale. Unconditionally, the probability of exercise-and-sell at the package-month level is 0.46%, and that of exercise-and-hold is 0.28%. Both are on par with probabilities reported 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 EDGAR. This piece of data is updated from Fos (2015),

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[10]Table A1 in the Appendix reports the main results classifying option exercises as any exercise of 100 shares or more. The results are similar to those in Table 3 and Table 7.

which contains more details about the institutional background of proxy contests as well as the construction of the event variables. There are 1,029 announced proxy contests between 1996 and 2012, with annual frequency ranging from 33 (in 1996) to 89 (in 2008). We construct a dummy variable $Contest$ equal to one if there was a proxy contest announcement during the current or past 12 months. In a given year, an average of 0.62% of the public firms in our sample are targets of proxy contests.

Among the dissidents, a slight majority (56%) are hedge funds. The next biggest players are individual shareholders (20%) and corporations (12%). The widespread adoption of antitakeover provisions and the enactment of state-level antitakeover laws sheltering management have increased the cost of hostile tender offers 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 engage in communication more freely without heightened legal risk, played an important role in the increasing frequency of proxy contests (Sharara and Hoke-Witherspoon, 1993; Bradley et al., 2010; Fos, 2015).

Figure 1 demonstrates the stock return dynamics of firms targeted by proxy contests from 24 months prior to the announcement of the contest to 24 months afterwards,[11] and reveals three important patterns: First, target firms significantly underperform during the two years prior to the proxy contest by about 10 percentage points in risk-adjusted returns. Second, the stock price jumps up by 5 - 6 percentage points upon the announcement of the proxy contest. Third, there is no significant post-announcement drift in either direction. In other words, the market's assessment of the impact (positive on average) of proxy contests on the target firms upon announcement is unbiased. Given that we are analyzing post-announcement CEO option exercises, the absence of a return drift indicates

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[11]The cumulative abnormal returns are computed as cumulative *alphas* from four-factor (market, size, book-to-market, and momentum) models using 73 monthly observations (or as many observations as are available) centered on the announcement date.

that any exercise motive based on anticipated future returns is not justified by the ex post realization of the returns.

[Insert Figure 1 here]

Third, the transactions from TIF are matched to the CRSP/Compustat merged databases for standard stock- and company-level information. The following variables are imputed at the monthly level using the value as of the close of the prior fiscal year: *Market cap*, the market capitalization of a company (which enters regressions in log value); *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 are available during the three-year period); *Idiosyncratic vol* is the stock's annualized residual return from a regression of daily stock returns on the Fama-French three factors; *Dividend yld* is the ratio of common dividends to market capitalization; *Dividend record month* is a dummy variable equal to one if the month contains a dividend record date; 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.

Two additional variables are included because they were identified by Klein and Maug (2011) as important determinants of CEO option exercises. *Earnings month* is a dummy variable equal to one if the firm announces quarterly earnings during the month. Corporate insiders are restricted from trading stocks during some informationally sensitive time windows ("black-out periods"), of which an 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 upon receiving new grants.

Fourth, we match our sample to the Execucomp database to retrieve and construct CEO characteristics, compensation, and wealth, because some of these variables serve as

proxies for the CEOs' risk aversion and incentives to diversify. This 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 them to the monthly frequency): *CEO tot wealth* is a proxy for the CEO's total wealth, which is estimated using the procedure pioneered by Dittmann and Maug (2007) based on the previous years' compensation reported in Execucomp; % *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.

Finally, we obtain data on takeover defenses from RiskMetrics to analyze interaction between option exercises and managerial entrenchment. We consider the E-Index, a summary score of six components that are considered by Bebchuk et al. (2009) to be the most effective in deterring takeovers and most exemplary of managerial entrenchment.[12] Definitions of the main variables are listed in Table 1, and the summary statistics for option, firm, and CEO variables are reported in Table 2.

[Insert Table 1 here]

[Insert Table 2 here]

2.2. Hazard analysis

Given the nature of the data structure (records of option packages over their "lifetimes") and the research question (what motivates CEOs to exercise their options before maturity), the appropriate estimation method is a hazard analysis. The Cox proportional hazards model is among the most popular in settings similar to ours (Klein and Maug, 2011)because of its flexibility with base hazard functions. We make two major changes

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[12]The six components are staggered boards, two limits to bylaw amendments, poison pills, golden parachutes, and super-majority rule.

from the 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 distinct motives when control is at stake, departing from existing models that assume that the insider intends to sell the resulting shares.

As a result, each option package is subject to two types of "risk" of "exiting" before expiration: exercise in order to sell the shares and exercise in order to hold the shares. Moreover, the two exit strategies are mutually exclusive but are not necessarily independent of 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 developed by Fine and Gray (1999).[13]

In such a model, the coefficient on the j-th regressor X^j measures the effect of increasing the j-th covariate by an infinitesimal amount on the log ratio of hazard rates. For ease of interpretation and following common practice, we report in the tables the exponentiated coefficients e^{β_j}, which represent the multiples of the hazard rates, or the hazard ratios, associated with a one-unit change in the covariate X^j. In our context, the hazard ratios are essentially the option exercise rate (at the monthly frequency) relative to the normal rates. We first estimate the relation between the rate of *Exercise&sell* and the covariates with *Exercise&hold* as the competing risk, and then we reverse the order. Finally, because a package could experience multiple exercises over the course of its life, we let an option package "start anew" immediately following each exercise until the option exit date.

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[13]The key difference between a regular hazard model and a competing risk model in our setting is that when a CEO exercises an option package and holds the resulting shares, the standard 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.

2.3. Determinants of exercise-and-sell

Section 1 presented a hypothesis predicting that proxy contests should have a negative impact on the probability that a CEO will exercise-and-sell. Results from the competing risk model, reported in Table 3, confirm this prediction. We conduct regressions on three decreasingly nested samples: (1) the universe of public companies covered by the TIF that award CEOs options; (2) the sub-sample of firms in (1) with non-missing firm characteristic variables; and (3) the sub-sample of firms in (2) that are covered by the Execucomp database so as to have CEO personal and wealth characteristics. All regressions include yearly dummies and report exponentiated coefficients or hazard ratios. The neutral value of a hazard ratio is one (i.e., at the same exercise rate as normal). The t-statistics are associated with the difference between the original (unexponentiated) coefficients and zero, and indicate of whether the reported hazard ratios are significantly different from the unit. The standard errors are clustered at the option package level.

[Insert Table 3 here]

First and foremost, proxy contests significantly deter exercise-and-sell, consistent with CEOs' motive to maintain the option to acquire more shares. The coefficients are stable, with progressive inclusion of control variables. The presence of a proxy contest during the past 12 months reduces the monthly rate of exercise-and-sell to about one-fourth (0.20 to 0.30) of the normal level. The original coefficients (the log hazard ratios) 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.[14] By refraining from selling, insiders could affirm the voting power associated with these shares, preventing the same shares from falling into the hands of the dissidents and their supporters.

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[14]We find similar deceleration in exercise-and-sell by non-CEO insiders (other top executives and board members): the probability of exercise-and-sell decreases from 1.37% three years prior to a proxy contest to 0.63% during the contest year, or a 50% deceleration.

As expected, the coefficients on the covariates are consistent with the standard theories predicting option exercises. For example, *Idio volatility* is associated with significantly lower incidences of option exercise-and-sell due to the high time value of the options. On the other hand, the variable that proxies for higher fundamental value (*Stock ret*) predicts significantly more exercises.[15] The 22%–27% increase in the odds ratio of exercise-and-sell during the dividend record month confirms the prediction of a standard model that dividend payments encourage exercises of call options whose strike prices do not adjust for dividends (which is the convention for executive options).

However, empirical support for diversification motives is more mixed. On the one hand, new grants (*New grant*) prompt CEOs to exercise 15-17 times more (significant at the 1% level) than the normal rate, raising the exercise probability of 0.44% in a typical month to 7-8% during a month with new grants, consistent with the diversification motivation. On the other hand, CEO firm-specific wealth (*%CEO firm wealth*) is significantly and negatively related to exercise-and-sell, exactly the opposite of what standard portfolio theories predict. We should interpret these results to mean that some CEOs seek to accumulate shares in their firms, and that such traits are highly persistent.

Lastly, due to prevalent black-out periods for insider trading around earnings announcement windows (varying from a week to a full month), the rate of exercise-and-sell during the earnings announcement month offers a benchmark for the direct effect of trading restrictions. Table 3 indicates that CEOs reduce exercise-and-sell behavior during the month by about one quarter (corresponding to the hazard ratio of 0.74-0.76 associated with *Earnings month*). The fact that during proxy contests the rate of exercise-and-sell decelerates to only 20% of the normal level indicates that a large portion of such activity is likely to be voluntary rather than due to a mechanical effect of a strict or soft black-out.

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[15] If we add stock returns during the six post-announcement months, the coefficient is significantly negative but with modest economic magnitude: a 10 percentage point increase in future returns is associated with a 4% drop in the rate of exercise-and-sell. Both effects support a "lock-in-value" motive, but do not affect the coefficient on *Contest*.

