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Nondisclosure and analyst behavior: evidence from redaction of proprietary information from public filings

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NONDISCLOSURE AND ANALYST BEHAVIOR: EVIDENCE FROM REDACTION OF PROPRIETARY INFORMATION FROM PUBLIC FILINGS

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DEDICATION

I dedicate this dissertation to my husband Dongfang, my daughter Emma, and my parents for their love, patience, and support during my doctoral studies.

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ABSTRACT

This study explores how the redaction of proprietary information from public filings is related to analyst following and properties of analysts' earnings forecasts. The paper uses hand-collected data on firms' confidential treatment orders from the SEC EDGAR database to identify firms that withhold information (redacting firms), which are benchmarked to a matched set of firms that do not (non-redacting firms). Relative to non-redacting firms, the paper predicts and documents that redacting firms have (i) higher analyst following; (ii) more dispersed and less accurate analysts' earnings forecasts; and (iii) lower precision of both public and private information contained in analysts' earnings forecasts. Additional analyses reveal that analysts covering redacting firms trade off accuracy for timeliness when issuing earnings forecasts, that the market reaction to analyst reports is higher for redacting firms, and that for redacting firms investors place higher weight on information from analysts relative to that from the firm itself. Overall, the findings suggest that firms engaging in redacted disclosure exhibit greater investor demand

for analyst outputs, a deterioration in the analysts' information environment, but also greater investor reliance on analyst outputs.

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LIST OF ABBREVIATIONS

CEM...Coarsened Exact Matching

CT...Confidential Treatment

CTR... Confidential Treatment Request

EDGAR... Electronic Data Gathering, Analysis, and Retrieval

FAST..Fixing America's Surface Transportation

FOIA...Freedom of Information Act

GAAP...Generally Accepted Accounting Principles

IPO...Initial Public Offering

SEC...U.S. Securities and Exchange Commission

SOX.. Sarbanes-Oxley Act

NONDISCLOSURE AND ANALYST BEHAVIOR: EVIDENCE FROM REDACTION OF PROPRIETARY INFORMATION FROM PUBLIC FILINGS

1. INTRODUCTION

A substantial prior literature documents that more informative corporate disclosure is associated with reduced information asymmetry, lower cost of capital and higher stock liquidity (e.g., Welker 1995; Healy, Hutton, and Palepu 1999; Heflin, Shaw, and Wild 2005; Balakrishnan, Billings, Kelly, and Ljungqvist 2014; Billings, Jennings, and Lev 2015; Guay, Samuels, and Taylor 2016; Leuz and Wysocki 2016; Barth, Landsman, and Taylor 2017). However, firms are often reluctant to release proprietary information—such as trade secrets, pricing terms, specific milestone payments, or details about their products or services—due to concerns that public disclosure of this sensitive information can result in substantial competitive harm to the disclosing firms. To balance the public interest in promoting disclosures to investors with firms' need to protect proprietary information, the U.S. Securities and Exchange Commission (SEC) allows firms to request confidential treatment with respect to sensitive information contained in a contract or agreement normally required to be filed as an exhibit in the firm's public filings, such as 10-Q, 10-K, 8-K, S-1, F-1, or other reports. This process is known as redaction.[1]

While prior studies examine the determinants of the decision to redact proprietary information from material contracts, especially from the perspective of product market

[1] As a general rule, firms must disclose material information to investors under U.S. GAAP, SEC rules and exchange reporting requirements. Mandatory disclosures required by the SEC (such as the filing of material contracts into which a firm enters) are intended to protect investors and promote capital market efficiency. However, nondisclosure of proprietary and commercially sensitive information also promotes the public interest (Thompson 2011).

competition and technology spillover (Verrecchia and Weber 2006; Boone, Floros, and Johnson 2016; Bozanic, Dietrich, and Johnson 2017; Ettredge, Guo, Lisic, and Tseng 2017; Bourveau, She, and Zaldokas 2018; Glaeser 2018; Tian and Yu 2018), the economic consequences of redaction are more limited and focused primarily on stock market effects. For example, Verrecchia and Weber (2006) uses a limited sample of small firms from 2001 to document negative market effects from redaction of proprietary information from material contracts, reflected in a larger adverse selection component of the bid-ask spread, reductions in market depth, and lower market turnover. Boone et al. (2016) explores how IPO firms manage the tradeoff between the need for capital from public markets with the desire to protect the value of proprietary information. The paper finds that redacting firms experience greater IPO underpricing, but superior post-IPO financial performance. The current paper provides additional empirical evidence on the consequences of redaction by analyzing its relation with the behavior and outputs of a key information intermediary: financial analysts.

I examine the behavior and outputs of financial analysts in the setting of redaction for three reasons. First, the setting of redaction is unique and differs from other nondisclosure settings such as withholding of bad news. Of note, the latter represents what may colloquially be referred to as an "unknown unknown": market participants do not typically have any information about the signal that has been withheld in such circumstances. However, redaction is a "known unknown" setting: the type of information not disclosed is known for certain, with it generally being sensitive information pertaining to firms' competitive advantage. Critically, this suggests market participants and information intermediaries—including analysts—have a higher likelihood to acquire private information from other sources. The information redacted from public filings often is proprietary, requiring an expertise on the part of the analysts to seek out other sources of information and interpret potential effects of redaction on future firm value. Therefore, redaction provides a unique setting for examining whether analysts—as sophisticated information users—step in and generate private information and/or develop idiosyncratic insights when proprietary information is not disclosed (Bradshaw 2011). Second, the SEC requires that firms redacting information from material contracts detail why this information is not material as well as why its public disclosure would result in substantial competitive harm. In contrast, Thompson, Urcan, and Yoon (2018) examines the nature and materiality of redacted information, revealing at least some of it to be material to investors in the aggregate. This suggests an inherent complexity in the SEC's task of evaluating the materiality of redacted information, and whether such information is critical to key users of it (such as financial analysts).[2] Boone et al. (2016) documents that redacting firms exhibit significantly greater idiosyncratic return volatility than non-redacting firms, consistent with the information environment of redacting firms reflecting more private information as compared to non-redacting firms. Accordingly, my examination of the relation between redaction and properties of analysts' earnings forecasts provides additional insights into the nature and materiality of redacted information and whether it is critical to analysts' earnings forecasts. Finally, exploring the implications of redaction for

[2] As noted in Newman (1996), the joint requirement that the information be commercially important but immaterial to investors represents "the inherent difficulty in applying for confidential treatment."

analyst behavior helps shed light on the implications of the SEC's recent proposal to significantly change the rules governing a firm's obligation to file material contracts and redact proprietary information. In particular, the SEC is proposing to leave the decision to omit proprietary information in an SEC filing to the firm, without filing a confidential treatment request. If approved, the set of firms electing redaction as well as the amount of information to be redacted are both likely to increase, which in turn may influence the information environment of investors.[3]

I examine three primary predictions, all of which compare firms that withhold proprietary information (that is, redacting firms) against firms that do not (that is, non-redacting firms). First, I examine the association between redaction and analyst following. If analysts perceive redacted information as leading to greater private search costs, then I expect redacting firms to exhibit lower analyst following. However, if the redaction of proprietary information sufficiently increases investor demand for analyst services, then I expect redacting firms to exhibit higher analyst following. Second, I examine the association between redaction and two key proxies of the analyst information environment: earnings forecast dispersion and accuracy. If redaction leads analysts to search for additional information and incorporate relatively more private information in their

[3] In December 2015, Congress passed the Fixing America's Surface Transportation (FAST) Act, which directed the SEC to modernize and simplify the requirements in Regulation S-K. On October 11, 2017, the SEC voted unanimously to propose changes that would modernize and simplify the disclosure items in Regulation S-K and related rules and forms. The proposed changes aim to reduce the costs and burdens on public companies while continuing to ensure that all material information is provided to investors. Of note, the SEC's proposal would significantly change rules (Item 601) governing the obligation to file material contracts as exhibits to filings with the SEC, leaving the decision about omission of proprietary information in an SEC filing to the registrant, without filing a confidential treatment request. Firms would only be required to submit a detailed written analysis and an unredacted copy of the exhibit upon the SEC's formal request.

forecasts, then I expect redacting firms to exhibit higher forecast dispersion. Additionally, if analysts' private information search efforts cannot fully replace the redacted information and its insights into firm performance, then I expect lower analyst forecast accuracy for redacting firms. Third, I examine the relation between redaction and the precision of public and private information contained in analysts' earnings forecasts. If firms with redacted disclosures shield proprietary information from public filings, they are likely to also avoid releasing this information through other (public) channels. Accordingly, I expect analysts to have lower public information precision for redacting firms. Whether the precision of private information is higher or lower for redacting firms depends on the relation between public and private information (Barron, Byard, Kim, and Stevens 1998; Bozanic and Thevenot 2015).

Using the SEC's EDGAR database, I hand-collect key information from confidential treatment orders since May 2008 and identify firms that redact (presumably proprietary) information from their public filings. Consistent with expectations, I find that redacting firms exhibit higher analyst following as compared to matched non-redacting firms; this suggests that greater investor demand for analyst services outweighs any additional costs of obtaining additional private information when redaction exists. I also find that redacting firms exhibit more dispersed and less accurate earnings forecasts as compared to non-redacting firms. This finding is consistent with redacted information being both material and value relevant, leading to increased uncertainty in analysts' earnings outputs. Finally, I document lower precision of both public and private information contained in analysts' earnings forecasts for redacting firms relative to non-redacting firms.

The decision to redact information from a contract or agreement is unlikely to be random across firms. To mitigate potential selection bias from unobservable characteristics, I follow Verrecchia and Weber (2006) and Boone et al. (2016) and apply a self-selection correction model proposed by Heckman (1976). This includes estimating a first-stage probit model of the decision to redact to derive an inverse Mills ratio, and then including this as an additional explanatory variable in the second stage models. Results are unchanged from my baseline regressions. As a second specification addressing potential selection bias—this time from observable characteristics, I apply the coarsened exact matching technique. Results are again unchanged, suggesting that my findings are unlikely driven by differences between redacting and non-redacting firms. I also conduct five additional robustness tests. First, I replace the indicator variable used to capture the existence of redaction in the main analyses with a continuous measure: the natural logarithm of one plus the total number of redacted agreements during a year. Second, I include discretionary accruals as an additional control variable to capture firms' information opacity. Third, I include voluntary disclosure assessed via the likelihood of management earnings guidance to control for managers' other disclosure policies. Fourth, I conduct a shorter window analysis using quarterly analysts' earnings forecasts to more precisely align the redaction with the analyst activity. Finally, I examine the relation between redaction and analyst behavior using a subsample that consists only firms in Chemical and Allied Products industry and Business Services industry; this is done to examine whether the findings are more pronounced for industries with less information transparency. Results are unchanged across all these robustness tests.

Finally, I investigate several other properties of analyst reports for redacting firms versus non-redacting firms to better assess their usefulness to investors. First, I examine the timeliness of analyst reports; I find that analysts who cover redacting firms, on average, take less time to issue their first report following the 10-K filing, as compared to non-redacting firms. Combined with the previous evidence of reduced forecast accuracy, this suggests that analysts are trading off accuracy for timeliness in issuing forecasts when the demand for new private information is higher: that is, for redacting firms. Second, I examine the information content of analyst reports, documenting that both the three-day cumulative abnormal returns around the first forecast revision after the 10-K filing as well as the average firm returns associated with analyst reports are higher for redacting firms than that for non-redacting firms. Third, I investigate the relative weights investors place on information from the firm versus analysts and find that investors place more weights on information from analysts than that from the firm for redacting firms. Finally, I explore potential cross-sectional variations in the relation between redaction and analyst behavior. Overall, these tests help to triangulate that while the redaction of proprietary information from public filings appears associated with a deterioration in analysts' information environment (evidenced in lower accuracy and higher dispersion), it is related to higher investor demand for (reflected in higher analyst following) and usefulness in (reflected in greater timeliness and information content as well as greater relative weight investors place on information from analysts) analyst outputs.

This study provides three major contributions. First, it builds on the literature examining the determinants and consequences of redacted disclosure. Recent studies focus on the determinants of the decision to redact (Verrecchia and Weber 2006; Thompson 2011; Boone et al. 2016; Bozanic et al. 2017; Ettredge et al. 2017; Bourveau et al. 2018; Glaeser 2018; Tian and Yu 2018). Limited research assesses the economic consequences, and focuses on either a very limited sample/time series (e.g., one year of small firms in the context of Verrecchia and Weber 2006) or specific market settings (e.g., IPO firms in the context of Boone et al. 2016). This paper extends the literature by providing a large-scale study of the relation between firms' redaction of proprietary information from various public filings and analyst behavior. Of note, an underlying assumption in Verrecchia and Weber (2006) is that redacted information should have no significant effect on analysts; the results of this study suggest that redaction may have broader consequences than previously thought by documenting that redaction is associated with analyst following and properties of analysts' outputs.

