

# Mandatory disclosure and acquisition: Evidence from material contract redactions

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## Abstract.

In this study we examine the role of mandatory disclosure in the market for corporate control. Using confidential treatment orders in SEC filings that permit firms to redact otherwise mandatorily disclosed contract details, we find that redaction firms have a substantially higher likelihood of becoming a takeover target than their propensity-score matched non-redaction counterparts. This phenomenon is theoretically explained by two distinct categories of redacting firm: (i) those providing a credible signal to bidders on proprietary value through redaction (proprietary value hypothesis) and (ii) those exploiting redactions opportunistically to conceal adverse news from capital markets (agency cost hypothesis). We find evidence supporting the former hypothesis. The effect of redaction on takeover likelihood is stronger for firms with abnormal insider buying prior to the redaction filing dates, for firms with ex-ante higher quality financial reporting and for publicly-listed firms versus private firms. The redacting firms experience a positive stock return around the deal announcement date and higher post-acquisition sales growth. By contrast, firms requested by the SEC to amend their redaction experience a lower likelihood of takeover. These findings suggest that the SEC's recent amendment to simplify mandatory disclosure of proprietary information can significantly affect takeover deal values in the corporate control market.

JEL Classification: D8, M41, M48

**Keywords:** Mandatory disclosure; Proprietary information; Confidential treatment order; Redaction in SEC filings; Likelihood of takeover; Takeover deal value.

## 1 Introduction

Acquisitions are one of the major corporate watershed events with significant impacts on acquirer and target shareholder value, suppliers and customers, and the industry. Accordingly, acquisitions have been an important topic in the accounting literature. Early studies show that target firms resort to good news disclosure in a control contest setting to fend off takeover threats or negotiate a better exit (e.g., Healy and Palepu 2001; Brennan 1999; Baginski et al. 2014). Chen et al. (2020), however, shows that peer firms facing takeover threat may preempt the threat by increasing information uncertainty through bad news disclosure. The extant literature focuses singularly on the nature and frequency of non-proprietary voluntary disclosure without considering mandatory disclosure, particularly mandatory disclosure on proprietary contract details.<sup>1</sup> Our study fills this research gap. To our knowledge, this study is the first to examine the open question of whether and how the likelihood of receiving a takeover bid and its deal valuation and terms are affected by mandatory disclosure of material contract details. We use SEC redactions as our setting to examine the consequences of mandatory disclosure in corporate control market, since by their nature, firms consider redacted information in the SEC filings as proprietary (Verrecchia and Weber 2006) and corporate acquisitions are increasingly driven by R&D (Fresard, Hoberg and Phillips 2020). Our research topic is especially important to the recent discussions among politicians, academicians, and practitioners on the scope and consequences of mandatory disclosure. By exploiting a unique setting, we also contribute to the literature on the cost and benefit of reducing and simplifying mandatory disclosure in the corporate acquisition market.

The SEC under the Regulation S-K mandates that all firms disclose details of their significant contracts in a regulatory filing. However, because of cost and complexity, the SEC also regularly debates the simplification of mandatory disclosures and recently amended Regulation S-K to exempt firms from preapproving redaction of their contract details that would be otherwise mandatorily disclosed in firms' 8-K, 10-K, or 10-Q filings.<sup>2</sup> The SEC's new rule, effective April 2, 2019, allows gives protection from public disclosure for up to ten years.

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<sup>1</sup> See Ge and Lennox (2011), Kimbrough and Louis (2011), Ahern and Sosyura (2014), Amel-Zadeh and Zhang (2015), Chen (2019), and Chen et al. (2020).

<sup>2</sup> Redactions cannot be material to investors but, rather, only to the firm. Thus, if the information can cause substantial competitive harm to the firm but is material (i.e., price sensitive) to outside investors, it cannot be redacted under current rules. Staff Legal Bulletin

Firms' use of contract redactions presents an interesting context to explore the effect of mandatory disclosure on the likelihood of a firm receiving an acquisition bid for several reasons. Specifically, firms with successful innovation mostly rely on trade secrecy to protect their innovation relative to other mechanisms such as patents, marketing and manufacturing advantages (Cohen et al., 2000; Cohen, 2010). Redaction provides firms with innovation a powerful tool to keep their trade secrets from rivals (Glaeser 2018). A prospective bidder, especially a large firm, also searches for targets with successful innovation, expecting synergies and competitive advantage from their technology (Philips et al. 2010).<sup>3</sup> Redaction may thus affect their search efforts in a meaningful way.

Guided by prior studies on the economics of redaction (Section **Error! Reference source not found.**), we add tension by suggesting two distinct categories of firms as takeover targets withholding proprietary information, which would be otherwise required to be mandatorily disclosed. The first considers firms that use redaction to credibly signal to prospective bidders on the nature of the undisclosed information. Firm redaction signifies that the firm manager may have proprietary information and knowledge that can secure the firm's competitive advantage in the product market and increase firm value. As such, a redaction or pattern of redactions may naturally draw attention to a redacting firm as an attractive takeover target. Relatedly, Tian and Yu (2018) show that redacting firms experience higher market share growth, greater market power, and larger abnormal stock returns. Under this scenario, redacting firms should have a *higher* likelihood of becoming a takeover target because the uncertain undisclosed information portends higher firm value (*proprietary information hypothesis*).

The second considers firms that use redaction to conceal non-proprietary bad news or to cover up the adverse impact of corporate misconduct (such as empire building and pet projects) (Hui et al. 2019). This suggests that redactions could be a symptom of manager-shareholder agency costs. The market for corporate

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No. 1, issued in 1997 (replaced by CF Disclosure Guidance Topic No. 7 (SEC 2019)), contains the original SEC guidance on redactions based on CTOs.

<sup>3</sup> Recent news media articles describe how acquisitions are often attempts by large firms to grow by purchasing innovation. "A recent prominent example is Google. Google made 48 acquisitions of smaller firms in 2010, six years after it went public, and 60 acquisitions in the previous 5 years, for a combined total of 108 acquisitions in the 6 years post-IPO." (Philips and Zhdanov 2013, page 1).

control helps discipline firms with inefficient managers and may create additional firm value by their replacement (Jensen and Ruback 1983; Manne 1965). We contend that firms using redactions to hide misconduct or inefficiency are attractive to outsiders that have incentives to increase control through takeover. Accordingly, firms that redact negative information should also have a higher likelihood of becoming a takeover target (*agency cost hypothesis*).<sup>4</sup>

However, reduced mandatory disclosure from redaction, whether good or bad news, can also increase information asymmetry between insiders and outsiders (Barth et al. 2021), which creates an adverse selection problem. This may induce a redacting firm to be a less attractive takeover target. Adverse selection problems can be particularly harmful for corporate investment decisions such as takeovers, because prospective acquirers rely on publicly available information to launch the takeover and determine an offer price. They may have limited access to inside information of the target, even after the confidentiality agreements are signed prior to public announcement (Amel-Zadeh and Zhang 2015). Targets' redaction of sensitive information may, thus, reduce potential acquirers' ability to measure target value. Adverse selection theory indicates that this informational uncertainty engenders a pooling equilibrium for all the targets with respect to value rather than an equilibrium that separates lower- from higher-quality targets (Akerlof 1970). This lack of separation may dissuade prospective acquirers from making a takeover offer. As such, firms that redact positive or negative information could in theory also have a lower likelihood of becoming a takeover target. Given these conflicting scenarios on the effect of firm proprietary redaction, we contend that it is an open question of whether firms with higher levels of proprietary redaction are more or less likely to have predictable outcomes in the market for corporate control.

Using a sample of 12,728 firm-year observations with redactions and takeover bids over 2009–2019, we find that redacting firms are more likely to become a takeover target relative to propensity-score matched non-redacting firms. This higher likelihood is economically significant. A one standard deviation increase in the

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<sup>4</sup> Theoretically, continued underperformance of a firm in the capital market should serve as a signal of mismanagement, offering profit opportunities for potential acquirers. However, empirical studies have produced mixed results on the association between market prices and takeovers (Agrawal and Jaffe 2003; Edmans et al. 2012).

number of redactions measured over the past three years associates with a 41 percent increase in a firm becoming the takeover target.

Having established our main result – that redaction increases the likelihood of a firm becoming a takeover target – we further test the two theoretical scenarios. First, we find that the positive relation between firm redaction and the likelihood of becoming a takeover target strengthens for firms with higher financial reporting quality. These findings are consistent with the signaling effect of firm redaction being stronger among redacting firms with ex-ante high-quality information environments. The higher financial reporting quality signifies a lower level of agency conflicts, supportive of a redaction firm withholding proprietary and value-increasing information from rivals. Additionally, when firms redact their material contract details, their value is likely discounted in the market (Boone et al. 2016). This market value discount along with a credible signal on proprietary contract details render redaction firms to be attractive takeover targets in the corporate control market. These findings further support our first scenario, that redaction signifies to bidders the value of information redacted by a potential target, especially by those with higher financial reporting quality, thus increasing their likelihood of becoming a takeover target.

We further find that the targeted redacting firms experience a positive stock return around the deal announcement date, have stronger sales growth in the subsequent three years relative to those without redaction, and indicate higher levels of abnormal insider purchasing one quarter before filings with redactions. The observed effect of redaction is stronger for target firms with abnormal insider purchasing one quarter prior to the CTR filing dates and with higher financial reporting quality. The observed effect of redaction is also driven by publicly-listed firms versus private firms. The former is less subject to agency costs and informational frictions compared to the latter since public firms are regularly scrutinized by the SEC and other sophisticated information intermediaries such as institutional investors, news media and analysts. These results support the theory of the first scenario – that redaction signifies higher future firm value, leading to an increase in the firm becoming a takeover target.

Second, we provide evidence that firms requested by the SEC to amend their redaction experience a lower likelihood of becoming a takeover target. When firms with material contracts submit their confidential

treatment requests (prior to the 2019 amendment), the SEC staff reviews, approves, or rejects these applications. The staff requires firms to amend the rejected redaction if the redaction is considered to violate the non-materiality of information and/or the competitive harm conditions of an acceptable redaction. For these firms, Hui et al. (2019) find that redaction amendments are synonymous with agency costs. Firm managers may opportunistically use the protection of proprietary information as an excuse for hiding non-proprietary bad news from capital market investors. These firms experience a lower likelihood of being a takeover target. Thus, our finding that firms with amendments have a lower takeover likelihood is not supportive of the agency cost hypothesis.

In addition, we find that compared to bids that target non-redacting firms, takeover bids made to redacting firms take longer and require more attempts to complete. Further, we find that targeted firms with redactions in the past three years have lower acquisition valuations relative to non-redacting target firms. This discount amounts to 7.86 percent. We attribute the preceding results to the higher level of information uncertainty of redacting firms compared to their non-redacting counterparts. Whereas redacting firms exhibit a higher takeover probability, acquisitions of redacting firms take longer (e.g., due to multiple attempts until the successful acquisition) and suffer from lower deal value multiples. Thus, we find evidence consistent with prospective bidders pricing to protect themselves by providing a lower offer price. Hence, the findings indicate that higher firm information uncertainty and risk, either orthogonal in part or endogenously related to redaction, discourages prospective acquirers from launching a takeover offer. For these firms, redaction may increase the time to complete a deal and generate a lower deal value, which could be detrimental to the target yet beneficial for the acquirer. Additionally, we sharpen our identification strategy by distinguishing two types of redactions, namely, those related to trade secrets (e.g., R&D and licenses) versus those less related to trade secrets (e.g., all

others associated with financing, employment, peer, and shareholders). As predicted, we find that the effect of firm redaction is largely driven by redactions related to proprietary information (e.g., R&D and licenses).<sup>5,6</sup>

Overall, our results suggest that it is through the impact of redaction on the likelihood of takeover that the proprietary value of targets' trade secrecy plays an important role in the market for corporate control. In particular, our study uncovers a previously unexplored consequence of reduced mandatory disclosure, that is, the redaction of significant contract details in SEC filings, by providing evidence that firms with higher levels of redaction are more likely to become takeover targets. However, because information uncertainty is higher for redacting firms, redacting firms eventually taken over have lower deal values and the deals take longer to complete.