2.4. Attributing exercise behavior to proxy contests

2.4.1. Does unobserved CEO/firm heterogeneity drive the results?

Proxy contests and deceleration in exercise-and-sell could both be driven by some inherent CEO-specific trait. Overconfidence has been a leading explanation in the literature for CEOs' reluctance to reduce their personal exposure to company-specific risk. In fact, 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 literature also documents that CEO overconfidence leads to suboptimal capital structure and over-investment, and that the resulting inefficiencies can attract shareholder activism.

We thus resort to the conditional logit model with fixed effects in order to identify whether the pattern in option exercises is driven by unobserved CEO heterogeneity or by the unusual circumstances of a proxy contest.[16] Results are reported in the Appendix (Table A2). The effects of a proxy contest (as well as some of the key firm/stock level characteristics) are very close, when incorporating a CEO fixed effect, compared to those derived without fixed effects.

Similarly, we establish that there is no pre-existing trend in the pattern of exercise-and-sell for the same firms leading to the proxy contest. We estimate the same equation as in column (2) of Table 3 (which includes all firm-level but no CEO-level control variables) based on the sample of all Compustat firms, except that we replace the single regressor, *Contest*, with a set of regressors $Contest(t - j)$, an indicator variable equal to one if the firm-year observation is $j(= 4, 3, 2, 1, 0)$ years prior to a proxy contest at the firm. If a firm experiences repeated contests in consecutive years only the first contest is counted. We plot the coefficients on $Contest(t - j)$ and the corresponding 95% confidence intervals in

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[16]We change the model specification because currently available competing risk models do not deliver consistent estimates when fixed effects are incorporated.

Figure 2. The chart shows no pre-existing trend: CEOs at firms experiencing proxy contests maintained their normal rates of exercise-and-sell (the coefficients being indistinguishable from the neutral value of one) until the year before the contest, at which point the rate of exercise-and-sell drops precipitously to about 20% of the normal level.

[Insert Figure 2 here]

Both tests suggest that the observed deceleration of exercise-and-sell is driven by circumstances and motives associated with proxy contests, rather than by inherent CEO traits or unobserved firm heterogeneity. The subject of our analyses, CEOs' major option exercises at the monthly frequency, is a low-probability event (less than 1%). As such, statistical inferences might be susceptible to data flukes. For this reason, the two tests in this section also serve to confirm the stability of the probabilities and hazard ratios of exercises during the event and non-event windows.

2.4.2. Option exercise-and-sell along proxy contest evolvement

This section relates option exercises and features that are unique to proxy contests in order to form a more specific connection between them. First, we study option exercises before and after the record date. Proxy contests typically occur in connection with the company's annual shareholders' meeting, in which case the record date is the company's pre-determined official date before which one must be an owner on record in order to participate in the corporate elections. The manner of fixing a record date is determined by the bylaws of the corporation. Because record dates are occasionally subject to change, usually at the managers' discretion (Kalay et al. (2014)), we use the first record date to alleviate endogeneity concerns. The typical time interval between the record and meeting dates is around 50 days. Given that the significance of ownership as the basis of actual voting power has greater relevancy before the record date, we expect the deceleration patterns to be more pronounced in the pre-record date period if they are driven by control contests.

We repeat the specification used in column (2) of Table 3 with the same firm-level controls, except we replace the single variable *Contest* with a pair of disjoint variables: *Contest ∗ Before Record Date* and *Contest ∗ After Record Date*. The results are reported in column (1) of Table 4. We report only the coefficients on these new variables because the coefficients on the control variables are nearly identical to those shown in Table 3 and do not add any new insight.

[Insert Table 4 here]

Indeed, the deceleration of exercise-and-sell is more pronounced before the record date. The differences in the before-and-after exercise behavior are significant (see the "Test of equality" toward the bottom of the table). Exercise-and-sell comes to a virtual halt before the record date (as indicated by the coefficient of zero). However, although the unusually low rates of exercise-and-sell persist beyond the record date, the difference between the actual and normal frequencies of exercise-and-sell transactions becomes far less extreme. In the absence of exercise-and-sell, CEOs facing contests can maintain the option of acquiring more voting rights when needed. As long as the proxy contest is still looming, CEOs act defensively and avoid selling shares from option exercises even beyond the record date. In our sample, 20% of the event companies were targets of repeated contests; moreover, dissidents may well continue to seek board representation or influence through non-contested routes after the initial confrontation.

Given that the (first) record date is an exogenously set date unique to the proxy process, the difference in the exercise-and-sell rates before and after is unlikely to be explained by factors outside the context of proxy voting. It is, however, plausible that CEOs would refrain from selling before the record date in any proxy season (even in the absence of a contest) under two hypotheses. First, a significant reduction in CEO ownership revealed right before the annual shareholder meeting might be taken by the market as a negative signal. Second, proposals are voted on at all companies' annual shareholder meetings, and

a CEO could desire voting rights on issues that are important to her even though there is no explicit proxy contest.

To delineate the effect of a proxy contest from that of the record date in a non-contested proxy season, we add to the regression two additional regressors, *No Contest * Before Record Date* and *No Contest * After Record Date*, such that the first dummy variable is coded one if the observation belongs to a matched firm during its proxy season in the same year and the month is equal to or before the month of the record date, and the second dummy is coded one if the month is after the record date. We locate a match firm for each event firm from the same stock market capitalization and book-to-market quintile (using the NYSE quintile cutoffs) during the contest year, and from the same four-, three-, two-, or one-digit SIC code until we find a match. If there are multiple matches, we pick the one that is closest in market capitalization. Moreover, a necessary condition for a matched firm is that it does not have a proxy contest during the three-year period centered on the year in consideration.

Results are reported in column (2) of Table 4. The exercise-and-sell rate is indeed a bit slower than usual before the record date during a normal proxy season, but returns to normal afterwards. However, the before-and-after difference is not significant. More importantly, the difference-in-differences comparing the before-and-after change during proxy contests and normal proxy seasons is significant at less than the 1% level, indicating the necessity of a proxy contest in decelerating exercise-and-sell.

Second, we explore directors' differential vulnerability to contests due to their nomination status using the sub-sample of firms with a staggered board structure. In a staggered board, only the nominated incumbent directors are up for re-election because their terms have expired. Fos and Tsoutsoura (2014) show that nominated directors experience negative career consequences to a much greater extent relative to non-nominated directors when the firm is a target in a proxy contest. Such heterogeneity in the exposure

of incumbent directors to proxy contests should result in stronger motives among the nominated CEOs to refrain from exercise-and-sell.

We follow a similar specification to partition the key variable *Contest* into the following pair of disjoint variables: *Contest * Nominated* and *Contest * Not nominated.* The results, reported in column (3) of Table 4, indicate that while both nominated and non-nominated CEOs are less likely to exercise-and-sell when the company is involved in a proxy contest, the effect is significantly stronger for the nominated CEOs.

As was the case with the argument regarding the record dates, it is possible that a nominated CEO could be reluctant to appear to be selling her holdings for fear of sending negative signals to the market. To tease out the effect attributable to proxy contests, we add to the regression two dummy variable regressors, *No Contest*Nominated* and *No Contest* Not nominated*, such that the first dummy variable is coded one if the observation belongs to a nominated CEO during a proxy contest but the timing is three years earlier and the second dummy variable is defined analogously. These dummy variables are added to capture the situation for the same CEOs as those targeted by proxy contests but during a non-contest year with the same nomination status (because almost all staggered boards adopt three-year staggered terms). The results, reported in column (4) of Table 4, indicate that CEOs generally do not slow down their option exercises during a non-contested proxy season regardless of whether they are nominated. Again, the difference-in-differences between contested and non-contested proxy seasons for the nominated and non-nominated CEOs is significant at less than the 1% level.

To summarize, we reiterate that the first record date and the nomination status are both pre-determined variables that neither a CEO nor a dissident can influence. The fact that the exercise patterns are intertwined with these features renders proxy contests the most plausible explanation for CEOs' deviation from "normal" option exercise patterns.

2.4.3. Option exercise-and-sell and managerial entrenchment

Given our motivation to uncover private benefits of control from option exercises, it is natural to ask how our results interact with managerial entrenchment or corporate governance. We proceed with the following pair of disjoint variables: $Contest * Entrenched$ and $Contest * Not\ Entrenched$. The results are reported in Table 5.

[Insert Table 5 here]

In the first column, we classify firms into two groups using the Bebchuk et al. (2009) E-Index, which counts the number of key anti-takeover provisions (the maximum number is six).[17] Firms with E-Index values higher than the sample median in a given year (the all-sample median is two) are considered "entrenched" and the complement set are "not entrenched." In the second column, we classify firms into two groups depending on whether the boards are staggered. Firms with a staggered board structure are classified as "entrenched" ("not entrenched"). We single out staggered boards because the provision is specifically designed to defend incumbent control in proxy contests.