Second, this study contributes to the literature examining the link between firms' disclosure practices and analyst following as well as the properties of analysts' earnings forecasts. Prior studies examining the relation between firms' disclosure policies and analyst following generally document that lower disclosure quality is related to lower analyst following (e.g., Lang and Lundholm 1996). However, this study finds an alternative finding: that redaction is associated with more analyst following, consistent with investor demand for analyst services outweighing analysts' additional costs to search for private information when redaction exists. In addition, the extensive prior literature reports a negative relation between informative disclosures and analysts' information environment, generally assessed via attributes such as earnings forecast error and dispersion (e.g., Baldwin 1984; Lang and Lundholm 1996; Barron, Kile, and O'Keefe 1999; Bowen, Davis, and Matsumoto 2002; Byard and Shaw 2003; Vanstraelen, Zarzewski, and Robb 2003; Bozzolan, Trombetta, and Beretta 2009; Lehavy, Li, and Merkley 2011; Merkley 2014). Prior literature further documents a positive association between information complexity and the error and dispersion of analysts' earnings forecasts (Plumlee 2003). Combined, these findings suggest that understanding how disclosure affects analysts' outputs is an important step towards gaining a deeper understanding of the relation between disclosure practices and firms' information environment. My study provides additional empirical evidence on the relation between firms' disclosure policies and the properties of analysts' earnings forecasts using a unique setting in which there is a higher likelihood that analysts acquire private information from other sources. This examination also provides additional insights into the nature and materiality of redacted information and whether it is critical to analysts' outputs (Thompson et al. 2018).[4] Of note, my findings suggest that redaction leads to a deterioration in the analysts' information environment—reflected in both higher forecast errors and dispersion, but also simultaneously leads to heightened usefulness of the information produced by analysts—reflected in both higher timeliness and a greater market reaction.

[4] Thompson et al. (2018) focuses on supply chain contracts to examine the average effect of redaction and suggests that diversified investors are unlikely to be impacted by managers' decisions to redact information. However, analysts are less likely to represent diversified investors given that they primarily follow firms within a specific industry. Therefore, analysts' earnings forecasts are likely to be affected when redacted information is material.

Finally, the findings in this study are also relevant to the SEC's recent proposal to allow firms to redact proprietary information without filing a confidential treatment request. While the underlying criteria of redactions under the new proposal are unchanged and remain subject to the SEC's scrutiny, firms are likely to redact more information under the proposal as (i) the SEC's approval would not be required for every redacted report, and (ii) managers have discretion regarding the omission of proprietary information in a SEC filing.[5] This suggests the set of firms electing redaction, as well as the amount of information to be redacted, are both likely to increase, which in turn may influence the information environment of investors. Because financial analysts are generally thought to represent investors in the literature, the exploration of the implications of redaction for analyst behavior helps shed light on potential effects of regulatory changes in redaction on investors' information environment (Bradshaw 2011).

In section 2, I provide institutional information on redaction. Section 3 develops the main hypotheses, and Section 4 presents the research design. Section 5 describes the sample selection and descriptive statistics. I present my baseline results in Section 6, address self-selection in Section 7, and provide sensitivity and additional analyses in Section 8. Section 9 concludes.

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[5] For instance, firms may keep more information undisclosed by overly omitting entire contractual provisions of a contract filed with the SEC, rather than narrowly selected words, phrases and figures that constitute the essence of the proprietary information. It is also possible that firms keep proprietary information confidential perpetually.

2. INSTITUTIONAL BACKGROUND

While mandatory disclosure of firm information is intended to protect investors' interests, it may negatively affect a firm's competitive advantage if the disclosed information is valuable to competitors. For example, material contracts often contain sensitive and proprietary information, the disclosure of which could adversely affect the company's business and financial condition due to competitive harm.[6] Examples include trade secrets, pricing terms, specific milestone payments, details of intellectual property, and technical designs. To mitigate the negative consequences of disclosing this information, the SEC allows firms to make confidential treatment requests (CTRs). CTRs (see Appendix B for examples) can be made pursuant to Rule 406 of the Securities Act of 1933, or Rule 24b-2 of the Securities Exchange Act of 1934, with respect to certain information included in an exhibit such as material agreements; or Rule 83 of the SEC's Rules of Practice, with respect to information not required to be filed with the SEC such as supplemental information provided in the SEC comment letters and review process. In most cases, a CTR is made with respect to sensitive information contained in a contract or agreement that is required to be filed as an exhibit to a registrant's SEC filings, such as forms S-1, F-1, 8-K, 10-K, or 10-Q.[7]

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[6] Item 601 of Regulation S-K defines material contracts as significant binding agreements that are not made in the ordinary course of business and that convey enforceable rights and obligations to firms.

[7] Before 2004, SEC registrants had considerable discretion as to the timing of material contract filings. In particular, firms had the option to either file any material contracts immediately via Form 8-K, or defer the filing to a subsequent period 10-Q/10-K report or registration statement. Regulators expressed their concern that prolonged delays could negatively impact investors' ability to "accurately and quickly value securities" (SEC 2004). As a result, Section 409 in the Sarbanes-Oxley Act (SOX) requires firms to disclosure material corporate information "on a rapid and current basis." To implement SOX, the SEC issued the *Additional Form 8-K Disclosure and Acceleration of Filing Date Rule* in 2004, mandating that firms disclose entry into material contracts via Form 8-

A registrant needs to support its request for confidential treatment by citing one of the exemptions under the Freedom of Information Act (FOIA) on the basis that disclosure of the subject information will cause it substantial competitive harm. The FOIA specifies nine categories of information that may be exempted from the general FOIA requirement to make information available to the public.[8] In general, public companies would rely on subsection (b)(4) of the FOIA for their CTRs, which exempts companies from disclosing "trade secrets and commercial or financial information obtained from a person and privileged or confidential." Companies may not redact required disclosures under other SEC rules.[9]

Both domestic and foreign companies that are publicly held can request confidential treatment via the CTR process with the SEC. Staff Legal Bulletin No. 1 outlines the procedural requirements for the CTR submission. A company submits a paper application for confidential treatment of sensitive information at the time the redacted exhibit is filed via EDGAR, clearly specifying (i) the information to be redacted on a word-by-word or phrase-by-phrase basis, (ii) why the redacted terms are not material, (iii) why their public disclosure would result in substantial competitive harm, (iv) the requested duration for the

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K filings within four business days of contract execution. Firms may choose to file the entire contract as an exhibit either to the 8-K report or to the next 10-Q/10-K filing.

8 The nine exemptions include information that (i) is classified to protect national security, (ii) is related solely to the internal personnel rules and practices of an agency, (iii) is prohibited from disclosure by another federal law, (iv) involves trade secrets or commercial or financial information that is confidential or privileged, (v) is privileged communications within or between agencies, (vi) would invade another individual's personal privacy if disclosed, (vii) is compiled for law enforcement purposes, (viii) concerns the supervision of financial institutions, and (ix) is geological information on wells.

9 Examples of required disclosures ineligible for redaction include the identity of a 10% customer, interest expense in a credit agreement, required disclosure in the MD&A section, related party transactions, and the duration and effect of all patents, trademarks, licenses and concessions held. As a rule, information that is material to investors should be disclosed even if confidential.

CTR, and (v) an unredacted copy of the exhibit. A registrant also can request an extension of a previously granted CTR; this request must comply with the substantive and procedural rules applicable to an original CTR, as the SEC processes request for extensions in the same manner as a new CTR. If the CTR expired without the registrant submitting an extension request, then the subject information becomes publicly available upon request under the FOIA.

The SEC's decision to grant or deny a CTR is contained in a confidential treatment order (CT order) to be issued to the registrant. For CTRs filed under Rule 24b-2 of the Exchange Act, the SEC expects to complete the initial review and respond within 28 days from the filing date, either by issuing a CT order granting the request or by sending a comment letter to the firm (SEC 2001). Firms have 21 days from the date of the comment letter to respond. In the case of CTRs filed under Rule 406 of the Securities Act, the timing of review process is tied to the timing of the review of the registration statement.

The SEC may approve, deny, or request additional information about the CTR.[10] If the CTR is partially approved or denied, the firm needs to file an amendment of the original EDGAR filing (SEC 2001). If the CTR is granted, the CT order would specify the time period for which the confidential treatment is allowed. Usually, the duration of confidential treatment that is granted by the SEC would be for the minimum term of the

[10] The SEC may reject CTRs that do not meet the criteria for confidential treatment, either because the information is not proprietary or because the information is material to investors. In addition, the SEC may exercise discretion in approving CTRs even if the CTR meets the eligibility criteria (Thompson 2011).

contract or 10 years, whichever is less. For a contract that is terminable at will by either party, the SEC typically grants a confidential treatment period of no more than three years.

The SEC makes available, through EDGAR, a database of CT orders issued since May 1, 2008: this is the data source of my redacted information.[11] Each order includes the date granting or denying the CTR, the initial filing form and the date of initial filing requesting confidential treatment, whether the initial filing was amended, whether the CTR is a new request or a request for an extension of prior confidential treatments, whether the information qualifies as confidential commercial or financial information under the FOIA, the exhibits containing approved redactions, and the period over which the redacted information will remain confidential.[12] Appendix A provides an example of a CT order granting a request for confidential treatment.

3. HYPOTHESIS DEVELOPMENT

3.1 Redaction and Analyst Following

Theoretical work argues that the equilibrium of analyst following is determined by the intersection of the aggregate demand for and supply of analyst services (Bhushan 1989). Among firm characteristics predicted to affect this intersection, firm disclosure plays a prominent role. Prior research examining the relation between firm disclosure and analyst following generally documents that firms with higher disclosure quality and more

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[11] See https://www.sec.gov/edgar/searchedgar/ctorders.htm. Prior studies examining confidential treatment have searched in firms' 10-K reports or registration statements using the terms "confidential," "confidential request," or "confidential treatment."

[12] During my sample period, I find only 14 CTRs denied by the SEC; these are excluded from my sample.

informative disclosures attract higher analyst following (e.g., Lang and Lundholm 1996; Healy et al. 1999; Botosan and Harris 2000; Barth, Kasznik, and McNichols 2002).

However, in the setting of redaction, how nondisclosure of proprietary information relates to analyst following is unclear *ex ante*. On the one hand, the cost of analyst coverage may be greater. Nondisclosure will require analysts to increase effort and incur greater private search costs to obtain additional information as they evaluate and project the future performance of redacting firms (Boone et al. 2016; Thompson et al. 2018). In addition, analysts are less likely to cover firms with incentives to withhold or manipulate information (Lang, Lins, and Miller 2004). Collectively, these factors suggest that redaction may lead to reduced analyst following. On the other hand, redacting sensitive information from financial reports may increase investor demand for analyst services due to greater costs of processing the redacting firm's omitted information and the desire to have a better understanding of the firm's competitive advantages. This would suggest higher analyst following for redacting firms. Therefore, the net effect depends on the relative importance of the supply of and demand for analyst services.[13] This leads to the following non-directional hypothesis (stated in the null form):

> **H_1**: Analyst following is unrelated to the redaction of proprietary information from public filings.

[13] The direction of causality between a firm's disclosure policy and analyst following is debatable. Some papers show that the direction runs from disclosure policy to analyst following (Lang and Lundholm 1996); others argue that analysts can induce and shape managers' voluntary disclosure choices (Zhou 2016; Chapman and Green 2018). However, reverse causality appears less likely in the setting of redaction as the nondisclosure of proprietary information requires the SEC's approval; thus, it appears unlikely that analysts (on average) can induce managers to redact proprietary information and obtain this SEC approval.

3.2 Redaction and Analysts' Earnings Forecasts

Extant literature provides evidence on how firm disclosure affects the properties of analysts' earnings forecasts. These studies find that analyst forecast error and dispersion are negatively associated with increased segment disclosure (Baldwin 1984; Botosan and Stanford, 2005), the quality of firm disclosure (Lang and Lundholm 1996), the quality of MD&A disclosure (Barron et al. 1999), earnings-related conference calls (Bowen et al. 2002), the level of accounting policy disclosure (Hope 2003a), firm-level annual report disclosures (Hope 2003b), forward-looking non-financial disclosures (Vanstraelen et al. 2003), readability of 10-K filings (Lehavy et al. 2011), implementation of Regulation Fair Disclosure (Kross and Suk 2012), and narrative R&D disclosure quantity (Merkley 2014). Overall, this literature suggests that better disclosure of financial and nonfinancial information assists analysts in understanding and assessing a firm's future prospects. Some other studies document a positive relation between information complexity and analyst forecast error and dispersion (Plumlee 2003).

In forecasting future earnings, analysts face uncertainties related to understanding both the firm's economic situation and competitive advantage (Hope 2003). Redacted disclosures commonly include proprietary information—such as trade secrets, pricing terms, specific milestone payments, details of intellectual property, and technical designs—that is useful to the forecasts of future earnings. Carter and Soo (1999) documents that the market reacts to 8-K reports containing material information about contracts, consistent with the value relevance of this information. Given the inherent complexity of the SEC's task of evaluating the materiality versus proprietary nature of redacted information (Thompson et al. 2018), it is likely that redacted information contains information relevant to analysts' prediction of future firm performance.

Because analysts who follow firms with redacted disclosures bear the costs of private information acquisition, redaction is likely to be associated with the dispersion and accuracy of their related earnings forecasts. If redaction leads analysts to search for additional information and to incorporate more private information in their forecasts of these redacting firms, this should be associated with a more diverse set of forecasts. Accordingly, I expect analyst forecast dispersion to be higher for redacting firms:

> **H_{2a}**: Redacting firms have more dispersed analysts' earnings forecasts relative to non-redacting firms.

Despite increased private information search, financial analysts may be still unable to fully ascertain critical aspects of key redacted disclosures (such as trade secrets and key terms in purchase/sale agreements) (Thompson et al. 2018). Less qualitative and quantitative information about a firm's strategies, prospects, and future performance increases analysts' uncertainty about the firm's future earnings. Accordingly, if redacted information makes it more difficult for analysts to forecast earnings, then I expect forecast accuracy to be lower (i.e., analyst forecast error to be higher) for firms redacting proprietary information from financial reports:

> **H_{2b}**: Redacting firms have higher analyst forecast error relative to non-redacting firms.

3.3 Redaction and the Precision of Public/Private Information

Barron et al. (1998) assumes that analysts have two primary sources of information—private and public information, and then demonstrates how public and private information result in forecast errors and dispersion. The paper finds that forecast dispersion reflects only idiosyncratic error, that the error in individual forecasts reflects both common and idiosyncratic error, and that the error in the mean forecast reflects primarily common error. Accordingly, I follow the model of Barron et al. (1998) and construct empirical measures of public and private information precision. These measures combine forecast accuracy, dispersion, and the number of analyst forecasts, allowing me to examine more directly how redaction relates to the properties of analysts' information environment.