These results add to the literature on the economic consequences of redaction in several ways. First, our evidence on the unstudied role of redactions in takeover bids and takeover outcomes adds insight on the economic effects of redactions on investment decisions and information flow around news announcements (Amel-Zadeh and Zhang 2014; Barth et al. 2021; Boone et al. 2016; Chen et al. 2019; Hui et al. 2019). Earlier studies using data from the 1980s illustrate that poorly performing firms tend to be targeted in M&As (Morck, Shleifer and Vishny 1989). Yet, more recent empirical studies show that acquirers are likely to target firms with good performance records (Krug, Wright, Kroll 2014). Our study extends the literature by showing firm redaction provides a credible signal on its superior future performance in the corporate control market, increasing the likelihood of receiving a takeover offer. Second, we contribute to the corporate finance literature on the characteristics of takeover targets (Andrade and Stafford 2004; Gorton et al. 2009; Jensen 1988; Mitchell and Lehn 1990) and the determinants of takeover valuations (Bates and Lemmon 2003; Eckbo and Langohr 1989; Officer 2003). By providing insights for target selection and bidding strategies, our results may therefore

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<sup>5</sup> We also find that one of the redaction categories less likely to be related to proprietary costs (e.g., an employment contract) is also significantly positively associated with the likelihood of a firm becoming a target. This finding may be driven by agency costs. The redaction of executive compensation information may incur agency conflicts by reducing the opportunities for shareholders to persuade boards to reward executives in a manner aligned with shareholder value creation (Craighead et al. 2004). Thus, a redaction of an employment contract may signal agency costs to prospective bidders in the corporate takeover market. Firms with agency costs are typically discounted, offering profitable acquisition opportunities to prospective bidders. Consistently, Lee (2020) find market-adjusted stock return around the CTR dates is negative for employment CTRs.

<sup>6</sup> Second, we use an alternative proxy for firm trade secrecy, namely, the number of words related to trade secrecy in firm's 10-K filings (Glaeser 2018). We find that firms with more sentences including "trade secrets" in their 10-Ks are more likely to be a takeover target in the corporate control market.

have significant implications for firms that engage in acquisitions. Third, we add insight on the role of information quality in mergers and acquisitions (Marquardt and Zur 2014; Martin and Shalev 2016; Skaife and Wangerin 2013). Our findings complement these studies by documenting that a redaction of proprietary contract details affects takeover value and other characteristics through the channel of redaction-induced information uncertainty. Lastly, our study contributes to a growing body of literature that has examined the tradeoff between corporate mandatory versus voluntary disclosure (e.g., Glaeser 2018; Li and Li 2020).

Section 0 discusses the prior literature and develops our predictions. Section **Error! Reference source not found.** describes the sample and the research method. Section **Error! Reference source not found.** presents the results of the tests of our research questions. We conclude in Section 5.

## 2 Literature Review

Two strands of literature document the determinants and consequences of redaction. The first strand illustrates the informational and capital market consequences of redaction. CTRs lead to a higher informational uncertainty (Barth et al. 2017; Barth et al. 2020), an increase in subsequent non-proprietary management guidance (Heinle et al. 2018; Glaeser 2018; Barth et al. 2020), a higher cost of equity capital (Boone et al. 2016), an increase in firm peers' capital investments (Zhang 2020), and the opportunistic use of the pretext of protecting proprietary information to conceal adverse non-proprietary information from capital markets (Hui et al. 2020). The second strand documents the determinants of firms' redactions, including product market threats (Tian and Yu 2018) and an increase in product market competition from the threat of new entry (Pan et al. 2018). However, these studies do not consider the link between CTR and the corporate acquisitions or the control market consequences of proprietary redaction possibly counterbalanced by voluntary non-proprietary disclosure.

Moreover, only a few studies examine firm disclosure strategies in the corporate control setting. Healy and Palepu (2001) propose that targets of hostile takeovers or proxy contests use asymmetric voluntary disclosure strategies. They provide more positive information disclosure to preempt a control threat. The few studies document peer firm voluntary disclosure reaction in a non-M&A control setting show an increase in the



quantity of management forecasts (Bourveau and Schoenfeld 2017). A recent study by Chen et al. (2020) shows that peer firms facing control threat highlights bad news in their disclosure to fend off takeover threats. Thus, while researchers document the consequences of voluntary disclosure in corporate control setting, there is no equivalent literature on the consequences of proprietary information – often in the form of reduced mandatory disclosure in public filings – in the market corporate control.

### *2.1 Reduced mandatory disclosure and takeover likelihood*

Our first open question is whether firms with redacted contract details in their SEC filings face a change in the likelihood of becoming a takeover target. Regulation S-K mandates that firms submit all contracts filings to the SEC unless the contract is considered to be inconsequential in quantity or importance. Regulation S-K mandates firms to report in their Forms 10-K and 10-Q a list of all material contracts commenced during the reporting period. The contract list includes not only contracts that appear first in the Form 10-K or 10-Q, but also others formerly filed during the quarter in other SEC filings, e.g., Form 8-K, which the firm can include by reference. Firms that engage in redactions to hide proprietary information from competitors and subsequently release this information or exploit the redacted proprietary information and generate positive cash flows are associated with a higher likelihood of stock price jump risk (Griffin et al. 2020), a better access to equity capital (Boone et al. 2016), and an improvement in operating performance in the subsequent three years (Lee 2020). The results signify the presence of proprietary information. Takeovers are a chief device through which potential bidders identify undervalued potential targets with future upside potential, thus reaping a profit subsequent to the acquisition (Morck et al. 1990; Schwert 2000; Shivdasani 1993). If firm redaction indicates a superior valuation of a firm’s technological innovation and research, redacting firms can be attractive takeover targets.

However, prior studies also show that proprietary redactions increase information uncertainty between insiders and outsiders (Barth et al. 2019). Boone et al. (2016) further provide evidence that proprietary redactions exacerbate information risk at initial public offering, and Hui et al. (2020) suggest that firm managers hide non-proprietary bad news through redaction, which raises the cost of adverse selection in the acquisition process. This prior literature also illustrates that during the preliminary due diligence phase, the acquirer

depends solely on publicly available information to decide whether to launch a potential bid. Even during negotiation of the initial deal, the acquirer can still only access private information from the target (Wangerin 2019). Hence, information risk and uncertainty for redacting firms may decrease potential acquirers' appetite to initiate a bid. In sum, although superior future performance of redacting firms may offer an economic incentive for potential bidders to provide takeover offers, their higher information uncertainty and the stiffer cost of adverse selection may mitigate such an incentive. These considerations may also alter the takeover process once an acquiring firm initiates a bid.

## *2.2 Proprietary redactions and deal valuation*

The valuation of bids for redacting targets may differ from those for non-redacting targets. The offer price reflects the acquirer's valuation of the target, as well as achievable synergies based on knowledge of the target obtained from publicly available financial reports (and possibly from limited private information). Publicly available information is, thus, pivotal for the pricing of the target. The prior literature documents much of what drives takeover premium. In particular, expected synergies are positively correlated to the target's information quality (Amel-Zadeh and Zhang 2014; Martin and Shalev 2016; Raman et al. 2013). However, Martin and Shalev (2016) find that target shareholder returns from an acquisition decrease with the information quality of the target. A possible explanation is that the market corrects previously underpriced targets with low information quality upon the announcements of the bid. While deal values can be assessed using market values, market-based measures are affected not only by expected deal synergies but also by other factors such as mis-valuation of the target, probability of bid failure, and competition during acquisitions. Instead of market values, we follow Officer (2003) and focus on deal multiples in the form of ratios of offer prices to firm fundamentals, which should more unambiguously reflect bidders' decision making. Our analyses of deal multiples also help shed light on the results in Boone et al. (2016) suggesting that proprietary redactions increase the cost of equity capital in the IPO market. Accordingly, we contend that acquirers incorporate a higher cost of capital in valuing a target with redactions and make lower offers.

### 3 Method

#### 3.1 Sample Selection

We obtain data on acquisition transactions from the Securities Data Corporation (SDC) database. Following the prior literature, we start only with deals in which the acquirer seeks to purchase 100 percent of a public target, so that the acquirer does not have access to private information prior to the bid (Amel-Zadeh and Zhang 2014; Martin and Shalev 2017). In addition to the acquisition sample, we also extract a confidential treatment order (CT Order) sample from the EDGAR database. Form CT Order began public posting on Edgar as of May 2008. To cover full years, our sample period starts at 2009 and extends to 2019.

To test our first research question, we employ a propensity score matched sample between CTO and non-CTO firms based on estimated propensity scores of CTO redaction. We use a logistic regression model to determine the factors affecting the likelihood of CTO redaction. The model is:

$$CTO3_{i,t} = a + \beta_1 LNMKSIZE_{i,t} + \beta_2 BTM_{i,t-1} + \beta_3 EP_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SGROW_{i,t} + \beta_6 LIQ_{i,t} + \beta_7 TANGIBILITY_{i,t} + \beta_8 ROA_{i,t} + \beta_9 INSTOWN_{i,t} + \beta_{10} GRDUMMY_{i,t} + \beta_{11} NUMFILECUM3_{i,t} + \varepsilon, \quad (1)$$

where  $CTO3$  is a dummy variable that equals one if the firm has the CTO redaction in last three years, and 0 otherwise. To estimate this model, we employ 6,687 CTO and 39,129 non-CTO firm-year observations with data from Compustat, Thomson Reuters (13F), and CRSP from 2009 to 2019. Appendix A describes the measurement of the variables. Panel A of Appendix B reports the estimation of the logit model in Eq. (1). We find that firms with a smaller market capitalization, intensive R&D activities, a lower market share and at an early stage of their business are more likely to redact. Based on the estimated propensity scores for CTO redaction, we match each CTO firm with a non-CTO firm that has the closest propensity score to those with CTO redaction and the same Fama French 48 industry classifier. A control firm thus represents a firm having the closest unobservable firm characteristics relative to CTO firms. We employ the matching with

replacement.<sup>7,8</sup> Panel B of Appendix B shows the covariate balance analysis. The standardized differences between CTO firms and non-CTO firms are not significant, indicating the success of our propensity score matching procedure. For the tests of our primary research question, we use 6,646 CTO firm-years and 6,597 non-CTO firm-years. Among 13,243 firm-years, 93 CTO firms and 48 non-CTO firms receive takeover offers in the next 12 months.

### 3.2 Measures of Redaction

Firm redaction is measured based on six proxies such as *CTO3*, *CTOCUM3*, *CTORCUM3*, *LNCTONCUM3*, *LNCTOLENGTHCUM3* and *LNEXHIBITSUMCUM3*. The first proxy (*CTO3*) is an indicator variable equal to 1 if firm has a new CTO redaction in last three years, and 0 otherwise. The second proxy (*CTOCUM3*) is the number of new CTO redactions in last three years. While the first proxy merely captures the presence of CTO redactions in the prior three years, the second one represents the number of new CTO redactions. The third proxy (*CTORCUM3*) is the average yearly ratio of SEC filings with new CTO redactions to all SEC filings based on form filing dates associated with CTO redaction in last three years. Different from the first two proxies, this third measure captures the relative number of SEC filings with new CTOs from the entire SEC filings. The fourth proxy (*LNCTOLENGTH3*) is the log of one plus the average redaction period of new CTOs in days based on form filing dates associated with CTO redactions in last three years. A longer redaction period may reflect more valuable trade secrets in the redacted information or firm's stronger intensity to redact the information. Our fifth proxy (*LNEXEXIBITSUMCUM3*) is the log of one plus the number of exhibits in the filings associated with new CTOs based on form filing dates in last three years. A single CTO can contain redactions in several exhibits. As an alternative measure of CTO redaction, we use the number of exhibits included in CTO instead of the number of filing forms with CTO.