We further consider a more direct entrenchment measure (in the third column), *Overpaid*, a dummy variable indicating that during the year prior to the proxy contest a CEO was "overpaid," defined as a CEO who receives total compensation (using the total contracted compensation, or "tdc1," from the Execucomp database) of more than $1 million or more than one-third over "normal" pay. "Normal" pay is the predicted value from a year-by-year compensation regression with the most common regressors used in the literature: firm assets (in log), return on assets, book-to-market, CEO age, age squared, CEO tenure (in log), and industry fixed effects based on two-digit SIC codes. The procedure results in about one-quarter of the CEOs under contest being classified as "overpaid." These CEOs presumably have stronger incentives to defend their large pecuniary private benefits.

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[17]We use the E-index rather than the G-index (Gompers et al., 2003), which is based on 24 takeover defenses, because the former has superior data availability.

Results shown in Table 5 indicate that the deceleration of exercise-and-sell is more pronounced for "entrenched" CEOs—that is, CEOs who are already equipped with more options to defend themselves against dissidence and who had received compensation that appears excessive relative to their peers. The differences in the *Entrenched* and *Not Entrenched* exercise behavior is significant using all three entrenchment measures. Table 5 further reveals that option exercises serve as complements of, rather than substitutes for, other defenses. The voting rights associated with option exercises could be more effective in fending off non-control-aiming aggressive dissidence, which is not deterred by conventional takeover defenses.

2.4.4. Option exercise-and-sell and value of votes to incumbents

Given that deviating from normal option exercise plans is costly for CEOs, they should be more likely to resort to the strategy when it is necessary or when the resulting incremental voting power is *ex ante* more important. We reestimate the regressions after splitting the contest events into two groups captured by the two interaction terms *Contests* ∗ *Votes are more Needed*) and *Contest* ∗ *Votes are less Needed.*

First, market reaction upon the announcement of a proxy contest is informative about the level of support the dissident enjoys from outside shareholders. A CEO is facing greater challenges when the market warmly welcomes the emergence of a dissident. Accordingly, we code *Votes are more Needed* as one if the cumulative abnormal returns (CAR) during the three month period centered on the announcement month is positive.[18] Results are reported in the first column of Table 6, which shows that when the dissidents have support from public investors, the CEOs almost completely stop exercise-and-sell transactions. In contrast, when the market reacts negatively to the announcement of a proxy contest,

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[18]The CARs are estimated using a four-factor (market, size, market-to-book, and momentum) model using 73 monthly observations (or as many as are available) centered on the announcement month. The average CAR of the [-1, +1] month window is 5.1%, and 58.8% of the events have positive CAR, indicating that market generally perceives proxy contests as bringing value-enhancing changes.

the dissident—a minority shareholder who can succeed only with the assistance of fellow shareholder—is unlikely to win. In that case, the CEOs slightly reduce exercises relative to normal rates, but not significantly so. The difference between the two rates is significant at the 1% level.

[Insert Table 6 here]

In a similar vein, the market support for dissidents can also be captured by the recommendation of shareholder advisory companies, especially Institutional Shareholder Services (ISS) and Glass, Lewis & Co. (GL). Several recent studies show that leading proxy advisors can sway substantial number of votes by institutional investors (Larcker et al., 2014; Malenko and Shen, 2015). We hand-collect information on voting recommendations from EDGAR and news articles for five shareholder advisory companies: ISS, GL, PROXY Governance, Proxy Monitor, and Egan-Jones. ISS advised in 378 proxy contests, GL in 184 contests, and the three remaining companies advised in 157 contests. *Votes are more Needed* is coded one if either of the two top advisors supports the dissidents, or at least one of the five advisors supports the dissidents and nobody supports management. In about 30% of proxy contests this indicator equals one. The result shown in column (2) of Table 6 reveals that CEOs completely stop exercise-and-sell transactions when dissidents get support from shareholder advisory companies, presumably when the insiders are in greater need of their own votes.

Second, we expect the deviation from normal option exercises to be more pronounced when CEOs expect the contest to be a close call, such that CEOs would resort to any tactic to boost incumbent voting power. There are three major potential outcomes of a proxy contest:(1) In 15.7% of the cases, the dissident withdraws. These cases are clearly not ex ante close-calls. (2) The dissident and the incumbent reach a settlement without going into a voting contest in 24.7% of the cases. A settlement indicates that at least one party is not confident about winning a fight. (3) About 44.6% of the announced contests are ultimately

resolved by a shareholder vote; in our sample, dissidents won 63.4% of these voted contests. For events in the last group, both parties perceive a reasonable probability of winning, and hence are ex ante close-calls. Moreover, voting rights have ex post realized values only in this category. Indeed, the result shown in column (3) of Table 6 reveals that among proxy contests that were ultimately determined by voting, CEOs virtually halt exercise-and-sell in order to preserve all their voting rights. For the non-voted events, CEOs reduce the exercise-and-sell rate to about 25% of the normal level as potential voting rights may still boost the bargaining power in settlements or serve as deterrents. The difference between the two is again significant at the 1% level.

Third, we expect the deviation from normal option exercises to be more pronounced when the meetings are delayed, usually at the incumbent board's discretion in order to have more time to implement response plans or to build support for the incumbent in the contest. As expected, meetings with contests are far more likely to be delayed than meetings without contests: In our sample of proxy contests, 25% of the meetings were delayed. More importantly, the result shown in column (4) of Table 6 reveals that CEOs completely stop exercise-and-sell transactions when the meeting is rescheduled to a future date, suggesting that the CEOs seek to preserve voting rights when they could become useful in the near future.

The four tests reported in Table 6, built on different sources of data information, fully support the hypothesis that CEOs are more aggressive in preserving voting power when the voting rights are ex ante more valuable. Arguably, the existence of a proxy contest is *prima facie* evidence of a "close" contest. Indeed, our hand-collected data (from annual proxy statements) also indicate that the ownership stakes of the two directly opposing blocks— the incumbent block (executive officials and board members) and the dissident block—are both substantial and quite close: The mean and median values are all close to 10%,[19] the

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[19]Incumbent ownership at proxy contest targets is substantially higher than reported in earlier studies for general samples (Cheng et al., 2004; Rauh, 2006). This is consistent with the hypothesis that proxy

mean (median) difference is 1.29% (-1.30%), and the quartile values are all within a tight range (see Table 2). Refraining from exercise-and-sell potentially allows insiders (CEOs and directors) to retain on average about 2% of the voting rights, which potentially serves as a poison pill-like deterrent for the proxy fight to stop before the voting stage.

Conditional on the actually voted contests (296 of them), insiders' vested options fall within the ex post winning margin in a majority of the cases but have the potential to affect quite a few. We calculated the difference between the number of shares cast in favor of the winning party and the number of shares for the losing party, normalized by the number of shares outstanding. The average (median) winning margin is 33% (24%), but with high variance. A reallocation of 2% of voting rights from winners to losers could flip the voting outcome in 36 contests, corresponding to more than 10% of the sample of voted contests. Needless to say, option exercises are likely to be one of the tactics (e.g., soliciting large and small shareholders) that incumbents use in defending control challenges.

2.5. Determinants of exercise-and-hold

Models of option exercises usually do not predict exercise-and-hold for either diversification or liquidity motives. Instead, exercise-and-hold is usually predicted to be driven by frictions such as taxation (Cicero, 2009).[20] In this section, we analyze the effect of proxy contests on exercise-and-hold.

Results from the competing risk model are reported in Table 7. The specifications are the same as in Table 3 except that exercise-and-hold is now the main risk and exercise-and-sell becomes the competing risk. Consistent with the hypotheses presented in Section 2, the probability of exercise-and-hold increases considerably by about 50% (significant at

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contests were launched against firms with more powerful insiders who may not yield to more modest forms of shareholder activism.

[20]Most option grants are "non-qualified" for tax purposes. For such option grants, the exercise premium is taxed at the ordinary income level while the ensuing gains are taxed as capital gains. As such, CEOs who are privately informed about positive news about a stock should exercise the options and hold the stock for the duration of price appreciation in order to minimize taxes. In our sample, however, we do not find more highly accelerated exercise-and-hold when future stock returns are higher among the target firms.

the 10% level) in the full sample. However, the change is not significant for the Execucomp sample. Thus, CEOs of smaller firms accelerate option exercises in order to own more shares, but the effect does not prevail among firms in Execucomp, which includes only firms in the S&P 1500 Index.[21]

[Insert Table 7 here]

Table 7 shows that variables that indicate high time value of options (*Year to maturity* and *Idio volatility*) are associated with lower incidence of exercise-and-hold. Additionally, our proxy for higher fundamental value (*Stock ret*) predicts fewer exercises. *%CEO firm wealth* is significantly and positive related to exercise-and-hold. This relation is exactly opposite to the predicted outcome from diversification motives. As before, we interpret the results as suggesting that some CEOs persistently accumulate shares in their firms. The earnings month has no effect on exercise-and-hold, presumably because no open-market transaction is involved. New grants make it more likely that CEOs exercise options (significant at the 1% level), presumably to maintain a target portfolio of unexercised options.

