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

Vyacheslav Fos

College of Business, University of Illinois at Urbana-Champaign

Wei Jiang

Graduate School of Business, Columbia University

First Version: November 2013

This Version: November 2014

[☆]We have benefited from discussions with Patrick Bolton, Gur Huberman, Robert Jackson, Oguzhan Karakas, Kevin Murphy, Lalitha Naveen, Suresh Sundaresen, and seminar/conference participants at Boston College, Cambridge, Cass, Columbia, Indiana, Irvine, Iowa, Maryland, Oxford, Rice, Stanford, Stern, UIUC, Wharton, the ASU Winter Finance conference, the 7th Annual Academic Conference on Corporate Governance (at LeBow College of Business), and the NBER Law and Economics Conference. We are particularly grateful to Nicholas Panos from the SEC for educating us on the institutional details related to this study. We also thank Joseph Abadi, Like Chen, Danning Du, Ye Li, and Yujia Liu for excellent research assistantship. Please send your comments to vfos@illinois.edu (Fos) or wj2006@columbia.edu (Jiang).

Out-of-the-Money CEOs:

Private Control Premium and Option Exercises

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 control challenges. Such deviations are closely aligned with features unique to proxy contests such as the record dates and nomination status. Moreover, a contest triples the probability that an insider exercises options out-of-the-money, an irrational strategy under conventional models. The various distortions suggest that incumbents value their stocks 5% – 10% higher than the market price when the voting rights embedded in the shares are valuable for defending control and preserving private benefits.

1. Introduction

On August 13, 2010, Leonard Riggio, Chairman of the Board and former CEO of the New York-based bookseller Barnes & Noble, Inc (ticker: BKS) exercised option to acquire 990,740 shares at a price of $16.96 a piece. The stock's closing price on that day was $14.46, and the daily high was $15.00. That is, Riggio paid a premium of 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 an expected close contest. Riggio held held a stake of 29.9% in the company, including vested options; Burkle was the second largest shareholder of the company with a 19.2% stake.

The incidence exposes an intriguing phenomenon: A CEO's (or other insiders with control power) option exercises could be affected by a desire to maintain control, which in turn reflects a "private control premium," broadly defined as the incremental value of shares perceived by the insider relative to that by the investor public when the shares entail the voting rights needed to reinforce control. From Riggio's decision to acquire shares via an option exercise, we can infer that his willingness to pay (i.e., private valuation) was at least as high as the exercise price of the option, while the market valued the stock no more than $15.00 on that day, and valued the stock around $15 in the following days, presumably after digesting the public disclosure of Riggio's share acquisition. Therefore, 13.1% is a lower-bound estimate for the valuation wedge between Riggio (who is willing to defend the private control premium at a cost) and the investor public.

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 the firm's valuation to insiders and outsiders. A proxy contest reveals that at lease some shareholders consider the incumbent CEOs or directors to be "out-of-the-money," i.e., their value to the

firm is lower than what they cost. When control is under challenge, voting rights embedded in the shares drive a valuation wedge between the insiders and the market. As such, the "out-of-the-money" CEOs may exercise vested options (including the in-the-money ones) in a way that is different from what the benchmark models without private control premium would predict.

Indeed, after controlling for the standard variables which 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%. Both phenomena are 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 constant other motives such as liquidity needs and diversification. On the other side, the insider is more likely to exercise an option early with an intention to hold the stock, whereas the voting rights which help defend the contest serve the equivalent role of a lumpy dividend. With high enough a valuation wedge, an insider may even exercise options out-of-the-money relative to the market price (but presumably still in-the-money relative to the private valuation), as Riggio did, if there are no cheaper ways to acquire the shares promptly.

Several additional tests help to affirm a connection between deviation from normal exercises by CEOs and proxy contests. 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[1]). We confirm that the qualitative and quantitative nature of the relation between option exercises and proxy contests is preserved with the inclusion of a CEO fixed effect.

Second, we show that deceleration (acceleration) of exercise-and-sell (exercise-and-hold)

[1]Previous literature (Malmendier and Tate, 2005a,b) argues that overconfident CEOs are reluctant to exercise-and-sell — a pattern observationally equivalent to their behavior under proxy contests.

is more pronounced before the exogenously set first record date (the date used to determine which shareholders are entitled to the voting rights) of a proxy season. Equally interestingly, the unusually high rates of exercise-and-hold by CEOs mostly stop at the record date — is, CEOs attempt to acquire shares precisely for the additional voting rights. On the other hand, the unusually low rates of exercise-and-sell continue beyond that point but in waning magnitude until the outcome date (in the form of an actual vote, a settlement, or withdrawal by the dissident). 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. Moreover, a comparison of exercises around the record date during a proxy contest and those during a non-contested proxy season indicates that the documented pattern is indeed driven by the proxy contests.

The third test follows Fos and Tsoutsoura (2014) and exploits firms with staggered board structure and shows that the deceleration of exercise-and-sell is more pronounced for CEOs who are nominated for re-election. The underlying assumption is that a CEO should be more eager to defend her own board seat than the seats of her fellow directors. Because a staggered board structure introduces pre-determined heterogeneity in the exposure of incumbent directors to proxy contests, the resulting difference in option exercise patterns should thus be attributed to the control challenges. A falsifying test compares the option exercises for nominated and non-nominated CEOs against themselves three years before when the nomination status remains the same but there was an absence of a proxy contest. The significant difference-in-difference affirms that the abnormal exercise patterns is uniquely associated with a contest.

The fourth set of tests confirm that CEOs are more likely to refrain from exercise-and-sell in order to preserve their voting power when such additional voting power are deemed more important, and when the private benefits that is endangered by the contest are larger. We proxy for the importance of incremental voting rights using both an ex ante measure

– whether the market response to announced proxy contest is positive or negative, and an ex post measure – whether the announced contest indeed goes into the voting stage rather than being settled/withdrawn. 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.

Last, we conduct a systematic analysis of all recorded out-of-the-money option exercises by insiders between 1996 and 2012. Any option model that assumes a common valuation of the underlying security prescribes that out-of-the-money options never be exercised. For this reason, out-of-the-money option exercises by executives have not been empirically analyzed. The Riggio/Barnes & Noble story turns out to be a recurring theme among the "out-of-the-money" CEOs: we find that the presence of a proxy contest during the current year triples the probability of out-of-the-money exercises. In fact, the concurrence of a proxy contest is the single most powerful explanatory variable for out-of-the-money exercises among the usual list of firm and CEO characteristics variables including CEO/firm fixed effects. To the extent that a valuation wedge between the insider and the outside market is a necessary condition for out-of-the-money exercise to occur in a rational model, such extreme form of deviation from normality provides a unique identification for the valuation wedge between the insiders and the market when control is contested.

This paper contributes to several strands of literature. First, the paper builds on and extends the literature on the private value of corporate control and the value of voting rights. 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). Our estimates isolate the private value accrued to agents

in control that is incremental to the "fair market value" where the latter could contain the value of voting rights to the outside shareholders. That is, rather than identifying the value of control for the marginal trader in the market — which tends to be small and may not bear a direct relation to that of the insiders' — this study provides initial evidence on insiders' private valuation of the stocks from their option exercises. Calibrated to option valuation models, the abnormal patterns (from decelerating the exercise-and-sell of in-the-money options to exercising out-of-the-money options) suggest that insiders value the shares above the stock price by 5% to over 10%.

Second, this study expands our understanding of the motives underlying option exercises by executives. A full understanding of the mechanism is crucial in designing efficient incentive schemes given the importance of options grants in executive compensation.[2] Prior work has explored the diversification motive based on the utility theory (e.g., work by 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, 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, despite that option compensation is meant to be an important mechanism to align the executives' interest with that of the shareholders. Our analysis also justifies certain exercising behaviors that were deemed to be irrational by previous studies (e.g., Poteshman and Serbin, 2003).

Third, the paper contributes to the corporate governance literature in general and in particular the sub-literature on shareholder activism in the form of proxy contests. Our

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

study indicates that proxy contests exert real pressure on the insiders, confirming the findings from earlier studies (e.g., Fos, 2014; Fos and Tsoutsoura, 2014). Moreover, the evidence of private benefits of control from the distortion of insider option exercise also supports the view that aggressive shareholder activism serves an important role as market-based corporate governance.

2. Hypotheses Development

2.1. 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 the European call option with the same parameters if the stock pays no dividends.

Under more realistic assumptions fitted to the CEO (or other key insiders of the firm) setting, a CEO should exercise options before expiration when they are sufficiently in the money (Detemple and Sundaresan, 1999; Hall and Murphy, 2002; Sircar and Xiong, 2007). Conditions contributing to the early exercise include CEOs' lack of diversification due to concentrated exposure in their own companies, and the fact that they can only reduce exposure by selling shares resulting from exercise, rather than from selling options directly. We take the optimal exercise without 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 the control by incumbents by seeking the right to vote other shareholders' shares in favor of the directors nominated by the dissident group. When the control of a firm is under contest, there might be a date

τ by which an extra share of ownership brings the CEO additional control premium in the amount of b. One can think about the following situation: By staying in her position, a CEO derives private benefits of control equivalent to a pecuniary benefit of B.[3] If her control is not challenged, she can continue to receive the benefit without distorting her option exercises and shareholdings. However, when her control is under contest and the outcome depends on shareholder votes, then additional shares held could increase the probability that the incumbents win the proxy contest by λ. Under such parameterization, b is just proportional to λB. The date τ 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 form of the challenges 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 an amount of b. Note that stock price S_t may already embed a control premium as perceived by outside blockholders (Barclay and Holderness, 1989; Dyck and Zingales, 2004) or to the marginal trader in the market for whom the value of votes may also increase when control is under contest (Kalay et al., 2014; Aggarwal et al., 2012). In contrast to the previous studies, we focus on the incremental control premium accrued to the incumbent relative to the outsiders. This becomes our Condition 1.