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7 Compared with matching without replacement, matching with replacement decreases bias and circumvents the potential problem that the results are subject to the order in which the treatment units are matched (Dehejia and Wahba 2002).

8 Performing propensity score matching with replacement yields a lower sample size for non-CTO firms. One control firm could be matched to multiple treatment firms, control variables could have missing values, and COMPUSTAT could cease coverage due to various reasons, including bankruptcy and mergers and acquisitions by other firms.

### 3.3 Sample Distribution

Table 1 reports the distribution of the paired CTO and non-CTO sample by year (2009–2019) and industry. If the firm receives a takeover bid within 12 months after the event date, we code *TAKEOVER* as 1, and 0 otherwise. The distribution of *TAKEOVER* is largely consistent with data reported by Martin and Shalev (2009) and Amel-Zadeh and Zheng (2015). Panel A of Table 1 shows that the number of *TAKEOVER* observations is higher for the CTO sample than the non-CTO sample, especially during the recent years. Panel B of Table 1 reports the sample distribution by industry based on the Fama-French 17 classifier. Our sample covers a wide range of industries, the most heavily represented being Pharmaceutical Production (10.00 percent of the CTO subsample and 12.89 percent of the non-CTO subsample), followed by Machinery and Business Services (12.77 percent of the CTO subsample and 11.20 percent of the non-CTO subsample), and Transportation (4.61 percent of the CTO subsample and 4.82 percent of the Non-CTO subsample).

Table 2 reports descriptive statistics for the variables used in our main analysis. The mean values of *TAKEOVER* are 0.0140 and 0.0073 for the CTO and the non-CTO samples, respectively, indicating that redacting firms are more likely to be a takeover target relative to non-redacting firms. This statistic is supportive of our primary hypothesis (H1) on a univariate basis. Compared to the non-CTO sample, the CTO sample firms are more likely to be larger, highly leveraged and liquid, less profitable, and having a greater growth opportunities, sales growth, more institutional ownership, more severe mismatch between firm's growth opportunities and capital resources, and a higher number of contract filings to the SEC.

The upper (lower) triangle of Table 3 reports the Pearson (Spearman) correlation coefficients among our redaction proxies and the variables used in our main regressions. We observe positive relations among the redaction proxies. The redaction proxies are also significantly and positively correlated with *TAKEOVER*. These univariate correlations indicate that absent other factors firms with proprietary redaction are more likely to become a takeover target relative to those without redaction. Consistent with the literature, the likelihood of a takeover bid is also positively correlated with leverage (*LEV*), and sales growth (*SGROW*), and negatively correlated with firm profitability (*ROA*).

## 4 Results

### 4.1 Takeover Likelihood

Based on 13,243 paired firm-year observations with and without proprietary redaction (Table 1), we estimate the following multivariate logistic regression model:

$$\begin{aligned} \text{Prob}(\text{TAKOVER}=1)_{i,t} = & a + \beta_1 \text{CTO}_{i,t} + \beta_2 \text{LNMKSIZE}_{i,t} + \beta_3 \text{BTM}_{i,t-1} + \beta_4 \text{EP}_{i,t} + \beta_5 \text{LEV}_{i,t} + \beta_6 \text{SGROW}_{i,t} \\ & + \beta_7 \text{LIQ}_{i,t} + \beta_8 \text{TANGIBILITY}_{i,t} + \beta_9 \text{ROA}_{i,t} + \beta_{10} \text{INSTOWN}_{i,t} + \beta_{11} \text{GRDUMMY}_{i,t} + \\ & \beta_{12} \text{NUMFILECUM3} + \sum \text{Industry FE} + \sum \text{Year FE} + \varepsilon_{i,t}. \end{aligned} \quad (2)$$

Our main interest is the sign and significance of coefficient ( $\beta_1$ ). If the level of firm redaction associates with a higher (lower) likelihood of receiving a takeover bid, we predict  $\beta_1 > 0$  ( $\beta_1 < 0$ ). We use six measures related to redaction intended to capture the existence/amount of trade secrets and a firm's intention to withhold the information from competitors.

Based on the literature, our multivariate regression model includes the following firm characteristics: the number of firm contract filings (*NUMFILECUM3*), firm size (*LNMKSIZE*), book-to-market (*BTM*), earnings-to-price ratio (*EP*), leverage (*LEV*), sales growth (*SGROW*), liquidity (*LIQ*), tangibility of assets (*TANGIBILITY*), profitability (*ROA*), percentage of institutional ownership (*INSTOWN*), and the growth of firm resources (*GRDUMMY*) (Jensen and Ruback 1983; Cremers, Nair, and John 2009; Hasbrouck 1985; Palepu 1986; Ambrose and Megginson 1992; Berger and Ofek 1996; Dong, Hirshleifer, Richardson, and Teoh 2006; Garvey, Milbourn, and Xie 2011; Amel-Zadeh and Zhang 2015). In addition, we include the count of 8-Ks, 10-Ks, and 10-Qs in the last three years to circumvent any mechanical correlation between the frequency of confidential treatment requests and the number of filings. We also include Fama and French 48 industry and year fixed effects to control for industry-specific and year-specific idiosyncrasies. Appendix A defines the variables.

Table 4 presents the results of estimating Eq. (2). The dependent variable is *TAKEOVER*, which takes a value of one if the firm received a takeover bid, and zero otherwise. *t*-statistics are based on standard errors clustered at the two-digit SIC industry level. Consistent with the likelihood of receiving a takeover bid being higher for redacting firms, the coefficient on *CTO* is significantly positive across the six different proxies for

firm redaction ( $p < 0.05$ ). Economically, a one standard deviation increase in *CTO3* indicates a 41.68 percent increase in the likelihood of a redacting firm becoming a takeover target. The impact of redaction on the likelihood of a firm receiving a takeover bid is economically significant.

Consistent with the prior literature, the likelihood of a takeover bid is mostly positively associated with sales growth and tangibility of firm assets (Cremers et al. 2009). All other control variables are insignificant or marginally significant. These results are consistent with firm proprietary redaction signifying the underlying value from trade secrecy, which increases the chances of a takeover bid. Importantly, the likelihood of a takeover bid is mostly positively associated with the number of firm contract filings to the SEC, indicating that firms with a larger number of contracts are likely to have proprietary and value-enhancing information and thus subject to be a takeover target. Ex ante, it is not certain how prospective acquirers might perceive redaction. The first view is that firm redaction can be due to managerial effort to hide proprietary information from competitors, which can increase firm competitive advantage and status in the product market and shareholder value. This superior future valuation implication of redacting firms may attract prospect bidders in the takeover market. The second view is that redaction is viewed as exacerbating information uncertainty and increasing adverse selection. This elevated informational risk can cause prospective bidders to shun the redacting firms as a potential takeover target. The first and second views indicate that prior redactions are likely associated with an increase and a decrease in the probability of a firm receiving a takeover bid in the future, respectively. We note that these two effects of redactions may be intertwined to a certain extent. That is, while firm redactions signify the presence of proprietary information, they can also increase informational uncertainty and risk if a firm hides/obfuscates important information from its SEC filings (Barth et al. 2019).<sup>9</sup>

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<sup>9</sup> We rerun our main logistic regression model (Eq. (2)) by using the full COMPUSTAT universe prior to employing the propensity score matching procedure. As presented in Table A1, the size and significance of coefficients for CTO are similar to those reported in Table 4. This is consistent with our propensity score matching results being generalizable to the COMPUSTAT universe.

#### 4.2 Underlying Mechanisms of Relation between CTO Redaction and the Takeover Likelihood

Having established the positive correlation between CTO redaction and the likelihood of becoming a takeover target, we next examine whether the positive correlation is driven by a credible signal of firm's proprietary information or agency costs.

We test these mechanisms in four ways. First, we examine whether the observed effect of redaction is stronger for firms that experience insider purchasing prior to the redaction origination date. Insiders are considered to have access to private information and have superior ability to process firm's publicly-available information (Piotriski and Roulstone 2005). Under the signaling hypothesis, firm managers who redact proprietary information or good news from material contracts, should predict that the revelation of good news will increase the stock price in the future, leading to their buying firm stocks. In contrast, under the agency problem explanation, managers who withhold bad news through redaction should perceive that the release of bad news will decrease the stock price, thus protecting their personal wealth through the sales of firm stocks.

Specifically, we test whether insider buying and selling prior to the CTO origination date explains the variation of the correlation between CTO redaction and the likelihood of becoming a takeover target. We calculate *ABTRADE*, a difference between abnormal insider sales and purchases. Abnormal insider sales (purchases) are defined as actual sales (purchases) minus expected sales (purchases) in the quarter before the issue date or cancellation date. Expected sales (purchases) is the mean sales (purchases) of that firm in the 36-month period beginning 48 months prior to the announcement of a new issue and ending 13 months prior to the announcement. We then create two indicators for *TOP\_TERCILE\_ABTRADE* and *BOTTOM\_TERCILE\_ABTRADE* for the highest and the lowest terciles in *ABTRADE*, respectively. We include and interact these two indicators with *CTO3* in Eq. (2).

$$\begin{aligned} \text{Prob}(TAKOVER=1)_{i,t} = & a + \beta_1 CTO_{i,t} \\ & + \beta_2 TOP\_TERCILE\_ABTRADE_{i,t} + \beta_3 CTO \times TOP\_TERCILE\_ABTRADE_{i,t} \\ & + \beta_4 BOTTOM\_TERCILE\_ABTRADE_{i,t} \\ & + \beta_5 CTO \times BOTTOM\_TERCILE\_ABTRADE_{i,t} \\ & + \sum CONTROLS + \sum Industry\ FE + \sum Year\ FE + \varepsilon_{i,t}. \end{aligned} \quad (3)$$



Table 5 summarizes the results for Eq. (3). We find that the coefficient ( $\beta_5$ ) on  $CTO \times BOTTOM\_TERCILE\_ABTRADE$  is significant and positive (with p-value < 0.05), while the coefficient ( $\beta_3$ ) on  $CTO \times TOP\_TERCILE\_ABTRADE$  is insignificant. The positive  $\beta_5$  coefficients indicate that the observed effect of redaction in the takeover market is largely driven by firms experiencing abnormal insider purchasing one quarter prior to the CTR submission date. These results are consistent with firm redaction conveying a credible signal on proprietary information to the corporate control market.

Second, we examine whether the impact of firm proprietary redaction on the likelihood of receiving the takeover bids can be explained by firm's ex ante financial reporting quality. The prior literature shows that high-quality firms or firms run by capable managers generate higher-quality accounting information (Demerjian et al. 2013), while a lower quality of financial reporting is synonymous with agency conflicts.

