Survival of the most secretive: Firm bankruptcy and peer firm contract redactions

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Abstract. This paper examines whether and how firm bankruptcy and distress risk affect the disclosure of proprietary information by R&D-intensive industry peers. Based on material contract redactions in SEC regulatory filings, we find that R&D-intensive industry peers respond to the financial contagion of firm bankruptcy and distress risk by increasing their level of redaction. This response is strongest in competitive industries. In concentrated industries, peers' greater market share after firm bankruptcy attenuates the need for secrecy. We also observe an offsetting increase in non-proprietary disclosure, which allows R&D-intensive peers better access to external equity and debt capital. Third, we find that the most secretive firms survive the industry financial contagion better. They innovate more and reduce their own distress risk in the future. Our findings shed light on the SEC's new regulation to streamline the redaction process. By reducing the regulatory cost of redaction, this streamlining may have had a real effect on R&D-intensive peers' chances of future success when facing industry financial contagion from firm bankruptcy. Our study suggests that the fittest and most secretive innovators stand the best chance of survival in light of the financial contagion from bankruptcy.

EFM Classification Codes : 130, 540

Keywords: Firm bankruptcy; Peer firm contract redactions; Regulated disclosure; Proprietary information; Trade secrecy; R&D-intensive firms

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Working for a tech company may sound like all fun and ping-pong, but behind the façade is a ruthless code of secrecy – and retribution if you break it (The Guardian (2018).

1 Introduction

To survive competition in the product markets, firms deploy many approaches to protect their trade secrets and business advantages from the public and their competitors (Cohen et al. 2000). As one approach, the Securities and Exchange Commission (SEC) allows a public company to redact mandatory disclosure in a regulatory filing if it deems the disclosure to advantage unfairly the firm's rivals and competitors. Redaction policy can be especially important for firms whose value depends on whether rivals have access to information on their material contracts (Ellis et al. 2012; Jones 2007). Until recently, all redactions required preapproval by the SEC.[1] The SEC now examines filers' redactions in a later review.[2] While this amendment streamlines mandatory corporate disclosure, the fact that it represents a less restrictive mandatory disclosure rule could have significant consequences for those who rely on SEC filers' information. In this study, we investigate whether and how the shock of a firm's bankruptcy or financial distress affects the redaction behavior of its industry peers. In our setting for this study, a bankrupt SEC filer is likely to have a significant impact on peer firm redaction from financial contagion (i.e., from bankruptcy-related market disturbances) in the industry. The effects should also be stronger when the industry reflects competition among R&D-intensive firms. Such firms are arguably more dependent than others on industry-related proprietary information from their peers. This new SEC redaction policy may, thus, have created an important externality for R&D-intensive peer firms' innovation and survival in the future. Accordingly, as our main research question, we ask whether and how the financial contagion of firm bankruptcy or distress affects the proprietary disclosure of a bankrupt firm's industry peers as indicated by their use of redaction to alleviate mandatory disclosure. Given the potential significance of redaction for firms facing intense competition, we also ask whether R&D peer firms' redactions in response to firm bankruptcy alter peer firms' innovation activity and survival in the future.

We adopt the setting of peer firm redaction after firm bankruptcy because bankruptcy is a watershed event that enables a research design where the peer firm disclosure responses we study (i.e., the redactions) are most likely causal since they emanate from the firm bankruptcy itself and/or the aftershock disturbances of financial contagion within the industry. Firm bankruptcy is also an event that can occur in waves, such as during the 2007–2008 global financial crisis affecting banks and the 2020–2022 coronavirus pandemic affecting multiple industries. A bankruptcy wave may intensify the disclosure responses of a bankrupt firm's industry peers. Bankruptcy events may also accentuate the interplay between the proprietary costs and market benefits of firms' mandatory disclosure (Verrecchia 2001; Merton 1987). This interplay can be especially important for R&D-intensive firms, as these firms' proprietary information can have high value to industry rivals and future

[1] Information requested to be redacted based on a confidential treatment order (CTO) cannot be material to investors but, rather, only to the firm. If the information can cause substantial competitive harm to the firm but is material to outside investors, it cannot be redacted.