The effect of proxy contests on exercise-and-hold is consistent with the analysis in Section 1 and complements the results regarding exercise-and-sell. Aggregated at the firm-year level, the unconditional probability that a CEO will have a major exercise-and-sell (exercise-and-hold) in a given year is 8.1% (4.8%), and our analyses indicate that the probability decreases (increases) to 2.0% (7.7%) during the year the firm experiences a proxy contest. Out of the 1,029 proxy contests, if all CEOs maintain their normal rates of exercise-and-sell (exercise-and-hold), we should observe about 83 (49) of them exercise-and-sell (exercise-and-hold) during the proxy seasons; in fact we observe only 21 selling CEOs but 79 holding ones. To form a more specific connection between exercise-and-

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[21]The exercise-and-hold intensity for non-CEO insiders increases from 0.97% three years prior to proxy contest to 1.32% during the proxy contest year, corresponding to a 35% increase.

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hold and proxy contests, we explore the dynamics of exercise-and-hold decisions around record dates. We repeat the analysis in column (2) of Table 7 with the same firm-level controls except we replace the single variable $Contest$ with a pair of disjoint variables: $Contest * Before\ record\ date$ and $Contest * After\ record\ date$. In Table 8, we report only the coefficients on these new variables because the coefficients on the control variables are nearly identical to those in Table 7 and add no insights.

[Insert Table 8 here]

Results shown in Table 8 conform nicely to our hypotheses. Indeed, the acceleration of exercise-and-hold is more pronounced before a proxy contest reaches a resolution, especially before the record date where the difference in the before-and-after exercise behavior is significant. Equally interestingly, unusually high rates of exercise-and-hold by CEOs stop mostly at the record date, consistent with the needs to have shares by that time in order to boost actual voting power. It thus appears that exercise-and-hold is about acquiring actual voting rights.

Based on reasoning that is similar to that offered in Section 2.4.2, we separate the effect of the proxy contests from that of the record dates during non-contested proxy processes by adding to the regression two dummy variables: $No\ Contest * Before\ record\ date$ and $No\ Contest * After\ record\ date$. These variables are the same as those shown in column (2) of Table 4 and capture whether firms with similar characteristics exhibit the same exercise behavior before and after the record date in non-contested proxy seasons. The results, reported in column (2) of Table 8, reveals an interesting and significant (at the 1% level) acceleration of exercise-and-hold by CEOs right before the record dates during normal proxy seasons, suggesting that CEOs desire voting rights at the annual meetings even when there is no hostile contest. This could happen when dissidents put forward shareholder

proposals for voting at the annual meeting without launching a proxy contest.[22]

There are, however, two important distinctions between contests and non-contests. First, the ratio of the exercise-and-hold rate before and after the record date during contests is around 4.4 to 1, while the same ratio for non-contests is 2.6 to 1. That is, the desire to grab more voting rights right before the record date is stronger when there is a proxy contest. Second, the extra shares acquired via option exercises before the record date do not substitute for exercise-and-hold afterwards (the coefficient of 1.063 indicates a rate that is very close to the normal level). During a normal proxy season, CEOs' above-normal exercise-and-hold rates before the record dates is followed by slightly below-normal rates afterwards, leading to fewer extra shares acquired during the whole proxy season. Thus, while it affirms the role that record dates play in a general setting (with or without contests), Table 8 highlights the distinct effect of proxy contests on CEOs' share acquisitions via option exercises.

2.6. 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 out-of-the-money option exercises. Any option model that assumes a common valuation of the underlying security rules out exercising out-of-the-money options because the same shares could be acquired at the fair market price, which is lower than the strike price. For this reason, out-of-the-money option exercises by insiders epitomize the valuation wedge between insiders and the outside market.

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[22]Brav et al. (2008) show that hedge funds often launch their activist campaigns with shareholder proposals, and resort to the more aggressive proxy contests in about one-quarter of the cases. Although voting outcomes on the proposals are not legally binding, a voting outcome that is highly favorable to the dissidents will have a non-trivial negative impact on the firm/management due to public scrutiny and reputation concerns.

2.6.1. Data on out-of-the-money exercies

The main data source for analyzing out-of-the-money exercises remains the Thomson Reuters Insider Filing database. To identify out-of-the-money exercises, we do not rely exclusively 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-classifies the frequency of these transactions. In order to link option exercises with the resulting simultaneous stock purchases, we require both a "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 matching prices and number of shares.[23] To be conservative, our baseline definition of out-of-the-money exercise is that the strike price exceeds the daily high 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 filings, 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 a stock price below \$200. Using these filters, we uncover 1,497 out-of-the-money option exercises between 1996 and 2012. We compute the negative exercise premium to be the difference between the exercise price and the daily high price, scaled by the latter. The median (average) premium is 13% (37%), and the interquartile range is 4% to 43%. The average (median) time-to-maturity is 1314 (1157) days at the exercise point, comparable to the same figures for in-the-money options.

2.6.2. Determinants of out-of-the-money option exercises

This section explores the determinants of out-of-the-money option exercises at the firm-year level. The firm/CEO variables are defined in the same way as in Section 2.1

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[23]This procedure avoids misclassification due to coincidence, for example, when a CEO is awarded options and simultaneously buys the same amount of stocks at the same price.

except they are now recorded at the firm-year level. The dependent variable, OTM, is a dummy variable for the occurrence of any out-of-the-money option exercises. It captures the intensity of such events in a firm-year. We use the logit model for this specification.

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 3, we examine the relations using three nested samples with varying coverage by CRSP/Compustat and Execucomp. The results of this analysis are reported in Table 9. In columns (1) through (3) the analysis is performed in the full sample. In columns (4) through (6), the sample is restricted to include all firm-year observations where an insider has at least one vested out-of-the-money option during at least some months of the year. 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 many times the odds ratio $Pr(OTM)/[1 - Pr(OTM)]$ ($\approx Pr(OTM)$) 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.

[Insert Table 9 here]

The results in the first two columns of Table 9 indicate that the probability of an 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 when including firm-level controls, and is significant at the 1% level in both specifications. When limited to the sample covered by Execucomp, the coefficient on $Contest$ increases to 3.5, and is significant at the 5% level.

As a robustness check, we restrict the analysis to a "feasible set," i.e., firm-year observations where an insider has vested out-of-the-money options during at least some months of the year. Results shown in the last three columns of Table 9 indicate that the effect of proxy contests on the probability of an out-of-the-money exercise is both economically meaningful and statistically significant. While the probability of out-of-the-

money exercises ranges from 1.7% to 2.9% in this restricted sample, the same probability rises to 9.9% to 11.8% when a proxy contest is looming.

Most firm and CEO characteristics 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 or the CEO. The only notable exception is *Idiosyncratic vol*, which 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 an out-of-the-money exercise (imputed from the coefficients reported in columns (2) and (3)). There are two potential explanations for the significance of *Idiosyncratic vol*. First, high stock volatility may overwhelm a modest difference between the current market price and the strike price, and an out-of-the-money option could easily become in-the-money shortly. Second, some in-the-money option exercises might become out of the money between the decision to exercise and the actual execution due to the high volatility. These forces are largely orthogonal to proxy contests. Moreover, it would require a four standard-deviation change in *Idiosyncratic vol* to generate the same effect on the odds ratio as a proxy contest. Hence the presence of a proxy contest is, by far, the dominant determinant of out-of-the-money exercises.

In this context reverse causality—that is, the idea that shareholders are more likely to launch proxy contests when 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. To assess the importance of this hypothesis, we re-estimate the models in columns (1) to (3) of Table 9 using the conditional logit model with CEO (or firm) fixed effects to filter out firm/CEO-specific traits. Results are reported in the Appendix (Table A4). We find that the odds ratios associated with *Contest* are stable across all specifications. We therefore infer that circumstances, rather than unobserved personal (or firm) characteristics, lead

to out-of-the-money exercises. Overall, results suggest that the incumbents may resort to out-of-the-money exercises to defend their control of the firm.

Needless to say, the majority of the out-of-the-money exercises do not have proxy contests in sight. Other explanations for out-of-the-money exercises include data recording errors, high stock price volatility, funding of the exercise prices by the firm, and a tax motive.[24] This study establishes a relation between proxy contests and the propensity of CEOs to exercise out-of-the-money options, revealing the extent to which insiders are willing to go as a last resort in order to enhance their voting power.

3. The Premium Insiders Pay for Control: Inferences from Option Exercises

The previous sections have demonstrated consistent patterns of option exercise anomalies when proxy contests are in sight. Given the exercise distortions reported in this study, a natural follow-up question asks how large of a price premium insiders pay for control. Our earlier results indicate 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%). Additionally, Hypothesis 1 discussed in Section 1.2 indicates that a deceleration of exercise-and-sell could be generated by a valuation wedge between the insider and the marketplace.

To calibrate the implied parameter b (the incremental private valuation), we apply the certainty equivalent approach adopted in Hall and Murphy (2002).[25] We begin by estimating the value of an option for a risk-averse insider assuming the insider exercises the option optimally. We then impose an exogenous no-exercise window ("delay") of varying length and reassess the value of the option for the insider. By construction, the value of the call option to the insider under the constrained exercise policy is lower than it would

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[24]Data recording errors include simple clerical errors and incidences of option repricing that were not properly updated in the filings. The tax motive is analogous that explained in Footnote 20.