I view firms redacting information from public filings as consistent with firms that have high proprietary costs. For such firms, it seems reasonable to expect that they would avoid releasing this proprietary information through other public channels. For example, Hollander, Pronk, and Roelofsen (2010) examines conference calls to explore whether managers withhold information from the public, documenting that managers often do not answer certain participant questions that pertain to firm-specific financial disclosures (e.g., sales, margins, expenses, special items, net income) or firm-specific business (e.g., production, operations, mergers/acquisitions). Accordingly, I expect analysts to have lower precision of public information for redacting firms relative to non-redacting firms:

> **H_{2c}**: The precision of public information contained in analysts' earnings forecasts is lower for redacting firms relative to non-redacting firms.

However, the relation between redaction and analysts' private information precision is unclear, with theoretical models providing competing predictions. Some studies model settings where more precise public disclosure results in a decrease in private information (Diamond 1985; Kim and Verrecchia 1991), suggesting that higher-quality disclosure reduces the demand for private information, and thus reduces the precision of analysts' idiosyncratic information. In the current setting, if redaction of proprietary information is associated with analysts' efforts to obtain more private information, analysts may have a higher precision of private information for redacting firms exhibiting decreased public information precision. However, some other studies argue that higher-quality disclosures increase the precision of analysts' private information, if analysts use public information to confirm or develop new idiosyncratic insights (Kim and Verrecchia 1997; Lundholm 1991). Accordingly, if redaction leads to a lower likelihood that analysts can confirm or develop new idiosyncratic insights, then redaction may be associated with a lower precision of private information contained in analysts' earnings forecasts. This leads to the following non-directional hypothesis (stated in the null form):

> **H_{2d}**: The precision of private information contained in analysts' earnings forecasts does not differ for reacting firms as compared to non-redacting firms.

4. RESEARCH DESIGN

To examine the relation between redaction and analyst behavior, I estimate the following regression model (see Appendix C for the definition of all variables):

$$AnalystBehavior_{i,t+1} = \beta_0 + \beta_1 Redacting_{it} + \beta_2 Dynamic_{it} + \beta_3 Static_{it} + \beta_4 HHI_{it} + Other\_Controls + \text{Industry FE} + \text{Year FE} + \varepsilon_{i,t+1} \quad (1)$$

where $AnalystBehavior_{i,t+1}$ is alternatively: analyst following (*ln(Analysts)*);[14] forecast dispersion (*ln(AF-Disp)*); forecast error (*ln(AF-Error)*); the precision of public information (*Public*); or the precision of private information (*Private*) for firm *i* at time *t+1*.[15]

Following Verrecchia and Weber (2006) and Boone et al. (2016), I classify a firm as a redacting firm if it redacts information from at least one agreement for a given year. All other firms are defined as non-redacting firms.[16] Thus, the experimental variable (*Redacting*) is an indicator variable that is equal to one if a firm has at least one redacted agreement for a given year, and zero otherwise.

Regarding control variables, Mattei and Platikanova (2017) examines how product market threat influences the accuracy of analysts' earnings forecasts. The paper finds that analysts are more likely to exhibit less precise forecasting earnings for firms with high product market threat, as greater competitive threats increase the uncertainty regarding future cash flows. Competition can come from both potential entrants and existing rivals. Prior literature measures competition either at the industry level using industry concentration (Ali et al. 2014) or at the firm level such as threats to product substitutability (Hoberg, Philips, and Prabhala 2014; Hoberg and Philips 2016). Accordingly, I include the following three proxies to capture firm-level and industry-level variation in product

[14] The natural logarithm of one plus the number of analysts issuing earnings per share forecast.

[15] *Public* and *Private* are constructed using Barron et al. (1998) and data on individual analysts. Specifically, *Public* = $\frac{SE - \frac{D}{N}}{[SE + (1 - \frac{1}{N})D]^2}$ and *Private* = $\frac{D}{[SE + (1 - \frac{1}{N})D]^2}$, where *SE* is the expected squared error of the mean forecast, *D* is the expected forecast dispersion, and *N* is the number of analysts.

[16] Non-redacting firms may include firms that do not enter into any contracts, and thus have no confidential treatment requests. I search for those firms without any material contracts and exclude them from my sample to provide a stronger comparison group of non-redacting firms.

market competition: *Dynamic*, *Static*, and *HHI*.[17]

Other control variables (*Other_Controls*) are included to capture other factors determining analyst following and properties of analysts' forecasts based on the findings of prior research. In particular, papers document lower forecasting quality when firms experience losses or have volatile earnings and stock returns (King, Pownall, and Waymire 1990; Lang and Lundholm 1993; Lang and Lundholm 1996). Therefore, I include *Loss*, *EarnInc*, *StdEarn*, and *StdRet* in the regression model. In addition, I control for the demand for information by market participants including firm size (*Size*), leverage (*Leverage*), market-to-book ratio (*MTB*), and analyst following (*ln(Analysts)*) (Freeman 1987; Barth et al. 2001; Barron, Byard, and Kim 2002).[18] Finally, I include R&D expenditure (*R&D*), financial performance (*ROA*), and litigation risk (*Litigation*).

The coefficients are estimated using ordinary least squares (OLS) regressions. Industry fixed effects are included to control for unobservable time-invariant industry characteristics, and year fixed effects are included to control for any time trend. Robust standard errors are computed using the one-way clustering by firm to control for cross-

[17] Tian and Yu (2017) use the fluidity measure from Hoberg et al. (2014) to capture dynamic product market threat to product substitutability and the similarity measure from Hoberg and Phillips (2016) to capture the static threat to product substitutability. I follow their terms and include both dynamic and static threats to product market in Equation (1). Specifically, the product market fluidity measure for firm *i* at year *t* is a measure of "cosine" similarity between a firm's own product word vector at year t and its counterparts' product word change vector from year *t*-1 to year *t*, capturing threats to product substitutability from rivals' entry and exit to the firm's product market space. The product similarity measure for firm *i* at year *t* is a measure of "cosine" similarity between a firm's own product word usage and its counterparts' product word usage at the same year *t*, which intends to capture threats to product substitutability from existing rivals. Detailed descriptions of these two measures are provided by Hoberg et al. (2014) and Hoberg and Phillips (2016).

[18] When analyst following (*ln(Analysts)*) is the dependent variable, *ln(Analysts)* is not included in the other control variables.

sectional correlation of observations (Gow, Ormazabal, and Taylor 2010). To reduce the influence of outliers, I winsorize all continuous variables at the 1% and 99% levels.

5. SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

My initial sample consists of all CT orders identified from EDGAR from May 2008 to December 2017. I extract the CT order date, filing form, filing date, and exhibits of redacted reports. To ensure consistency with prior work (Verrecchia and Weber 2006; Boone et al. 2016), I exclude redacted reports from the utility industry (SIC codes 4900-4999) and financial services (SIC codes 6000-6999). I also exclude CT orders that are denied or file for extension of previously granted confidential treatment. Thus, the sample focuses only on new redaction of proprietary information, with 11,154 unique redacted exhibits. See Panel A of Appendix D for the sample selection for redacted agreements.

5.1 Descriptive Data on Redactions

Table 1 contains the distribution of redacted agreements. Panel A reports the frequency by filing form: 10-Q is the most common filing form to redact sensitive information (45.8%), followed by 10-K (22.0%) and 8-K (16%) reports. These latter descriptive results are consistent with firms choosing to file the entire material contract in redacted version as an exhibit to the next 10-Q/10-K filing, rather than as an exhibit to the 8-K report (with the latter being required within four business days of contract execution). One potential explanation is that the time required to prepare CTRs may exceed the four business day filing requirement for 8-Ks.

Panel B reports the distribution by year of redaction. The number of CTRs is relatively evenly distributed over the sample period, averaging 1,163 agreements redacted per year.[19] This indicates that a proportion of firms seeks confidential treatment. Panel C provides an overview of the industry classification of redacted agreements based on two-digit SIC code, to assess whether industry affiliation matters. There is a significant variation across industries, with approximately 81% of redacted agreements in the top ten industries. Firms are more likely to redact proprietary information if in: Chemicals and Allied Products, Business Services, Instruments and Related Products, Electronic and Other Electronic Equipment, and Communications. As previously mentioned, to control for time trend and industry effects, I include both year and industry fixed effects in the regression analyses.

At each firm-report level, I collect the total exhibits filed with the SEC, the number of redacted exhibits, and the ratio of these two values. Panel D provides the related summary statistics. On average, redacting firms file 13 agreements and redact approximately 4 of them: the mean ratio of redacted exhibits is 33% (median ratio is 25%). Thus, about one third of exhibits that redacting firms file with the SEC have redacted information from competitors and investors.

Panel E provides the frequency distribution of types of agreements redacted from financial reports. I focus on those agreements with data on firm characteristics from Compustat, leaving 6,984 redacted exhibits in this subsample. To identify the types of

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[19] Since the availability of CT orders through EDGAR begins on May 1, 2008, there are fewer redacted agreements in 2008 than other years in my sample.

redacted exhibits, I manually collect the title of each redacted agreement. If the title does not indicate its type, then I read the content of the agreement to identify the primary purpose and assign an appropriate title to it.[20] Similar to Verrecchia and Weber (2006) and Boone et al. (2016), I classify hand-collected agreements into the following eight categories: *Customer/supplier*; *License/R&D*; *Credit/leasing*; *Employment/incentive*; *Equity-related*; *Investment*; *Peer*; and *Others*.[21] The most common type is *Customer/Supplier* (44%), followed by *License/R&D* (28%) and *Credit/Leasing* (12%). This is intuitive, as such contracts are more likely to contain proprietary cost and pricing data, the disclosure of which may negatively affect a firm's competitive advantage. I provide abridged examples of these three types of redacted agreements in Appendix B.

<Table 1>

5.2 Firm-year Level Data and Summary Statistics

I test my hypotheses at the firm-year level. It is possible that a firm files multiple exhibits with redacted disclosure in a single financial report and/or multiple financial reports with redacted disclosure in a given year. To be classified as a redacting firm, I

[20] For example, some agreements have titles such as Amendment Agreement, Letter Agreement, or Supplemental Agreement. In these cases, I read the entire agreement to identify the key task in the agreement and assign a related title to it.

[21] *Customer/supplier* includes purchase of inventory and supply, sales, manufacturing, distribution, marketing, vendor, production, payment and services; *License/R&D* includes license or royalty agreements, research, patent, trademark, technology, collaboration, and development agreements; *Credit/leasing* includes contracts related to debt, loans, credit, waivers, guarantees, and lease/rental; *Employment/incentive* involves contracts with a firm's employees and managers, including offer letters, option plans, bonus plans, incentive plans, and severance agreements; *Equity-related* covers agreements such as rights agreements, stock purchase or sale agreement, and warrants; *Investment* involves contracts related to purchase and sale of long-lived assets and financial asset investments, and mergers; *Peer* includes joint ventures, strategic alliances, and partnerships; and *Others* captures miscellaneous contracts filed with the SEC.

require that the firm have at least one redacted agreement in any financial report with the SEC in a given year.

I merge the redacted sample at the firm-year level with COMPUSTAT and CRSP to retrieve data on firm characteristics as well as to generate the set of non-redacting firms. Of note, the latter set may include firms that do not enter into any material contracts, and thus are unable to make confidential treatment requests. Accordingly, I eliminate from the set of non-redacting firms any that lack material contracts; this helps to provide a stronger comparison group of non-redacting firms. I then merge the sample with the I/B/E/S Summary and Detail Files to obtain data on properties of analysts' earnings forecasts and construct the precision of public/private information. The data on text-based competition measures including both dynamic threat and static threat is downloaded from Hoberg-Phillips Data Library.[22] I require data availability on all firm-specific control variables, and exclude observations with negative total assets and negative stock prices. The sample period is 2008 to 2015, corresponding to the availability of the Hoberg and Phillips' text-based competition measures. See Panel B of Appendix D for the sample selection at the firm-year level.

<Table 2>

Table 2 provides summary statistics for the full, redacting, and non-redacting samples, including tests of mean differences for the redacting and non-redacting samples. I find that for my wider range of firm sizes over a longer time period, approximately 14% of the sample firms are classified as redacting firms; this is similar to the 10-K redaction

[22] http://hobergphillips.usc.edu/industryconcen.htm.

rate (16%) observed in Verrecchia and Weber (2006) using a single year focused on smaller firms.

The summary statistics for the dependent variables provide univariate support for my expectations. The mean analyst following (*ln(Analysts)*) is 1.764 for the redacting firms and 1.665 for the non-redacting firms; mean dispersion (*ln(AF-Disp)*) is 0.542 for the redacting and 0.391 for the non-redacting firms; mean forecast error (*ln(AF-Error)*) is 0.765 for the redacting and 0.641 for the non-redacting firms; the precision of public information contained analysts' earnings forecasts (*Public*) is 0.914 for the redacting and 1.286 for the non-redacting firms; and the precision of private information (*Private*) is 1.330 for the redacting and 1.871 for the non-redacting firms. All differences are statistically significant. Overall, this provides univariate support that, relative to non-redacting firms, redacting firms exhibit higher analyst following, higher analyst forecast dispersion and error, lower public information precision, and lower private information precision.

Regarding control variables, Table 2 indicates that redacting firms have higher dynamic (*Dynamic*) and static threats (*Static*) and lower industry concentration (*HHI*) relative to non-redacting firms. In addition, redacting firms are smaller (*Size*), have higher R&D (*R&D*) and market-to-book ratios (*MTB*), and lower leverage (*Leverage*) and likelihood of issuing debt (*Debt_Issue*). Redacting firms are also more likely to be in industries with higher litigation risk (*Litigation*), experience poor performance (*Loss*), and have more volatile earnings (*StdEarn*) and stock returns (*StdRet*) as compared to non-redacting firms.