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

competitors, prompting a stronger response of peer firm redaction to firm bankruptcy. R&D-intensive industry peers may also use redaction to protect their monopoly rents from innovation and intellectual property by adjusting their proprietary disclosure in response to financial contagion.

Adding tension to our research question, we state three theoretical scenarios to capture the different ways R&D-intensive peers may alter their proprietary disclosure through redaction in response to firm bankruptcy or distress. First, firm bankruptcy can increase the cost of proprietary disclosure when the remaining peers face industry financial contagion. The literature documents some effects of industry financial contagion, such as a decrease in stock price and an increase in loan spread within an industry.[3] Yet, the literature is silent on disclosure effects. When an R&D-intensive firm discloses proprietary information, potential predators may use this information to improve their innovation while undertaking more aggressive pricing and marketing tactics. Information leakage can also increase predation risk, exacerbated when peer firms experience industry financial contagion. In addition, predation risk can weaken a peer firm's competitive position in the product market (Verrecchia and Weber 2006). Also, R&D-intensive firms' proprietary information after bankruptcy can be especially important in imperfect capital markets since the leakage of proprietary information to competitors can force even the most efficient firm to exit. In response, R&D-intensive peer firms may use redaction to suppress the disclosure of proprietary information that their competitors might otherwise leverage to mitigate predation risk (Allen and Gale 1999; Bhattacharya et al. 2004; Bhattacharya and Chiesa 1995; Bhattacharya and Ritter 1983; Erkins 2011). These effects should be greatest for peer firms in competitive industries.

Second, while all firms in an industry may increase their market share and power after a bankrupt firm's exit, firms in concentrated industries can expect to achieve greater market share and power compared to firms in competitive industries. Firms in a concentrated industry will also have less concern for the cost of knowledge spillover from proprietary disclosure since proprietary disclosure is less costly to them from a competitive advantage standpoint. Less concerned about spillover, these firms may maintain or increase their level of

[3] Firm events have been shown to affect peer firms' stock prices (Foucault and Fresard 2014; Hertzel et al. 2008; Hertzel and Officer 2012; Lang and Stulz 1992), credit spreads (Hertzel and Officer 2012; Jorion and Zhang 2007), corporate tax strategies (Bird et al. 2018), capital expenditures (Foucault and Fresard 2014), employment (Bernstein et al. 2019), customers and suppliers (Hertzel et al. 2008; Kolay et al. 2016), capital structure (Leary and Roberts 2014), lending choice (DeFranco et al. 2020), and listing choice (Gordon et al. 2020). In addition, prior literature shows that firm events influence market sentiment (Addoum et al. 2014), and that news announcements about a firm impact market pricing through intra-industry information transmission (Foster 1981; Han et al. 1989; Laux et al. 1998).

proprietary disclosure in financial reports to capture capital market benefits (Raith 2003). This view is consistent with the finding in Verrecchia and Weber (2006) that firms in low competition (i.e., concentrated) industries are less likely to redact proprietary information in published reports.

Third, competition differences aside, financial contagion from firm bankruptcy may also induce R&D-intensive peers to increase proprietary disclosure on major contracts to alleviate financing constraints.[4] Financing constraints can be important as R&D-intensive peers have a large and important portion of their assets in intangibles, which generates uncertainty about collateral value (Hall 2002). Thus, R&D-intensive peer firms can face steeper costs of external capital and capital rationing after firm bankruptcy (Ozkan 2002). Moreover, R&D-intensive peers' redaction can exacerbate this capital rationing. For example, Hui et al. (2019) find that some firms exploit the pretext of protecting proprietary information by concealing adverse information from external capital providers. If external capital providers perceive the non-disclosure of proprietary information as symptomatic of agency costs, this may exacerbate capital rationing. Thus, as a response to industry financial contagion, rather than increase redaction, R&D-intensive firms may maintain (or increase) the level of proprietary disclosure in published reports to alleviate the costs of external financing of what might be seen as uncertain innovative technology.[5]