[25]Because these models implicitly assume that insiders exercise options for the sole purpose of selling, we do not have a structural procedure to infer the private valuation premium from accelerated exercise-and-hold.

be under an optimal exercise policy. The reduction in the option value corresponds to the loss in option value the insider is willing to bear for delaying exercise-and-sell when facing a proxy contest. Finally, we calculate the reduction in the stock value under the unconstrained regime needed to equate the option values under the two regimes. The reduction in the stock valuation is an estimate of the price insiders pay for delaying exercise-and-sell when facing proxy contests.

The default parameters are set to reflect the conditions of a typical option package in our sample: the exercise price (X) is \$30, time-to-maturity (T) is four years, and the option is currently 50% in the money in proportion to the current stock price. We assume that the stock pays no dividends, $\beta = 1$, $r_f = 6\%$, $\sigma = 30\%$, $r_m - r_f = 6.5\%$. Following Hall and Murphy (2002), we assume the insider's utility over wealth is $U(W) \equiv (1/(1-\rho))W^{1-\rho}$, where ρ is the constant relative risk aversion (CRRA) coefficient. We adopt the Capital Asset Pricing Model (CAPM) and assume that the distribution of stock prices in T years is lognormal with volatility σ and that the expected return is equal to $(r_f + \beta(r_m - r_f) - \sigma^2/2)T$, where β is the firm's systematic risk loading and r_m is the return on the market portfolio. The calibration results are reported in Table 10.

[Insert Table 10 here]

Table 10 presents three variations in time to maturity (4, 2, and 8 years in Panels A, B, and C), three variations in relative risk aversion (ρ=2, 3, and 10), and two variations in CEO wealth in the firm (50% and 75%). These are the standard permutations adopted in the literature. Our benchmark is "no delay" (0% delay), where we report the option value to the insider. We then calibrate the insider option values with delays in exercise equal to 25%-100% of the options' remaining life. For example, for an option with four years to expiration, this corresponds to a forced delay of 1-4 years in exercise.

Our key interest lies in the numbers in the "% Change" and "Implied Discount" columns in Table 10. "% Change" is the percentage change in option value relative to

the unconstrained option exercise policy. "Implied Discount" is the equivalent reduction in stock price under the unconstrained regime that equates the value of the option with the delay in exercise to the value under the optimal exercise policy. Suppose our default benchmark is an insider with a CRRA coefficient of 3 and with 50% of her wealth in the firm who exercises options optimally given her diversification needs but lacks any control motives. Imposing a one-year "no exercise" window on an option with four years to expiration will cause a 2.5% reduction in option value, corresponding to 1.3% of the stock's value. Imputed on the average stock market capitalization ($4,180 million) and the average size of vested options held by CEOs (1.8% of outstanding shares), the delay amounts to a reduction of $1.9 million in the value of options to the insider. The numbers quickly rise to 28.9% and 14.4% if the delay is for three years. In other words, it is as if the insiders value the stocks about 10-15% above the market price so that they exhibit the same delay in exercising in the absence of a control motive.

4. Conclusion

This study explores how CEOs' (and insiders') private benefits of control are reflected in their option exercise behavior. Through a series of analyses, the study documents that CEOs distort their option exercise behavior in order to boost their voting power prior to proxy contests. CEOs are significantly less (more) likely to exercise options in order to sell (hold) the resulting shares when a proxy contest is looming, and the results are more pronounced when the voting rights are ex ante more important. Our study uncovers a novel motive underlying CEO option exercises and highlights the role of proxy contests in addressing managerial agency issues.

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Figure 1: **Cumulative abnormal returns around proxy contests.** This chart plots the cumulative abnormal returns from the four-factor (market, size, book-to-market, and momentum) model from 24 months before the announcement of a proxy contest to 24 months after.
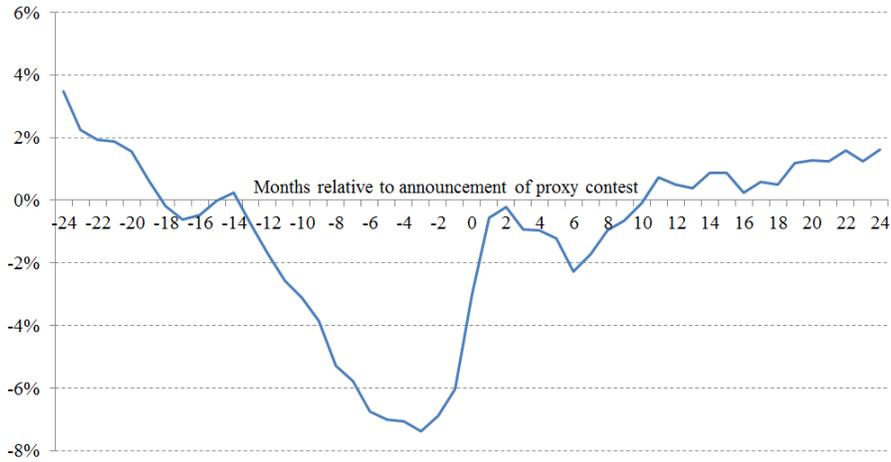

Figure 2: **Pre-existing trend.** The solid line plots coefficients of $Contest(t - j)$ for $j = 1, 2, 3, 4$. The dashed lines plot the corresponding 95% confidence intervals.
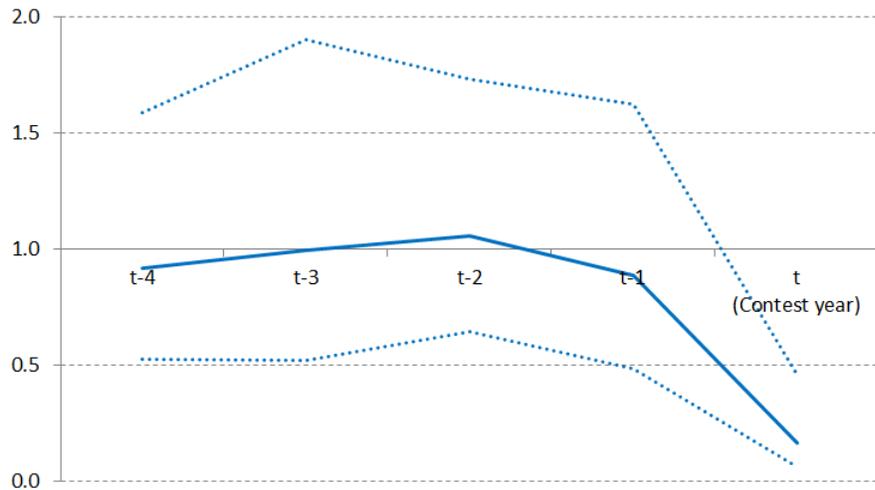
Table 1: **Variable Definitions.**

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

Table 2: **Summary statistics.** Panel A reports summary statistics for option and firm variables recorded at the option package-month level (the unit of observation for our main regression analysis) for the Compustat/CRSP sample. Panel B reports summary statistics for CEO variables for the Execucomp sample. Panel C reports ownership variables for the sample of firms subject to proxy contests. All variables are defined in Table 1. All potentially unbounded variables are pre-winsorized at the 1% and 99% extremes. Columns (1) and (2) report the 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)	Min (3)	25% (4)	Median (50%) (5)	75% (6)	Max (7)
A. Full Sample							
Exercise & sell	0.0046	0.0679	0.0	0.0	0.0	0.0	1.0
Exercise & hold	0.0027	0.0524	0.0	0.0	0.0	0.0	1.0
Vested options held by CEO	0.0179	0.0439	0.0000	0.0016	0.0055	0.0181	0.1746
Exercise size (# of shares)	104,004	345,222	334	12,900	35,000	96,000	1,445,000
Exercise size (% of shares)	0.0037	0.0120	0.0000	0.0003	0.0009	0.0028	0.0812
Exercise & hold size (# of shares)	130,615	482,120	334	10,000	30,000	100,000	1,445,000
Exercise & hold size (% of shares)	0.0066	0.0193	0.0000	0.0004	0.0016	0.0052	0.0812
Exercise & sell size (# of shares)	93,286	270,561	1,626	15,000	37,189	93,724	984,048
Exercise & sell size (% of shares)	0.0025	0.0069	0.0000	0.0003	0.0008	0.0022	0.0201
Contest	0.0042	0.0648	0.0	0.0	0.0	0.0	1.0
Years to maturity	3.94	2.62	0.00	1.75	3.67	5.92	18.00
Market Cap ($ mil)	4180	11129	8	184	705	2672	80829
BM	0.51	0.41	-0.12	0.25	0.42	0.66	2.45
Growth	0.20	0.35	-0.31	0.04	0.12	0.24	2.30
Stock ret	0.14	0.60	-0.84	-0.20	0.04	0.32	3.20
Idio volatility	0.45	0.26	0.13	0.26	0.37	0.56	1.47
Illiquidity	0.33	0.36	0.01	0.04	0.16	0.61	2.07
Dividend yld	0.02	0.04	0.00	0.00	0.00	0.03	0.23
Dividend record month	0.12	0.33	0.00	0.00	0.00	0.00	1.00
Earnings month	0.33	0.47	0.00	0.00	0.00	1.00	1.00
New grant	0.01	0.09	0.00	0.00	0.00	0.00	1.00
B. Execucomp Sample							
CEO age	55.26	6.79	29.00	51.00	55.00	60.00	89.00
CEO tot wealth ($ mil)	10.71	1.35	1.85	9.78	10.70	11.63	1100.00
% CEO wealth in firm	0.58	0.27	0.00	0.37	0.58	0.81	1.00
% Own Top 5	0.14	14.83	0.00	0.01	0.03	0.12	0.42
C. Ownership at Proxy Contest Targets							
incumbents' ownership	0.1091	0.1187	0.0000	0.0232	0.0680	0.1470	0.6030
dissidents' ownership	0.0962	0.1067	0.0000	0.0294	0.0810	0.1330	0.4100
Vested options held by CEO	0.0122	0.0168	0.0000	0.0022	0.0057	0.0153	0.0945