To estimate accounting quality, we exploit estimation errors in working capital accruals as an inverse measure of earnings quality based on Dechow and Dichev (2002) as modified by McNichols (2002). This proxy is based on the reasoning that the role of accruals is to mitigate the noise in operating cash flow, which arises from exogenous or manipulative variation in firms' working capital levels and may make operating cash flow less useful for predicting firm performance. Working capital accruals, which incorporate assets such as inventory, prepayments, and accounts receivable and liabilities such as unearned revenue, warranty provisions, and accounts payable, shift the recording of cash flows to the adjusted number of earnings making earnings more useful for representing the firm's current performance and for predicting future cash flows. Nevertheless, the recording of accruals requires estimates about future cash flows, invariably leading to measurement error. Therefore, estimated errors in accruals are considered an inverse measure of earnings quality (Dechow and Dichev 2002). We define  $DDAQ$  as the standard deviation of three firm-year residuals on a rolling basis, ending in the measurement year, obtained from the following cross-sectional estimation.

$$\Delta WC_t = \beta_0 + \beta_1 \times CFO_{t-1} + \beta_2 \times CFO_t + \beta_3 \times CFO_{t+1} + \beta_4 \times \Delta Sales_t + \beta_5 \times PPE_t + \varepsilon_t \quad (4)$$

All of the variables are scaled by beginning of year total assets.<sup>10</sup> Eq. (4) is estimated cross-sectionally for each industry with at least 20 observations in a given year based on the Fama and French (1997) 48 classification. We multiply  $DDAQ$  by minus one such that the value of  $DDAQ$  increases with earnings quality. We then categorize the observations into three subgroups contingent upon the level of  $DDAQ$  and report the impact of redaction in the two extreme terciles.

Table 6 shows that the positive association between firm redaction and the likelihood of receiving a takeover bid is present only in the highest terciles of  $DDAQ$  (at least  $p < 0.10$ ). This suggests that the positive association between firm redaction and the likelihood of receiving a takeover bid is largely driven by firms with higher-quality accounting information. These information environment factors, thus, combine with firms' decision to redact to generate the interesting result that when firm managers hide good news, they are more likely to receive a takeover bid. Because firms redact mainly to conceal positive information regarding their competitive advantage, we contend that these redactions more likely than not occur because financial reporting quality reflects the operations and investments of the firm.

Third, we test whether the observed effects of redaction in the takeover market is explained by managerial bad news hiding via redaction. Hui et al. (2019) find that firms exploit the pretext of protecting proprietary information to withhold bad news from capital markets. Using a sample of redaction amendments requested by the SEC, they find the firm's stock price decreases around redaction amendment dates and this decrease is explained by the release of non-proprietary bad news that is originally redacted. We test this idea by testing whether the effects are driven by a sample of redaction amendments requested by the SEC as in Eq. (5).

$$\begin{aligned} Prob(TAKOVER=1)_{i,t} = & a + \beta_1 AMEND_{i,t} \\ & + \sum CONTROLS + \sum Industry FE + \sum Year FE + \varepsilon_{i,t}. \end{aligned} \quad (5)$$

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<sup>10</sup>  $\Delta WC$  denotes changes in working capital accounts as disclosed on the statement of cash from operations, measured as the increase in accounts receivable ( $RECT$ ) plus the increase in inventory ( $INVT$ ) plus the decrease in accounts payable and accrued liabilities ( $APALCH$ ) plus decrease in taxes accrued ( $TXACH$ ) plus the increase (decrease) in other assets (liabilities) ( $UAOLOCH$ ), scaled by beginning total assets.  $CFO$  denotes cash from operations in year  $t$  ( $OANCF$ ).  $\Delta Sales$  is change in sales ( $SALE$ ) scaled by beginning total assets ( $AT$ ), and  $PPE$  is property, plant, and equipment ( $PPENT$ ) scaled by beginning total assets.

We measure firm amendments (*AMEND*) by using two proxies—an indicator for the presence of amendment filings filed to the SEC by the firm in the past-three years (*CTOAMEND3*) and the cumulative number of amendment filings filed to the SEC by the firm in the past-three years (*CTOAMENDCUM3*). Table 7 summarizes the results of Eq. (6). The coefficients on all *AMEND* measures are negative and significant ( $p < 0.01$ ). The negative  $\beta_1$  coefficients indicate that to the extent that firm amendment filings are synonymous with agency conflicts (Hui et al. 2019), the observed positive relation between redaction and the likelihood of becoming a takeover target is not likely to be driven by firms opportunistically hiding negative non-proprietary information through the CTOs. Thus, the results are not supportive of the agency cost hypothesis.

Fourth, we test whether the positive relation between redaction and the takeover likelihood is stronger for public versus private firms. Private firms are typically more exposed to informational opacity and agency costs relative to public firms. When we separate the sample into the publicly-listed firms versus private firms based on the target firm’s public status, we find that the positive relation is driven by public firms, indicating that the observed effect of redaction in the corporate control market is not likely to be driven by agency costs such as managerial bad news withholding via redaction.

In sum, the preceding results are more supportive of the proprietary information hypothesis rather than the agency cost hypothesis, indicating that firms withholding good news or proprietary information through redaction are likely to be an attractive target in the takeover market.

#### 4.3 Deal Characteristics

In this subsection, we examine the effect of redaction on deal characteristics. As discussed above, we predict that CTO redaction could increase or decrease deal value, time to completion, and the number of takeover attempts until these attempts are successful. We test this idea by estimating Eq. (6).

$$\begin{aligned} \text{RATIO to SALES}_{i,t} \text{ or TIME\_COMPLET}_{i,t} \text{ or NUM\_TAKEOVER} = & a + \beta_1 \text{CTO}_{i,t} + \beta_2 \text{LNMKSIZE}_{i,t} + \\ & \beta_3 \text{BTM}_{i,t-1} + \beta_4 \text{EP}_{i,t} + \beta_5 \text{LEV}_{i,t} + \beta_6 \text{SGROW}_{i,t} + \beta_7 \text{LIQ}_{i,t} + \beta_8 \text{TANGIBILITY}_{i,t} + \beta_9 \text{ROA}_{i,t} + \\ & \beta_{10} \text{INSTOWN}_{i,t} + \beta_{11} \text{GRDUMMY}_{i,t} + \beta_{12} \text{MBID} + \beta_{13} \text{HOSTILE} + \beta_{14} \text{DIVERSITY} + \beta_{15} \text{TENDER} + \\ & \beta_{16} \text{PCTSTOCK} + \sum \text{Industry FE} + \sum \text{Year FE} + \varepsilon_{i,t} \end{aligned} \quad (6)$$

Table 9 summarizes the results for time to completion. Eq. (6) uses the same control variables as Eq. (2) plus the following deal characteristics: diversifying takeover (*DIVERSITY*), multiple bidders (*MBID*), hostile

bid (*HOSTILE*), tender offer (*TENDER*), and the percentage of stock used as payment (*PCTSTOCK*). The coefficient on the CTO measure is positive and significant ( $p < 0.01$ ). The positive  $\beta_1$  coefficients indicate that bids to acquire redacting firms take longer to complete than those made to non-redacting firms. Consistent with the prior literature, bids involving larger, riskier, and more profitable target, and those with a higher percentage of stock used as payment also take longer to complete.

The second column presents OLS regression estimates on the deal valuation ratio (*RATIO to SALES*). The coefficients on all CTO based measures are positive and significant ( $p < 0.05$ ) for all CTO proxies. This suggests that bids to takeover CTO firms have, on average, lower deal values. These results are supportive of the notion that redacting firms suffer from informational uncertainty and risk, thus inducing acquirers to protect themselves through a lower deal value.

The last column regresses the number of takeover attempts on the redaction measures. The coefficients for the redaction variables are uniformly positive and significant at least at  $p < 0.05$  for five of the six proxies. Thus, the number of takeover attempts is higher when firms engage in more redaction in prior years. These results are also supportive of firm redaction engendering informational uncertainty and risk to prospective bidders, which can cause multiple failures of the deal negotiations and processes until a successful completion of the deal.

#### 4.4 *Announcement Returns*

In this subsection, we examine stock market reaction to the announcement date of the acquisition for both target and acquirer firms. Specifically, we test whether the stock market reacts to the valuation signal by the target firm with redaction. If the market believes that redactions provide a credible signal on their proprietary contracts, which may increase the firms future competitive advantage in the product market, we expect the market to react positively to the acquisition deal announcement. We test this idea by estimating the following model.

$$CAR_{3,t+1} = a + \beta_1 CTO_{i,t} + \sum CONTROL + \sum Industry FE + \sum Year FE + \varepsilon_{i,t}. \quad (7)$$

Table 10 summarizes the OLS regression estimates for Eq. (7). The dependent variable is the bidder announcement return (*Bidder CAR3*) is over days (-1, +1), where day 0 is the date of the initial bid

announcement. Daily abnormal stock returns are computed using the market model and the value-weighted CRSP index. The coefficient for  $CTO3$  is positive and significant ( $p < 0.01$ ), supportive of the view that firm redaction signifies value-enhancing and proprietary information. The dependent variable in the second column is the acquirer's announcement return ( $Acquirer CAR3$ ) is over days  $(-1, +1)$ , where day 0 is the date of the initial bid announcement. The coefficient for  $CTO3$  is insignificant. These results suggest that target firms' redaction provides a credible signal on their proprietary contracts.

#### 4.5 Post-Acquisition Operating Performance

As previously discussed, we predict that CTO redaction could have an implication on future sales growth subsequent to the acquisition. We test these ideas by estimating

$$SGROW_{i,t+1} = a + \beta_1 CTO_{i,t} + \beta_2 LNMKSIZE_{i,t} + \beta_3 BTM_{i,t-1} + \beta_4 EP_{i,t} + \beta_5 LEV_{i,t} + \beta_6 SGROW_{i,t} + \beta_7 LIQ_{i,t} + \beta_8 TANGIBILITY_{i,t} + \beta_9 ROA_{i,t} + \beta_{10} INSTOWN_{i,t} + \beta_{11} GRDUMMY_{i,t} + \sum Industry FE + \sum Year FE + \varepsilon_{i,t}. \quad (8)$$

Table 11 summarizes the OLS regression estimates for Eq. (8). The dependent variable is the sales growth ratio at year  $t+2$  defined as the percentage change in dollar sales growth in  $t+2$  over sales growth in  $t+1$ . The coefficients for all CTO based measures are positive and significant ( $p < 0.01$ ). In sum, these results show that acquiring firms have a significant propensity to identify takeover targets with greater future sales growth ratios. This is interesting as a practical matter, since it shows that redactions have in-sample predictive value.<sup>11</sup> Firms with higher levels of redaction, defined in several different ways, associate with higher *future* sales growth over sales growth in the prior year. These results are consistent with firm redaction signifying the presence of trade secrecy that is associated with an improvement in firm sales growth in the post-acquisition period.

#### 4.6 Different Types of Firm Redaction

To sharpen our identification strategy, we categorize firm redactions into two types: those more related to trade secrets (e.g., R&D and licenses) and those less related to trade secrets (e.g., all others associated with firm

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<sup>11</sup> We are currently investigating whether redactions have out-of-sample ability to predict change in future sales growth by splitting our sample into a training sample and a test sample.

financing, employment, peer, and shareholders).<sup>12</sup> We expect that the effect of firm redaction is driven largely by redactions related to trade secrets (e.g., R&D and licenses) rather than other types of redactions. Specifically, we categorize firm redaction into five groups based on the types of redacted information and create indicators for these five groups. We create indicators, including *CTO\_PEER* (redaction on supply/purchase or collaboration/alliance contract details such as identity of contracting party and price/quantity information), *CTO\_R&DLIC* (redaction on firm R&D and license contract details such as product and technical details), *CTO\_FINANCE* (redaction on firm financing details such as details of credit agreement with a financial institution and lease contract), *CTO\_EMPLOYMENT* (redaction on employment contract details such as compensation and incentive details) and *CTO\_SHAREHOLDER* (redaction on shareholder information such as details of shareholder and share purchase agreement). We then regress *TAKE\_OVER* on these five indicators and the controls in Eq. (1). The model is:

$$\begin{aligned}
 TAKE\_OVER = & a + \beta_1 CTO\_PEER + \beta_2 CTO\_R\&DLIC + \beta_3 CTO\_FINANCE + \beta_4 \\
 & CTO\_EMPLOYMENT + \beta_5 CTO\_SHAREHOLDER + \sum Firm\ Characteristics + \sum Industry\ FE + \sum Year \\
 & FE + \varepsilon_{i,t}
 \end{aligned}
 \tag{9}$$

In the untabulated results, we find that the coefficient on *CTO\_R&DLIC* is significant and positive ( $p < 0.01$ ), consistent with redacting firms signifying their propriety value and being more likely to be a takeover target. We also find that one of the redaction categories less likely to be related to proprietary costs (e.g., redaction on employment contract) is also significantly and positively associated with the likelihood of a firm becoming a takeover target. This finding may be driven by the agency costs related to firm redaction of employee compensation. That is, the redaction of executive compensation information may worsen corporate governance by reducing the opportunities for shareholders to persuade boards of directors to reward executives in a manner aligned with shareholder value creation (Craighead et al. 2004), signaling agency costs. Prior studies show that firms with agency costs are often considered to be an attractive takeover target (Amel-Zadeh and Zhang 2014). Takeovers are an important venue through which acquirers reduce these agency costs by

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<sup>12</sup> In this analysis, we limit our sample to CTOs associated with 10-Ks, 10-Qs, and 8-Ks because the process requires extensive textual extraction in categorizing redaction information from exhibit information.

terminating inefficient management teams and improving governance (Morck et al. 1990; Schwert 2000; Shivdasani 1993). Consistently, Lee (2020) finds the three-day market-adjusted stock return around the CTR dates is positive for R&D CTRs but is insignificant and negative for employment CTRs.