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

Moreover, there is a strictly positive probability $0 < \eta \leq 1$ that the insider is restricted

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

from trading shares of the company in the open market (see Section 2.3 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 during the same time.

2.2. Hypotheses about early exercises

Private benefits of control affect a CEO's incentive to exercise options prior to maturity. We consider two types of early exercises: an early exercise with an intention to sell the resulting shares and an early exercise with an intention to hold the resulting shares. We relegate the formal proofs to Appendix A, but explain the intuitions following each hypothesis.

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

The main intuition underlying Hypothesis 1 is that a CEO will 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 the date τ (when voting rights are needed) with an intention to hold the stock if $\tau < T$ (the maturity date).*

Hypothesis 2 suggests that if a CEO 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 in order to hold the stock. The intuition here is similar to exercising an option prior to the rationale for a dividend record date.

It follows from the previous discussion that 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 under the same conditions about trading restrictions.

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

2.3. Institutional background

We now discuss the institutional background regarding insiders' transactions in stocks and options that produce the two necessary elements underlying our hypotheses. First, insides may face restrictions from trading, or from deviating from pre-planned transactions, during a period when a proxy contest in under the way. Second, deviating from normal courses of option exercises is not subject to the same restriction.

Two two legal pillars governing insider trading are the Section 16 of the Securities Exchange Act of 1934 (and the various amendments) and the SEC Rule 10b-5. The law prohibits anyone to trade while "aware" of material nonpublic information. Under this principal, insiders (including executives and directors) face various forms of restrictions during informationally sensitive periods, such as announcement of earnings and events of material importance (e.g., M&As). Though proxy contests, which are informationally sensitive events, do not usually entail strict "black-out" periods for trading as earnings announcements, insiders bear potential legal risk if their transactions (that were not pre-committed) cause or coincide with large imminent stock price movements. Therefore, it is reasonable to assume that insiders face additional restrictions in trading compared to times of "peace." In Section 2.1, we model the restriction as a positive probability with which the insider is prohibited from acquiring additional shares from the open market.

In contrast, Section 16 provides lenient exemptions for transactions that involve a grant

or award. Specifically, option exercises by insiders are exempt from the rule as long as the exercise is not a "cashless" one and is not accompanied by an imminent sale of shares. Therefore, insiders can accelerate option exercises to acquire additional shares even if they possess sensitive information during a proxy contest. The rationale behind the exemption is that shares acquired due to option exercises are purchased from the corporation as opposed to the shareholding public. The case law and SEC rule recognize that there is no insider trading violation when the counterparty (here, the corporation) has equal knowledge.

In addition, the "Safe Harbor" in Rule 10b-5 allows an insider to cancel a planned trade (usually selling), even while in possession of inside information without constituting insider trading. Thus, during a proxy contest an insider could decelerate option exercises which were part of pre-committed plan to sell vested shares without incurring additional legal liability. The Safe Harbor reflects the U.S. Supreme Court's holding that there can be no liability for insider trading without an actual securities transaction.

On the surface, the deceleration (acceleration) of option exercises for the purpose of selling (holding) the resulting shares might be construed as a takeover defense in that the actions serve to defend/maintain control by the incumbents. Then it begs the question whether manipulating option exercises is as cost effective as the popular takeover defenses such as poison pills. There is a subtle but substantive difference between the two: while they can deter a change in majority control, the conventional takeover defenses are not necessarily effective in fending off aggressive shareholder activism often aiming at minority board representation.[4] For example, a poison pill effectively puts a limit on a dissidents stock ownership, but does not increase the votes supporting an incumbent. Similarly, while a staggered board structure can prevent dissidents from seeking board control, it cannot shield a particular incumbent from being voted out. This is why strategic option exercises

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

by insiders enhance incumbent voting power in a way not accomplishable by the common takeover defenses.

3. Option Exercises and Proxy Contests: Empirical Evidence

3.1. Data overview

To perform empirical analyses on distortions in option exercises by CEOs in firms undergoing proxy contests, we build our sample from five main data sources. First, information about CEO options and their exercises comes from the Thomson Reuters Insider Filings Data ("TIF" henceforth), accessible through WRDS. The data source captures all U.S. insider trading activities as reported on Forms 3, 4, 5, and 144.[5] Due to the coverage of the TIF database, we restrict our sample to 1996 and beyond. Form 4 is the most important document for our purpose because it contains information on both stock (or non-derivative) transactions and on derivative securities including options.[6] When options are exercised, filers must report the type of option involved, number of shares involved, strike price (how much it costs the insider to exercise each option), date the options vest, date the options expire, and holdings resulting from exercising the series of options.

For our research purpose, we focus exclusively on CEOs, and the unit for analysis is an option package belonging to a CEO at a given month between vesting and expiration. The construction of the data mostly follows the methods in Klein and Maug (2011). An option package is defined as options awarded to 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 (which is the starting date for our hazard analysis) to the date

[5]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 which includes exempt transactions not required on a Form 4. Finally, Form 144 reports proposed sales of restricted stock.

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

of exercise, expiration, or the end of the sample period (January 2013). The end date of a package is either the first date on which at least three-quarters of the options in the package have been exercised (which is the exit date in the hazard analysis), the date of expiration, or the last month of our sample period if more than a quarter remain unexercised (which is the censoring date in the hazard analysis). This results in 997,034 observations at option package-month level. The average in-sample duration of an option package is about 71 months.

We analyze two key action variables and relate them to proxy contests as well as firm/CEO characteristics. We first define *Exercise* as an exercise of at least a quarter of an option package. The one-quarter filter follows the default parameter used in Klein and Maug (2011), although the results are not sensitive to the exact magnitude chosen. The first action variable is *Exercise&sell*, defined as an exercise followed by a sale of at least 25% of the initial amount 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 is 0.46%, and that of exercise-and-hold is 0.28%, both at the package-month level. These figures are on par with those in Cicero (2009).

Second, information about the key independent variable of interest, proxy contests, was hand-collected from SEC filings PREC14C (a preliminary proxy statement in connection with contested solicitations) and DEFC14A (a definitive proxy statement in connection with contested solicitations) from EDGAR. This piece of data is updated from Fos (2014), which contains more details about the institutional background about proxy contests as well as the construction of the event variables. There are 1,029 announced proxy contests between 1996 and 2012, with annual incidences range from 33 (in 1996) to 89 (in 2008). We construct a dummy variable *Contest* equal to one if there was a proxy contest announcement during the current or past 12 months. At monthly frequency, the sample average of *Contest* is

0.42%.

Among the dissidents, a slight majority (51%) are hedge funds. The next biggest players are corporations (19%) and individual shareholders (16%). Fos (2014) documents that dissident shareholders in the 1980s relied more on hostile tender offers, during the last decade they have instead generally resorted to proxy contests in order to exert control or influence. 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 more freely engage in communication without a heightened legal risk, played an important role in the increasing frequency of proxy contests (Sharara and Hoke-Witherspoon, 1993; Bradley et al., 2010; Fos, 2014).

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.[7] The figure reveals three important features about the stock return process before and after proxy contests: First, target firms significantly underperform during the two years prior to targeting by about 10 percentage points below par risk adjusted returns. Second, the stock price jumps up by 5 - 6 percentage points upon announcement. Third, post announcement there is no significant drift in either direction. In other words, the market's assessment about the impact of proxy contests on the target firms upon announcement is unbiased. Given that we are analyzing CEO option exercises post announcement, the absence of a return drift indicates that any exercise motive based on anticipated future returns is not justified by the ex post realization of the returns.

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

[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 with the corresponding values recorded at the previous year-end or during the previous year: *Market cap*, the market capitalization of a company (which enters regressions in log values); $Book/market$, the book to market ratio of equity; *Growth*, the average annual sales growth for the last three years (or for as many years as available during the three-year period); *Idiosyncratic vol* is the stock's annualized residual return from a regression of daily stock returns on 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.

Fourth, we match our sample to the Execucomp database to retrieve and construct CEO characteristics, compensation, and wealth, some of which serve as proxies for their risk aversion and incentives to diversify. The granular information comes at the cost of losing about three-quarters of the sample. More specifically, we construct the following variables at the annual frequency (and impute to the monthly frequency): *CEO tot wealth* is the proxy for 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. The following variables are constructed at the monthly

level: *Earnings month* is a dummy variable equal to one if the firm announces quarterly earnings during the month. Corporate insiders are restricted from trading stocks during some informationally sensitive time windows (the "blackout period"), of which earnings announcement is a premier example. *New grant* is a dummy variable equal to one if the CEO receives new option or stock grants in the month. A CEO who targets a particular level of company exposure should be motivated to exercise and sell some vested options when they receive new grants (which are usually not vested). The last two variables are identified by Klein and Maug (2011) as important determinants for CEO option exercises.

Finally, we obtain data on takeover defenses from RiskMetrics in order to analyze the interaction between option exercises and managerial entrenchment. The takeover defense that is most relevant for proxy contests is a staggered board, which we single out in our analysis. Moreover, we consider the E-Index, a summary score of six components[8] that are considered by Bebchuk et al. (2009) to be the most effective in deterring takeovers and most exemplary of managerial entrenchment.