<Table 3>

Table 3 presents Pearson correlations. Consistent with expectations, *Redacting* is significantly positively correlated with *ln(Analysts)*, *ln(AF-Disp)* and *ln(AF-Error)* and negatively correlated with *Public* and *Private*. The correlations for the control variables are consistent with previous studies. In addition, *Redacting* is positively related to *Dynamic*, *Static*, *R&D*, *MTB*, *Loss*, *StdEarn*, *StdRet*, and *Litigation*, and negatively associated with *HHI*, *Size*, *Leverage*, and *ROA*. Correlations among control variables appear unlikely to pose multicollinearity concerns, with variance inflation factors all below 3.0 in my main tests.

6. EMPIRICAL RESULTS

6.1 Redaction and Analyst Following

Table 4 presents results from estimating Equation (1) using *ln(Analysts)* (i.e., analyst following) as the dependent variable.[23] Column 1 presents the regression result controlling for firm-level and industry-level factors; Column 2 presents the result adding year fixed effects; and Column 3 presents the result adding both industry and year fixed effects. Consistent with H_1, I find a significantly positive coefficient on *Redacting* (0.102, *t*-statistic 3.39). This is consistent with redacting firms having higher analyst following relative to non-redacting firms; the average redacting firm has 10.7% greater analyst coverage as compared to the non-redacting firms. This finding suggests that investor

[23] While the level of analyst following is used for the main analysis, the results are robust if I use the change in analyst following as the dependent variable when testing the effect of redaction on analyst following.

demand for analyst services outweighs any additional costs of analysts obtaining private information.

<Table 4>

Regarding the control variables, as expected I find that analyst following is positively associated with competition threat from both potential entrants (*Dynamic*) and existing rivals (*Static*), and negatively with industry concentration (*HHI*). I also find that analyst following is lower when a firm has an earnings increase (*EarnInc*), higher earnings volatility (*StdEarn*) and stock return volatility (*StdRet*). In addition, I find higher analyst following for firms that are larger (*Size*), have more R&D (*R&D*), higher market-to-book ratios (*MTB*), and better financial performance (*ROA*). Finally, I find that analyst following is negatively associated with *Leverage*. Overall, estimates of the control variables are consistent with the findings in prior research.

6.2 Redaction and Analysts' Earnings Forecasts

Table 5 presents the results examining the association between redaction and analysts' earnings forecasts. Columns (1) – (3) report results using *ln(AF-Disp)* (i.e., forecast dispersion) as the dependent variable. In Column (1), I find a significantly positive coefficient on *Redacting* (0.060, with *t*-statistic 3.28) after controlling for other factors; the coefficient on *Redacting* remains significantly positive after adding year fixed effects in Column (2), and industry and year fixed effects in Column (3). This is consistent with redacting firms having higher forecast dispersion among analysts than non-redacting firms, and supports H_{2a}. Columns (4) – (6) present the results using (*ln(AF-Error)*) (i.e., analyst forecast error) as the dependent variable. Once again, the coefficient on *Redacting* is significantly positive when excluding fixed effects in Column (4), adding year fixed effects in Column (5), and adding industry and year fixed effects in Column (6). This suggests that redacting firms exhibit less accurate analysts' earnings forecasts relative to non-redacting firms, in support of H_{2b}.

<Table 5>

Results for the control variables are consistent with prior studies. Specifically, I find consistent results that forecast dispersion and error are increasing with the competitive threat from potential entrants (*Dynamic*), debt (*Leverage*), firm performance (*ROA*), when firms experience a loss (*Loss*), and when they have higher earnings volatility (*StdEarn*) or stock return volatility (*StdRet*). I also find forecast dispersion and error to be decreasing in firm size (*Size*), market to book ratio (*MTB*), and earnings increases (*EarnInc*).

6.3 Redaction and the Precision of Public/Private Information

Table 6 presents the results of regressions examining the relation between redaction and the precision of information contained in analysts' earnings forecasts. Columns (1) – (3) present results using *Public* (i.e., the precision of public information contained in analysts' earnings forecasts) as the dependent variable. Across all three columns, the coefficient on *Redacting* is significantly negative; this is consistent with redacting firms having lower precision of public information relative to non-redacting firms, and supports H_{2c}. Columns (4) – (6) present results using *Private* (i.e., the precision of private information contained in analysts' earnings forecasts) as the dependent variable. Again, the coefficient on *Redacting* is significantly negative in all three columns, consistent with redacting firms also exhibiting lower precision of private information relative to non-redacting firms. This provides support for H_{2d}.

<Table 6>

Regarding the control variables, I find consistent results that both the precision of public information and the precision of private information increase with firm size (*Size*), market-to-book ratio (*MTB*), and earnings increase (*EarnInc*), and decrease with the reporting of losses (*Loss*), volatility of earnings (*StdEarn*), and volatility of stock returns (*StdRet*).

Overall, the primary empirical results suggest that redacting firms exhibit higher analyst following, more dispersed and less accurate analysts' earnings forecasts, and lower precision of both public and private information contained in analysts' earnings forecasts. Combined, these findings suggest that redaction is associated with greater investor demand for analyst services, as well as a corresponding increase in analysts' uncertainty on forecasting future earnings.

7. SELF-SELECTION

7.1 Heckman Two-stage Model

Firms' decision to redact information from contracts/agreements in financial reports may not be random. That is, the decision to redact likely reflects the tradeoff between the benefits and the costs of doing so. Accordingly, systematic differences may exist between redacting and non-redacting firms, with a potential bias arising from self-selection on unobservable characteristics. To mitigate this endogeneity concern, I follow previous redaction research (Verrecchia and Weber 2006; Boone et al. 2016) and employ a self-selection correction model proposed by Heckman (1976). I first estimate a probit model of the choice to redact; this allows derivation of an inverse Mills ratio. I then control for the inverse Mills ratio in the second stage regressions that use an indicator variable, *Redacting*, as the experimental variable.

To model the decision to redact sensitive information from public filings with the SEC, I use the following probit model:

$$\begin{aligned} \Pr(Redacting_{i,t+1} = 1) = {} & \beta_0 + \beta_1 Dynamic_{it} + \beta_2 Static_{it} + \beta_3 HHI_{it} + \beta_4 R\&D_{it} + \beta_5 Size_{it} \\ & + \beta_6 Leverage_{it} + \beta_7 MTB_{it} + \beta_8 ROA_{it} + \beta_9 Loss_{it} + \beta_{10} EarnInc_{it} \\ & + \beta_{11} StdEarn_{it} + \beta_{12} StdRet_{it} + \beta_{13} Debt\_Issue_{it} + \beta_{14} Litigation_{it} \\ & + \text{Industry FE} + \text{Year FE} + \varepsilon_{i,t+1} \qquad (2) \end{aligned}$$

As proprietary costs likely play an important role in the redaction decision, I include three proxies for product market competition to capture potential proprietary costs of disclosure: *Dynamic*, *Static*, and *HHI*. I also include *R&D* as it is more likely to be associated with the presence of valuable proprietary information. I also include other firm characteristics documented by prior literature. Finally, I include year and industry fixed effects and cluster standard errors at the firm level.

<Table 7>

Table 7 Panel A presents the results of the first stage regressions. Columns (1) and (2) report the results excluding and including the proxies for product market competition (*Dynamic*, *Static*, and *HHI*), respectively. Columns (3) and (4) present the results including year fixed effects and both industry and year fixed effects, respectively. The results show that both dynamic and static threat measures of product market competition are

significantly positively associated with the probability of redaction, and that firms in highly concentrated industries are less likely to redact information; collectively, these latter results are consistent with the theoretical literature arguing that competition reduces a firm's propensity to make proprietary disclosures (Verrecchia 1983). I also find that the redaction decision is more likely for firms that are smaller, have higher R&D expenditures, higher leverage, higher return on assets, and higher stock return volatility. Finally, I find that firms are less likely to disclose proprietary information when experiencing losses or in industries with high litigation risk. Based on this probit model estimation, I calculate an inverse Mills ratio and include it in the second-stage OLS estimations.

Table 7 Panel B presents results after including the inverse Mills ratio to control for the self-selection bias. Confirming Table 4, 5, and 6 results, I continue to find that *Redacting* is significantly associated with analyst following in Column (1), analyst forecast dispersion in Column (2), analyst forecast error in Column (3), the precision of public information contained in analysts' earnings forecasts in Column (4), and the precision of private information in Column (5). The coefficient on *IMR* is significant only in the regression for analyst forecast error in Column (3).

Finally, Lennox, Francis, and Wang (2012) argues that multicollinearity can arise in selection models when there are no exclusion restrictions imposed, or the excluded variables are not exogenous. When multicollinearity is high, the coefficient standard errors are inflated, making it less likely that the coefficient on the inverse Mills ratio is statistically significant in the second stage estimation. Thus, the paper recommends reporting diagnostic tests for multicollinearity. Accordingly, Table 7 Panel C presents the variance-inflation-factors (VIFs) for the above regressions. Of note, I find that VIFs for the *IMR* variable exceed 16 for all regressions.[24] This suggests that the above statistically insignificant coefficients on the inverse Mills ratio does not necessarily indicate a lack of self-selection bias; thus, I caveat that the reported results could still be affected by selection bias. However, further comparison shows that the coefficients on *Redacting* for all analyses in the second stage models are of similar magnitude to those in the OLS models. In addition, the VIFs for *Redacting* for both models are low, ranging from 1.27 to 1.36. This suggests a lower likelihood of estimation of coefficients on *Redacting* being affected when the inverse Mills ratio is included in the second stage models.

7.2 Coarsened Exact Matching

Table 2 revealed that redacting and non-redacting firms are different along several firm dimensions. Following the recommendation of Lennox et al. (2012), I further address potential self-selection bias by adopting a matching technique called coarsened exact matching (CEM). CEM matches firms based on industry, year, and firm characteristics including firm size, firm performance, and uncertainty measures.[25] This matching better aligns the distributional characteristics of redacting and non-redacting firms, and thus mitigates concerns of statistics bias and model dependence (Iacus, King, and Porro 2011). Of note, CEM has beneficial statistical properties as compared to other matching methods, with the treatment-control balance determined *ex ante*: observed covariates are "coarsened"

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[24] Multicollinearity is typically regarded as high (very high) when VIFs exceed 10 (20).

[25] Results are robust to my alternatively using of propensity score matching.

into bins; coarsened data are "pruned" and matched into strata, creating weights for each observation so that strata have at least one treatment and one control unit; and estimates are then run on the original un-coarsened data with the CEM weights (Iacus et al. 2011). Table 8 presents the results using the CEM-matched sample; these are again qualitatively similar to the baseline results of Tables 4, 5, and 6. Overall, the evidence in this section mitigates concerns that my previous findings are driven by self-selection.

<Table 8>

8. SENSITIVITY AND ADDITIONAL TESTS

8.1 Sensitivity Analyses

I conduct several additional sensitivity tests to mitigate the endogeneity concern and further assess the robustness of the main empirical findings.

8.1.1 Alternative measure of redaction

The primary analyses reported above use a binary experimental variable, capturing whether a firm redacts information from at least one contract/agreement included in financial fillings. To capture the extent of redaction, I alternatively use the natural logarithm of one plus the total number of agreements redacted during a year, *ln(Redacted)*. Table 9 Panel A presents the results, which are qualitatively similar to the primary analyses.

<Table 9>

8.1.2 Additional control variables

To better control for firms' information opacity, I additionally include discretionary accruals (constructed using the modified Jones model). Panel B presents the results, which again are unchanged from the primary findings. Besides, to examine whether managers' other disclosure policies affect the relation between redaction and analyst behavior, I additionally include a proxy for voluntary disclosure—the likelihood of management earnings guidance. Results, presented in Panel C, are again unchanged.

8.1.3 Shorter window analysis

According to the descriptive data on redactions presented in Table 1 Panel A, 10-Q report is the most common filing form for firms to redact sensitive information. To examine whether the relation between redaction and analyst behavior holds for a more frequent analysts' earnings forecasting, I conduct a shorter window analysis using quarterly analysts' earnings forecasts to construct analyst following and associated properties of analysts' earnings forecasts. The results from the shorter window analysis are robust, as presented in Panel D.

8.1.4 Subsample analysis

Given that Chemicals and Allied Products industry and Business Services industry, based on two-digit SIC code 28 and 73, are the two top industries within which firms are more likely to redact proprietary information from contracts/agreements, I conduct a subsample analysis using only firms in those two industries to examine whether the effect is stronger when the likelihood of redaction is higher. Panel E presents the results, showing that the association between redaction and analyst behavior is stronger for Chemicals and Allied Products industry and Business Services industry.

8.2 Timeliness of Analyst Reports

Analysts may face a tradeoff between the accuracy and the timeliness of their forecasts. Prior research suggests that timely forecasts are valued by the market, and that forecast timing plays an important role in forecast usefulness (Cooper, Day, and Lewis 2001; Shroff, Venkataraman, and Xin 2014). In the setting of redaction, investor demand for new information may be greater for redacting firms than for non-redacting firms. Thus, analysts covering redacting firms may be likely to trade off accuracy for timeliness when issuing earnings forecasts.