#### 4.7 *Alternative Measures of Trade Secrets*

To address a potential concern that firm redaction is a noisy proxy for firm trade secrecy, we employ an alternative proxy for trade secrecy. Specifically, we follow Glaeser (2015) and categorize the presence of a trade secret using 10-K descriptions of trade secrecy. Firms with trade secrets are required to describe the risk of misuse in the 10-K under Regulation S-K. As reported in Table A3, the coefficient on *TRADE\_SECRECY* is positive and significant ( $p < 0.01$ ), indicating that our results are robust to an alternative proxy for firm trade secrecy.

## 5 **Conclusion**

How firms manage trade secrecy can be critical to their future success. In this paper, we study an important aspect of this idea, namely, whether and how trade secrecy impacts the market for corporate control. Relying on the level and intensity of firms' redactions of information in their SEC filings to indicate trade secrecy, we discover three important relations as evidence of an impact. First, redacting firms are more likely to receive a takeover bid than otherwise similar non-redacting firms. Second, when redacting firms receive a takeover bid, the bid values are lower, and the deals take longer to complete. We attribute this second result to evidence that successful bids for redacting firms occur in settings of higher information uncertainty or lower information quality. Third, and also of interest from a practical standpoint, we find that successful takeovers of redacting firms on average generate increasingly higher future sales growth for up to three years beyond the takeover. Fourth, for firms that are eventually targeted for takeover, we find evidence of more abnormal purchasing one quarter before target-firms' filings with redactions, which we interpret as another insight into takeover likelihood that we contend is uncovered in the decisions of firms to redact material information. These results are new to the literature to our knowledge. We contend that our finding that redacting firms are more likely to operate in a more uncertain information environment contributes to the ability of redactions to predict

successfully critical outcomes in the takeover market. Overall, we can conclude that trade secrecy generates important economic externalities in the market for corporate control.



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## Appendix A. Definitions

Variable	Definition
<i>CTO3</i>	Indicator variable equal to 1 if firm has the new CTO (excluding extensions of the previously granted CTOs and CTOs rejecting requests) in last three years based on form filing dates associated with CTO redaction, and 0 otherwise.
<i>CTOCUM3</i>	The number of new CTO in last three years based on form filing dates associated with CTO redaction.
<i>CTORCUM3</i>	The average yearly ratio of SEC filings with new CTO redaction to the entire SEC filings based on form filing dates associated with CTO redaction in last three years.
<i>LNCTONCUM3</i>	The log of one plus the number of new CTOs based on form filing dates associated with CTO redaction in last three years.
<i>LNCTOLENGTHCUM3</i>	The log of one plus the average redaction period of new CTOs in days based on form filing dates associated with CTO redactions in last three years.
<i>LNEXHIBITSUMCUM3</i>	The log of one plus the number of exhibits in the filings associated with new CTOs based on form filing dates in last three years.
<i>TAKEOVER</i>	Indicator variable equal to 1 if firm has received a takeover offer at year $t+1$ , and 0 otherwise.
<i>RATIO_SALES</i>	Deal Value over Sales
<i>TIME_COMPLETE</i>	Decile rank of the number of days from announcement of the takeover to completion
<i>SGROW</i>	Change in net sales in year $t$ divided by net sales in year $t - 1$ .
<i>LNMKSIZE</i>	Natural logarithm of market value of equity [PRCC * CSHO].
<i>BTM</i>	Book-to-market ratio [CEQT/(PRCC * CSHO)].
<i>EP</i>	Earnings-to-price ratio [EPSPX/PRCC].
<i>LEV</i>	Total debt (short-term debt plus long-term debt) divided by total assets at the end of fiscal year $t$ .
<i>LIQ</i>	Liquidity [(CHE + RECT)/AT].
<i>TANGIBILITY</i>	Net property, plant, and equipment divided by total assets at the end of fiscal year $t$ .
<i>ROA</i>	Return on assets, calculated as net income before extraordinary items divided by total assets at the end of fiscal year $t$ .
<i>INSTOWN</i>	Percentage of institutional ownership.
<i>GRDUMMY</i>	Growth-resource mismatch dummy following Palepu (1986). Equal to 1 for firms with low growth (SGROW), high liquidity (LIQUIDITY), and low leverage (LEVERAGE) or for firms with high growth, low liquidity, high leverage, and 0 otherwise, where low and high for each variable is defined relative to Compustat median in the year.
<i>NUMFILECUM3</i>	The number of 10-K, 10-Q, and 8-K filings in last three years.
<i>MBID</i>	Indicator variable equal to 1 if multiple bidders are involved in the takeover process, and 0 if only one bidder is involved.
<i>HOSTILE</i>	Indicator variable equal to 1 if takeover bid is classified as hostile, and 0 otherwise.
<i>DIVERSITY</i>	Indicator variable equal to 1 if takeover is diversifying, and 0 otherwise, where diversification is based on two-digit SIC codes.
<i>TENDER</i>	Indicator variables equal to 1 if takeover classified as tender offer, and 0 otherwise.
<i>PCTSTOCK</i>	Percentage of stock offered as payment in the acquisition by the bidding firm.
<i>LNAT</i>	Natural logarithm of total assets

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<i>INDADJEBITTA</i>	The ratio of EBITDA over sales net of the mean EBITDA ratio of all companies in the same three-digit SIC code industry during the same fiscal year.
<i>RDEXP</i>	Research and development expenditures divided by assets.
<i>LNFIRMAGE</i>	Natural Logarithm of the number of years after the first appearance in Compustat.
<i>MKTSIZE</i>	the natural log of industry sales for each three-digit SIC code industry.
<i>ENTCOST</i>	the natural log of the weighted average of gross value of cost of property, plant and equipment for firms in the three-digit SIC code industry weighted by each firm's market share in the three-digit SIC code industry.
<i>PRODSUBST</i>	Sales over operating costs (costs of goods sold, selling, general and administrative expenses, and depreciation, depletion, and amortization) for each three-digit SIC code industry
<i>MKTSHARE</i>	the percentage of sales for each three-digit SIC code industry
<i>DDAQ</i>	Accounting quality, measured as -1*the standard deviation of five annual residuals (from t to t-4) from the cross-sectional, industry-level estimation of the modified Dechow and Dichev (2002) model.
<i>IDD</i>	1 in the year of and years following the adoption of a favorable IDD ruling by state courts that allows the owner of a trade secret to obtain an injunction prohibiting a departing employee from founding a new firm or working for a competitor (Castellaneta et al. 2017).
<i>TRADE_SECRECY</i>	An indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy."
<i>CTOCUM_PEER</i>	the number of new CTO redactions on supply/purchase or collaboration/alliance contract details in last three years
<i>CTOCUM_R&amp;DLIC</i>	the number of new CTO redactions on firm R&D and license contract details in last three years
<i>CTOCUM_FINANCE</i>	the number of new CTO redactions on details of credit agreement and lease contract in last three years
<i>CTOCUM_EMPLOYMENT</i>	the number of new CTO redactions on employment contract details in last three years
<i>CTOCUM_SHAREHOLDER</i>	the number of new CTO redactions on the description/name of the variable to shareholder/ownership, including shareholder agreement, voting agreement, and bankruptcy/restructuring related information in last three years

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## Appendix B: Implementing Propensity Score Matching Method

### Panel A: First-Stage Logit Model

Variables	CTO3
<i>INDADJEBITTA t-2</i>	-0.0274 (-8.36)***
<i>RDEXP t-2</i>	0.8989 (15.01)***
<i>LNFIRMAGE t-2</i>	-0.1433 (-16.06)***
<i>MKTSIZE t-2</i>	-0.0847 (-7.28)***
<i>ENTCOST t-2</i>	0.0686 (5.77)***
<i>PRODSUBST t-2</i>	-0.0004 (-0.77)
<i>MARKETSHARE t-2</i>	-0.6047 (-7.22)***
Observations	45,782
Year FE	YES
IND FE	YES
Pseudo-R Squared	0.1431

### Panel B: Covariate Balance Analysis

Variables	CTO Sample		Non-CTO Sample		Std-diff	Balanced Var-ratio
	Mean	Variance	Mean	Variance		
<i>LNAT t-2</i>	6.1413	5.0861	6.2042	7.4772	-0.0251	0.6802
<i>INDADJEBITTA t-2</i>	-0.3153	33.5368	-0.0919	19.5199	-0.0434	1.7181
<i>RDEXP t-2</i>	0.1174	0.0468	0.1200	0.0821	-0.0101	0.5696
<i>LNFIRMAGE t-2</i>	2.3896	0.8146	2.3824	0.8973	0.0077	0.9079
<i>INDSIZE t-2</i>	12.2670	2.1883	12.2457	2.2589	0.0143	0.9687
<i>ENTCOST t-2</i>	9.2206	1.7242	9.2264	1.7663	-0.0044	0.9761
<i>PRODSUBST t-2</i>	1.0245	3.3067	1.1205	2.7726	-0.0551	1.1926
<i>MARKETSHARE t-2</i>	0.0254	0.0073	0.0307	0.0082	-0.0601	0.8886

This table reports results using the propensity score matching approach, which involves pairing treatment and control firms based on similar observable characteristics (Dehejia and Wahba 2002). All variables are defined in Appendix A. t-statistics in parentheses are based on robust standard errors clustered by industry and year. Panel A reports estimation results of a logistic model to predict CTO. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively. Panel B reports the standardized differences between CTO sample and the matched non-CTO sample for covariate balancing. Standardized differences of 0.2, 0.5, and 0.8 correspond to small, medium, and large differences between the treatment sample and the control sample.