These three theoretical scenarios, together with a lack of evidence on how firm bankruptcy and financial distress affect proprietary disclosure, warrant further investigation on how and whether firm bankruptcy and financial distress change the proprietary disclosure strategy of R&D-intensive industry peers. Firms' use of redactions as a proprietary disclosure strategy also provides an interesting topic in its own right. This is because redactions capture peer firms' choice of withholding material contract information from competitors in the product markets that would otherwise be mandatorily disclosed in SEC filings. However, as a counterbalance to redaction, firms may also increase voluntary disclosure. As such, our study provides insight into the effect

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[4] The literature shows that corporate disclosure can alleviate financing constraints, especially for firms facing information-related capital-market imperfections, by reducing informational frictions and agency costs (Dhaliwal et al. 2011; El Ghoul et al. 2011; Francis et al. 2005; Francis et al. 2008; Hubbard 1998; Jones 2007).

[5] Non-disclosure can create problems of adverse selection and moral hazard, as first described by Akerlof (1970) in his "lemons" paper. Without any mechanism to allow outside investors to differentiate between bad and good projects, there exists a pooling equilibrium for all projects regarding prices rather than a separating equilibrium between the bad and the good. Eventually, because of informational asymmetries, the bad denominates and markets may collapse. Subsequent studies have proposed models that use signaling and reputational capital as disciplinary mechanisms to alleviate the adverse selection problem and verify the quality of the firm (Leland and Pyle 1977b; Myers and Majluf 1984; Ross 1977; Titman and Trueman 1986; Varshney and Robinson 2004).

of the SEC's recent endeavor to reduce and simplify firms' choice of mandatory disclosure while providing additional information through voluntary disclosure.

To sharpen identification, we distinguish between redactions related to proprietary information (e.g., material contract details related to R&D, consulting, licensing, royalties, supply chains, and peer-firm relations) and redactions unrelated to proprietary information (e.g., information on compensation, employment, leasing agreements, financing, and restructuring). In addition, we explore whether R&D-intensive peer firms with redactions are signaling that they are better innovators and less likely to experience financial distress in the future compared to firms without redactions. This analysis is consistent with the idea that the fittest and most secretive firms in an industry stand the best chance of success in light of financial contagion from bankruptcy.

Our analysis produces three sets of findings: on (i) peer firm redaction in SEC filings, (ii) the interplay between peer firm redaction and non-proprietary disclosure, and (iii) the future outcomes from peer firms' dual disclosure strategy of proprietary and non-proprietary disclosure.

For the first set of findings, we find that firm bankruptcy associates with a higher level of redaction by peer firms with high R&D intensity and that these redactions mostly contain proprietary information. We also recognize that bankruptcy events cluster (Hertzel and Officer, 2012), a consideration not reflected in traditional credit risk models. Thus, in addition to investigating isolated bankruptcy filings, we find that the contagion of an industry bankruptcy wave also affects peer firm proprietary disclosure. We further find that a higher level of distress risk increases the propensity of peer firms to restrict their proprietary information using redactions. Thus, our results generalize to bankruptcy waves and events of financial distress not exclusive of bankruptcy. Peer firm redaction in response to financial contagion, however, increases mostly for peer firms in competitive industries (the first scenario). By contrast, as predicted, peer firms in concentrated industries (the second scenario) or facing external financing constraints (the third scenario) do not significantly increase their redaction activity in response to firm bankruptcy. This first set of results is robust to alternative econometric tests and industry-level shocks to firms' business environment. This evidence also suggests that the SEC's recent policy change on redaction has a bright side for R&D-intensive firms facing industry financial distress and bankruptcy by making it easier for them to redact proprietary contract details from potential predators and to weather out industry distress risk.