Table 3: **Exercise & Sell and proxy contests: Hazard model with competing risk.** This table shows the determinants of CEO exercise and sell decisions. Results are presented at the option package-month level using the Cox proportional hazards model with competing risks (Fine and Gray, 1999). The empirical methodology is described in Section 2.2. We estimate the relation between the subdistribution hazard rates and covariates for *Exercise&sell* as the main risk and *Exercise&hold* as the competing risk. All independent variables are as defined in Section 2.1 and Table 2. All regressions include yearly dummies. The table reports exponentiated coefficients or hazard ratios. The *t*-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported odds ratios are significantly different from unity. 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.

	(1)	(2)	(3)
Contest	0.2254***	0.2034***	0.3063*
	[-3.07]	[-3.35]	[-1.76]
Years to maturity		0.9963	1.0246*
		[-0.35]	[1.70]
Market cap		1.0446**	0.9644
		[2.49]	[-1.14]
BM		0.8241***	0.8466
		[-2.58]	[-1.56]
Growth		0.9354	1.1967*
		[-1.00]	[1.79]
Stock ret		1.9254***	2.1131***
		[23.76]	[19.14]
Idiosyncratic vol		0.3487***	0.3212***
		[-6.90]	[-4.90]
Illiquidity		0.5054***	0.0410***
		[-5.18]	[-4.27]
Dividend yld		0.2667**	0.4397
		[-1.99]	[-1.01]
Dividend record month		1.2154***	1.2666***
		[3.18]	[3.16]
Earnings month		0.7577***	0.7371***
		[-5.33]	[-4.56]
New grant		14.7853***	17.1961***
		[37.00]	[32.84]
CEO age			1.0025
			[0.54]
CEO tot wealth			1.0277
			[1.01]
% CEO wealth in firm			0.6098***
			[-4.21]
Year Dummies	Yes	Yes	Yes
# option package series	19,058	14,133	8,384
# option package months	1,024,673	643,958	356,882
# observations with y=1	4,713	2,962	1,642

Table 4: **Exercise & Sell dynamics around record dates and staggered terms.**
This table follows the same regression specifications as in Table 7 to explore the unique features associated with proxy contests: The record dates and the terms of staggered boards. In columns (1) and (2), the key variable *Contest* is partitioned into *Contest* ∗ *Before record date* and *Contest* ∗ *After record date* to indicate whether the current month (associated with a proxy contest) is before or after the date of ownership record that entitles the holder to voting rights at the upcoming meeting. In columns (3) and (4), the key variable *Contest* is partitioned into *Contests* ∗ *Nominated* and *Contests* ∗ *Not Nominated* to indicate whether the announced proxy contest is against a board in which the CEO is nominated for re-election at the upcoming meeting. In columns (2) and (4) we interact the new variables with *No Contest*, a dummy variable coded one if the observation belongs to a (size/book-to-markt/industry) matched firm which is not a target firm for a proxy contest during its proxy season in the same year and month. Firm-level control variables and yearly dummies are included in the regressions but not reported. Significance of differences is tested using chi-tests. The table reports exponentiated coefficients or hazard ratios. The t-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported hazard ratios are significantly different from unity. 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.

	(1)	(2)		(3)	(4)
Contests *	0.0000***	0.0000***	Contests *	0.0000***	0.0000***
Before Record Date	[-34.94]	[-34.78]	Nominated	[-77.83]	[-49.57]
Contests *	0.2420***	0.2412***	Contests *	0.0712***	0.0663***
After Record Date	[-2.95]	[-2.96]	Not nominated	[-3.39]	[-3.19]
p-val for the difference	0.000***	0.000***		0.000***	0.000***
No Contest *		0.6608	No Contest *		1.3784
Before record date		[-1.33]	Nominated		[0.58]
No Contest *		1.1128	No Contest *		1.1681
After record date		[0.51]	Not nominated		[0.32]
p-val for the difference		0.163			0.821
p-val for the dif-in-dif		0.000***			0.000***
Firm Controls	Yes	Yes		Yes	Yes
# option package series	14,133	14,133		5,381	5,381
# option package months	643,958	643,958		237,290	237,290
# observations with y=1	2,962	2,962		1,092	1,092

Table 5: **Exercise & Sell, proxy contests, and takeover defenses.** This table follows the same regression specifications as in Table 3 except that the key variable *Contest* is partitioned into a pair of disjoint variables, *Contests * Entrenched* and *Contests * Not Entrenched*. In column (1), *Entrenched* indicates that the firm has a greater number of E-Index provisions (Bebchuk et al., 2009) than the annual median of all sample firms. In column (2), *Entrenched* indicates that the firm has a staggered board structure. The sample is limited to firms with RiskMetrics coverage. In column (3), *Entrenched* indicates that during the year prior to the proxy contest a CEO was "overpaid," defined as a CEO who receives actual pay (using the total contracted compensation, or "tdc1," from the Execucomp database) of more than $1 million per year or who receives more than one-third over "normal" pay. "Normal" pay is the predicted value from a year-by-year compensation regression with the most common regressors used in the literature: firm assets (in log), return on assets, book-to-market, CEO age, age squared, CEO tenure (in log), and an industry fixed effect based on two digit SIC codes. Firm-level control variables and yearly dummies are included in the regressions but not reported. "Test of equality" tests equality of the two coefficients using chi-tests. The table reports exponentiated coefficients or hazard ratios. The t-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported hazard ratios are significantly different from unity. 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.

Entrenchment Measure	E-Index	Staggered Board	Overpaid
	(1)	(2)	(3)
Contest * Entrenched	0.0000***	0.0692***	0.0000***
	[-82.17]	[-3.33]	[-25.55]
Contest * Not Entrenched	0.2087**	0.5376	0.3174
	[-2.31]	[-1.04]	[-1.63]
Firm Controls	Yes	Yes	Yes
# option package series	8,897	8,993	8,520
# option package months	410,460	411,505	341,916
# observations with y=1	1,888	1,892	1,572
Test of equality (p-val)	0.000***	0.040**	0.000***

Table 6: **Exercise & Sell and the likelihood that dissident shareholders will win the contest.** This table follows the same regression specifications as in Table 3 except that the key variable *Contest* is partitioned into a pair of disjoint variables, *Contests * Votes are more Needed* and *Contest * Votes are less Needed*. In column (1), *Votes are more Needed* indicates that the contest occurred at a firm with positive cumulative abnormal returns (CAR) during the three month period centered on the announcement month. In column (2), *Votes are more Needed* indicates contests in which the outcome was ultimately determined by voting. In column (3), *Votes are more Needed* indicates that the contest occurred at a firm that delayed its annual meeting. In column (4), *Votes are more Needed* indicates that either two top shareholder advisory companies (Institutional Shareholder Services and Glass, Lewis & Co.) supported dissidents or at least one of the five shareholder advisory companies supports dissidents and nobody supports management. Firm-level control variables and yearly dummies are included in the regressions but not reported. "Test of equality" tests equality of the two coefficients using chi-tests. The table reports exponentiated coefficients or hazard ratios. The *t*-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported hazard ratios are significantly different from unity. 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.

	Positive CAR (1)	Voted Contest (2)	Meeting Delayed (3)	Support Dissidents (4)
Contest * Votes are more needed	0.0000***	0.0000***	0.0000***	0.0000***
	[-38.49]	[-72.93]	[-78.79]	[-62.12]
Contest * Votes are less needed	0.6888***	0.2563***	0.1757**	0.1947**
	[-0.57]	[-2.76]	[-2.27]	[-2.45]
Firm Controls	Yes	Yes	Yes	Yes
# option package series	14,132	14,133	14,133	8,897
# option package months	641,991	643,958	643,283	410,460
# observations with y=1	2,953	2,959	2,959	1,888
Test of equality (p-val)	0.000***	0.000***	0.000***	0.000***

Table 7: **Exercise & Hold and proxy contests: Hazard model with competing risk.** This table shows the determinants of CEO exercise-and-hold decisions. Results are presented at the option package-month level using the Cox proportional hazards model with competing risks (Fine and Gray, 1999). The empirical methodology is described in Section 2.2. We estimate the relation between the subdistribution hazard rates and covariates for *Exercise&hold* as the main risk and *Exercise&sell* as the competing risk. All independent variables are defined in Section 2.1 and Table 2. All regressions include yearly dummies. The table reports exponentiated coefficients or hazard ratios. The *t*-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported hazard ratios are significantly different from unity. 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.