Definitions of the main variables are listed in Table 1. The summary statistics for option, firm, and CEO variables at the option package-month level (the unit for most regression analyses) are reported in Table 2. The table encompasses two panels corresponding to the CRSP/Compustat merged sample and the Execucomp sample as our main analyses will be conducted separately on the two samples with the trade-off between sample coverage and additional CEO information.

[Insert Table 1 here]

[Insert Table 2 here]

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

3.2. Hazard analysis with competing risk

This section develops an empirical strategy to study the effect of proxy contests on option exercise policy. Given the nature of the data structure (records of option packages over their "lifetime") and the research question (what motivate CEOs to exercise their options before maturity), the appropriate estimation method is a hazard analysis, for which the Cox proportional hazards model is among the most popular in such a setting (e.g., Klein and Maug, 2011) due to its flexibility on the base hazard functions. We make two major changes from Klein and Maug (2011) framework. First, we incorporate proxy contests as an explanatory variable of key interest. Second, we explicitly differentiate exercise-and-sell from exercise-and-hold because they are driven by different motives when control is at stake. As a result, each option package is subject to two types of "risk" of "exiting" before expiration: exercise in order to sell the stocks and exercise in order to hold the shares. Moreover, taking one exit "impedes" the other. That is, the two exit strategies are mutually exclusive but are not necessarily independent from each other (and if they are dependent, the sign of their dependence is *a priori* unclear). The right model for such a situation is the Cox proportional hazards model with competing risks developed by Fine and Gray (1999).[9]

The Fine and Gray (1999) model allows us to estimate the "subdistribution hazards" which is the instantaneous risk of exiting to exercise-and-sell (or exercise-and-hold) given that the option package has not been exercised for the purpose of holding (or selling) the resulting shares. Most relevantly, 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 subdistribution hazard rates associated with the covariates after and before the perturbation. For ease of interpretation and following the common practice, we report in tables the exponentiated

[9]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.

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.

Given that neither the direction nor the extent of dependence between *Exercise&sell* and *Exercise&hold* is ex ante clear, the relation between *Exercise&sell* and the explanatory variables is not informative about the latter's relation to *Exercise&hold*. We thus first estimate the relation between the subdistribution hazard rates and covariates for *Exercise&sell* as the main risk and *Exercise&hold* as competing risk, and then we reverse the order.

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

3.3. Determinants of exercise-and-sell

Most models analyzing the frictions in option exercises by insiders implicitly assume the insider intends to sell the resulting shares. The abnormal patterns in exercise-and-sell due to proxy contests thus uncover a determinant of CEO option exercise that is distinct from the other forces studied in the literature. Section 2 presents a hypothesis predicting that proxy contests should have a negative impact on the probability that a CEO will exercise his options early in order to sell the resulting shares. This section tests this hypothesis.

Results from the competing risk model are reported in Table 3. We conduct regressions on three decreasingly nested samples: (1) the universe of public companies covered by the TIF that award CEOs options; (2) a sub-sample of (1) with non-missing firm characteristic variables; and (3) a sub-sample of (2) that are covered by the Execucomp database so as to have CEO personal and wealth information. All regressions include yearly dummies and report exponentiated coefficients or hazard ratios. The neutral value of a hazard ratio is one, which indicates that the variation in the covariate does not

change the rate at which options are exercised. Due to the small value of unconditional exercise probabilities at the monthly frequency, hazard rates are indistinguishable from the instantaneous probabilities. The t-statistics are associated with the difference between the original (unexponentiated) coefficients and zero, and are indicative of whether the reported hazard ratios are significantly different from unit. The t-statistics are based on standard errors clustered at the option package level.

[Insert Table 3 here]

The pattern revealed in Table 3 is highly consistent across specifications. First and foremost, proxy contests significantly deter exercise-and-sell. The coefficients are stable with progressive inclusion of control variables. The presence of a proxy contest during the past 12 months reduces the instantaneous probability (i.e., the monthly rate) of exercise-and-sell to about one-fourth (0.20 to 0.30) of the normal level. The original hazard coefficients are significantly different from zero at the 1% level for the CRSP/Compustat samples and at the 10% level for the much smaller Execucomp sample. The results from the exercise-and-sell indicate that proxy contests motivate CEOs to maintain the option to acquire more shares.

Second, the coefficients on the control variables are mostly consistent with standard theories predicting option exercises. Table 3 shows that *Idio volatility* is associated with significantly lower incidences of option exercise-and-sell due to the high time value of options. On the other hand, the variable that proxies for higher fundamental value (*Stock ret*) predicts significantly more exercises. $\%CEO\ firm\ wealth$ is significantly and negatively related to exercise-and-sell. The relations are exactly the opposite of the predictions from diversification motives. We should interpret the results to mean that some CEOs desire to accumulate shares in their firms, and that such traits are highly persistent.

Finally, *Earnings month* and $New\ grant$ have the expected effects. Due to prevalent blackout periods for insider trading around the earnings announcement window, CEOs

reduce their exercise-and-sell during the earnings announcement month by about one quarter (corresponding to the hazard ratio of 0.74-0.76 in columns (2) and (3) in Table 3), and reduction is significant at the 1% level. New grants prompt CEOs to exercise more (significant at the 1% level), presumably to maintain a target portfolio of unexercised options. The hazard ratio associated with new grants is 15-17 times, raising the exercise probability of 0.44% in a typical month to 7-8% during a month with new grants. Such actions suggest that CEOs have a target level of option holdings, which provides support for the diversification motivation.

3.4. Attributing exercise behavior to proxy contests

The specification in Table 3 pools cross-sectional and time-series relations. A primary concern impeding a causal interpretation is that abnormal exercises and proxy contests could both be influenced by a common cause. This section presents multiple tests to rule out the alternative explanation as the driving force and to attribute the exercise behavior to CEOs' desire to maintain control when the latter is under contest.

3.4.1. Does unobserved CEO heterogeneity drive the results?

Proxy contests and deceleration in exercise-and-sell could both be driven by some CEO-specific inherent trait, for which overconfidence is a prime candidate. 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 same literature documents that CEO overconfidence leads to suboptimal capital structure and over investment, and that the resulting inefficiencies could also attract shareholder activism (Brav, Jiang, Partnoy, and Thomas, 2008; Fos, 2014).

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. We change the model specification because the existent competing risk models do not deliver consistent estimates when fixed effects are incorporated. By design, only observations associated with CEOs that ever experience a proxy contest and exercise options at least once are included in the analysis.[10] Results are reported in the Appendix (Table A1). We find that the coefficients on *Contest* are highly consistent between the hazard model and the logit model, that is, the presence of a contest reduces the probability of exercise-and-sell to one-fourth of its normal level. Once we incorporate the CEO fixed effects, results indicate that the effects of a proxy contest, as well as some of the key firm/stock level characteristics, are very close to those from the corresponding sample but without fixed effects. This suggests that the determinants for exercise operate cross-sectionally and within CEO in very similar ways due to the common economic motives, and are not due to CEO inherent traits.

With CEO fixed effects included, $CEO\ tot\ wealth$ becomes significantly positive, suggesting that when a CEO accumulates more wealth, she also becomes more prone to exercising. This is consistent with the diversification motive. Moreover, $\%CEO\ wealth\ in\ firm$ loses its significance when analyzed within-CEO, indicating that the same CEO's propensity to exercise is not related to her existing exposure to the firm. Comparing this with the significantly negative relation between firm-specific exposure and exercise-and-sell in the cross section (see Table 3), we learn that some CEOs desire to maintain and accumulate high exposure in their own companies and that this desire is highly persistent. The heterogeneity comes from the cross-section and not from within a CEO.

[10]The logit model is different from the hazard model with competing risk in several ways. First, we treat each firm-month as a parallel observation without incorporating the information of its conditional "survival." Second, in the logit model, all exercise-and-buy observations are excluded from the analysis for exercise-and-sell, rather than treated as competing risk with unknown correlations. For the same reasons, the competing risk model is better suited for the situation, but the only the conditional logit model allows a fixed effect.

3.4.2. Pre-existing trend and placebo test

First, 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 not 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 targeted at the firm. If a firm experiences repeated contests in consecutive years only the first one is counted. We plot the coefficients on $Contest(t-j)$ and the corresponding 95% confidence intervals in Figure 2. The chart shows a clear lack of a pre-exiting trend: CEOs in firms under proxy contest maintained their normal rate of exercise-and-sell (the coefficients being indistinguishable from the neutral value of one) all the way to the year before the contest, and then the rate of exercise-and-sell drops precipitously to about 20% of the normal level during the year of the contest. This result echoes that of Table A1 that the observed deceleration of exercise-and-sell is driven by circumstances associated with proxy contests rather than by unobserved firm heterogeneity.

[Insert Figure 2 here]

A related placebo test confirms that CEOs decelerate option exercise-and-sell only when there is a proxy contest, and not during a regular proxy season around annual shareholder meetings. In this test, we locate a "match" firm for each event firm from the same stock market capitalization and book-to-market quintile (we use the NYSE quintile cutoffs following the standard literature) during the contest year, and from the same four, three, two, or one-digit SIC code till 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 match firm is that it does not have a proxy contest during a three-year period centering on the year in consideration. For each match firm, we create a "pseudo contest" event in the same

year by creating an pseudo "announcement date" with the same distance to the shareholder record date for the proxy season as the distance between the two dates for the true events. In other words, observations with $Contest = 1$ and those with $PseudoContest = 1$ belong to firms with similar characteristics during the same time in a proxy season – they only differ in whether there is a proxy contest.