For the second set of findings, our main result is that peer firms increase the frequency of non-proprietary management guidance disclosure following firm bankruptcy to compensate for the material contract redactions that would otherwise be mandatorily disclosed. The frequency of management guidance, however, only increases for peer firms in competitive industries and not for firms in concentrated industries. This suggests that the trade-off between proprietary and non-proprietary disclosure is important for R&D-intensive peer firms in competitive industries where the costs of firm bankruptcy are higher than for firms in concentrated industries. In addition, we find that, while higher levels of redaction adversely affect the issuance of external capital, more non-proprietary management guidance attenuates this effect. Interestingly, this finding also supports our earlier result that firms facing external financing constraints do not increase their redactions, since doing so only adds to the cost of raising external capital.

Our third set of findings links peer firm redactions to economic consequences. The literature on peer firms' use of redaction to suppress good or bad news shows mixed results (Bao et al. 2021; Barth et al. 2021; Boone et al. 2016; Glaeser 2018; Hui et al. 2019; Li and Li 2020). Consistent with good news suppression, Boone et al. (2016) show that redacting-IPO firms suffer from higher underpricing on the IPO date. Yet the public release of the redacted information in a later secondary offering helps raise more capital. R&D-intensive firms also use redactions to hide good news from potential and current rivals and protect the monopoly rents associated with firm innovation. There is a risk, however, that some firms may inappropriately apply the SEC redaction rules to hide bad news and agency costs from investors. although Hui et al. (2019) indicate that the SEC monitors these attempts and requires modified filings.

To study whether redactions have economic consequences, we investigate whether peer firms use redaction to suppress good or bad news by examining whether redacting firms experience greater (less) innovation and lower (higher) distress risk in the future, consistent with good (bad) news. We also check whether the frequency of SEC redaction modifications requests differs for R&D-intensive firms in an industry with versus without a bankruptcy. We first find that SEC modification rates are lower for R&D-intensive firms in an industry with versus without a bankruptcy, indicating that financial contagion appears to have a disciplining effect on managerial dysfunctional behavior intended to hide poor performance. Second, we find that R&D-intensive firm redactions associate with a higher quality and quantity of innovation and a lower level of distress risk in the next three years after firm bankruptcy. For innovation quality, we use a firm's conversion of R&D spending into future sales (Knott 2008). For innovation quantity, we use the number of patents filed by peer firms (Kogan et al. 2017). Collectively, this evidence supports the view that redactions by R&D-intensive firms are likelier to suppress good news than hide bad news and high agency costs.

Together, these findings contribute to knowledge in several ways. First, we add to the literature on the contagion of events in an industry by showing that the financial contagion from bankruptcy and financial distress significantly affects industry peers' disclosure of proprietary and non-proprietary information. While the prior studies document the contagion effects of firm bankruptcy on stock returns and credit spreads (e.g., Hertzel et al. 2008; Hertzel and Officer 2012; Jorion and Zhang 2007), those studies do not extend to the impacts of financial contagion on proprietary and/or non-proprietary disclosure.

Second, our study provides an important insight into the SEC's recent amendment of Regulation S-K (SEC 2019), which allows a firm to redact contract information without seeking prior SEC approval. By lowering the cost of redaction, the SEC amendment may also have unwittingly improved R&D-intensive firms' chances of future success. Hence, our results have implications for equity and credit investors since we show that higher levels of redaction in response to financial contagion associate with long-term innovative success and lower financial distress risk. Also relevant to the SEC amendment, we find no evidence that the redaction process enables managers of R&D-intensive firms facing industry financial contagion to hide bad news from investors, which is also contrary to the overall aim of the SEC regulation. Rather, financial contagion may have a disciplinary effect on managerial dysfunctional behavior in R&D-intensive firms whose growth opportunities outweigh the costs of rent extraction through redaction. As such, we add new results to a developing literature on the motivations for and consequences of material contract redactions in SEC filings (also Section 2.1).