**Table 1**  
**Distribution of Matched CTO and Non-CTO sample**

**Panel A: By Fiscal Year**

	CTO Sample		Non-CTO Sample		Total
	Takeover = 0	Takeover = 1	Takeover = 0	Takeover = 1	
2009	342	4	371	10	727
2010	497	4	487	2	990
2011	653	11	751	0	1,415
2012	650	6	742	5	1,403
2013	648	4	673	3	1,328
2014	638	7	627	0	1,272
2015	634	7	594	4	1,239
2016	648	15	603	7	1,273
2017	605	12	549	3	1,169
2018	623	10	591	2	1,226
2019	615	13	561	12	1,201
Total	6,553	93	6,549	48	13,243

**Panel B: By Fama French 17 Industry Classification**

	CTO Sample		Non-CTO Sample		Total
	Takeover = 0	Takeover = 1	Takeover = 0	Takeover = 1	
Automobiles	60	2	67	0	129
Banks, Insurance Co..	569	7	545	4	1,125
Chemicals	130	3	136	0	269
Consumer Durables	68	0	59	2	129
Drugs, Soap, Prfums..	654	11	846	5	1,516
Food	107	1	92	1	201
Machinery and Busin..	838	11	739	0	1,588
Mining and Minerals	72	1	86	2	161
Oil and Petroleum P..	288	9	274	8	579
Other	3,017	42	2,917	21	5,997
Retail Stores	256	1	273	2	532
Steel Works Etc	61	3	57	0	121
Transportation	307	0	317	1	625
Utilities	126	2	141	2	271
Total	6,553	93	6,549	48	13,243

Panels A and B describe the main sample by year and industry. The sample consists of 13,243 firm-year observations (6,553 CTO sample and 6,549 non-CTO sample) for the sample period of 2009–2019.

**Table 2**  
**Descriptive Statistics of Matched CTO and Non-CTO sample**

Variables	CTO Sample			Non-CTO Sample			Diff.		
	MEAN	P50	SD	MEAN	P50	SD	T-Stat p-value	Wilcoxon p-value	F-Stat p-value
<i>CTO3</i>	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000			
<i>CTOCUM3</i>	1.5811	1.0000	0.7444	0.0000	0.0000	0.0000	***	***	***
<i>CTORCUM3</i>	0.0534	0.0370	0.0587	0.0000	0.0000	0.0000	***	***	***
<i>LNCTONCUM3</i>	1.0700	1.0986	0.4508	0.0000	0.0000	0.0000	***	***	***
<i>LNCTOLENGTHCUM3</i>	7.7129	7.8535	0.9892	0.0000	0.0000	0.0000	***	***	***
<i>LNEXHIBITSUMCUM3</i>	1.3758	1.0986	0.7029	0.0000	0.0000	0.0000	***	***	***
<i>TAKEOVER</i>	0.0140	0.0000	0.1175	0.0073	0.0000	0.0850	***	***	***
<i>LNMKSIZE</i>	6.3259	6.4087	2.1656	6.2263	6.2272	2.6382	**	***	***
<i>BTM</i>	0.0982	0.1799	1.3493	0.2032	0.1952	1.4375	***	***	***
<i>EP</i>	-0.2305	-0.0017	0.8695	-0.2197	0.0212	0.9492		***	***
<i>LEV</i>	0.2720	0.2122	0.2796	0.2608	0.1911	0.2764	**	**	
<i>SGROW</i>	1.1694	1.0663	0.5270	1.1439	1.0561	0.4747	***	***	***
<i>LIQ</i>	0.4251	0.3846	0.2714	0.3785	0.3187	0.2612	***	***	***
<i>TANGIBILITY</i>	0.2173	0.1100	0.2444	0.2229	0.1256	0.2436		***	
<i>ROA</i>	-0.1274	-0.0015	0.3240	-0.1031	0.0132	0.3390	***	***	***
<i>INSTOWN</i>	0.4629	0.4541	0.3903	0.3303	0.1043	0.3819	***	***	*
<i>GRDUMMY</i>	0.1703	0.0000	0.3759	0.1608	0.0000	0.3674			*
<i>NUMFILECUM3</i>	46.8736	46.0000	25.3070	31.7811	35.0000	25.5548	***	***	

This table shows descriptive statistics and univariate tests for redacting and non-redacting firms. Tests of differences are based on t-tests for means, Wilcoxon tests for medians, and F-tests for the standard deviation. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively



**Table 3**  
**Correlation Matrix**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) CTO3	1	<b>0.94</b>	<b>0.93</b>	<b>0.93</b>	<b>0.92</b>	<b>0.93</b>	<b>0.03</b>	<b>0.02</b>	<b>-0.03</b>	<b>-0.08</b>	<b>0.02</b>	<b>0.02</b>	<b>0.09</b>	<b>-0.03</b>	<b>-0.08</b>	<b>0.30</b>
(2) CTCUM3	<b>0.83</b>	1	<b>0.96</b>	<b>0.98</b>	<b>0.94</b>	<b>0.96</b>	<b>0.04</b>	<b>0.03</b>	<b>-0.04</b>	<b>-0.09</b>	<b>0.03</b>	<b>0.04</b>	<b>0.10</b>	<b>-0.03</b>	<b>-0.09</b>	<b>0.33</b>
(3) CTORCUM3	<b>0.54</b>	<b>0.67</b>	1	<b>0.97</b>	<b>0.91</b>	<b>0.95</b>	<b>0.03</b>	<b>-0.03</b>	<b>-0.03</b>	<b>-0.10</b>	0.01	<b>0.03</b>	<b>0.12</b>	<b>-0.04</b>	<b>-0.11</b>	<b>0.27</b>
(4) LNCTONCUM3	<b>0.86</b>	<b>0.96</b>	<b>0.70</b>	1	<b>0.93</b>	<b>0.97</b>	<b>0.04</b>	<b>0.03</b>	<b>-0.05</b>	<b>-0.10</b>	<b>0.03</b>	<b>0.03</b>	<b>0.10</b>	<b>-0.04</b>	<b>-0.10</b>	<b>0.34</b>
(5) LNCTOLENGTHCUM3	<b>0.98</b>	<b>0.87</b>	<b>0.56</b>	<b>0.88</b>	1	<b>0.92</b>	<b>0.04</b>	<b>0.05</b>	<b>-0.04</b>	<b>-0.09</b>	<b>0.05</b>	<b>0.03</b>	<b>0.06</b>	0.00	<b>-0.09</b>	<b>0.32</b>
(6) LNXHIBITSUMCUM3	<b>0.81</b>	<b>0.90</b>	<b>0.68</b>	<b>0.94</b>	<b>0.84</b>	1	<b>0.04</b>	<b>0.03</b>	<b>-0.04</b>	<b>-0.09</b>	<b>0.04</b>	<b>0.04</b>	<b>0.10</b>	<b>-0.03</b>	<b>-0.10</b>	<b>0.32</b>
(7) TAKEOVER	<b>0.03</b>	<b>0.04</b>	<b>0.02</b>	<b>0.04</b>	<b>0.04</b>	<b>0.04</b>	1	0.00	-0.01	<b>-0.03</b>	<b>0.02</b>	<b>0.02</b>	-0.01	<b>0.02</b>	<b>-0.03</b>	<b>0.05</b>
(8) LNMKSIZE	<b>0.02</b>	<b>0.04</b>	<b>-0.05</b>	<b>0.03</b>	<b>0.03</b>	<b>0.04</b>	0.01	1	<b>-0.13</b>	<b>0.46</b>	<b>0.15</b>	<b>0.12</b>	<b>-0.25</b>	<b>0.17</b>	<b>0.49</b>	<b>0.07</b>
(9) BTM	<b>-0.04</b>	<b>-0.03</b>	-0.01	<b>-0.04</b>	<b>-0.04</b>	<b>-0.03</b>	0.00	<b>0.09</b>	1	<b>0.18</b>	<b>-0.35</b>	<b>-0.09</b>	<b>0.08</b>	<b>0.15</b>	<b>0.10</b>	<b>-0.13</b>
(10) EP	-0.01	0.00	0.00	-0.01	-0.01	0.00	-0.02	<b>0.38</b>	<b>0.39</b>	1	<b>-0.02</b>	<b>0.14</b>	<b>-0.17</b>	<b>0.10</b>	<b>0.86</b>	<b>-0.08</b>
(11) LEV	<b>0.02</b>	<b>0.04</b>	0.01	<b>0.04</b>	<b>0.03</b>	<b>0.05</b>	<b>0.02</b>	-0.01	<b>-0.37</b>	<b>-0.21</b>	1	<b>-0.03</b>	<b>-0.46</b>	<b>0.32</b>	<b>-0.04</b>	<b>0.13</b>
(12) SGROW	<b>0.03</b>	<b>0.05</b>	<b>0.03</b>	<b>0.04</b>	<b>0.03</b>	<b>0.05</b>	<b>0.04</b>	<b>0.03</b>	0.00	<b>0.09</b>	<b>-0.03</b>	1	<b>0.07</b>	<b>-0.06</b>	<b>0.15</b>	<b>0.03</b>
(13) LIQ	<b>0.09</b>	<b>0.10</b>	<b>0.11</b>	<b>0.11</b>	<b>0.08</b>	<b>0.10</b>	0.00	<b>-0.23</b>	<b>0.06</b>	<b>0.02</b>	<b>-0.31</b>	<b>0.14</b>	1	<b>-0.57</b>	<b>-0.22</b>	<b>-0.03</b>
(14) TANGIBILITY	-0.01	-0.01	-0.01	-0.01	0.00	0.00	<b>0.03</b>	<b>0.13</b>	<b>0.12</b>	<b>-0.05</b>	<b>0.27</b>	<b>-0.08</b>	<b>-0.58</b>	1	<b>0.15</b>	-0.01
(15) ROA	<b>-0.04</b>	<b>-0.05</b>	<b>-0.06</b>	<b>-0.06</b>	<b>-0.04</b>	<b>-0.05</b>	-0.01	<b>0.44</b>	<b>0.16</b>	<b>0.43</b>	<b>-0.17</b>	0.01	<b>-0.27</b>	<b>0.14</b>	1	<b>-0.07</b>
(16) NUMFILECUM3	<b>0.28</b>	<b>0.31</b>	<b>0.13</b>	<b>0.33</b>	<b>0.30</b>	<b>0.28</b>	<b>0.05</b>	<b>0.05</b>	<b>-0.09</b>	<b>-0.07</b>	<b>0.10</b>	<b>0.04</b>	<b>-0.02</b>	0.00	<b>-0.05</b>	1

This table reports the correlation coefficients among selected variables. Pearson product moment correlations (Spearman rank correlations) appear below (above) the diagonal. Bold text indicates significantly different from zero ( $p < 0.05$ ). Appendix A defines the variables.

**Table 4**  
**Redaction and Corporate Takeover Likelihood**

Variables	Dependent Variable = <i>TAKEOVER</i>					
<i>CTO3</i>	0.4168 (2.18)**					
<i>CTOCUM3</i>		0.2521 (4.10)**				
<i>CTORCUM3</i>			1.7992 (2.41)**			
<i>LNCTONCUM3</i>				0.3944 (2.40)**		
<i>LNCTOLENGTHCUM3</i>					0.0586 (2.33)**	
<i>LNEXHIBITSUMCUM3</i>						0.2920 (2.01)**
<i>LNMKSIZE</i>	0.0161 (0.25)	0.0141 (0.21)	0.0156 (0.22)	0.0133 (0.20)	0.0153 (0.23)	0.0115 (0.17)
<i>BTM</i>	0.0868 (0.76)	0.0845 (0.75)	0.0831 (0.76)	0.0838 (0.75)	0.0879 (0.77)	0.0834 (0.74)
<i>EP</i>	-0.1283 (-0.77)	-0.1322 (-0.80)	-0.1255 (-0.89)	-0.1329 (-0.79)	-0.1296 (-0.78)	-0.1308 (-0.77)
<i>LEV</i>	0.2228 (0.46)	0.1820 (0.39)	0.2277 (0.43)	0.1620 (0.36)	0.2137 (0.45)	0.1522 (0.34)
<i>SGROW</i>	0.4664 (2.02)**	0.4549 (1.94)*	0.4713 (2.14)**	0.4491 (1.86)*	0.4613 (2.00)**	0.4454 (1.82)*
<i>LIQ</i>	0.3353 (0.65)	0.2791 (0.54)	0.3891 (0.71)	0.2612 (0.48)	0.3115 (0.59)	0.2685 (0.48)
<i>TANGIBILITY</i>	0.9988 (2.11)**	0.9669 (2.10)**	1.0337 (2.59)**	0.9433 (1.99)**	0.9658 (2.02)**	0.9508 (2.05)**
<i>ROA</i>	-0.1355 (-0.47)	-0.1261 (-0.44)	-0.1457 (-0.49)	-0.1235 (-0.44)	-0.1322 (-0.46)	-0.1256 (-0.45)
<i>INSTOWN</i>	0.2774 (1.18)	0.2702 (1.14)	0.3380 (1.23)	0.2659 (1.17)	0.2699 (1.17)	0.2731 (1.19)
<i>GRDUMMY</i>	-0.0898 (-0.19)	-0.0943 (-0.20)	-0.0818 (-0.15)	-0.1075 (-0.23)	-0.0912 (-0.19)	-0.1060 (-0.22)
<i>NUMFILECUM3</i>	0.0119 (5.95)***	0.0116 (5.73)**	0.0130 (6.51)**	0.0113 (6.16)**	0.0117 (5.88)**	0.0117 (6.47)***
Observations	13,243	13,243	13,243	13,243	13,243	13,243
Year FE	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES
Pseudo R-Squared	0.0734	0.0753	0.0712	0.0756	0.0742	0.0759