We then run the same regression as before except the key regressors are now $Contest$ and $PseudoContest$. The results are reported in the Appendix (Table A2) and suggest that the estimated hazard rates are 0.2032 (significantly different from one at the 1% level) and 0.9288 (not significantly different from one), and the difference is significant at the p-value of 0.003. Hence, the deceleration of exercise-and-sell is unique to proxy contests, and is absent during normal proxy seasons.

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

The previous section shows that time-invariant CEO characteristics are not driving the results. There is still the possibility that some time-varying unobservable firm or CEO specific characteristics causes both the abnormal exercise patterns and proxy contests. We next explore the dynamics of and features unique to proxy contests in order to form a sharper connection between two phenomena.

First, we study option exercises before and after the record date. Proxy contests typically occur in connection with the companies' annual meeting of stockholders, 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 annual meeting and corporate elections. In other cases, the manner of fixing a record date is determined by the bylaws of a corporation. Record dates are occasionally subject to change, usually at the managers' discretion to their own favor (Kalay et al. (2014)), we use the first record date so as to alleviate endogeneity concerns. The typical time interval between a record and meeting dates is around 50 days. Given that the significance of ownership as actual voting power is more relevant before

the record date, we expect the exercise patterns documented in Section 3.3 to be more pronounced in the pre-record date period if they are driven by control contests.

We repeat the specification of column (2) in 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 the 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 in Table 3 and do not add insights.

[Insert Table 4 here]

Results are highly informative. Indeed, the deceleration of exercise-and-sell is more pronounced before the record date. The differences in the before-and-after exercise behavior is significant (see the "Test of equality" toward the bottom of the table which tests the equality of the coefficients associated with $Contest * Before\ Record\ Date$ and $Contest * After\ Record\ Date$. Exercise-and-sell virtually comes to a halt before the record date (as indicated by the coefficient of zero). However, although the unusually low rates of exercise-and-sell last beyond the record date, the difference between the actual and normal frequency of exercise-and-sell transactions becomes far less extreme. A lack of exercise-and-sell allows CEOs under contest to maintain the option to acquire more voting rights when needed. As long as the proxy contest is still looming, a CEO could still act defensively and avoid selling shares from option exercises even beyond the record date. In our sample, 20% of the event companies were repeated proxy contest targets; 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 given 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 restrain from selling before the record date in any proxy season (even in the absence of a contest) under two hypotheses. First, a significant reduction of CEO ownership revealed right before the annual shareholder meeting might be taken by the market as a negative signal. Second, all companies' annual shareholder meetings encompass proposals for voting, and a CEO could desire voting rights on issues 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 normal proxy season, 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 match firm during its proxy season in the same year and the month is on or before the record date, and the second dummy indexes for being after the record date. The match firms are the same as described in Section 3.4.2. Results are reported in column (2) of Table 4 Panel A. The exercise-and-sell rate is indeed a bit slower than usual before the record date during a normal proxy season, but completely resumes to normal afterwards. However, the before-and-after difference is not significant. More importantly, the difference-in-difference comparing the before-and-after change during proxy contests and normal proxy seasons are significant at less than the 1% level, indicating the crucial importance of a proxy contest in decelerating exercise-and-sell.

Second, we consider the sub-sample of firms with a staggered board structure, which allows us to explore directors' differential vulnerability to contests due to their nomination status. Conditional on a proxy contest against a staggered board, some incumbent directors are up for re-election because their term has expired. Other directors may continue to serve as they wish simply because they are not up for re-election. Fos and Tsoutsoura (2014) show that nominated directors experience significantly more negative career consequences when the firm is a target in a proxy contest relative to non-nominated directors. As a result, the heterogeneity in the exposure of incumbent directors to proxy contests should

be reflected in their option exercises under our hypotheses. That is, nominated CEOs should refrain from exercise-and-sell even more than non-nominated CEOs, conditional on a proxy contest.

To test the hypothesis, we follow a similar specification as in Table 4 breaking the key variable *Contest* into the following pair of disjoint variables: $Contest * Nominated$ and $Contest * Not\ nominated$. The results, reported in column (1) of Table 5, 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 nominated CEOs (see p-val for the difference). We thus conclude that deceleration in option exercise-and-sell is more pronounced among CEOs who are more directly exposed to proxy contests.

[Insert Table 5 here]

Similar to the analysis of the record dates, an argument could be made that a CEO nominated in a proxy season could be reluctant to appear selling for fear of sending negative signals to the market, even when there is no proxy contest. To tease out the effect attributable to proxy contests, we add to the regression two dummy variable regressors, $No\ Contest{*}Nominated$ and $No\ Contest{*}Not\ nominated$, where 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 during a year with the same nomination status (because almost all staggered boards adopt a three-year staggered term) but without a proxy contest.[11] Results, reported in column (2) of Table 5, indicate that CEOs generally do not slow down their option exercises whether they are nominated or not during a proxy season without contest. Again, the difference-in-difference between proxy contest and normal proxy season

[11] If the proxy contest target firm experience another contest three years ago, then $No\ Contest{*}Nominated$ and $No\ Contest * Not\ nominated$ are codes as zero.

for the nominated and non-nominated CEOs is significant at less than the 1% level.

To summarize, it is important to note that the first record date and a nomination status are both pre-determined variables that neither a CEO nor a dissident can impact. The fact that the exercise patterns are closely entwined with these features indicates that CEOs manipulate option exercises in response to the evolvement of individual contesting events — rendering proxy contests the most plausible explanation for CEOs' deviation from "normal" option exercise patterns.

3.4.4. 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 start with the commonly used proxies in terms of takeover defenses (Gompers et al., 2003). We again follow the specification in Table 5 with the following pair of disjoint variables: $Contest * Entrenched$ and $Contest * Not\ Entrenched$. The results are reported in Table 6.

[Insert Table 6 here]

In the first column, we classify firms into two groups using the Bebchuk et al. (2009) E-Index, which counts the number of six key anti-takeover provisions.[12] Firms with E-Index values higher than the sample median in a given year (the all sample median is 2) are considered "entrenched" and the complement set are "not entrenched."[13] 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.

[12]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 more data availability.

[13]We sort the E-index by year because the values after 2006 are not comparable (within or cross firms) to those before 2006.

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's actual pay (using the total contracted compensation, or "tdc1," from the Execucomp database) being 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 a two-digit SIC fixed effect. The procedure results in about one-quarter of the CEOs under contest being classified as "over-paid." These CEOs presumably have stronger incentives to defend the larger pecuniary private benefits.

Results in Table 6 indicate that the deceleration of exercise-and-sell is more pronounced for "Entrenched" CEOs — that is, CEOs who are already equipped with more defenses against dissidence and who had been receiving compensation that appear excessive compared to peers. The differences in the *Entrenched* and *Not Entrenched* exercise behavior is significant (see the "Test of equality") using all three entrenchment measures.

Table 6 further reveals that option exercises serve as complements, rather than substitutes, for other defenses. The apparent complementarity provides two pieces of insights. First, CEOs who receive greater benefits from control are likely to take advantage of all available options. Second, the voting rights associated with option exercises could be more effective in fending off non-control-aiming aggressive dissidence, which is not deterred by the conventional takeover defenses (see the discussion in Section 2.1).

3.4.5. Option exercise-and-sell and expected outcome of contest

Given that deviating from normal option exercise plans is costly to CEOs, they should be resort to the strategy more when it is necessary or the resulting incremental voting power is *ex ante* pivotal. Market reaction upon the announcement of a proxy contest is informative about the level of support the dissident enjoys from outside shareholders. And

the CEO is facing more challenge when the market warmly welcomes the emergence of a dissident. Therefore, we reestimate the regression splitting the contest events into two groups, those with positive cumulative abnormal returns (CAR) during the three month period centering on the announcement month ($Contests * Dissident\ Likely\ Win$), and those with negative CARs ($Contest * Dissident\ Unlikely\ Win$).[14] The two key regressors now become $Contests * Dissident\ Likely\ Win$ and $Contest * Dissident\ Unlikely\ Win$. Results are reported in the first column of Table 7, which shows that when the dissents have support from the investor public, the CEOs almost completely stop exercise-and-sell. In contrast, when the market reacts negatively to the announcement of a proxy contest, the dissident–who is a minority shareholder who can only succeed with persuasion of fellow shareholder–is unlikely to win. In that case, the CEOs slow down exercise a bit from normal rates, but not significantly so. The difference between the two rates is significant at the 5% level.

[Insert Table 7 here]

We also expect the deviation from normal option exercises to be more pronounced when the CEOs expect the contest to be a close call such that CEOs would resort to anyway to boost incumbent voting power. There are three major potential outcomes of a proxy contest:[15] (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 is an indication that at least one party is not confident about winning a fight. (3) About 44.6% of the announced contest actually ended with a voting contest with dissents winning 63.4% of the voted contests. For such an event, both parties perceive a reasonable probability of winning on their own side,

[14]The CARs are estimated using a four-factor (market, size, market-to-book, and momentum) model using 73 monthly observations (or as many as 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 perceive proxy contests as bringing value-enhancing changes.

[15]There is residual "other" category which is both small and uninformative.

and hence are ex ante close-calls. Moreover, voting rights have ex post realized values only in this category. Indeed, result in column (2) of Table 7 reveals that among ex post voted contests, CEOs virtually halt exercise-and-sell in order to preserve all their voting rights.[16] For the non-voted events, CEOs slows down 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 deterrence. The difference between the two is again significant at the 5% level.

Overall Table 7 fully supports the hypothesis that CEOs are more aggressive in preserving voting power when the voting rights are ex ante more valuable based on the market support for dissidents and whether the announced proxy contests actually materialize into a contested vote.