Third, our study also relates to the literature on disclosure by financially constrained firms. Bernard (2016) finds that financially constrained German private firms react to an increase in disclosure compliance cost by restricting their financial statement non-disclosure less due to predation risk. We extend this work by examining whether and how, when facing financial contagion risk following firm bankruptcy, industry peers undertake a dual strategy regarding their proprietary mandatory disclosure on material contract details and non-proprietary voluntary disclosure. We find that R&D-intensive rivals are more likely to release non-proprietary information to mitigate external financing constraints while protecting their competitive status by maintaining their use of redactions. Our study, thus, sheds light on a real effect of the SEC's recent endeavor by providing evidence of an increase in the innovation success and survival of peers facing higher industry distress risk following firm bankruptcy.

Section 2 reviews the literature and develops our hypotheses. Section 3 outlines the research method. Section 4 describes the sample and data. Section 5 presents the results, and Section 6 concludes.

2 Literature and Hypotheses

2.1 Literature

Our study relates to three strands of literature. The first examines the impact of firm-level events on peer firm financial outcomes. This literature builds on the idea that firm events can impact peer firms in an industry due to contagion (Ferris et al. 1997). Peer firms' financial outcomes vary with firms' profit margin and firm structure (Lang and Stulz 1992), firm- and market-wide factors (Bernstein et al. 2019; Hertzel and Officer 2012), and the responses of customers and suppliers. For example, an event signaling financial distress at one firm can lead supplier firms to increase credit terms to mitigate the risk of disruption to the supply chain (Hertzel et al. 2008; Kolay et al. 2016). This literature also shows that firm bankruptcy lowers rivals' stock prices (Lang and Stulz 1992) and increases loan spreads (Hertzel and Officer 2012) but positively affects rivals' firm value in concentrated industries through an increase in market share and power. Overall, this literature documents that firm events are important determinants of peer firms' financial outcomes.

A second strand of literature focuses on the industry-related effects of firm disclosure. Early studies show that the information in financial statements affects other firms' investment decisions (Badertscher et al. 2013; Foster 1981; Han et al. 1989; Laux et al. 1998). More recent studies show that the externalities of disclosure-induced information transfer may benefit rivals and future competitors (Gordon et al. 2020). These studies focus on disclosures such as earnings and management guidance. A related study (Cao et al. 2018) shows that peer pressure can induce firms to issue fewer product development press releases, as such releases can leak sensitive information to rivals. Our research is distinct from these studies in that we focus on a single type of event – firm bankruptcy (and financial distress as a precursor to bankruptcy) – to provide evidence on peer firms' choice of proprietary mandatory disclosure versus non-proprietary voluntary disclosure in response to that firm-level event.

In a related study, Bernard (2016) finds that financially-constrained German private firms restrict generic and non-proprietary disclosure in the presence of predation risk when the regulatory cost of non-disclosure is low. While we extend Bernard (2016) by testing whether redacted proprietary disclosure after firm bankruptcy generates positive future outcomes for R&D-intensive firms, such as an increase in innovation or a reduction in distress risk in the next three years, our study is different in many respects.[6] We examine the industry financial contagion after firm bankruptcy, which we contend prompts R&D-intensive peers to withhold proprietary information through redaction of material contract details while releasing non-proprietary information through voluntary disclosure. As such, the former information type protects R&D-intensive firms from predation risk in the product market, whereas the latter information type helps mitigate capital market disadvantages from withholding information on material contract details after firm bankruptcy.

Third, our study relates to the literature on redactions in SEC filings (Bao et al. 2021; Barth et al. 2021; Boone et al. 2016; Glaeser 2018; Hui et al. 2019; Li and Li 2020). This literature relies on the level and frequency of redactions as a valid proxy for listed firms' proprietary disclosure costs. To mitigate the cost and risk of public disclosure, a firm required to file financial statements might restrict voluntary disclosure (Aboody and Lev 2000; Ellis et al. 2012; Hughes and Pae 2015) or seek approval to redact portions of mandatory disclosures by filing a request under Securities Act Rule 406 and Exchange Act Rule 24b-2 (SEC 2011, 2019).[7] This literature on redactions, however, does not examine the use of redactions by industry peers in light of industry financial contagion from firm bankruptcy.