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto CTO, based on takeover bids during 2009-2019. *TAKEOVER* takes a value of one if the target is acquired in the next year after the redaction, and 0 otherwise. We capture CTO by using six proxies, including *CTO3*, *CTOCUM3*, *CTORCUM3*, *LNCTONCUM3*, *LNCTOLENGTHCUM3* and *LNEXHIBITSUMCUM3*. *CTO3* denotes an indicator variable equal to 1 if firm has a new CTO the redaction in last three years, and 0 otherwise. *CTOCUM3* denotes the number of new CTO redactions in last three years, and 0 otherwise. *CTORCUM3* denotes the average yearly ratio of SEC filings with new CTO redaction to the entire SEC filings based on form filing dates associated with CTO redaction in last three years. *LNCTONCUM3* denotes the log of one plus the number of new CTOs based on form filing dates associated with CTO redaction in last three years. *LNCTOLENGTHCUM3* denotes the log of one plus the average redaction period of new CTOs in days based on form filing dates associated with CTO redactions in last three years. *LNEXHIBITSUMCUM3* denotes the log of one plus the number of exhibits in the filings associated with new CTOs based on form filing dates in last three years. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

**Table 5**  
**Redaction and Corporate Takeover Likelihood: Conditional on Insider Trading Activities**

Variables	Dependent Variable = <i>TAKEOVER</i>	
<i>CTO3</i>	0.8286 (3.00)***	0.4583 (1.30)
<i>TOP_TERCILE_ABTRADE</i>	0.6297 (1.76)*	
<i>CTO3*TOP_TERCILE_ABTRADE</i>	-0.3875 (-1.55)	
<i>BOTTOM_TERCILE_ABTRADE</i>		-0.7674 (-2.56)**
<i>CTO3*BOTTOM_TERCILE_ABTRADE</i>		0.7479 (2.15)**
<i>NUMFILECUM3</i>	0.0120 (5.11)***	0.0120 (4.79)***
<i>LNMKSIZE</i>	0.0220 (0.33)	0.0237 (0.31)
<i>BTM</i>	0.0574 (0.40)	0.0547 (0.39)
<i>EP</i>	-0.1417 (-0.74)	-0.1407 (-0.85)
<i>LEV</i>	0.3237 (0.57)	0.3087 (0.51)
<i>SGROW</i>	0.6007 (2.24)**	0.5964 (2.62)***
<i>LIQ</i>	0.2294 (0.38)	0.2693 (0.32)
<i>TANGIBILITY</i>	0.1606 (0.79)	0.1777 (0.53)
<i>ROA</i>	-0.2630 (-0.73)	-0.2718 (-0.54)
<i>INSTOWN</i>	0.2824 (1.34)	0.2946 (0.80)
<i>GRDUMMY</i>	0.1920 (0.38)	0.1735 (0.35)
Firm-level controls	YES	YES
Observations	10,654	10,654
Year FE	YES	YES
IND FE	YES	YES
R2_Adjusted	0.0762	0.0756

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto *CTO*, conditioning on insider trading activities. *ABTRADE* calculates a difference between abnormal insider sales and purchases. *TOP\_TERCILE\_ABTRADE* and *BOTTOM\_TERCILE\_ABTRADE* are indicators for the highest and the lowest terciles in *ABTRADE*, respectively. Abnormal insider sales (purchases) are defined as actual sales (purchases) minus expected sales (purchases) in the quarter before the issue date or cancellation date. Expected sales (purchases) is the mean sales (purchases) of that firm in the 36-month period beginning 48 months prior to the announcement of a new issue and ending 13 months prior to the announcement. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

**Table 6**  
**Redaction and Corporate Takeover Likelihood: Conditional on Accounting Quality**

Dep. Variable =	TAKEOVER											
	DDAQ = Lower		Higher		Lower		Higher		Lower		Higher	
<i>CTO3</i>	0.1837	0.7998										
	(0.39)	(2.17)**										
<i>CTOCUM3</i>			0.3415	0.3249								
			(1.89)*	(5.40)***								
<i>CTORCUM3</i>					3.4077	1.8873						
					(1.19)	(0.77)						
<i>LNCTONCUM3</i>							0.4459	0.6144				
							(1.34)	(2.62)***				
<i>LNCTOLENGTHCUM3</i>									0.0406	0.1120		
									(0.68)	(10.75)***		
<i>LNEXHIBITSUMCUM3</i>											0.3841	0.5072
											(1.03)	(2.30)**
<i>Diff.</i>		0.6161		-0.0166		-1.5204		0.1685		0.0714		0.1231
		(2.41)**		(-0.51)		(-0.13)		(1.34)		(26.43)***		(2.73)***
Firm-level controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,998	2,057	2,998	2,057	2,998	2,057	2,941	2,057	2,998	2,057	2,998	2,057
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2_Adjusted	0.263	0.1464	0.2702	0.1439	0.2643	0.1367	0.2494	0.1493	0.2641	0.1486	0.2714	0.1523

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto CTO, conditioning on Accounting Quality (*DDAQ*). The sample is categorized into three subgroups based on the level of proxies for Accounting Quality (*DDAQ*). All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

**Table 7**  
**Redaction Amendment and Corporate Takeover Likelihood**

Dep. Variable =	<i>TAKEOVER</i>	
<i>CTOAMEND3</i>	-0.3366 (-4.20)***	
<i>CTOAMENDCUM3</i>		-0.0580 (-5.37)***
<i>LNKSIZE</i>	0.0222 (0.35)	0.0217 (0.35)
<i>BTM</i>	0.0839 (0.75)	0.0838 (0.75)
<i>EP</i>	-0.1261 (-0.78)	-0.1259 (-0.78)
<i>LEV</i>	0.2443 (0.50)	0.2501 (0.51)
<i>SGROW</i>	0.4632 (2.05)**	0.4658 (2.06)**
<i>LIQ</i>	0.3617 (0.70)	0.3753 (0.73)
<i>TANGIBILITY</i>	0.9894 (1.97)**	1.0047 (2.02)**
<i>ROA</i>	-0.1211 (-0.41)	-0.1267 (-0.43)
<i>HELD_PCT</i>	0.4063 (1.56)	0.3974 (1.55)
<i>GRDUMMY</i>	-0.0816 (-0.18)	-0.0819 (-0.18)
<i>NUMFILECUM3</i>	0.0132 (6.39)***	0.0132 (6.40)***
Observations	12,728	12,728
Year fixed effects	YES	YES
Industry fixed effects	YES	YES
Pseudo R-Squared	0.0639	0.0656

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto management guidance, based on takeover bids during 2009-2019. **TAKEOVER** takes a value of one if the target is acquired in the next year after the redaction, and 0 otherwise. *CTOAMEND3* equals one if firm amend a CTO the redaction in last three years, and 0 otherwise. *CTOAMENDCUM3* denotes the number of amended CTO redactions in last three years, and 0 otherwise.. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

**Table 8**  
**Redaction and Corporate Takeover Likelihood: Private versus Public Firms**

Dep. Variable =	<i>TAKEOVER</i>											
	Public Status =		Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
<i>CTO3</i>	0.1496	0.4300										
	(0.59)	(3.28)***										
<i>CTOCUM3</i>			0.2625	0.2561								
			(1.58)	(5.87)***								
<i>CTORCUM3</i>					2.5747	2.3748						
					(0.56)	(3.54)***						
<i>LNCTONCUM3</i>							0.2574	0.3995				
							(0.95)	(4.67)***				
<i>LNCTOLENGTHCUM3</i>									0.0253	0.0592		
									(0.74)	(3.51)***		
<i>LNEXHIBITSUMCUM3</i>											0.1665	0.2950
											(1.41)	(4.03)***
<i>Diff.</i>		0.2804		-0.0064		-0.1999		0.1421		0.0339		0.1285
		(3.54)***		(-0.25)		(-0.01)		(2.29)**		(26.36)***		(22.50)***
Firm-level controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4,353	38,472	4,353	38,472	4,353	38,472	4,353	38,472	4,353	38,472	4,353	38,472
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Pseudo R-Squared	0.1645	0.0513	0.1662	0.0519	0.1648	0.0497	0.1651	0.0523	0.1647	0.0517	0.1649	0.0522

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto the different types of firm redactions in firm 10-K, 10-Q, and 8-K filings, based on takeover bids during 2009-2019. *TAKEOVER* takes a value of one if the target is acquired in the next year after the redaction, and 0 otherwise. *CTOCUM\_PEER* denotes the number of new CTO redactions on supply/purchase or collaboration/alliance contract details in last three years. *CTOCUM\_R&DLIC* denotes the number of new CTO redactions on firm R&D and license contract details in last three years. *CTOCUM\_FINANCE* denotes the number of new CTO redactions on details of credit agreement and lease contract in last three years. *CTOCUM\_EMPLOYMENT* denotes the number of new CTO redactions on employment contract details in last three years. *CTOCUM\_SHAREHOLDER* denotes the number of new CTO redactions on the description/name of the variable to shareholder/ownership, including shareholder agreement, voting agreement, and bankruptcy/restructuring related information in last three years. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

**Table 9**  
**Redaction and Deal Characteristics**

Dependent Variable =	Time to Completion	Deal Value/Sales	Number of Takeover Attempts
<i>CTO3</i>	0.0646 (2.85)***	-0.0786 (-2.28)**	0.0045 (2.73)***
<i>LNKSIZE</i>	0.0248 (1.83)*	0.0971 (8.45)***	0.0004 (0.53)
<i>BTM</i>	0.0116 (0.72)	0.0134 (0.77)	0.0012 (0.73)
<i>EP</i>	-0.0423 (-1.98)*	-0.0436 (-5.97)***	-0.0017 (-0.50)
<i>LEV</i>	0.0965 (2.11)**	0.0116 (0.27)	0.0057 (0.92)
<i>SGROW</i>	0.0197 (0.85)	-0.0310 (-2.03)**	0.0082 (1.61)
<i>LIQ</i>	-0.0871 (-0.83)	-0.1814 (-4.64)***	0.0026 (0.63)
<i>TANGIBILITY</i>	-0.0454 (-0.40)	-0.1272 (-1.31)	0.0123 (2.30)**
<i>ROA</i>	0.3830 (4.32)***	0.1643 (2.99)***	-0.0013 (-0.33)
<i>INSTOWN</i>	-0.1157 (-1.90)*	0.0188 (0.26)	-0.0006 (-0.21)
<i>GRDUMMY</i>	0.1648 (2.94)***	-0.0359 (-1.13)	0.0015 (0.44)
<i>NUMFILINGCUM3</i>	-0.0007 (-0.72)	0.0008 (0.84)	0.0002 (4.33)***
<i>MBID</i>	0.2618 (3.18)***	0.0433 (1.09)	
<i>HOSTILE</i>	-0.2005 (-5.63)***	0.0025 (0.07)	
<i>DIVERSITY</i>	-0.0902 (-3.43)***	0.0392 (1.17)	
<i>TENDER</i>	0.0824 (2.51)**	-0.0141 (-0.78)	
<i>PCTSTOCK</i>	0.2203 (2.77)***	0.1011 (0.89)	
Observations	416	277	13,243
Year FE	YES	YES	YES
IND FE	YES	YES	YES
Adj. R-squared	0.132	0.530	0.009