3.5. 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 other motives such as taxation.[17] In this section, we analyze the effect of proxy contests on exercise-and-hold.

Results from the competing risk model are reported in Table 8. 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 the 10% level) in the full sample. However, the change is not significant for the Execucomp sample.

[16] We collected data on the ex post "winning margins" for voted contest, defined as the difference between the lowest votes a winning party receives and the highest votes a losing party receives. The interquartile range is 26% to 99%. Because the CEOs almost never exercise-and-sell during a voted contest as shown in Table 7, splitting the sample by ex post winning margin will yield identical rate of exercise-and-sell (i.e., zero) in all subsamples. That is, the fact that the contest goes to a voting stage is sufficient to minimize option exercise-and-sell, the ex post closeness of the voting outcome does not play a role.

[17] 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 the stock should exercise the options and hold the stocks for the duration of price appreciation in order to minimize taxes (Cicero, 2009).

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.

[Insert Table 8 here]

Table 8 shows that variables that indicate high time value of options (*Year to maturity* and *Idio volatility*) are associated with lower incidences 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 prompt CEOs to exercise more (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 2. This motive to exercise-and-hold has not been analyzed before. To form a sharper connection between exercise-and-hold and proxy contests, we explore the dynamics of exercise-and-hold decisions around record date. Given that the significance of ownership as actual voting power is more relevant before the record date, we expect the exercise-and-hold patterns to be more pronounced in the pre-record date period.

We repeat the analysis in column (2) of Table 8 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 9, we report only the coefficients on these new variables because the coefficients on the control variables are nearly identical to those in Table 8 and do not add insights.

[Insert Table 9 here]

Results in Table 9 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 differences in the before-and-after exercise behavior is significant (see the "Test of equality" which tests the equality of the coefficients associated with $Contest * Before\ record\ (outcome)\ date$ and $Contest * After\ record\ (outcome)\ date$. Equally interestingly, unusually high rates of exercise-and-hold by CEOs mostly stop at the record date, consistent with the needs to have shares by that time in order to boost actual voting power. It thus appears that exercise-and-hold is about acquiring actual voting rights.

Based on a similar argument as in Section 3.4.3, we separate the effect of the proxy contests to that the record dates during non-contested proxy processes by adding to the regression two dummy variables $No\ Contest * Before\ record\ date$ and $No\ Contest * After\ record\ date$ which are defined in the same way as in column (2) of Table 4 to capture the situation of firms with similar characteristics during the non-contested proxy seasons. Results, reported in column (2) of 9, 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.

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 times; while the same ratio for non-contests is 2.6. That is, the desire to grab more voting rights right before the record date is much stronger when there is a proxy contest. Such a desire could be intensified when dissidents put forward shareholder proposals for voting at the annual meeting without launching a proxy contest.[18] Second,

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

the extra shares acquired via option exercises before the record date does 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 before the record dates is followed by slightly (not significant) below-normal rates afterwards, leading to fewer extra shares acquired during the whole proxy season. Thus, while they affirm the role that records date play in a general setting (with or without contests), more importantly, results in Table 9 highlight distinct effect of proxy contests on CEO's share acquisition via option exercises.

3.6. 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 prescribes that out-of-the-money options never be exercised because the same shares could be acquired at the fair market price which is lower than the strike price of the options. For this reason, out-of-the-money option exercises by insiders epitomize the valuation wedge between insiders and the outside market. This section analyzes the relation between out-of-the-money exercises and proxy contests at the firm-year level.

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

The main data source to analyze out-of-the-money exercise remains the Thomson Reuters Insider Filing database. To identify out-of-the-money exercise, we do not exclusively rely on the transaction code in TIF — where "O" is coded for exercise of out-of-the-money derivative securities defined by the SEC — because the coding severely under-classifies the frequency of these transactions. In order to link option exercise with the resulting simultaneous stock purchase, 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 matched prices and number of shares.[19] Our baseline definition of out-of-the-money exercise is that the strike price exceeds the daily high price so as to be on the conservative side. The results are robust to using daily close price as the market price, or requiring the price spread to be at least 1% of the market close price.

For the initially identified out-of-the-money exercise cases, we cross-check the strike price recorded in TIF with the original records in Form 4, and the stock priced recorded in CRSP with another source such as Yahoo Finance or Bloomberg. We declassify a case if any information source indicates that the exercise was in the money, or if there is a stock split around the time. Moreover, we further require a minimum exercise of 100 shares and the stock price to be below $200. Using these filters, we uncover 1,497 out-of-the-money option exercises between 1996 and 2012. 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%.

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

This section explores the determinants of out-of-the-money option exercises. The firm/CEO variables are defined in the same way as in Section 3.1 except they are now recorded at the firm-year level. Two dependent variables capture the intensity of such events in a firm-year. The first, OTM, is a dummy variable for the occurrence of any out-of-the-money option exercises. We use the logit model for this specification. The second dependent variable, $\#OTM$, is the number of such incidences during the firm-year, which is a non-negative count number. Hence we use the negative binomial model, which is suitable for count data with unidentified correlation.

The key independent variable is *Contest*, a dummy variable equal to one if there is an announcement of a proxy contest for the same firm-year. Control variables include firm and

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

CEO characteristics. As in Table 3, we examine the relations using three nested samples with varying coverage by CRSP/Compustat and Compustat. The two by three sorting yields six specifications, the results of which are reported in Table 10.

[Insert Table 10 here]

In columns (1) to (3) of Table 10, 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 $\Pr(OTM)/[1 - Pr(OTM)]$ will multiply when there is a proxy contest for the firm in the same year, relative to the odds ratio in a non-contest firm-year. Given that $\Pr(OTM)$ is unconditionally very small (0.4% for the full sample), the odds ratio is virtually indistinguishable from $\Pr(OTM)$. Hence, for simplicity we will just interpret this coefficient as how the probability of out-of-the-money exercise will multiply when the control for the firm is under contest. The results in the first two columns of Table 10 indicate that the probability of out-of-the-money exercise increases by 2.6-2.8 times (i.e., from about 0.4% to 1.1%). The effect is stable 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. Overall, proxy contests are positively and significantly associated with the incidences of out-of-the-money option exercises.

Moreover, 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 and the CEO. Section 2 points out that trading frictions could make out-of-the-money (with moderate negative premium) exercises rational if buying shares from the spot market incurs high transaction costs or is restricted due to insider trading rules. Therefore, a priori we expect out-of-the-money exercises to be more likely among the less liquid stocks. Somewhat surprisingly, the Amihud illiquidity

measure (*Amihud illiq*) is not significant. *Amihud illiq* turns out to be highly correlated (with a correlation coefficient of 0.6) with idiosyncratic volatility (*Idiosyncratic vol*), but *Amihud illiq* remains insignificant even when we exclude *Idiosyncratic vol* from the regression. Therefore, trading restrictions, rather than the conventional transaction cost of buying shares from the stock market, is more likely to be a factor in prompting out-of-the-money exercises.

On the other hand, *Idiosyncratic vol* is significant at the 5% level with an economically meaningful magnitude: An interquartile change in the variable leads to a 1.2 – 1.7 times increase in the probability of out-of-the-money exercise (imputed from the coefficients reported in columns (2) and (3)). 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. It is worth noting that 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 for out-of-the-money exercises.

The second dependent variable we analyze, $\#OTM$, is the number of incidences of out-of-the-money exercises for the firm-year, which is a non-negative integer number. The appropriate estimation model is the negative binomial model, which assumes that the count variable is generated by Poisson processes with dispersed mean arrival rates that are proportional to an exponentiated linear function of the covariates. Columns (4)–(6) of Table 10 report estimates of the negative binomial model. The key coefficient on *Contest*, ranging between 2.49 and 3.40, indicates the magnitude of semi-elasticity, or $\partial ln(\#OTM)/\partial Contest$. Approximately, the number of out-of-the-money exercises more

than doubles (in the Compustat sample) or even triples (in the Execucomp sample) the normal incidences when proxy contests are looming (all significant at the 1% level). The magnitude of the coefficient is in close synchronicity with that from the logit analysis (columns (1) to (3)). Therefore, we conclude that proxy contests are positively and significantly associated with the number of out-of-the-money option exercises.

In this context, a reverse causality — that is, shareholders are more likely to launch proxy contests when the insiders acquire shares out-of-the-money — is implausible. However, it is possible that some unobserved factors (such as CEO characteristics) could drive both option exercise patterns and the firm's vulnerability to proxy contests. To assess the importance of this hypothesis, we re-estimate the models in columns (1) to (3) of Table 10 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 A3). We find that the odds ratios associated with *Contest* are stable across all specifications and are even stronger than the coefficients in Table 10 (all significant at the 10% level or better). 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 exercise 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, funding of the exercise prices by the firm, and a tax motive.[20] Importantly, we establish a significant and robust relation between proxy contests and the propensity of CEOs to exercise out-of-the-money options — the probability of the latter increases from an unconditional 0.4% (at the firm-year level) to about 1.2% conditional on proxy contests. Moreover, we also verify that the tax motive does not apply to the out-of-the-money

[20]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 12.

exercises concurrent with proxy contests because the average post exercise stock return is negative for this subsample.

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

The previous sections demonstrated robust patterns of option exercise anomalies when proxy contests are in sight. Given the exercise distortions reported in this study, a natural following question asks how large of a price premium insiders pay for control. In this section, we calibrate CEOs' private valuation of the stocks based on the observed behavior.