<Table 10>

To investigate whether the timeliness of analyst forecasts differs between redacting and non-redacting firms, I follow Lehavy et al. (2011) and measure the timeliness of analyst forecasts as the length of time in days required for individual analysts to issue their first forecast revision following the 10-K filing.[26] In addition, I average individual analyst timeliness at the firm level for each year. Thus, I examine the relation between redaction and the average time from a firm's 10-K filing to an analyst's first report subsequent to the filing using the CEM-matched sample. Table 10 Panel A presents the results. I find that on average analysts of redacting firms take 2.74 days less to issue their reports following the 10-K filing relative to non-redacting firms. This evidence, combined with the lower forecast accuracy, is consistent with analysts trading off accuracy for timeliness in issuing

[26] I include only observations for which the analyst has issued at least one report during the 90 days prior to the 10-K filing and issues a report in the 90 days subsequent to the 10-K filing, in order to capture analyst reports issued in response to the filing of the 10-K instead of other corporate events.

earnings forecasts when the demand for new information is higher: that is, for redacting firms.

8.3 Information Content of Analyst Reports

The informativeness of analyst reports is unclear *ex ante* in the setting of redaction. On the one hand, less precise public information for redacting firms may drive investor demand for information from financial analysts, thereby possibly increasing their responsiveness to analysts' earnings forecasts (Frankel, Kothari, and Weber 2006; Lehavy et al. 2011). Additionally, analyst reports for redacting firms would also be informative if analysts acquire and incorporate more private information into their earnings forecasts (Shroff et al. 2014). Accordingly, I expect that if analyst incorporate relatively more information into their earnings forecasts and if investor demand for analyst reports increases for redacting firms to obtain more private information, then the information content of these reports will be higher relative to that for non-redacting firms. On the other hand, redaction is associated with lower accuracy of analysts' earnings forecasts, which could result in investors being less responsive to information provided by analysts. If this is the case, then I expect that the information content of analyst reports for redacting firms will be lower as compared to non-redacting firms. Therefore, whether the information content of analyst reports for redacting firms is higher or lower relative to non-redacting firms is an empirical issue.

I measure the information content of analyst reports in two ways. First, I use the absolute value of three-day value-adjusted abnormal returns for the first analyst forecast revision after the 10-K filing, denoted as *CAR3*. Second, I follow Frankel et al. (2006) and use the firm's absolute size-adjusted returns related to analyst forecast revisions as a proportion of the firm's total absolute size-adjusted returns during the time period between the 10-K filing and the subsequent fiscal year-end, divided by the number of forecast revision dates, denoted as *CAR_Average*.[27] I conduct both univariate tests and regression analyses using the CEM-matched sample. For the regression analyses, I estimate Equation (1) using *CAR3* and *CAR_Average* as the dependent variables.

Table 10 Panel B presents the results. The univariate difference between redacting and non-redacting firms is significant for both *CAR3* and *CAR_Average*, indicating that analyst reports for redacting firms convey more private information or idiosyncratic insights to market participants as compared to those for non-redacting firms. Similar results obtain using the regression analyses: the coefficient on *Redacting* is significantly positive. Overall, the evidence suggests that investors consider analyst reports more informative and useful for redacting firms relative to non-redacting firms.

8.4 Relative Weights Investors Place on Information from the Firm versus Analysts

Given the results that analyst reports for redacting firms are both more timely and more informative, as compared to that for non-redacting firms, I further examine investors' relative weights placed on information from the firm versus financial analysts when redaction exists. I construct the following measure to capture the relative weights investors place on information from the firm versus analysts:

[27] I exclude analyst reports that coincide with earnings announcements.

$RelativeWeights = CAR^{AF} / (CAR^{AF} + CAR^{EA})$,

where CAR^{AF} is the absolute value of three-day value-adjusted abnormal returns for the first analyst forecast revision after the 10-K filing, and CAR^{EA} is the absolute value of three-day value-adjusted abnormal returns for a firm's earnings announcement. Table 11 presents the result. I find that on average investors tend to place more weights on information from financial analysts than that from the firm for redacting firms, relative to non-redacting firms, providing support for the argument that investor demand for analyst services is higher for redacting firms and thus investors place more weights on the information provided by analysts, as compared to non-redacting firms.

<Table 11>

8.5 Cross-sectional Analyses

I finally explore potential cross-sectional variations in the relation between redaction and analyst following as well as the properties of analysts' earnings forecasts using the CEM-matched sample.

8.5.1 Is the relation more pronounced when the redacting firm is an industry leader?

Prior literature generally documents that analysts' information advantage stems from their access to macroeconomic expertise and their industry expertise that enable them to survey a broad set of industry statistics and data and infer the implications of the data for the firm and its customers, suppliers, and competitors (Hutton, Lee, and Shu 2012). In the setting of redaction, when a firm omits sensitive information from public filings, analysts who cover the firm are likely to rely more heavily on information from similar firms within the industry to assess the implications of redacted information for firm value. If the redacting firm is an industry leader, then it might be less likely that analysts can turn to similar firms to extrapolate the value of the redacted information. If this is the case, I expect that the relation between redaction and analyst behavior is more pronounced when the redacting firm is an industry leader.

To proxy for a firm's industry leadership, I construct an indicator variable *Leader*, which is equal to one if the firm's market value is within the top decile in an industry based on the two-digit SIC code, and zero otherwise, and include an interaction term, *Redacting*Leader*, in the regression models. Table 12 Panel A presents the results. I find that the coefficient on *Redacting*Leader* is negative and statistically significant for the precision of private information, consistent with the conjecture that analysts' private information may be less precise for redacting firms when the redacting firm is an industry leader. However, I find a negative coefficient on the interaction term for analyst following, indicating that redaction may deter analyst following when the redacting firm is an industry leader because the costs of additional information search is likely to outweigh incremental benefits of following in this situation.

<Table 12>

8.5.2 Is the relation moderated when the redacting firm has greater voluntary disclosure?

Firms redacting proprietary information face a tradeoff between protecting sensitive information and increased information asymmetry. To reduce information asymmetry, redacting firms may provide more voluntary disclosures. Heinle, Samuels, and Taylor (2018) predicts and finds that redacted mandatory disclosure is associated with greater voluntary disclosure, i.e., aggregated management earnings forecasts. If a redacting firm has greater voluntary disclosure, then the relation between redaction and analyst behavior may be moderated because greater voluntary disclosure is thought to be associated with reduced information asymmetry. However, Feng, Floros, Johnson, and Ling (2018) documents that while the majority firms that redact proprietary information in their IPO filings choose voluntary disclosure via management forecasts, managers forecast fewer items, avoid quarterly forecasts, and avoid forecasting expenses when they have redacted information in supplier contracts. Accordingly, it is unknown whether increased voluntary disclosure is able to offset the negative consequences of redacting proprietary information, as reflected in the properties of analysts' earnings forecasts.

To explore whether the relation between redaction and analyst behavior is moderated when the redacting firm has greater voluntary disclosure, I include *Frequency*, the number of management earnings forecasts for a firm in a given year, in the regression model and interact it with *Redacting*. Results for this testing are reported in Table 12 Panel B. While I find a moderating effect for analyst forecast dispersion when the redacting firm has greater voluntary disclosure, the coefficients on *Redacting*Frequency* for other dependent variables are not statistically significant, suggesting that it is less likely for redacting firms to offset the negative consequences of redacted information by issuing more earnings guidance. This is either because the aggregated nature of management earnings guidance makes it less likely to convey proprietary information, or because redacting firms change their forecasting strategy so that analysts are less likely to infer sensitive information from management earnings guidance.

9. CONCLUSION

This study examines how redacting proprietary information from public filings relates to analyst following and the properties of analysts' earnings forecasts. Using a broad cross-sectional sample spanning 2008-2015, I provide empirical evidence that compared to non-redacting firms, redacting firms have higher analyst following, more dispersed and less accurate analysts' earnings forecasts, and lower precision of public and private information contained in analysts' earnings forecasts. These results are supported by a number of robustness tests, including explicit tests to address potential self-selection bias using a Heckman two-stage design, as well as coarsened exact matching (CEM). Further analyses indicate that analysts covering redacting firms appear to tradeoff lower accuracy for greater timeliness, that the information content of analyst reports for redacting firms is higher than that for non-redacting firms, and that investor place more weights on information from analysts than that from the firm for redacting firms. Overall, this study extends our understanding of the nature and materiality of redacted information by examining the relation between redaction and behaviors of financial intermediaries and the associated properties of their earnings forecasts. Collectively, the results suggest that redaction is associated with greater investor demand for analyst outputs (evidenced in higher analyst following), a decline in the analysts' information environment (evidenced in greater dispersion, lower accuracy, and lower information precision), but also greater usefulness of analysts' earnings outputs (evidenced in higher timeliness, greater information content, and more investor weights).

APPENDICES

Appendix 1. Confidential Treatment Order

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
OCTOBER 20, 2017

ORDER GRANTING CONFIDENTIAL TREATMENT
UNDER THE SECURITIES EXCHANGE ACT OF 1934

Sparton Corporation

File No. 001-01000 - CF#35519

Sparton Corporation submitted an application under Rule 24b-2 requesting confidential treatment for information it excluded from the Exhibits to a Form 10-K filed on September 14, 2017.

Based on representations by Sparton Corporation that this information qualifies as confidential commercial or financial information under the Freedom of Information Act, 5 U.S.C. 552(b)(4), the Division of Corporation Finance has determined not to publicly disclose it. Accordingly, excluded information from the following exhibit(s) will not be released to the public for the time period(s) specified:

Exhibit 10.36	through September 30, 2020
Exhibit 10.37	through September 30, 2020
Exhibit 10.38	through September 30, 2020

For the Commission, by the Division of Corporation Finance, pursuant to delegated authority:

Brent J. Fields
Secretary

Appendix 2. Examples of Redacted Material Contracts

[***] Denotes that confidential treatment of redacted portions has been requested. An unredacted version has been filed separately with the SEC.

Customer/supplier:

Purchase and Formation Agreement

THIS PURCHASE AND FORMATION AGREEMENT, dated as of November 26, 2008 (the **"Agreement Date"**), is made by and among RIT ONCOLOGY, LLC, a Delaware limited liability company (the **"Company"**), CELL THERAPEUTICS, INC., a Washington corporation (**"CTI"**), and Spectrum Pharmaceuticals, Inc., a Delaware corporation (**"Spectrum"**).

"Designated IP Correspondence" means the correspondence regarding [***].

Section 3.2. Milestone Payments. In accordance with Section 3.1 above, as additional contingent consideration for the Conveyed Assets, the Company shall pay to CTI up to the maximum amount of Fifteen Million Dollars ($15,000,000), upon satisfaction of certain financial milestones, as follows: if the Company achieves the amount of Net Sales set forth in the left column below in any given calendar year, (i) Spectrum shall deliver to the Company the portion of the Subscription Price equal to the amount of the Milestone Payment when due and owing under this Section 3.2(ii), and (ii) the Company shall pay to CTI the amount set forth in the corresponding right column below (each a **"Milestone Payment"** and collectively, the **"Milestone Payments"**):

Net Sales	Milestone Payment
$[***]	$ [***]
$[***]	$ [***]
$[***]	$ [***]
Total	$ 15,000,000

For avoidance of doubt, Net Sales shall not be cumulative from year to year and shall be viewed only on an annual basis. In a given year, one or more of the Milestone Payments may become due and owing (i.e., if the Company achieves $[***] or more in Net Sales in year one, then the full $15,000,000 shall become due and owing subject to the terms hereof), except that the Milestone Payments shall be paid in three installments such that the Company shall not be obligated to deliver more than one Milestone Payment in any given calendar year.

- Exhibit 2.1 to Form 8-K filed in 2008

License/R&D:

License Agreement

This LICENSE AGREEMENT (the **"Agreement"**) is entered into on November 6, 2009 (the **"Effective Date"**) between **NIPPON KAYAKU CO., LTD.**, a Japanese corporation with its principal place of business at 11-2, Fujimi 1-chome, Chiyoda-ku, Tokyo 102-8172, Japan (**"NK"**), and SPECTRUM

Pharmaceuticals, Inc., a Delaware corporation with its principal place of business at 157 Technology Drive, Irvine, CA 92618 (**"Spectrum"**). Spectrum and NK are sometimes referred to herein individually as a **"Party"** and collectively as the **"Parties."**

(iii) NK shall pay to Spectrum [***] percent ([***]%) of all Sublicense Revenues within [***] after the receipt of each payment of the Sublicense Revenue from each sublicensee. "**Sublicense Revenue**" means all upfront payments and milestone payments made by any sublicensee to NK under any Sublicense Agreement. For the avoidance of doubt, Sublicense Revenue shall not include: (A) any sales-based royalty payment; (B) any payment in exchange for the fair market value for actual services performed by or on behalf of NK to such sublicensee or the fair market value for the supply of Products by NK to such sublicensee; and (C) any payment in exchange for the fair market value of NK's equity.

For clarity, for each calendar year, NK shall initially calculate its royalty payments to Spectrum and submit such royalty payments at the royalty rate of [***]% until the aggregate annual Net Sales for all Products throughout the NK Territory reaches $[***]. Thereafter, NK shall calculate royalty payments to Spectrum and submit such royalty payments at the royalty rate of [***]%. In addition, NK shall submit to Spectrum a true-up payment at the end of the calendar quarter during which such aggregate annual Net Sales reaches $[***], in the amount of $[***].

Appendix B

Spectrum Patents Existing as of the Effective Date

[***]

- Exhibit 10.36 to Form 10-K filed in 2010

Credit/leasing:

Lease Agreement

This Spectrum Manager Lease Agreement ("Lease Agreement") is entered into as of this 31st day of October, 2007, between Globalstar Licensee LLC, a Delaware limited liability company and a wholly-owned subsidiary of Globalstar, Inc. with its principal place of business located at 461 South Milpitas Blvd., Building 5, Milpitas, CA 95035 ("Lessor"), and Open Range Communications, Inc., a Delaware corporation with its principal place of business located at 6465 South Greenwood Plaza Blvd., Suite 820 Centennial, CO 80111 ("Lessee") (collectively the "Parties" or, individually, a "Party").