[6] We also note that the informational environment faced by our sample (U.S. public firms) differs from the sample in Bernard (2016) (German private firms). For German private firms, a lack of alternative information sources can cause the non-disclosure of financial performance and status to limit the information available to rivals and reduce proprietary costs. However, public firms in the United States have a rich informational environment, which provides a wide range of alternative information sources, including brokerage house and analyst research reports, news articles, and social media. This rich informational environment can compensate for the non-disclosure of generic and non-proprietary financial information by U. S. public firms (Lev and Gu 2016).

[7] Until 2019, the SEC reviewed the CTR and approved a CTO. As a result of streamlining under the FAST Act of 2019, a firm can now redact material information subject to SEC staff oversight without a CTR.

2.2 *Hypotheses*

When deciding on the level of disclosure, a firm manager in theory trades off the potential capital market benefits of disclosure against the proprietary costs of disclosure (e.g., Ali et al. 2014; Bamber and Cheon 1998; Clinch and Verrecchia 1997; Tian and Yu 2018; Verrecchia 1983; Verrecchia and Weber 2006). Verrecchia (1983) shows that the disclosure of proprietary information can erode a firm's competitive advantage and threaten its profitability when rivals use the disclosed information to identify the firm's weaknesses and increase market share. The financial contagion of firm bankruptcy may further exacerbate the cost and benefit tradeoffs of proprietary disclosure, the reason being that product-market rivals may seek to exploit weaknesses in an industry exposed to the contagion of firm bankruptcy or financial distress (Verrecchia 1983). This adverse effect of financial contagion on sales and profits then incentivizes firms to decrease proprietary disclosure. Thus, firm bankruptcy may lead peer firms to decrease mandatory disclosure to hide trade secrets from rivals seeking to exploit the contagion of financial distress (Lang and Stulz 1992; Verrecchia and Weber 2006). Proprietary information spillover can be especially costly for firms with high levels of innovation and R&D investment (Erkins 2011; Glaeser 2018) by jeopardizing their monopoly rents and survival (Mansfield 1985). This leads to our first hypothesis:

> H1: Firm bankruptcy decreases R&D-intensive peer firms' proprietary disclosure (i.e., increases their redactions in SEC filings) in industries subject to financial contagion (financial contagion channel).

Firms in some industries face higher proprietary disclosure costs than in others due to differences in competition (Ali et al. 2014; Lang and Sul 2014). In line with this view, Verrecchia and Weber (2006) and Clinch and Verrecchia (1997) argue that firms are likelier to consider information as proprietary when they face a high level of competition, especially R&D-intensive firms (Bloom et al. 2013; Jones 2007). These studies suggest that peer-firm redactions in response to firm bankruptcy vary between competitive versus concentrated industries. On the one hand, firm bankruptcy may reduce proprietary disclosure among peer firms in competitive industries due to financial contagion. On the other hand, for R&D-intensive firms in concentrated industries, we predict a smaller shift and, possibly, no reduction in proprietary disclosure. This prediction is consistent with the finding in Verrecchia and Weber (2006) – that firms are *less* likely to consider technological information as proprietary when they face less competition. For the remaining firms in the industry, firm bankruptcy can increase their market share, power, and profitability. This leads to our second hypothesis:

H2: Firm bankruptcy decreases R&D-intensive peer firms' proprietary disclosure in competitive industries but does not decrease proprietary disclosure in concentrated industries (product-market competition channel).

R&D-intensive firms may also be constrained in their access to external capital. In this situation, firm bankruptcy and industry financial distress could prompt a higher or lower or no change in the level of redaction depending on how a firm balances the need for additional external capital against the cost of not decreasing proprietary disclosure. This leads to our third hypothesis:

H3: Firm bankruptcy does not decrease R&D-intensive peer firms' proprietary disclosure when they are financially constrained versus decreases R&D-intensive peer firms' proprietary disclosure when they are not financially constrained (financing constraint channel).