This table reports coefficients from regressing deal characteristics on CTO. The deal characteristics are measured by (1) the time to complete (calculated as Decile rank of the number of days from announcement of the takeover to completion; (2) deal value (calculated as deal value divided by sales) and (3) the number of takeover attempts (calculated as the number of bids which the target received in the next year after the redaction). We also report the sales growth ratio at year t+2 defined as the percentage change in dollar sales growth in t+2 over sales growth in t+1. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

**Table 10**  
**The Effect of Redaction on Abnormal Bidder Announcement Returns**

Dep. variable =	Target CAR3	Acquirer CAR3
<i>CTO3</i>	0.0231 (2.00)**	-0.0078 (-0.44)
<i>LNKSIZE</i>	-0.0001 (-0.25)	0.0005 (1.39)
<i>BTM</i>	-0.0158 (-6.70)***	0.0072 (2.67)***
<i>EP</i>	-0.0213 (-1.56)	0.0145 (1.80)*
<i>LEV</i>	0.0085 (0.58)	-0.0294 (-2.66)***
<i>SGROW</i>	-0.0468 (-1.28)	0.0096 (0.57)
<i>LIQ</i>	-0.0217 (-1.93)*	0.0020 (0.45)
<i>TANGIBILITY</i>	-0.0381 (-1.35)	-0.0672 (-1.53)
<i>ROA</i>	-0.0173 (-0.92)	-0.0906 (-1.54)
<i>HELD_PCT</i>	0.0356 (1.18)	0.0206 (0.76)
<i>GRDUMMY</i>	-0.0222 (-1.93)*	-0.0025 (-0.10)
<i>NUMFILECUM3</i>	-0.0022 (-0.09)	-0.0197 (-0.84)
<i>MBID</i>	-0.0013 (-0.03)	0.0114 (0.25)
<i>HOSTILE</i>	0.0829 (1.07)	-0.0390 (-1.54)
<i>DIVERSITY</i>	-0.0437 (-2.39)**	-0.0236 (-1.17)
<i>TENDER</i>	0.0672 (3.68)***	-0.0104 (-0.90)
<i>PCTSTOCK</i>	-0.0176 (-1.02)	0.0229 (0.56)
<i>BASE_RET</i>	-0.0158 (-1.73)*	
<i>ACQBASE_RET</i>		-0.0015 (-0.08)
Observations	1,503	208
Year FE	YES	YES
IND FE	YES	YES
Adj. R-Squared	0.089	0.230

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto *CTO*, based on takeover bids during 2009-2019. We capture *CTO* by using *CTO3*, denoting an indicator variable equal to 1 if firm has a new *CTO* the redaction in last three years, and 0 otherwise. Following Bradley, Desai, and Kim (1988), *Bidder CAR3* and *Acquirer CAR3* denotes the cumulative abnormal return over the (-1, +1) event window for the target and the acquirer, respectively. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.



**Table 11**  
**Post-Acquisition Operating Performance**

Dependent Variable =	Sales growth
<i>CTO3</i>	0.0957 (2.28)**
<i>LNMKSIZE</i>	0.0482 (2.48)**
<i>BTM</i>	-0.0125 (-0.43)
<i>EP</i>	0.0855 (1.93)*
<i>LEV</i>	0.1101 (0.47)
<i>SGROW</i>	0.1710 (2.89)***
<i>LIQ</i>	0.6569 (7.09)***
<i>TANGIBILITY</i>	0.0123 (0.05)
<i>ROA</i>	-1.0226 (-8.54)***
<i>INSTOWN</i>	0.1276 (1.69)*
<i>GRDUMMY</i>	0.1045 (0.67)
Observations	9,567
Year FE	YES
IND FE	YES
Adj. R-squared	0.078

This table reports coefficients from regressing deal characteristics on CTO. The deal characteristics are measured by (1) the time to complete (calculated as Decile rank of the number of days from announcement of the takeover to completion; (2) deal value (calculated as deal value divided by sales) and (3) the number of takeover attempts (calculated as the number of bids which the target received in the next year after the redaction). We also report the sales growth ratio at year t+2 defined as the percentage change in dollar sales growth in t+2 over sales growth in t+1. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

## Supplementary Tables

### Table A1. Full CTO Sample

Dep. variable =	TAKEOVER					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>CTO3</i>	0.4319 (2.98)***					
<i>CTOCUM3</i>		0.2597 (4.59)***				
<i>CTORCUM3</i>			2.4305 (3.47)***			
<i>LNCTONCUM3</i>				0.3993 (3.81)***		
<i>LNCTOLENGTHCUM3</i>					0.0590 (3.10)***	
<i>LNEXHIBITSUMCUM3</i>						0.3019 (3.11)***
<i>LNMKSIZE</i>	-0.0522 (-1.67)*	-0.0530 (-1.70)*	-0.0513 (-1.33)	-0.0533 (-1.70)*	-0.0526 (-1.68)*	-0.0542 (-1.72)*
<i>BTM</i>	0.0862 (1.60)	0.0841 (1.58)	0.0857 (2.09)**	0.0843 (1.57)	0.0862 (1.60)	0.0842 (1.57)
<i>EP</i>	-0.1631 (-1.38)	-0.1639 (-1.40)	-0.1620 (-1.46)	-0.1651 (-1.41)	-0.1635 (-1.39)	-0.1641 (-1.40)
<i>LEV</i>	0.9607 (3.12)***	0.9404 (3.09)***	0.9697 (3.42)***	0.9342 (3.13)***	0.9546 (3.11)***	0.9286 (3.14)***
<i>SGROW</i>	0.2311 (1.90)*	0.2228 (1.84)*	0.2534 (3.27)***	0.2189 (1.73)*	0.2263 (1.87)*	0.2179 (1.68)*
<i>LIQ</i>	-0.3790 (-1.43)	-0.4166 (-1.61)	-0.3245 (-0.91)	-0.4251 (-1.58)	-0.3939 (-1.48)	-0.4219 (-1.51)
<i>TANGIBILITY</i>	-0.0537 (-0.17)	-0.0663 (-0.21)	-0.0433 (-0.14)	-0.0732 (-0.24)	-0.0628 (-0.20)	-0.0716 (-0.24)
<i>ROA</i>	0.0023 (0.01)	0.0110 (0.04)	-0.0473 (-0.18)	0.0205 (0.07)	0.0094 (0.03)	0.0183 (0.06)
<i>INSTOWN</i>	0.3756 (1.75)*	0.3703 (1.71)*	0.4082 (1.57)	0.3685 (1.70)*	0.3726 (1.73)*	0.3719 (1.68)*
<i>GRDUMMY</i>	0.2084 (1.69)*	0.2093 (1.68)*	0.2020 (1.49)	0.2063 (1.66)*	0.2089 (1.69)*	0.2046 (1.63)
<i>NUMFILECUM3</i>	0.0129 (6.34)***	0.0128 (6.40)***	0.0133 (8.18)***	0.0127 (6.53)***	0.0128 (6.35)***	0.0128 (6.60)***
Observations	47,224	47,224	47,224	47,224	47,224	47,224
Year FE	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES
Pseudo R-Square	0.0561	0.0567	0.0546	0.057	0.0564	0.057

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto CTO, by using sample before employing Propensity score matching. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

**Table A2. Alternative Matching Approach**

**Panel A: Entropy Matching**

Dep. variable =	TAKEOVER					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>CTO3</i>	0.0038 (2.70)***					
<i>CTOCUM3</i>		0.0027 (2.97)***				
<i>CTORCUM3</i>			0.0259 (1.82)*			
<i>LNCTONCUM3</i>				0.0046 (3.14)***		
<i>LNCTOLENGTHCUM3</i>					0.0006 (2.93)***	
<i>LNEXHIBITSUMCUM3</i>						0.0034 (3.09)***
Firm Controls	YES	YES	YES	YES	YES	YES
Observations	51,811	51,811	51,811	51,811	51,811	51,811
Year FE	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES
F-STAT	5.91	5.51	5.5	5.54	5.83	5.52

**Panel B: Propensity Score Matching with Nearest 1**

Dep. variable =	TAKEOVER					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>CTO3</i>	0.3674 (4.11)***					
<i>CTOCUM3</i>		0.2181 (4.75)***				
<i>CTORCUM3</i>			1.6277 (3.17)***			
<i>LNCTONCUM3</i>				0.3539 (12.43)***		
<i>LNCTOLENGTHCUM3</i>					0.0524 (2.83)***	
<i>LNEXHIBITSUMCUM3</i>						0.2641 (7.82)***
Firm Controls	YES	YES	YES	YES	YES	YES
Observations	13,698	13,698	13,698	13,698	13,698	13,698
Year FE	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES
Pseudo R-Square	0.054	0.0554	0.0524	0.0559	0.0547	0.0562

### Panel C: Size Matching

Dep. variable =	TAKEOVER					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>CTO3</i>	0.3513 (1.89)*					
<i>CTOCUM3</i>		0.2725 (3.46)***				
<i>CTORCUM3</i>			2.1384 (1.64)			
<i>LNCTONCUM3</i>				0.4318 (2.91)***		
<i>LNCTOLENGTHCUM3</i>					0.0495 (2.11)**	
<i>LNEXHIBITSUMCUM3</i>						0.3072 (2.56)**
Firm Controls	YES	YES	YES	YES	YES	YES
Observations	31,597	31,597	31,597	31,597	31,597	31,597
Year FE	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES
Pseudo R-Square	0.0367	0.0384	0.0358	0.0387	0.037	0.0384

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto CTO, by using alternative matching techniques. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.

**Table A3. Alternative Measure of Trade Secrets: Description of Trade Secrets in 10-K Filings**

<i>Variables</i>	Dependent Variable = <i>TAKEOVER</i>
<i>TRADE_SECRECY</i>	0.3714 (6.52)***
<i>LNMKSIZE</i>	-0.0444 (-1.65)*
<i>BTM</i>	0.1501 (3.08)***
<i>EP</i>	-0.2113 (-1.92)*
<i>LEV</i>	1.2063 (4.18)***
<i>SGROW</i>	0.3329 (3.19)***
<i>LIQ</i>	-0.4553 (-1.12)
<i>TANGIBILITY</i>	0.3752 (0.58)
<i>ROA</i>	0.1490 (0.57)
<i>HELD_PCT</i>	0.0763 (0.41)
<i>GRDUMMY</i>	0.3074 (2.38)**
Observations	37,181
Year FE	YES
IND FE	YES
Pseudo R-Square	0.0543

This table presents the results of a multivariate logistic model where an indicator for takeover bids is regressed onto the number of trade secret words in firm 10-K filings, based on takeover bids during 2009-2019. *TAKEOVER* takes a value of one if the target is acquired in the next year after the redaction, and 0 otherwise. *TRADE\_SECRECY* denotes the number of sentences including trade secrecy in firm 10-K filings. All regressions control for year and industry fixed effects. All variables are measured at the end of the fiscal year prior to the takeover announcements. t-statistics in parentheses are based on robust standard errors clustered by industry and year. All variables are defined in Appendix A. \*, \*\*, \*\*\* Indicate two-sided significance levels of 10 percent, 5 percent, and 1 percent, respectively.