Lessee may use the Leased Spectrum to offer wireless broadband internet access services utilizing data rates of [*] Mbps downlink and [*] Kbps uplink over the System (the "ORC Services")…

8. Payments.

(a) Ongoing Lease Agreement Payments for Initial Markets and Deferred Pop Markets. Beginning on the Lease Commencement Date and continuing on the same day of each month thereafter until the expiration or termination of the term of this Lease Agreement, Lessee will pay to Lessor monthly lease payments as follows:

(i) Fixed monthly payments ("Fixed Lease Payments") and down payments ("Down Payments") as set forth on Exhibit D hereto. The Fixed Lease Payments for the Initial Markets shall begin, and the Down Payment for the Initial Markets shall be payable, on the Lease Commencement Date. The Fixed Lease Payments for the Deferred Pop Markets shall begin, and the Down Payment for the Deferred Pop Markets shall be payable, on the earlier of (A) the date on which Lessee begins offering any ORC Services in such market pursuant to Section 10(a) hereof and (b) the first day of the [*] month following the Lease Commencement Date. If Lessee is not able to use a portion of the GSAT Spectrum due to a regulatory restriction imposed by the FCC, the Down Payment and all Fixed Lease Payments shall be adjusted so that they apply proportionately based on the portion (determined by number of MHz) of GSAT Spectrum actually available for use by Lessee, as more specifically set forth on Exhibit D hereto.

(ii) Variable monthly payments ("Variable Lease Payments") equal to $[*] per subscriber per month on the System. A "subscriber" is defined as a unit of customer premises equipment, or a group of units of customer premises equipment employed by the same user that share a single wireless access card or specific customer identifier and no two of which may be used simultaneously. Within five days following each month-end during the term of this Lease Agreement, Lessee shall deliver to Lessor a written certification of the number of subscribers on the System during such month. The Variable Lease Payments shall increase [*]% on the first day of the 25th month following the Lease Commencement Date (the "Escalation Date"), and the Variable Lease Payments then in effect shall increase [*]% on each anniversary of the Escalation Date thereafter, all as set forth on Exhibit D.

- Exhibit 10.3 to Form 10-Q filed in 2008

Appendix 3. Variable Definitions

Variable	Definition	Data Source
Dependent Variables		
ln(Analysts)	The natural logarithm of one plus the number of analysts issuing earnings per share forecast.	I/B/E/S Detail
ln(AF-Error)	The natural logarithm of one plus the absolute value of the difference between the first mean consensus forecast of earnings per share and actual earnings per share, scaled by the absolute value of actual earnings per share.	I/B/E/S Summary
ln(AF-Disp)	The natural logarithm of one plus the standard deviation of analysts' earnings per share forecast, scaled by the absolute value of actual earnings per share.	I/B/E/S Summary
Public	A measure of precision of public information developed by Barron et al. (1998).	I/B/E/S Detail
Private	A measure of precision of private information developed by Barron et al. (1998).	I/B/E/S Detail
Independent Variables		
Redacting	An indicator variable equal to one if the firm redacts at least one agreement for a given year, and zero otherwise.	SEC EDGAR
ln(Redacted)	The natural logarithm of one plus the number of agreements redacted for a given year.	SEC EDGAR
Dynamic	A text-based, firm-specific fluidity measure of competitive threat from potential rivals developed by Hoberg et al. (2014).	Hoberg-Phillips
Static	A text-based, firm-specific similarity measure of competitive threat from existing rivals developed by Hoberg et al. (2014).	Hoberg-Phillips
HHI	The Herfindahl index that is calculated as the square of the market share of the firm in a particular 3-digit SIC code.	Compustat
R&D	R&D expenditures scaled by total assets. Missing values of R&D are replaced by zeros.	Compustat
Size	The natural logarithm of total book value of assets.	Compustat
Leverage	Total book value of debt to total book value of assets.	Compustat
MTB	Market value of assets to book value of assets.	Compustat
ROA	Net income scaled by the average of total assets.	Compustat
Loss	An indicator variable equal to one if net income is negative, and zero otherwise.	Compustat
EarnInc	An indicator variable set to 1 if earnings of year t are higher than earnings of the previous year, and 0 otherwise.	Compustat
StdEarn	Standard deviation of annual earnings before extraordinary items scaled by total assets over the five years (with a minimum of three years) prior to year t.	Compustat
StdRet	The standard deviation of stock returns over the past 12 months.	CRSP
Debt_Issue	An indicator variable equal to one if the firm issued debt during the year, and zero otherwise.	Compustat
Litigation	A proxy for litigation risk, measured as an indicator variable equal to one if the firm operates in an industry facing high litigation risk (SIC codes 2833-2836, 3570-3577, 3600-3674, 5200-5961, 7370-7374, and 8731-8734), and zero otherwise.	Compustat

Appendix 4. Sample Selection

Panel A: Sample Selection for Redacted Agreements		
Redacted agreements collected from CT Orders		14,112
Less:		
Agreements from utilities (4000-4999) and financial (6000-6999) industries	(1,374)	
Agreements from reports filed before 2008	(1,598)	
Total redacted agreements		11,154

Panel B: Sample Selection at Firm-year Level		
Firm-year observations from Compustat and CRSP		31,190
Less:		
Observations from utilities (4000-4999) and financial (6000-6999) industries	(3,002)	
Duplicate observations at firm-year level	(149)	
Observations from non-redacting firms without material contracts	(7,218)	
Observations with missing data for main variables in the test of analyst following	(3,689)	
Total firm-year observations		17,132

Table 1. Descriptive Data on Redactions

Panel A: Distribution of Redacted Agreements by Filing Form

Filing Form	Frequency	Percent
10-Q	5,110	45.8%
10-K	2,407	21.6
8-K	1,811	16.3
S-1	825	7.4
20-F	427	3.8
Others	574	5.1
Total	**11,154**	**100.0%**

Panel B: Distribution of Redacted Agreements by Year

CT Order Year	Frequency	Percent
2008	685	6.1%
2009	1,074	9.7
2010	1,164	10.4
2011	1,153	10.3
2012	1,170	10.5
2013	1,114	10.0
2014	1,216	10.9
2015	1,192	10.7
2016	1,284	11.5
2017	1,102	9.9
Total	**11,154**	**100.0%**

Panel C: Distribution of Redacted Agreements by Industry

SIC Code	Industry	# Redacted Contracts	Percent
28	Chemicals and Allied Products	4,090	36.7%
73	Business Services	1,345	12.1
38	Instruments and Related Products	906	8.1
36	Electronic and Other Electronic Equipment	760	6.8
48	Communications	475	4.3
45	Transportation by Air	440	3.9
87	Engineering and Management Services	304	2.8
35	Industrial Machinery and Equipment	257	2.7
13	Oil and Gas Extraction	186	1.7
80	Health Services	173	1.7
	Subtotal	8,936	80.7
	Other Industries	2,218	19.3
	Total	**11,154**	**100.0%**

Table 1. Descriptive Data on Redactions - *Continued*

Panel D: Frequency of Filed and Redacted Agreements

Variable	**Mean**	**Median**	**SD**	**Min**	**Max**
Number of exhibits filed	13.2	9.0	13.7	1.0	100
Number of exhibits redacted	3.6	2.0	4.4	1.0	40
Ratio of exhibits redacted	33%	25%	0.23	1%	100%

Panel E: Distribution of Redacted Agreements by Type

Type of Agreements	**Frequency**	**Percent**
Customer/Supplier	3,053	44.3%
License/R&D	1,938	28.1
Credit/Leasing	821	11.9
Employment/Incentive	409	5.9
Equity-related	202	2.9
Investment	191	2.8
Peer	75	1.1
Others	205	3.0
Total	**6,894**	**100.0%**

This table presents the distribution of redacted agreements in my sample over the period of 2008-2017. Panel A reports the frequency distribution of redacted agreements by filing form. Panel B presents the distribution of redacted agreements by year of redaction. Panel C presents the distribution based on two-digit SIC code. Panel D reports summary statistics on the frequency of filed and redacted exhibits among redacting firms. Panel E presents the frequency distribution of types of agreements redacted from the public filings.

Table 2. Firm-year Level Descriptive Statistics

Variables	Full Sample				Redacting Sample			Non-Redacting Sample			Differences
	N	Mean	Med	Std. Dev.	*N*	Mean (1)	Std. Dev.	*N*	Mean (2)	Std. Dev.	(1) – (2)
Dependent Variables											
ln(Analysts)	17,132	1.679	1.946	1.203	2,336	1.764	1.139	14,796	1.665	1.213	0.099***
ln(AF-Disp)	9,689	0.414	0.218	0.535	1,455	0.542	0.644	8,234	0.391	0.510	0.151***
ln(AF-Error)	12,565	0.659	0.373	0.783	1,800	0.765	0.858	10,765	0.641	0.768	0.124***
Public	9,639	1.230	0.769	1.636	1,448	0.914	1.278	8,191	1.286	1.685	–0.372***
Private	9,639	1.789	0.652	3.202	1,448	1.330	2.475	8,191	1.871	3.307	–0.541***
Independent Variables											
Redacting	17,132	0.136	0.000	0.343							
ln(Redacted)	17,132	0.150	0.000	0.423	2,336	1.101	0.513	14,796	0.000	0.000	1.101***
Dynamic	17,132	6.420	5.659	3.405	2,336	8.387	3.991	14,796	6.109	3.195	2.278***
Static	17,132	4.354	1.755	7.133	2,336	8.961	11.87	14,796	3.626	5.728	5.335***
HHI	17,132	0.038	0.000	0.141	2,336	0.020	0.107	14,796	0.041	0.145	–0.021***
R&D	17,132	0.056	0.005	0.106	2,336	0.113	0.151	14,796	0.047	0.094	0.066***
Size	17,132	6.365	6.336	2.026	2,336	6.089	1.901	14,796	6.409	2.041	–0.320***
Leverage	17,132	0.200	0.164	0.193	2,336	0.191	0.200	14,796	0.202	0.192	–0.011**
MTB	17,132	0.996	0.908	0.360	2,336	1.104	0.431	14,796	0.979	0.344	0.125***
ROA	17,132	–0.023	0.032	0.200	2,336	–0.089	0.254	14,796	–0.013	0.188	–0.076***
Loss	17,132	0.353	0.000	0.478	2,336	0.489	0.500	14,796	0.332	0.471	0.157***
EarnInc	17,132	0.540	1.000	0.498	2,336	0.548	0.498	14,796	0.538	0.499	0.010
StdEarn	17,132	0.106	0.049	0.163	2,336	0.160	0.206	14,796	0.098	0.153	0.062***
StdRet	17,132	0.140	0.117	0.101	2,336	0.164	0.134	14,796	0.136	0.094	0.028***
Debt_Issue	17,132	0.498	0.000	0.500	2,336	0.434	0.496	14,796	0.509	0.500	–0.075***
Litigation	17,132	0.365	0.000	0.482	2,336	0.533	0.499	14,796	0.339	0.473	0.194***

This table presents the descriptive statistics for the variables used in my tests over the sample period of 2008-2015 for the full, redacting, and non-redacting samples, including mean differences between the redacting and non-redacting samples. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. All variables are defined in Appendix C.

Table 3. Correlations

Variables	*ln(Analysts)*	*ln(AF-Error)*	*ln(AF-Disp)*	*Public*	*Private*	*Redacting*	*ln(Redacted)*	*Dynamic*	*Static*	*HHI*
ln(Analysts)	**1.000**									
ln(AF-Error)	**–0.283**	**1.000**								
ln(AF-Disp)	**–0.147**	**0.673**	**1.000**							
Public	**0.197**	**–0.309**	**–0.394**	**1.000**						
Private	**0.138**	**–0.373**	**–0.247**	**–0.057**	**1.000**					
Redacting	**0.028**	**0.056**	**0.101**	**–0.081**	**–0.060**	**1.000**				
Ln(Redacted)	**0.031**	**0.058**	**0.097**	**–0.084**	**–0.061**	**0.894**	**1.000**			
Dynamic	**0.064**	**0.067**	**0.156**	**–0.131**	**–0.081**	**0.230**	**0.223**	**1.000**		
Static	**0.042**	**0.043**	**0.149**	**–0.121**	**–0.079**	**0.257**	**0.248**	**0.613**	**1.000**	
HHI	**0.109**	**–0.064**	**–0.064**	**0.079**	**0.048**	**–0.050**	**–0.052**	**–0.105**	**–0.097**	**1.000**
R&D	**–0.086**	**0.060**	**0.101**	**–0.122**	**–0.083**	**0.213**	**0.193**	**0.332**	**0.503**	**–0.110**
Size	**0.600**	**–0.262**	**–0.185**	**0.248**	**0.183**	**–0.054**	**–0.037**	0.005	**–0.089**	**0.230**
Leverage	**0.107**	0.017	**0.049**	0.004	0.013	**–0.020**	–0.001	**0.063**	**–0.034**	**0.077**
MTB	**0.223**	**–0.170**	**–0.090**	**0.102**	**0.089**	**0.120**	**0.096**	**0.141**	**0.264**	**–0.029**
ROA	**0.265**	**–0.195**	**–0.198**	**0.219**	**0.145**	**–0.130**	**–0.115**	**–0.266**	**–0.329**	**0.091**
Loss	**–0.258**	**0.363**	**0.343**	**–0.265**	**–0.189**	**0.113**	**0.104**	**0.205**	**0.224**	**–0.103**
EarnInc	**0.049**	**–0.140**	**–0.116**	**0.125**	**0.087**	0.007	0.009	**–0.031**	**–0.017**	**0.016**
StdEarn	**–0.238**	**0.142**	**0.161**	**–0.166**	**–0.114**	**0.132**	**0.114**	**0.260**	**0.337**	**–0.103**
StdRet	**–0.259**	**0.223**	**0.219**	**–0.220**	**–0.165**	**0.094**	**0.086**	**0.140**	**0.135**	**–0.093**
Litigation	0.014	0.001	0.015	**–0.034**	0.002	**0.138**	**0.135**	**0.130**	**0.258**	**–0.150**

Table 3. Correlations - *Continued*

Variables	*R&D*	*Size*	*Leverage*	*MTB*	*ROA*	*Loss*	*EarnInc*	*StdEarn*	*StdRet*	*Litigation*
R&D	**1.000**									
Size	**–0.365**	**1.000**								
Leverage	**–0.261**	**0.375**	**1.000**							
MTB	**0.354**	**–0.072**	**–0.198**	**1.000**						
ROA	**–0.574**	**0.413**	**0.028**	**–0.051**	**1.000**					
Loss	**0.359**	**–0.369**	0.000	**–0.057**	**–0.686**	**1.000**				
EarnInc	**–0.015**	**0.033**	**–0.029**	**0.141**	**0.204**	**–0.251**	**1.000**			
StdEarn	**0.449**	**–0.404**	**–0.136**	**0.178**	**–0.566**	**0.382**	–0.009	**1.000**		
StdRet	**0.203**	**–0.338**	0.000	**–0.049**	**–0.362**	**0.346**	–0.014	**0.338**	**1.000**	
Litigation	**0.405**	**–0.185**	**–0.247**	**0.246**	**–0.175**	**0.142**	0.015	**0.193**	**0.072**	**1.000**

This table presents pairwise Pearson correlations for the full sample over the period of 2008-2015. Boldfaced values are significant at the 5% level or lower based on a two-tailed test. All variables are defined in Appendix C.