Decreasing proprietary disclosure to reduce the costs of information spillover may also decrease the ability to attract external capital (Bloom et al. 2013), reduce market liquidity (Thompson et al. 2020), and increase the cost of capital (Boone et al. 2016). In trading off the potential capital market benefits against the proprietary costs of disclosure (e.g., Ali et al. 2014; Bamber and Cheon 1998; Clinch and Verrecchia 1997; Tian and Yu 2018; Verrecchia 1983; Verrecchia and Weber 2006), absent financing constraints, a firm may increase *non*-proprietary disclosure (Heinle et al. 2019; Lambert et al. 2011). This leads to our fourth hypothesis:

H4: Firm bankruptcy increases R&D-intensive peer firms' use of *non*-proprietary disclosure (offsetting disclosure channel).

We further examine whether R&D-intensive peer firm redactions lead to a higher or lower quality and quantity of innovation in the future after firm bankruptcy and whether R&D-intensive peer firm redactions associate with lower financial distress risk in the future. Superior innovation in the future would be consistent with a firm using redactions to withhold proprietary information to protect its investment in innovation, whereas evidence of inferior innovation in the future would suggest that the firm uses redactions to suppress bad news.

The first view suggests that R&D-intensive peer firms redact proprietary information to protect trade secrets and monopoly rents, thus strengthening their competitive position in the product market. This could lead to higher innovation output and lower financial distress risk. This view is consistent with Boone et al. (2016), who find that whereas redacting IPO firms suffer from greater underpricing at IPO they raise more capital in secondary offerings after the release of the redacted information. Under the second view, a firm exploits the pretext of redaction to conceal bad news and agency costs (e.g., empire-building) from investors (Grossman and Hart 1980; Healy and Palepu 2001; Hui et al. 2019; Jensen and Meckling 1976; Thompson et al. 2020). This could lead to lower innovation output and higher financial distress risk in the future. Two studies (Bao et al. 2021; Hui et al. 2019) suggest that some firms may hide negative non-proprietary information through redaction. Bao et al. (2021) base their evidence on short selling, although this is contrary to the SEC rule that redaction should not restrict material information for investors (SEC 2019). Consistent with this rule, Hui et al. (2019) find that SEC staff review modifies earlier attempts to use redaction to hide bad news from investors. Nonetheless, if redactions are successful in suppressing negative information, we should observe lower innovation output and higher financial distress risk in the years after redaction. Our fifth hypothesis is:

H5a: R&D-intensive peer firm redaction that suppresses good (bad) news is associated with higher (lower) innovation output in the years after the redaction.

H5b: R&D-intensive peer firm redaction that suppresses good (bad) news is associated with lower (higher) financial distress risk in the years after the redaction.

3 Method

To test our hypotheses, we require measures of proprietary disclosure and industry product-market competition for firms that vary in R&D intensity in an industry experiencing the shock of at least one firm bankruptcy. We view the shock of firm bankruptcy as largely exogenous to peer firms' disclosures except through the contagion of industry financial distress. Our empirical strategy minimizes identification concerns by exploiting variation in proprietary disclosure of peer firms sensitive to knowledge spillover from innovation (i.e., peer firms with high R&D-intensity). We also focus on proprietary disclosures that relate to trade secrecy and other material contract information valuable to rivals and future competitors. We test hypotheses H1–H4 by regressing proprietary non-disclosure on R&D intensity, the number of bankruptcies in an industry in a year, the interaction between these two variables, controls, and fixed effects. Of main interest is whether the proprietary disclosure in response to firm bankruptcy varies more for high versus low R&D-intensive peer firms. We expect higher proprietary disclosure costs for R&D-intensive peer firms in industries with high versus low competition (Verrecchia and Weber 2006). We also expect higher proprietary disclosure costs for R&D-intensive peer firms in industries with high versus low financing constraints depending on firms' need for capital.

To test H5, we regress measures of innovation output or distress risk of peer firms in the three years after redaction on the level of redaction and R&D intensity.