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%). The Hypothesis 1 discussed in Section 2.2 indicates that a deceleration of exercise-and-sell could be generated by a valuation wedge between the insider and the market place.

To calibrate the implied parameter b (the incremental private valuation), we apply the certainty equivalent approach adopted in Hall and Murphy (2002).[21] To start with, we estimate 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 various 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 under an optimal exercise policy. 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 for the price insiders pay for delaying exercise-and-sell when facing proxy contests.

Consider a call option with the following characteristics: 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. These parameters are set to reflect the conditions

[21] 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.

of a typical option package in our sample. 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. We assume that the stock pays no dividends, $\beta = 1$, $r_f = 6\%$, $\sigma = 30\%$, $r_m - r_f = 6.5\%$ (a detailed description of the approach can be found in Section 4.1 of Hall and Murphy (2002)). The calibration results are reported in Table 11.

[Insert Table 11 here]

Table 11 presents three variations in time to maturity (4, 2, and 8 years in Panels A, B, C), two variations in relative risk aversion ($\rho = \{2, 3\}$), 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" ($Delay = 0\%$) where we report the option value to the insider and the implied reduction in stock valuation (0%). 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 "Discount" columns in Table 11, which reflect the equivalent reduction in stock valuation to the insider under the unconstrained regime that would equate the option values with delays in exercise to those under the optimal exercise policy. Suppose our default benchmark is an insider with a CRRA coefficient of 3 and with two-thirds of her wealth in the firm who exercises options optimally given his diversification needs but without any control motives. Imposing a one-year "no exercise" window on an option with four years to expiration will cause a loss to the insider equivalent to 4.81% of stock valuation, and the number quickly rises to 9.58% if the delay is for two

years. In other words, it is as if the insiders value the stocks about 5-10% above the market so that they exhibit the same delay in exercise in the absence of a control motive. The many permutations in Table 10 indicate that the equivalent reduction in stock valuation increases with the extent of delay, risk aversion, and option time to maturity (if the delay is kept proportional to time to maturity).

5. Conclusion

This study explores how CEOs' (and insiders') private benefits of control are reflected in their option exercise behavior. We document two salient patterns. First, we show that CEOs are significantly less (more) likely to exercise options in order to sell (hold) the resulting shares when a proxy contest is looming, i.e., when voting rights are needed. Second, the presence of a proxy contest triples the probability that an insider exercises call options out-of-the money, a strategy deemed unambiguously irrational under the conventional models that do not include a valuation wedge between the insiders and the market.

These findings are consistent with the hypothesis that CEOs' valuation of their stocks exceed that of the market price by a range of 5% to over 20%. When private benefits of control are at risk, combined with some restrictions on trading in stocks by insiders, CEOs distort their option exercises in order to boost their voting power. Such incidences allow us to infer both the existence and the magnitude of the private control premium.

References

Aggarwal, R., Saffi, P. A. C., Sturgess, J., 2012. Does proxy voting affect the supply and/or demand for securities lending?, working paper, Georgetown University.

Albuquerque, R., Schroth, E., 2010. Quantifying private benefits of control from a structural model of block trades. Journal of Financial Economics 96 (1), 33–55.

Barclay, M. J., Holderness, C. G., 1989. Private benefits from control of public corporations. Journal of Financial Economics 25, 371–395.

Bartov, E., Mohanram, P., 2004. Private information, earnings manipulations, and executive stock-option exercises. The Accounting Review 79 (4), 889–920.

Bebchuk, L., Cohen, A., Ferrell, A., 2009. What matters in corporate governance? Review of Financial Studies 22 (2), 783–827.

Bertrand, M., Mullainathan, S., 2003. Enjoying the quiet life? Corporate governance and managerial preferences. The Journal of Political Economy 111 (5), 1043–1075.

Bradley, M., Brav, A., Goldstein, I., Jiang, W., 2010. Activist arbitrage: A study of open-ending attempts of closed-end funds. Journal of Financial Economics 95 (1), 1–19.

Brav, A., Jiang, W., Partnoy, F., Thomas, R., 2008. Hedge fund activism, corporate governance, and firm performance. The Journal of Finance 63 (4), 1729–1775.

Carpenter, J., Stanton, R., Wallace, N., 2010. Optimal exercise of executive stock options and implications for firm cost. Journal of Financial Economics 98 (2), 315–337.

Carpenter, J., Stanton, R., Wallace, N., 2014. The importance of behavioral factors in the exercise and valuation of employee stock options, working paper, New York University.

Carpenter, J. N., 1998. The exercise and valuation of executive stock options. Journal of Financial Economics 48 (2), 127 – 158.

Carpenter, J. N., Remmers, B., 2001. Executive stock option exercises and inside information*. The Journal of Business 74 (4), 513–534.

Christoffersen, S. E. K., Geczy, C. C., Musto, D. K., Reed, A. V., 2007. Vote trading and information aggregation. The Journal of Finance 62 (6), 2897–2929.

Cicero, D. C., 2009. The manipulation of executive stock option exercise strategies: Information timing and backdating. The Journal of Finance 64 (6), 2627–2663.

Cremers, M., Ferrell, A., 2010. Thirty years of shareholder rights and firm valuation, working paper.

Detemple, J., Sundaresan, S., 1999. Nontraded assets valuation with portfolio constraints: A binomial approach. Review of Financial Studies 12 (4), 835–872.

Dittmann, I., Maug, E., 2007. Lower salaries and no options? on the optimal structure of executive pay. The Journal of Finance 62 (1), 303–343.

Dyck, A., Zingales, L., 2004. Private benefits of control: An international comparison. The Journal of Finance 59 (2), 537–600.

Fine, J. P., Gray, R. J., 1999. A proportional hazards model for the subdistribution of a competing risk. Journal of the American Statistical Association 94 (446), 496–509.

Fos, V., 2014. The disciplinary effects of proxy contests, working paper, The University of Illinois at Urbana-Champaign.

Fos, V., Tsoutsoura, M., 2014. Shareholder democracy in play: Career consequences of proxy pontests. Journal of Financial Economics 114 (2), 316–340.

Frydman, C., Jenter, D., 2010. CEO compensation. Annual Review of Financial Economics 2, 75–102.

Gompers, P., Ishii, J., Metrick, A., 2003. Corporate governance and equity prices. The Quarterly Journal of Economics 118 (1), 107–156.

Hall, B. J., Murphy, K. J., 2002. Stock options for undiversified executives. Journal of Accounting and Economics 33 (1), 3–42.

Hauser, S., Lauterbach, B., 2004. The value of voting rights to majority shareholders: Evidence from dual-class stock unifications. Review of Financial Studies 17 (4), 1167–1184.

Heath, C., Huddart, S., Lang, M., 1999. Psychological factors and stock option exercise. The Quarterly Journal of Economics 114 (2), 601–627.

Huddart, S., Lang, M., 1996. Employee stock option exercises: An empirical analysis. Journal of Accounting and Economics 21 (1), 5–43.

Huddart, S., Lang, M., 2003. Information distribution within firms: evidence from stock option exercises. Journal of Accounting and Economics 34 (1), 3–31.

Kalay, A., Karakas, O., Pant, S., 2014. The market value of corporate votes: Theory and evidence from option prices. The Journal of Finance 69 (3), 1235–1271.

Karpoff, J., Malatesta, P., 1989. The wealth effects of second-generation state takeover legislation. Journal of Financial Economics 25 (2), 291–322.

Klein, D., Maug, E., 2011. How do executives exercise their stock options, working paper, University of Mannheim.

Lease, R. C., McConnell, J. J., Mikkelson, W. H., 1983. The market value of control in publicly-traded corporations. Journal of Financial Economics 11 (1), 439–471.

Levy, H., 1983. Economic evaluation of voting power of common stock. The Journal of Finance 38 (1), 79–93.

Malmendier, U., Tate, G., 2005a. CEO overconfidence and corporate investment. The Journal of Finance 60 (6), 2661–2700.

Malmendier, U., Tate, G., 2005b. Does overconfidence affect corporate investment? CEO overconfidence measures revisited. European Financial Management 11 (5), 649–659.

Nenova, T., 2003. The value of corporate voting rights and control: A cross-country analysis. Journal of Financial Economics 68 (3), 325–351.

Poteshman, A. M., Serbin, V., 2003. Clearly irrational financial market behavior: Evidence from the early exercise of exchange traded stock options. The Journal of Finance 58 (1), 37–70.

Sharara, N. M., Hoke-Witherspoon, A. E., 1993. The evolution of the 1992 shareholder communication proxy rules and their impact on corporate governance. The Business Lawyer 49 (1), 327–358.

Sircar, R., Xiong, W., 2007. A general framework for evaluating executive stock options. Journal of Economic Dynamics and Control 31 (7), 2317 – 2349.

Zingales, L., 1994. The value of the voting right: A study of the Milan stock exchange experience. Review of Financial Studies 7 (1), 125–148.

Zingales, L., 1995. What determines the value of corporate votes? The Quarterly Journal of Economics 110 (4), 1047–1073.