Table 4. Redaction and Analyst Following

Variables	Analyst Following *ln(Analysts)*		
	(1)	**(2)**	**(3)**
***Redacting* (+ / –)**	**0.075 ****	**0.080 *****	**0.102 *****
	(2.48)	**(2.63)**	**(3.39)**
Dynamic (+)	0.008 *	0.005	0.013 **
	(1.72)	(0.94)	(2.28)
Static (+)	0.001	0.001	0.006 **
	(0.33)	(0.52)	(2.25)
HHI (–)	–0.167 *	–0.173 *	–0.181 *
	(–1.81)	(–1.88)	(–1.86)
R&D (+)	0.720 ***	0.708 ***	0.904 ***
	(4.76)	(4.67)	(5.67)
Size (+)	0.377 ***	0.377 ***	0.385 ***
	(38.15)	(38.14)	(39.41)
Leverage (–)	–0.414 ***	–0.426 ***	–0.357 ***
	(–5.33)	(–5.43)	(–4.64)
MTB (+)	0.759 ***	0.769 ***	0.763 ***
	(20.47)	(19.90)	(20.50)
ROA (+)	0.224 ***	0.237 ***	0.256 ***
	(2.81)	(2.96)	(3.24)
Loss (+)	0.002	0.005	0.002
	(0.06)	(0.18)	(0.07)
EarnInc (+ / –)	–0.032 **	–0.024 *	–0.031 **
	(–2.25)	(–1.70)	(–2.28)
StdEarn (–)	–0.372 ***	–0.369 ***	–0.296 ***
	(–4.78)	(–4.74)	(–3.88)
StdRet (–)	–0.316 ***	–0.289 ***	–0.278 ***
	(–3.79)	(–3.25)	(–3.20)
Litigation (+ / –)	0.104 ***	0.103 ***	0.021
	(3.20)	(3.17)	(0.39)
Industry FE	No	No	Yes
Year FE	No	Yes	Yes
Observations	17,132	17,132	17,132
Adjusted R^2	0.447	0.448	0.471

This table presents regression results examining the relation between redaction and analyst following. Column 1 presents results excluding year and industry fixed effects; Column 2 includes year fixed effects; and Column 3 includes both year and industry fixed effects (the latter based on two-digit SIC codes). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on a two-tailed tests. All variables are defined in Appendix C.

Table 5. Redaction and Analysts' Earnings Forecasts

Variables	Forecast Dispersion: *ln(AF-Disp)*			Forecast Error: *ln(AF-Error)*		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
***Redacting* (+)**	**0.060** ***	**0.060** ***	**0.058** ***	**0.051** **	**0.052** **	**0.064** ***
	(3.28)	**(3.32)**	**(3.19)**	**(2.28)**	**(2.29)**	**(2.81)**
Dynamic (+)	0.008 ***	0.010 ***	0.006 **	0.010 ***	0.013 ***	0.008 **
	(3.61)	(3.69)	(2.16)	(3.25)	(3.97)	(2.23)
Static (+)	0.005 ***	0.005 ***	0.004 ***	0.000	–0.001	0.000
	(4.27)	(3.63)	(3.09)	(0.03)	(–0.70)	(0.04)
HHI (–)	–0.022	–0.017	–0.019	–0.002	0.008	0.029
	(–0.61)	(–0.48)	(–0.45)	(–0.04)	(0.16)	(0.52)
ln(Analysts) (–)	–0.015	–0.011	–0.011	–0.133 ***	–0.130 ***	–0.138 ***
	(–1.03)	(–0.74)	(–0.68)	(–7.97)	(–7.78)	(–7.76)
R&D (+)	–0.085	–0.052	0.040	–0.086	–0.065	0.009
	(–0.81)	(–0.50)	(0.36)	(–0.64)	(–0.48)	(0.06)
Size (–)	–0.037 ***	–0.039 ***	–0.046 ***	–0.049 ***	–0.051 ***	–0.056 ***
	(–5.61)	(–5.80)	(–6.78)	(–6.29)	(–6.49)	(–6.78)
Leverage (+)	0.177 ***	0.168 ***	0.116 ***	0.171 ***	0.156 ***	0.117 **
	(4.44)	(4.13)	(2.77)	(3.45)	(3.10)	(2.19)
MTB (–)	–0.156 ***	–0.175 ***	–0.166 ***	–0.283 ***	–0.303 ***	–0.276 ***
	(–7.39)	(–8.11)	(–7.33)	(–10.93)	(–11.23)	(–9.91)
ROA (+)	0.548 ***	0.564 ***	0.559 ***	0.816 ***	0.831 ***	0.804 ***
	(8.49)	(8.68)	(8.53)	(10.59)	(10.66)	(10.11)
Loss (+)	0.410 ***	0.407 ***	0.395 ***	0.623 ***	0.618 ***	0.600 ***
	(16.96)	(16.78)	(16.59)	(22.27)	(22.13)	(21.52)
EarnInc (+ / –)	–0.040 ***	–0.042 ***	–0.042 ***	–0.086 ***	–0.086 ***	–0.086 ***
	(–3.69)	(–3.88)	(–3.89)	(–6.70)	(–6.61)	(–6.57)
StdEarn (+)	0.144 **	0.139 **	0.093	0.157 **	0.166 **	0.116 *
	(2.50)	(2.40)	(1.63)	(2.25)	(2.34)	(1.66)
StdRet (+)	0.486 ***	0.575 ***	0.502 ***	0.566 ***	0.615 ***	0.554 ***
	(3.00)	(2.90)	(2.74)	(3.44)	(3.22)	(3.09)
Litigation (+ / –)	–0.043 ***	–0.042 ***	–0.001	–0.017	–0.015	0.033

	(–2.97)	(–2.96)	(–0.04)	(–0.93)	(–0.83)	(1.07)
Industry FE	No	No	Yes	No	No	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Observations	9,689	9,689	9,689	12,565	12,565	12,565
Adjusted R^2	0.169	0.170	0.191	0.215	0.216	0.228

This table presents regression results of the relation between redaction and properties of analyst earnings forecasts. Columns (1) – (3) present the results using dispersion of analyst earnings forecasts (*ln(AF-Disp)*) as the dependent variable. Columns (4) – (6) present the results using error of analyst earnings forecasts (*ln(AF-Error)*) as the dependent variable. Standard errors are clustered at the firm level (*t*-statistics are in parentheses). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. All variables are defined in Appendix C.

Table 6. Redaction and the Precision of Public/Private Information

Variables	Precision of Public Info: *Public*			Precision of Private Info: *Private*		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
***Redacting* (+ / –)**	**–0.145** ***	**–0.147** ***	**–0.162** ***	**–0.212** **	**–0.212** **	**–0.249** ***
	(–3.24)	**(–3.28)**	**(–3.55)**	**(–2.40)**	**(–2.40)**	**(–2.75)**
Dynamic (–)	–0.024 ***	–0.027 ***	–0.012	–0.021	–0.037 **	–0.034 **
	(–3.47)	(–3.59)	(–1.45)	(–1.51)	(–2.49)	(–2.04)
Static (–)	–0.008 ***	–0.006 **	–0.005	–0.012 **	–0.006	–0.013 *
	(–3.18)	(–2.30)	(–1.64)	(–2.41)	(–1.09)	(–1.92)
HHI (+ / –)	0.111	0.096	0.038	0.009	–0.049	–0.253
	(0.70)	(0.61)	(0.22)	(0.03)	(–0.16)	(–0.88)
ln(Analysts) (+ / –)	0.011	0.000	0.026	–0.110	–0.137	–0.054
	(0.21)	(0.00)	(0.48)	(–1.08)	(–1.34)	(–0.53)
R&D (–)	0.189	0.130	–0.059	–0.841 *	–1.062 **	–0.979 **
	(0.76)	(0.53)	(–0.22)	(–1.75)	(–2.21)	(–2.00)
Size (+)	0.184 ***	0.189 ***	0.212 ***	0.331 ***	0.345 ***	0.354 ***
	(7.27)	(7.41)	(8.55)	(6.46)	(6.63)	(7.16)
Leverage (–)	–0.328 ***	–0.317 ***	–0.178	–0.275	–0.207	–0.023
	(–2.83)	(–2.69)	(–1.49)	(–1.22)	(–0.91)	(–0.10)
MTB (+)	0.650 ***	0.689 ***	0.580 ***	1.211 ***	1.356 ***	1.185 ***
	(9.97)	(10.38)	(8.75)	(9.10)	(9.87)	(8.82)
ROA (–)	–0.190	–0.216	–0.133	–0.934 ***	–1.041 ***	–0.928 ***
	(–1.36)	(–1.54)	(–0.96)	(–3.39)	(–3.78)	(–3.42)
Loss (–)	–0.540 ***	–0.536 ***	–0.504 ***	–0.816 ***	–0.793 ***	–0.734 ***
	(–13.27)	(–12.92)	(–11.78)	(–10.60)	(–10.10)	(–9.25)
EarnInc (+ / –)	0.198 ***	0.205 ***	0.200 ***	0.242 ***	0.254 ***	0.239 ***
	(5.69)	(5.72)	(5.66)	(3.63)	(3.76)	(3.55)
StdEarn (–)	–0.413 ***	–0.426 ***	–0.247 **	–0.710 ***	–0.736 ***	–0.609 ***
	(–3.67)	(–3.69)	(–2.23)	(–3.18)	(–3.19)	(–2.79)
StdRet (–)	–1.562 ***	–1.605 ***	–1.403 ***	–2.513 ***	–2.940 ***	–2.788 ***
	(–3.24)	(–2.91)	(–2.84)	(–3.25)	(–2.98)	(–2.94)
Litigation (+ / –)	0.056	0.051	–0.019	0.326 ***	0.314 ***	0.224

	(1.09)	(0.99)	(–0.19)	(3.05)	(2.94)	(1.16)
Industry FE	No	No	Yes	No	No	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Observations	8,831	8,831	8,831	8,831	8,831	8,831
Adjusted R^2	0.137	0.138	0.165	0.081	0.083	0.100

This table presents regression results of the relation between redaction and the precision of public and private information contained in analysts' earnings forecasts. Columns (1) – (3) present the results using *Public* as the dependent variable. Columns (4) – (6) present the results using *Private* as the dependent variable. Standard errors are clustered at the firm level (*t*-statistics are in parentheses). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on a two-tailed tests. All variables are defined in Appendix C.