	(1)	(2)	(3)
Contest	1.6031*	1.7318*	0.5342
	[1.86]	[1.84]	[-0.63]
Years to maturity		0.8817***	0.9036***
		[-11.02]	[-5.46]
Market Cap		0.7505***	0.8163***
		[-10.33]	[-3.85]
BM		0.8260**	1.1832
		[-2.19]	[0.93]
Growth		1.5959***	1.6203***
		[7.52]	[2.94]
Stock ret		0.9366	0.8140**
		[-1.32]	[-2.00]
Idiosyncratic vol		1.0763	0.7329
		[0.46]	[-0.77]
Illiquidity		0.9935	1.7182
		[-0.06]	[1.00]
Dividend yld		0.1861*	0.0232**
		[-1.93]	[-2.53]
Dividend record month		1.4199***	1.2151
		[4.19]	[1.56]
Earnings month		1.0603	1.1591
		[0.90]	[1.41]
New grant		8.7289***	7.6156***
		[21.70]	[14.27]
CEO age			0.9977
			[-0.30]
CEO tot wealth			1.0847
			[1.52]
% CEO wealth in firm			3.4119***
			[5.27]
Year Dummies	Yes	Yes	Yes
# option package series	19,058	14,133	8,384
# option package months	1,024,673	643,958	356,882
# observations with y=1	2,767	1,739	963

Table 8: **Exercise & Hold dynamics around record dates.** This table follows the same regression specifications as in Table 7 except that the key variable *Contest* is partitioned into *Contests ∗ Before record date* and *Contests ∗ After record date* to indicate that the current month (associated with a proxy contest) is before or after the date of ownership record that entitles the holder to voting rights at the upcoming meeting. In column (2) we add to the regression two additional regressors *No Contest ∗ Before Record Date* and *No Contest ∗ After Record Date*, where the first dummy variable is coded one if the observation belongs to a matched firm during its proxy season in the same year and the month is equal or prior to the month including the record date, and the second dummy is defined analogously. The matched firms are the same as described in Section 2.4.2. Firm-level control variables and yearly dummies are included in the regressions but not reported. Significance of differences is tested using chi-tests. The table reports exponentiated coefficients or hazard ratios. The *t*-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported hazard ratios are significantly different from unity. 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.

	(1)	(2)
Contest * Before Record Date	5.0098***	4.6783***
	[4.56]	[4.35]
Contest * After Record Date	1.1054	1.0633
	[0.21]	[0.13]
p-val for the difference	0.017**	0.016*
No Contest * Before record date		1.8665***
		[2.53]
No Contest * After record date		0.7123
		[-1.25]
p-val for the difference		0.0084***
p-val for the difference-in-difference		0.4799
Firm Controls	Yes	Yes
# option package series	14,133	14,133
# option package months	643,958	643,958
# observations with y=1	1,739	1,739

Table 9: **Determinants of out-of-the-money (OTM) exercise.** This table reports determinants of out-of-the-money exercises with three specifications at the firm-year level. All independent variables are defined in Section 2.1 and Table 1. The dependent variable is OTM—a dummy variable for the occurrence of out-of-the-money option exercises. The columns report odds ratios from logit models and the t-statistics associated with the original (unexponentiated) coefficients, which indicate whether the reported odds ratios are significantly different from unity. In columns (1) to (3), the analysis is performed using the full sample. In columns (4) to (6), the sample is restricted to include only firm-year observations where an insider has vested out-of-the-money options during at least one month of the year. 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.

Sample VARIABLES	Full (1)	Full (2)	Full (3)	Feasible Set (4)	Feasible Set (5)	Feasible Set (6)
Contest	2.6450***	2.7851***	3.4840**	3.4534***	3.7920***	7.0677***
	[2.68]	[2.81]	[2.09]	(3.08)	(3.24)	(2.93)
log(Market cap)		0.9578	1.0156		0.9152*	1.0071
		[-0.85]	[0.11]		(-1.75)	(0.05)
BM		1.0392	0.9554		1.0477	0.8484
		[0.35]	[-0.26]		(0.40)	(-0.77)
Growth		1.1264	0.2873*		1.2788**	0.3249
		[1.16]	[-1.72]		(2.47)	(-1.30)
Stock ret		1.0812	0.6396		0.5572	0.5444
		[0.07]	[-0.19]		(-0.50)	(-0.24)
Idiosyncratic vol		1.5380**	3.3490**		1.3709	2.3231
		[2.39]	[2.11]		(1.48)	(1.35)
Illiquidity		0.8475	0.9140		1.0660	1.4318
		[-1.30]	[-0.11]		(0.51)	(0.38)
CEO total wealth			1.1267			1.0613
			[1.02]			(0.46)
% CEO wealth in firm			0.5298			0.5828
			[-1.18]			(-0.97)
CEO age			1.0004			1.0053
			[0.02]			(0.28)
% Own top 5			0.4153			1.8138
			[-0.40]			(0.24)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.88%	1.02%	3.52%	2.75%	3.98%	5.06%
Observations	90,341	83,834	25,594	11,755	11,316	4,660
E(Y)	0.37%	0.38%	0.31%	2.88%	2.81%	1.67%
# observations with y=1	334	319	79	339	318	78

Table 10: **Option valuation with delay in exercise-and-sell.** This table reports the values of stock options with an exercise price of $30 and moneyness that is 50% of the market price using the Hall and Murphy (2002) method. The option value is estimated as the grant-date cash award that yields the same expected utility to the insider as receiving the option. The insider executive is assumed to have a constant relative risk aversion (CRRA) utility function with an initial wealth of $5 million split between riskless cash and company stock. The stock price is log-normal and returns follow the Capital Asset Pricing Model (CAPM). We assume the stock pays no dividends, $\beta = 1$, $r_f = 6\%$, $\sigma = 30\%$, $r_m - r_f = 6.5\%$. Panels A through C provide variations in time to maturity (4, 2, and 8 years). In each panel, the forced delay in exercise ranges from 0% to 100% of the time to maturity. "Option Value" is the value of the option from the executive's perspective. "% Change" is the percentage change in option value relative to the unconstrained option exercise policy. "Implied Discount" is the equivalent reduction in stock price under the unconstrained regime that equates the value of the option with the delay in exercise to that under the optimal exercise policy.

CRRA coef. (1)	% of wealth in stock (2)	0% delay Option Value (3)	25% delay			50% delay			75% delay			100% delay		
			Option Value (4)	% Change (5)	Implied Discount (6)	Option Value (7)	% Change (8)	Implied Discount (9)	Option Value (10)	% Change (11)	Implied Discount (12)	Option Value (13)	% Change (14)	Implied Discount (15)
Panel A: time to maturity 4 years, moneyness 50%														
2	0.5	32.8	32.7	-0.2%	0.1%	32.4	-1.2%	0.7%	31.7	-3.1%	1.8%	30.8	-5.9%	3.5%
2	0.67	30.5	30.0	-1.6%	0.9%	28.9	-5.2%	2.8%	27.5	-9.9%	5.4%	25.9	-15.2%	8.4%
3	0.5	30.4	29.6	-2.5%	1.3%	28.1	-7.4%	4.0%	26.3	-13.5%	7.3%	24.1	-20.5%	11.2%
3	0.67	30.0	27.1	-9.6%	4.8%	24.2	-19.2%	9.6%	21.3	-28.9%	14.4%	18.4	-38.8%	19.6%
10	0.5	30.0	21.1	-29.8%	14.9%	14.4	-52.2%	26.1%	9.2	-69.3%	34.6%	5.2	-82.6%	42.3%
10	0.67	30.0	17.5	-41.8%	20.9%	9.4	-68.7%	34.3%	4.5	-85.1%	42.8%	1.6	-94.5%	51.0%
Panel B: time to maturity 2 years, moneyness 50%														
2	0.5	31.0	30.9	-0.1%	0.0%	30.8	-0.5%	0.3%	30.5	-1.4%	0.7%	30.2	-2.5%	1.3%
2	0.67	30.0	29.5	-1.6%	0.8%	28.8	-3.9%	1.9%	28.1	-6.5%	3.3%	27.2	-9.3%	4.7%
3	0.5	30.0	29.2	-2.7%	1.3%	28.3	-5.8%	2.9%	27.2	-9.4%	4.7%	26.0	-13.3%	6.6%
3	0.67	30.0	27.9	-7.0%	3.5%	25.9	-13.5%	6.8%	24.0	-20.0%	10.0%	22.1	-26.4%	13.2%
10	0.5	30.0	23.4	-21.9%	10.9%	17.9	-40.4%	20.2%	13.3	-55.7%	27.9%	9.4	-68.7%	34.3%
10	0.67	30.0	20.7	-30.8%	15.4%	13.5	-55.1%	27.5%	8.2	-72.6%	36.3%	4.5	-84.9%	42.4%
Panel C: time to maturity 8 years, moneyness 50%														
2	0.5	36.6	36.5	-0.3%	0.2%	35.7	-2.4%	1.6%	34.2	-6.7%	4.5%	31.9	-12.8%	8.6%
2	0.67	32.6	32.0	-1.8%	1.1%	30.2	-7.4%	4.6%	27.6	-15.4%	9.5%	24.5	-24.8%	15.6%
3	0.5	32.4	31.6	-2.5%	1.5%	29.2	-9.7%	5.9%	26.1	-19.5%	12.0%	22.3	-31.1%	19.3%
3	0.67	30.2	27.4	-9.2%	4.9%	23.5	-22.2%	12.2%	19.2	-36.3%	20.4%	14.9	-50.6%	29.3%
10	0.5	30.0	20.2	-32.5%	16.3%	12.9	-56.8%	28.6%	7.4	-75.4%	40.0%	3.3	-89.1%	52.1%
10	0.67	30.0	16.1	-46.5%	23.2%	7.9	-73.7%	37.1%	3.2	-89.4%	49.0%	0.8	-97.4%	61.6%