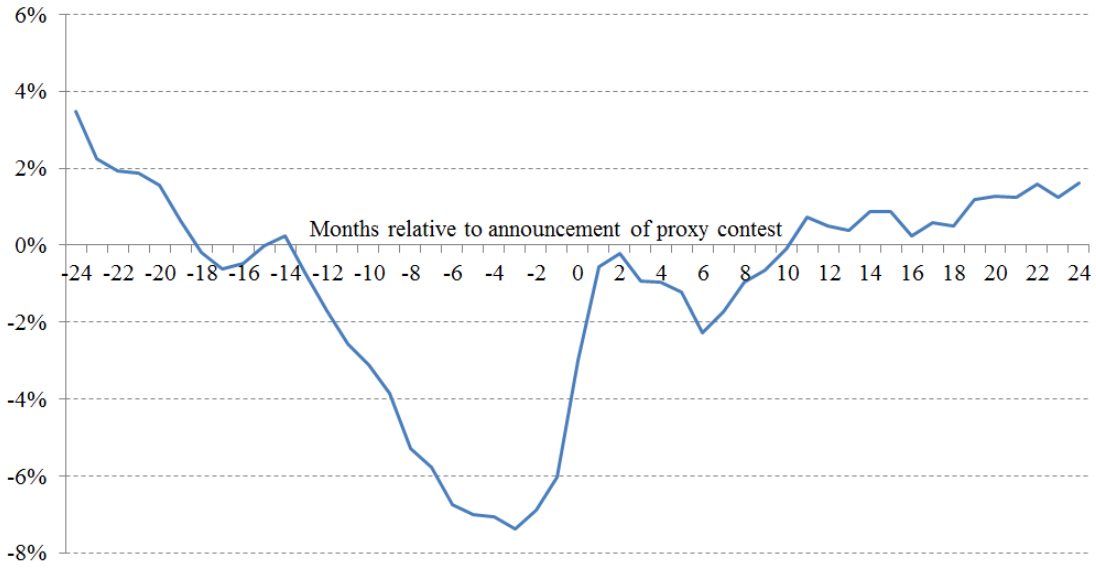

Figure 1: **Cumulative abnormal returns around proxy contests.** This chart plots the cumulative abnormal returns from the four-factor (market, size, book-to-market, and momentum) model from 24 months before the 24 month after the announcement of proxy contests.

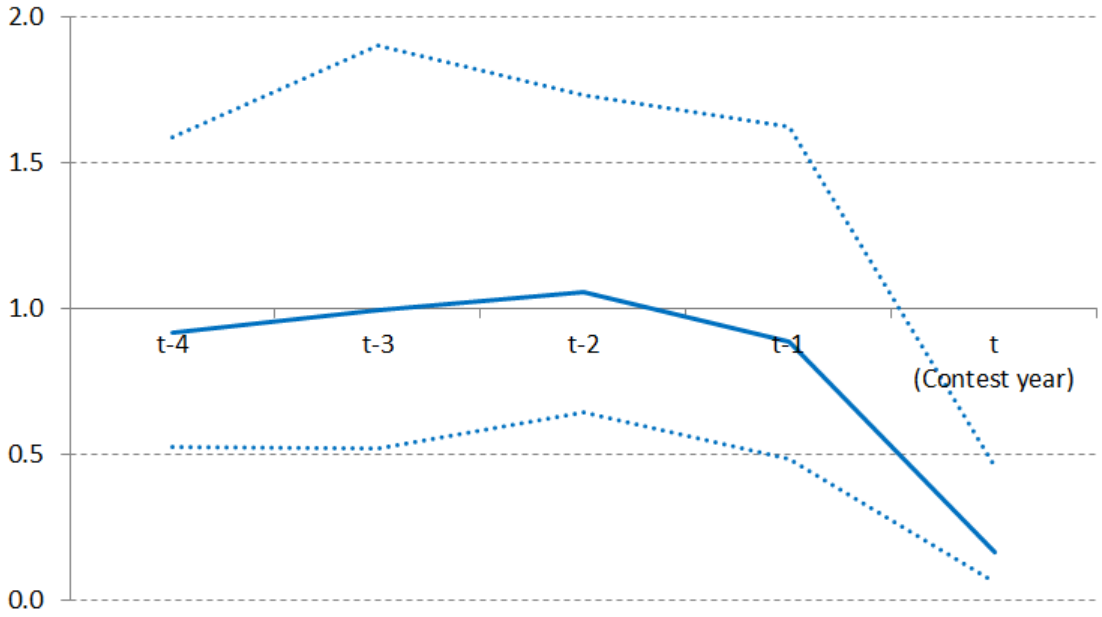

Figure 2: **Pre-existing trend.** The solid line plots coefficients of $Contest(t-j)$ for $j = 1, 2, 3, 4$. The dashed lines plot the corresponding 95% confidence intervals.

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.
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 option expiration.
Market cap	The firm's market capitalization at the last year-end.
BM	The firm's equity market-to-book ratio at the last 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	Twelve-month stock return on the monthly rolling window using data from the past 12 months.
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.

Table 2: **Summary statistics.** This table reports summary statistics for option, firm, and CEO variables recorded at the option package-month level (the unit of observation for our main regression analysis). All variables are defined in **??**, and are presented separately for the full Compustat/CRSP and the Execucomp samples. 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)	25% (3)	Median (50%) (4)	75% (5)
Full Sample					
Exercise&sell	0.0046	0.0679	0.0	0.0	0.0
Exercise&hold	0.0027	0.0524	0.0	0.0	0.0
Contest	0.0042	0.0648	0.0	0.0	0.0
Years to maturity	3.94	2.62	1.75	3.67	5.92
Market cap ($ mil)	4,180	11,129	184	705	2,672
BM	0.51	0.41	0.25	0.42	0.66
Growth	0.20	0.35	0.04	0.12	0.24
Stock ret	0.14	0.60	-0.20	0.04	0.32
Idiosyncratic vol	0.45	0.26	0.26	0.37	0.56
Illiquidity	0.33	0.36	0.04	0.16	0.61
Dividend yld	0.02	0.04	0.00	0.00	0.03
Dividend record month	0.12	0.33	0.00	0.00	0.00
Earnings month	0.33	0.47	0.00	0.00	1.00
New grant	0.01	0.09	0.00	0.00	0.00
Execucomp Sample					
Exercise&sell	0.0055	0.0742	0.0	0.0	0.0
Exercise&hold	0.0018	0.0426	0.0	0.0	0.0
Contest	0.0041	0.0637	0.0	0.0	0.0
Years to maturity	3.66	2.46	1.58	3.33	5.42
Market cap ($ mil)	5,149	12,583	285	1,011	3,646
BM	0.50	0.39	0.25	0.42	0.65
Growth	0.17	0.30	0.03	0.11	0.21
Stock ret	0.15	0.57	-0.17	0.05	0.31
Idiosyncratic vol	0.41	0.24	0.25	0.35	0.50
Illiquidity	0.21	0.33	0.02	0.06	0.24
Dividend yld	0.03	0.04	0.00	0.01	0.04
Dividend record month	0.18	0.38	0.00	0.00	0.00
Earnings month	0.33	0.47	0.00	0.00	1.00
New grant	0.01	0.10	0.00	0.00	0.00
CEO age	55.26	6.79	51.00	55.00	60.00
CEO tot wealth ($ mil)	10.71	1.35	9.78	10.70	11.63
% CEO wealth in firm	0.58	0.27	0.37	0.58	0.81
%OwnTop5	0.14	14.83	0.01	0.03	0.12

Table 3: **Exercise & Sell and proxy contests: Hazard model with competing risk.** Results in this table illustrates the determinants of CEO option exercises for the purpose of selling 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 3.2. We estimate the relation between the subdistribution hazard rates and covariates for *Exercise&sell* as the main risk and *Exercise&hold* as competing risk. All independent variables are defined in Section 3.6.1 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 are indicative of whether the reported odds ratios are significantly different from unit. The *t*-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Contest	0.2254***	0.2034***	0.3063*
	[-3.07]	[-3.35]	[-1.76]
Year to maturity		0.9963	1.0246*
		[-0.35]	[1.70]
Market Cap		1.0446**	0.9644
		[2.49]	[-1.14]
B/M		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]
Idio volatility		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

Table 4: **Exercise & Sell dynamics around record date.** This table follows the same regression specifications as in Table 3 except that the key variable *Contest* is broken down into $Contests * Before\ record\ date$ and $Contests * After\ record\ date$ 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 column (2) we add to the regression two additional regressors $NoContest * Before\ Record\ Date$ and $NoContest * After\ Record\ Date$, where the first dummy variable is coded one if the observation belongs to a match firm during its proxy season in the same year and the month is on or before the record date, and the second dummy indexes for being after the record date. The match firms are the same as described in Section 3.4.2. 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 are indicative of whether the reported hazard ratios are significantly different from unit. The *t*-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
Contests * Before Record Date	0.0000***	0.0000***
	[-34.94]	[-34.78]
Contests * After Record Date	0.2420***	0.2412***
	[-2.95]	[-2.96]
p-val for the difference	0.000***	0.000***
No Contest * Before record date		0.6608
		[-1.33]
No Contest * After record date		1.1128
		[0.51]
p-val for the difference		0.163
p-val for the difference-in-difference		0.000***
Firm Controls	Yes	Yes
# option package series	14,133	14,133
# option package months	643,958	643,958

Table 5: **Exercise & Sell dynamics and nomination status.** This table follows the same regression specifications as in Table 3 except that the key variable *Contest* is broken down 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 column (2) we add to the regression two dummy variable regressors, $NoContest * Nominated$ and $NoContest * Not\ nominated$, where 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. The sample is limited to firms with a staggered board structure. 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 are indicative of whether the reported hazard ratios are significantly different from unit. The *t*-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
Contests * Nominated	0.0000***	0.0000***
	[-77.83]	[-49.57]
Contests * Not nominated	0.0712***	0.0663***
	[-3.39]	[-3.19]
p-val for the difference	0.000***	0.000***
No Contest * Nominated		1.3784
		[0.58]
No Contest * Not nominated		1.1681
		[0.32]
p-val for the difference		0.821
p-val for the difference-in-difference		0.000***
Firm Controls	Yes	Yes
# option package series	5,381	5,381
# option package months	237,290	237,290