Table 7. Self-Selection: Heckman Two-stage Regressions

Panel A: Probit Regression of the Determinants of the Decision to Redact

Variables		***Redacting***		
	(1)	**(2)**	**(3)**	**(4)**
Dynamic (+)		0.064 ***	0.056 ***	0.068 ***
		(12.16)	(11.52)	(11.76)
Static (+)		0.010 ***	0.013 ***	0.011 ***
		(4.39)	(6.13)	(4.54)
HHI (–)		–0.354 ***	–0.204 *	–0.353 ***
		(–2.92)	(–1.85)	(–2.90)
R&D (+)	1.057 ***	0.392 **	0.901 ***	0.359 **
	(6.46)	(2.25)	(5.60)	(2.05)
Size (–)	–0.006	–0.017	–0.005	–0.018 *
	(–0.57)	(–1.58)	(–0.54)	(–1.72)
Leverage (+)	0.255 ***	0.194 **	0.231 ***	0.221 **
	(3.01)	(2.27)	(2.87)	(2.57)
MTB (+)	0.055	0.049	0.100 **	0.037
	(1.38)	(1.22)	(2.52)	(0.88)
ROA (+)	0.372 ***	0.352 ***	0.298 ***	0.329 ***
	(3.67)	(3.43)	(2.98)	(3.19)
Loss (+)	0.255 ***	0.216 ***	0.173 ***	0.216 ***
	(6.78)	(5.67)	(4.70)	(5.66)
EarnInc (+ / –)	0.025	0.030	0.034	0.019
	(0.92)	(1.11)	(1.26)	(0.67)
StdEarn (+)	0.195 **	0.042	0.100	0.033
	(2.20)	(0.46)	(1.13)	(0.36)
StdRet (+)	0.696 ***	0.584 ***	0.600 ***	0.574 ***
	(5.22)	(4.33)	(4.39)	(4.02)
Debt_Issue (–)	–0.029	–0.018	–0.040	–0.014
	(–0.92)	(–0.56)	(–1.29)	(–0.44)
Litigation (+ / –)	0.352 ***	0.182 ***	0.179 ***	0.171 ***
	(7.48)	(3.76)	(6.14)	(3.52)
Industry FE	No	No	No	Yes
Year FE	No	No	Yes	Yes
Observations	17,132	17,132	17,132	17,132
Pseudo R^2	0.254	0.256	0.259	0.288

Table 7. Self-Selection: Heckman Two-stage Regressions - *Continued*

Panel B: The Second Stage OLS Regression of Selection Model

Variables	***ln(Analysts)***	***ln(AF-Disp)***	***ln(AF-Error)***	***Public***	***Private***
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Redacting	**0.023 ****	**0.054 *****	**0.070 *****	**–0.158 *****	**–0.245 ****
	(2.60)	**(3.03)**	**(2.70)**	**(–3.50)**	**(–2.72)**
IMR	0.349	–0.779	1.479 **	0.847	1.138
	(1.59)	(–1.61)	(2.38)	(0.64)	(0.43)
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	11,549	9,642	12,507	8,788	8,788
Adjusted R^2	0.177	0.191	0.228	0.166	0.099

Panel C: Variance-Inflation-Factors (VIFs)

	ln(Analysts)	*ln(AF-Disp)*	*ln(AF-Error)*	*Public*	*Private*
Variables	(1)	(2)	(3)	(4)	(5)
Redacting	1.32	1.35	1.32	1.36	1.36
IMR	16.40	17.40	16.88	18.34	18.34
Redacting (OLS)	1.27	1.33	1.30	1.33	1.33

This table presents regression results of the Heckman two-stage self-selection correction models. Panel A presents results of estimating the likelihood of redacting information from financial reports using probit regression models. Panel B presents the regression results from the second stage models, including the inverse Mills ratios. Panel C presents Variance-Inflation-Factors for all regressions with respect to *Redacting* and *IMR* using correction models and *Redacting* using OLS models. All regressions include year and industry fixed effects, the latter using two-digit SIC codes. Standard errors are clustered by firm (*t*-statistics are in parentheses). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on a two-tailed test. All variable definitions are provided in Appendix C.

Table 8. Self-Selection: All Tests Using CEM-matched Sample

Variables	*ln(Analysts)*	*ln(AF-Disp)*	*ln(AF-Error)*	*Public*	*Private*
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Redacting	**0.092 *****	**0.051 *****	**0.072 *****	**–0.133 *****	**–0.211****
	(2.90)	**(2.68)**	**(2.95)**	**(–2.64)**	**(–2.09)**
Dynamic	0.015 **	0.008 **	0.013 ***	–0.016 *	–0.021
	(2.45)	(2.55)	(3.43)	(–1.70)	(–1.07)
Static	0.004	0.004 **	–0.001	–0.005	–0.018 **
	(1.27)	(2.38)	(–0.28)	(–1.24)	(–2.24)
HHI	–0.188 *	–0.030	0.012	0.092	–0.534 *
	(–1.78)	(–0.69)	(0.21)	(0.48)	(–1.84)
ln(Analysts)		–0.008	–0.129 ***	0.028	–0.146
		(–0.43)	(–6.45)	(0.46)	(–1.25)
R&D	1.240 ***	–0.040	–0.069	0.147	–0.561
	(6.21)	(–0.30)	(–0.42)	(0.45)	(–0.93)
Size	0.392 ***	–0.043 ***	–0.061 ***	0.211 ***	0.380 ***
	(34.10)	(–5.32)	(–6.16)	(8.14)	(6.23)
Leverage	–0.329 ***	0.089 *	0.074	–0.139	0.200
	(–3.75)	(1.87)	(1.28)	(–1.02)	(0.72)
MTB	0.811 ***	–0.154 ***	–0.274 ***	0.595 ***	1.145 ***
	(19.09)	(–6.05)	(–8.65)	(7.43)	(7.44)
ROA	0.469 ***	0.561 ***	0.930 ***	0.045	–0.526
	(3.77)	(6.52)	(8.58)	(0.23)	(–1.36)
Loss	0.029	0.396 ***	0.624 ***	–0.460 ***	–0.603 ***
	(0.89)	(13.76)	(19.39)	(–9.55)	(–6.81)
EarnInc	–0.020	–0.043 ***	–0.087 ***	0.214 ***	0.220 ***
	(–1.19)	(–3.58)	(–6.14)	(5.41)	(2.87)
StdEarn	–0.324 ***	0.085	0.045	–0.320	–0.308
	(–2.66)	(0.99)	(0.41)	(–1.64)	(–0.80)
StdRet	–0.292 **	0.791 ***	0.719 ***	–2.298 ***	–4.103 ***
	(–2.42)	(4.56)	(4.60)	(–7.18)	(–6.73)
Litigation	0.021	–0.008	0.014	–0.030	0.360 *
	(0.36)	(–0.30)	(0.40)	(–0.29)	(1.65)
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	12,007	7,385	9,440	6,792	6,792
Adjusted R^2	0.435	0.193	0.230	0.160	0.092

This table presents regression results of all primary tests using coarsened exact matching to address potential self-selection. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on a two-tailed tests. All variables are defined in Appendix C.

Table 9. Sensitivity Analyses Using CEM-matched Sample

Panel A: Alternative Measure of Redaction

Variables	*ln(Analysts)* (1)	*ln(AF-Disp)* (2)	*ln(AF-Error)* (3)	*Public* (4)	*Private* (5)
ln(Redact)	**0.067 *****	**0.036 *****	**0.047 *****	**–0.120 *****	**–0.197 *****
	(3.83)	**(2.72)**	**(2.43)**	**(–3.79)**	**(–3.05)**
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	12,007	7,385	9,440	6,792	6,792
Adjusted R^2	0.462	0.189	0.225	0.162	0.089

Panel B: Controlling for Information Quality

Variables	*ln(Analysts)* (1)	*ln(AF-Disp)* (2)	*ln(AF-Error)* (3)	*Public* (4)	*Private* (5)
Redacting	**0.085 ****	**0.071 ****	**0.102 *****	**–0.107 ***	**–0.308 ****
	(1.96)	**(2.49)**	**(2.72)**	**(–1.74)**	**(–2.28)**
Accrual	–0.699 ***	0.210 **	0.145	–0.472 **	–0.613
	(–6.11)	(2.09)	(1.26)	(–2.35)	(–1.52)
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	12,007	7,385	9,440	6,792	6,792
Adjusted R^2	0.443	0.202	0.231	0.150	0.110

Panel C: Controlling for Voluntary Disclosure

Variables	*ln(Analysts)* (1)	*ln(AF-Disp)* (2)	*ln(AF-Error)* (3)	*Public* (4)	*Private* (5)
Redacting	**0.101 *****	**0.042 *****	**0.050 *****	**–0.096 *****	**–0.210 ****
	(3.38)	**(2.68)**	**(2.18)**	**(–2.26)**	**(–2.43)**
Guidance	0.310 ***	–0.178 ***	–0.173 ***	0.553 ***	0.631 ***
	(10.54)	(–13.99)	(–10.23)	(13.64)	(7.56)
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	12,007	7,385	9,440	6,792	6,792
Adjusted R^2	0.474	0.210	0.234	0.185	0.091

Table 9. Sensitivity Analyses Using CEM-matched Sample - *Continued*

Panel D: Shorter Window Analysis—Quarterly Analysts' Earnings Forecasts

Variables	*ln(Analysts)* (1)	*ln(AF-Disp)* (2)	*ln(AF-Error)* (3)	*Public* (4)	*Private* (5)
Redacting	**0.035 ****	**0.080 *****	**0.079 *****	**–0.049 *****	**–0.198 *****
	(2.00)	**(3.87)**	**(3.42)**	**(–4.99)**	**(–4.34)**
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	64,485	28,218	33,795	28,031	28,031
Adjusted R^2	0.552	0.208	0.155	0.191	0.040

Panel E: Subsample Analysis

Variables	*ln(Analysts)* (1)	*ln(AF-Disp)* (2)	*ln(AF-Error)* (3)	*Public* (4)	*Private* (5)
Redacting	**0.117 ****	**0.057 ***	**0.079 ***	**–0.194 *****	**–0.456 *****
	(2.33)	**(1.93)**	**(1.96)**	**(–2.61)**	**(–3.36)**
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	3,227	2,017	2,506	2,008	2,008
Adjusted R^2	0.458	0.213	0.189	0.155	0.104

This table presents results for several sensitivity analyses using the CEM-matched sample. All regressions include year and industry fixed effects. Standard errors are clustered by firm (*t*-statistics are in parentheses). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on a two-tailed tests. All variables are defined in Appendix C.

Table 10. Timeliness and Information Content of Analyst Reports

Panel A: Timeliness of Analyst Reports

	TimeGap	
	N	**Mean**
Redacting Firms	1,912	19.64
Non-Redacting Firms	8,854	22.38
Differences		**–2.74 *****

Panel B: Information Content of Analyst Reports

	CAR3	
	N	**Mean**
Redacting Firms	1,206	0.095
Non-Redacting Firms	7,159	0.085
Differences		**0.010 *****

	CAR_Average	
	N	**Mean**
Redacting Firms	1,478	0.028
Non-Redacting Firms	8,977	0.024
Differences		**0.004 *****

	Regression Analysis	
	CAR3	*CAR_Average*
Variables	(1)	(2)
***Redacting* (+)**	**0.006 ****	**0.001 ***
	(2.12)	**(1.81)**
Controls	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	6,644	8,465
Adjusted R^2	0.166	0.452

This table presents results examining the timeliness and informativeness of analyst reports using the CEM-matched sample. Panel A presents tests of mean differences in *TimeGap*, defined as the average number of days for individual analysts to issue their first revision following the 10-K filing, for redacting firms and non-redacting firms. Panel B reports the results of the information content of analyst reports. *CAR3* is the absolute three-day value-adjusted cumulative abnormal returns for the first forecast revision after the 10-K filing. *CAR_Average* is the proportion of a firm's absolute size-adjusted returns related to analyst forecast revisions to the firm's total absolute size-adjusted returns, divided by the number of forecast revision dates. Regression analyses are conducted by estimating Equation (1) using *CAR3* and *CAR_Average* as the dependent variables. Standard errors are clustered by firm (*t*-statistics are in parentheses). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on a two-tailed tests. All variables are defined in Appendix C.

Table 11. Relative Weights Investors Place on Information from the Firm versus Analysts

	RelativeWeights	
	N	**Mean**
Redacting Firms	1,477	0.354
Non-Redacting Firms	8,927	0.346
Differences		**0.008***

This table presents results investigating the relative weights investors place on information from the firm versus financial analysts' earnings forecasts. *RelativeWeights* = CAR^{AF} / (CAR^{AF} + CAR^{EA}). CAR^{AF} is the absolute value of three-day value-adjusted abnormal returns for the first analyst forecast revision after the 10-K filing, and CAR^{EA} is the absolute value of three-day value-adjusted abnormal returns for a firm's earnings announcement. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on a two-tailed tests.

Table 12. Cross-sectional Analyses Using CEM-matched Sample

Panel A: Is the Relation Stronger when the Redacting Firm is an Industry Leader?

	ln(Analysts)	*ln(AF-Disp)*	*ln(AF-Error)*	*Public*	*Private*
Variables	(1)	(2)	(3)	(4)	(5)
Redacting	0.103 ***	0.054 ***	0.070 ***	–0.099 **	–0.195 **
	(3.17)	(2.75)	(2.80)	(–2.02)	(–2.07)
Leader	–0.138 **	0.050 **	0.103 ***	0.004	0.641 **
	(–2.16)	(2.23)	(4.05)	(0.03)	(2.13)
Redacting*Leader	**–0.331 ***	**–0.068**	**0.053**	**–0.373**	**–1.222 ***
	(–1.87)	**(–1.62)**	**(0.95)**	**(–1.47)**	**(–2.12)**
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	12,007	7,385	9,440	6,792	6,792
Adjusted R^2	0.436	0.193	0.231	0.160	0.087

Panel B: Is the Relation Moderated for Firms with Greater Voluntary Disclosure?

	ln(Analysts)	*ln(AF-Disp)*	*ln(AF-Error)*	*Public*	*Private*
Variables	(1)	(2)	(3)	(4)	(5)
Redacting	0.109 ***	0.083 ***	0.059 *	–0.041	–0.203 **
	(2.84)	(3.18)	(1.88)	(–0.84)	(–2.27)
Frequency	0.026 ***	–0.015 ***	–0.016 ***	0.069 ***	0.080 ***
	(6.66)	(–8.90)	(–8.54)	(9.72)	(6.03)
Redacting*Frequency	**–0.016**	**–0.048 *****	**0.008**	**–0.064**	**–0.023**
	(–0.53)	**(–2.78)**	**(0.38)**	**(–1.24)**	**(–0.23)**
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	12,007	7,385	9,440	6,792	6,792
Adjusted R^2	0.442	0.208	0.236	0.184	0.101

This table presents results for two cross-sectional analyses using the CEM-matched sample. *Leader* is an indicator variable that is equal to one if the firm's market value is within the top decile in an industry based on the two-digit SIC code, and zero otherwise. *Redacting*Leader* is the interaction term of *Redacting* and *Leader*. *Frequency* is the number of management earnings forecasts for a firm in a given year. *Redacting*Frequency* is the interaction term of *Redacting* and *Frequency*. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, based on a two-tailed tests. All variables are defined in Appendix C.

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