Internal Appendix for the paper

"Out-of-the-Money CEOs: Private Control Premium and Option Exercises"

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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 those stated in Section 1.1.

We first show formally how the private benefits of control affect an insider's incentives 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 will not find it profitable to sell the stock. □

Proposition 1 leads to Hypothesis 1.

On the other hand, the record dates for proxy contests or dividends might trigger an early exercise of a call option. Below we provide two propositions 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 to 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 with the situation in which the private control premium is zero ($b = 0$).*

Proof. When a stock pays a constant dividend yield, an early exercise takes place if the 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. □

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

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 to the effect of the dividend yield. $\qquad\square$

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 prior to the maturity date of the option ($\tau < T$), and the insider assigns a positive value to the voting rights that will result from 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 help to defend 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 unity, 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. $\quad\square$

Lastly, 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 $(S_{\tau+} + D - X < 0)$ 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. □

Propositions 4 and 5 lead to Hypothesis 3.

Table A1: **Alternative definition of an exercise event.** This table reports the analysis of *Exercise&sell* and *Exercise&hold* decisions, while considering an exercise of at least 100 shares as an exercise event (as opposed to the primary definition of exercise, which considers an exercise event to be the exercise of 25% or more of the package). In columns (1) and (2), we estimate the relation between the subdistribution hazard rates and covariates for *Exercise&sell* as the main risk and *Exercise&hold* as the competing risk. In columns (3) and (4), we estimate the relation between the subdistribution hazard rates and covariates for *Exercise&hold* as the main risk and *Exercise&sell* as the competing risk. All independent variables are defined in Section 2.1 and Table 1. All regressions include yearly dummies. The table reports exponentiated coefficients or hazard ratios. The t-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported odds ratios are significantly different from unity. 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.

| | Exercise&sell | | Exercise&hold | |
	(1)	(2)	(3)	(4)
Contest	0.4567***	0.4218***	1.5997***	1.5598**
	[-3.59]	[-3.36]	[2.63]	[2.30]
Years to maturity		1.0738***		0.9747***
		[2.43]		[-3.54]
Market Cap		1.0539***		0.7446***
		[5.35]		[-16.77]
BM		0.7317***		0.8345***
		[-7.29]		[-3.18]
Growth		0.9096**		1.4223***
		[-2.2]		[7.60]
Stock ret		1.6637***		0.8096***
		[29.10]		[-6.76]
Idiosyncratic vol		0.5340***		0.8579
		[-7.6]		[-1.54]
Illiquidity		0.3745***		1.1774**
		[-10.84]		[2.51]
Dividend yld		1.0589		0.3694*
		[0.18]		[-1.90]
Dividend record month		1.0172		1.4705***
		[0.46]		[7.46]
Earnings month		0.6709***		1.0712*
		[-13.04]		[1.72]
New grant		4.9169***		3.8584***
		[25.17]		[18.33]
Year Dummies	Y	Y	Y	Y
Observations	1,023,073	642712	1,024,541	643,862

Table A2: **Exercise & Sell: Logit and conditional logit with CEO fixed effects.** This table analyzes the determinants of CEO option exercises. Results are presented at the option package-month level using logit and conditional logit (with CEO fixed effects) models. The conditional logit models rely on within-CEO variations and include only observations associated with those CEOs who experience at least one proxy contest and exercise options at least once. The dependent variable is *Exercise&sell*. All independent variables are defined in Section 2.1 and Table 1. The reported coefficients are odds ratios (or exponentiated coefficients). The *t*-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported odds ratios are significantly different from unity. 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.

	(1)	(2)	(3)	(4)
Contest	0.2355***	0.2517**	0.2071***	0.2088**
	[-2.96]	[-2.44]	[-2.96]	[-2.53]
Years to maturity	0.9529***	0.9721***	0.9081***	0.9191***
	[-6.50]	[-3.07]	[-8.81]	[-6.18]
Market Cap	1.0505***	0.9587*	1.2717***	1.1878**
	[3.52]	[-1.87]	[4.57]	[2.00]
BM	0.8268***	0.8158**	0.6618***	0.8995
	[-3.18]	[-2.56]	[-3.46]	[-0.61]
Growth	1.0743	1.2578**	1.3607***	1.5857**
	[1.27]	[2.43]	[2.95]	[2.49]
Stock ret	1.9487***	2.1750***	2.1836***	2.3286***
	[26.89]	[22.65]	[25.20]	[19.08]
Idiosyncratic vol	0.4069***	0.2697***	0.4562***	0.2764***
	[-6.67]	[-6.64]	[-3.84]	[-4.06]
Illiquidity	0.5318***	0.0724***	0.3931***	0.0299***
	[-5.25]	[-4.67]	[-4.60]	[-3.65]
Dividend yld	0.4838	0.6221	0.1502***	0.1865**
	[-1.44]	[-0.77]	[-2.99]	[-2.21]
Dividend record month	1.2335***	1.1606***	1.2859***	1.2089***
	[4.80]	[2.86]	[5.13]	[3.26]
Earnings month	0.8446***	0.8440***	0.8501***	0.8473***
	[-4.46]	[-3.59]	[-4.14]	[-3.39]
New grant	38.2279***	43.4929***	46.7947***	53.2327***
	[84.78]	[74.71]	[79.32]	[69.28]
CEO age		1.0063*		1.0162**
		[1.77]		[2.42]
CEO tot wealth		1.0134		1.1788***
		[0.62]		[3.47]
% CEO wealth in firm		0.7329***		1.0400
		[-3.33]		[0.26]
CEO FE	No	No	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Observations	651,829	360,878	385,668	240,737
Pseudo R^2	14.3%	16.4%	–	–

Table A3: **Option exercise dynamics during proxy contests and regular shareholder meetings.** This table follows the same regression specifications as in Tables 3 and 7 except that we add an additional regressor *Pseudo Contest*, which is coded one if the observation belongs to a matched firm during its proxy season in the same year and month. Firm-level control variables and yearly dummies are included in the regressions but not reported. Significance of differences is tested using chi-tests. The table reports exponentiated coefficients or hazard ratios. Column (1) reports hazard ratios for *Exercise&Sell* and column (2) reports hazard ratios *Exercise&Hold*. The t-statistics are associated with the original (unexponentiated) coefficients, and indicate whether the reported hazard ratios are significantly different from unity. 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.

	Exercise & Sell (1)	Exercise & Hold (2)
Contest	0.2032***	1.7316*
	[-3.35]	[1.83]
Pseudo Contest	0.9288	1.1031
	[-0.43]	[0.54]
p-val for the difference	0.003***	0.199
Firm Controls	Yes	Yes
# option package series	14,133	14,133
# option package months	643,958	643,958

Table A4: **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 2.1. We use the conditional logit model with firm (columns (1) and (2)) or CEO (column (3)) fixed effects. The table reports the odds ratios and t-statistics associated with the original (unexponentiated) coefficients, which indicate whether the reported odds ratios are significantly different from unity. 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.

	OTM (1)	OTM (2)	OTM (3)
Contest	4.4005***	4.5251***	5.4833*
	[3.16]	[3.20]	[1.72]
log(Market cap)		0.9474	0.5502
		[-0.42]	[-1.40]
BM		0.8794	1.0635
		[-0.87]	[0.12]
Growth		1.1010	0.3611
		[0.71]	[-1.25]
Stock ret (Size decile adj)		1.0330	5.5923
		[0.02]	[0.37]
Idiosyncratic vol		1.1638	8.2129*
		[0.48]	[1.86]
Illiquidity		0.8599	0.3428
		[-0.85]	[-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