Table 6: **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 broken down 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's actual pay (using the total contracted compensation, or "tdc1," from the Execucomp database) being 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 a two-digit SIC fixed effect. 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 are indicative of whether the reported hazard ratios are significantly different from unit. The t-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

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
Test of equality (p-val)	0.000***	0.040**	0.000***

Table 7: **Exercise & Sell and the likelihood of dissident winning the contest.** This table follows the same regression specifications as in Table 3 except that the key variable *Contest* is broken down into a pair of disjoint variables, *Contests* $*$ *Dissident is Likely to Win* and *Contest* $*$ *Dissident is Likely to Lose*. In column 1, *Dissident is Likely to Win* indicates contests with positive cumulative abnormal returns (CAR) during the three month period centering on the announcement month. In column 2, *Dissident is Likely to Win* indicates voted contests. 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 are indicative of whether the reported hazard ratios are significantly different from unit. The *t*-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Positive CAR (1)	Voted Contest (2)
Contest * Dissident Likely Win	0.0000***	0.0000***
	[-38.49]	[-72.93]
Contest * Dissident Unlikely Win	0.6888***	0.2563***
	[-0.57]	[-2.76]
Firm Controls	Yes	Yes
# option package series	14,132	14,133
# option package months	641,991	643,958
Test of equality (p-val)	0.000***	0.000***

Table 8: **Exercise & Hold and proxy contests: Hazard model with competing risk.** Results in this table illustrate the determinants of CEO option exercises for the purpose of holding 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 3.2. We estimate the relation between the subdistribution hazard rates and covariates for *Exercise&hold* as the main risk and *Exercise&sell* as competing risk. All independent variables are defined in Section 3.6.1 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 are indicative of whether the reported hazard ratios are significantly different from unit. The *t*-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Contest	1.6031*	1.7318*	0.5342
	[1.86]	[1.84]	[-0.63]
Year to maturity		0.8817***	0.9036***
		[-11.02]	[-5.46]
Market Cap		0.7505***	0.8163***
		[-10.33]	[-3.85]
B/M		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]
Idio volatility		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

Table 9: **Exercise & Hold dynamics and record date.** This table follows the same regression specifications as in Table 8 except that the key variable *Contest* is broken down 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 $NoContest * Before\ Record\ Date$ and $NoContest * After\ Record\ Date$, where the first dummy variable is coded one if the observation belongs to a match firm during its proxy season in the same year and the month is on or before the record date, and the second dummy indexes for being after the record date. The match firms are the same as described in Section 3.4.2. 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 are indicative of whether the reported hazard ratios are significantly different from unit. The *t*-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(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

Table 10: **Determinants of out-of-the-money (OTM) exercise.** This table reports determinants of out-of-the-money exercise with three specifications at the firm-year level. All independent variables are defined in Section 3.6.1 and Table 2. In columns (1)–(3) the dependent variable is OTM — a dummy variable for the occurrence of out-of-the-money option exercises, and the columns report odds ratios from the logit model and the t-statistics associated with the original (unexponentiated) coefficients, whi chare indicative of whether the reported odds ratios are significantly different from unit. In columns (4)-(6), the dependent variable is #OTM — the number of occurrences of out-of-the-money option exercises for the firm-year, and the columns report estimated coefficients from the negative binomial model and the corresponding t-statistics. The coefficients represent the change in $ln(\#OTM)$ associated with a unit change in a covariate. All t-statistics in this table are calculated using heteroscedasticity robust standard errors and are clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

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

Table 11: **Stock 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 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 to C provides variations in time to maturity (4, 2, and 8 years). In each panel, the forced delay in exercise ranges from 25% to 100% of the time to maturity. "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.

		Optimal Exercise								No early exercise	
		Delay=0%		Delay=25%		Delay=50%		Delay=75%		Delay=100%	
CRRA coef.	% of wealth in stock	Insider Option Value	Discount	Insider Option Value	Discount	Insider Option Value	Discount	Insider Option Value	Discount	Insider Option Value	Discount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: time to maturity 4 years, moneyness 50%											
2	0.5	32.77	0.00%	32.72	0.15%	32.39	1.18%	31.74	3.15%	30.82	5.95%
2	0.5	32.77	0.00%	32.72	0.08%	32.39	0.68%	31.74	1.84%	30.82	3.51%
2	0.67	30.54	0.00%	30.04	0.89%	28.95	2.84%	27.53	5.40%	25.89	8.40%
3	0.5	30.37	0.00%	29.59	1.35%	28.12	3.97%	26.27	7.30%	24.14	11.17%
3	0.67	30.00	0.00%	27.11	4.81%	24.24	9.58%	21.33	14.44%	18.37	19.64%
Panel B: time to maturity 2 years, moneyness 50%											
2	0.5	30.96	0.00%	30.94	0.03%	30.80	0.28%	30.54	0.72%	30.18	1.34%
2	0.67	30.00	0.00%	29.52	0.80%	28.84	1.94%	28.06	3.27%	27.20	4.74%
3	0.5	30.00	0.00%	29.20	1.31%	28.26	2.90%	27.18	4.69%	26.01	6.64%
3	0.67	30.00	0.00%	27.90	3.49%	25.94	6.76%	24.01	9.97%	22.09	13.18%
Panel C: time to maturity 8 years, moneyness 50%											
2	0.5	36.61	0.00%	36.51	0.29%	35.73	2.40%	34.17	6.68%	31.91	12.84%
2	0.67	32.60	0.00%	32.00	1.84%	30.18	7.43%	27.60	15.35%	24.51	24.81%
3	0.5	32.38	0.00%	31.55	2.55%	29.25	9.66%	26.07	19.48%	22.32	31.05%
3	0.67	30.20	0.00%	27.43	9.16%	23.49	22.21%	19.25	36.27%	14.93	50.55%

Supplemental Internal Materials for the paper

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

Vyacheslav Fos, University of Illinois at Urbana-Champaign

Wei Jiang, Columbia University

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 2.1.

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

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

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

Proposition 1 leads to Hypothesis 1.

On the other hand, the proxy contest record date might trigger an early exercise of a call option, and so does the dividend record date. Below we provide two 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 exercise an option prior to maturity with an intention to hold the stock if the stock pays a constant dividend yield $q_d > 0$, compared to the situation 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 with an intention to hold the stock, compared to 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. □

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 (from voting rights) to holding the shares on date* τ *(e.g., the proxy contest record date).*

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

Let G be the value the insider assigns to holding a share of the stock on date τ, the value G is related to the private benefits of control b because the voting rights from holding the shares 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 unit,

the effect of b on $S^*_{\tau+}$ is larger than its effect on $C(S^*_{\tau+}, T-\tau+, X)$, making early exercise more likely. Again Condition 2 is necessary because the insider would otherwise prefer to purchase shares in the open market at cost $S_{\tau+}$ instead of paying the exercise price X. □

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

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

Proof. On the dividend record date, the insider will exercise a call option out-of-the-money ($S_{\tau+} + D - X < 0$) 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: **Exercise & Sell: Logit and conditional logit with CEO fixed effects.** This table reports estimates of logit and conditional logit (with CEO fixed effects) regressions, analyzing the determinants of CEO option exercises at the package-month level. The conditional logit model relies on within-CEO variations and include only observations associated with those CEOs who ever experience a proxy contest and exercise options. The dependent variable is *Exercise&sell*. All independent variables are defined in Section 3.6.1 and Table 2. The reported coefficients are odds ratios (or exponentiated coefficients). The *t*-statistics are associated with the original (unexponentiated) coefficients, and are indicative of whether the reported odds ratios are significantly different from unit. The *t*-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Contest	0.2355***	0.2517**	0.2071***	0.2088**
	[-2.96]	[-2.44]	[-2.96]	[-2.53]
Year 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]
B/M	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]
Idio volatility	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 A2: **Option exercise dynamics during proxy contests and regular shareholder meetings.** This table follows the same regression specifications as in Tables 3 and 8 except that we add to the regression an additional regressor *Pseudo Contest*, which is coded one if the observation belongs to a match firm during its proxy season in the same year and the month. The match firms are the same as described in Section 3.4.2. 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. 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 are indicative of whether the reported hazard ratios are significantly different from unit. The t-statistics are based on standard errors clustered at the option package level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	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 A3: **Out-of-the-money exercises: Conditional logit with CEO/firm fixed effects.** The dependent variable is OTM — a dummy variable for the occurrence of out-of-the-money option exercises in a firm-year. All independent variables are defined in Section 3.6.1. We use the conditional logit model with firm (columns (1) and (2)) or CEO (column (3)) fixed effects. The table reports odds ratios and the t-statistics associated with the original (unexponentiated) coefficients, which are indicative of whether the reported odds ratios are significantly different from unit. The t-statistics are calculated using heteroscedasticity robust standard errors and are clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable:	OTM (1)	OTM (2)	OTM (3)
Contest	4.4005***	4.5251***	5.4833*
	[3.16]	[3.20]	[1.72]
log(Market cap)		0.9474	0.5502
		[-0.42]	[-1.40]
Book-to-Market		0.8794	1.0635
		[-0.87]	[0.12]
Growth		1.1010	0.3611
		[0.71]	[-1.25]
stock return (Size decile adj)		1.0330	5.5923
		[0.02]	[0.37]
Idiosyncratic volatility		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