We measure the nondisclosure of proprietary information as the log of one plus the number of confidential treatment orders (CTOs), excluding denied CTOs and extensions of previously granted CTOs in a given year, based on the filing date of a firm's redaction request. We denote this as *LN(1+CTO_NUMBERS)*.[8] In an appendix, we examine additional measures of redaction including a CTO indicator variable (*CTO_DUMMY*), the number of exhibits associated with redaction (*LN(1+CTO EXHIBIT_NUMBERS))*[9], and the length of a redaction (*LN(1+CTO_LENGTH))*.[10]

For product-market competition, we use the Text-based Network Industry Classifications (TNIC) competition measure (Hoberg and Phillips 2016). This measure uses pairwise similarity scores from a textual analysis of product descriptions in Item 1 of firms' 10-K filings. We assign firms to a high- or low-competition industry (*INDUSTRY_COMPETITION*) if the firm is in the highest or lowest tercile of TNIC competition, respectively. To measure the demand for proprietary non-disclosure, we define an indicator variable as one for each firm-year if R&D expenditure scaled by firm assets (a measure of R&D intensity) is in the highest tercile and zero otherwise. We denote this as *R&D_INTENSITY*.

We consider knowledge spillover to industry rivals and an industry-level secrecy measure as two additional measures of the demand for proprietary non-disclosure. The first, *SPILLOVER*, equals to one if the firm's industry-level technology spillover, based on the Bloom et al. (2013) technological spillover measure, is above the median in a given year and zero otherwise. The second is an industry-level secrecy measure (Erkins 2011) based on the survey data in Cohen et al. (2000). This is limited to manufacturing firms only. *SECRECY* equals one if the firm's industry-level secrecy based on Erkins (2011) is above the median and zero otherwise.

[8] All the results are robust using the inverse hyperbolic sine transformation, which is defined for zero values without shifting, instead of using the logarithm transformation.
[9] A single CTO can contain redactions in several exhibits.
[10] To measure the period during which the redaction is valid, we use the file date of the SEC filing form with redaction and the CTO expiration date in the CTO form (equivalent to the last day of redaction). Thus, *LN(1+CTO_LENGTH)* captures the redacting firm's intention/intensity to shield the public from proprietary information.

4 Sample and data

4.1 Sample

We establish a sample of 20,221 firm-year observations for 3,955 firms. We first merge 2009–2017 COMPUSTAT firm financial information with bankruptcy information from Audit Analytics and confidential treatment information from SEC Edgar. On May 1, 2008, the SEC began posting publicly the results of confidential treatment request reviews (Form CT Order) to SEC Edgar (https://www.sec.gov/edgar/searchedgar/ctorders.htm). To cover full years, we examine CTO redactions from 2009 to 2017. We exclude denied CTOs[11] and extensions of previously approved requests as they are unlikely to relate to managers' current incentives for information disclosure. We also exclude bankruptcy filers and firms in the financial and regulated utility industries that have different disclosure requirements and incentives. Table 1 shows the sample distribution by Fama-French 48 industries (Panel A) and year (Panel B). The most-represented industries are business services, pharmaceuticals, electronic equipment, and retail, which make up 38 percent of the sample. The number of firms each year is stable.

We next identify a sample of bankruptcies that potentially affect the disclosure decisions of the remaining firms in the same industry. Industry peer firms are those in the same four-digit SIC code in a year. As indicated in Panel C of Table 1, we examine 486 bankruptcies consisting of 78 Chapter 7, 402 Chapter 11, and six Chapter 15 filings.[12] Based on this sample, our variable of interest to explain peer-firm non-disclosure using CTOs is *FIRM_BANKRUPTCY*. We define this as the log of one plus the number of firms that experiences a Chapter 7, 11, or 15 bankruptcy in the four-digit SIC code industry in a given year. For an industry with no bankrupt firms, we set *FIRM_BANKRUPTCY* to zero. We also examine only bankruptcies that occur in a bankruptcy wave (total of 344). We define a bankruptcy wave as any 12-month moving window for an industry where the number of bankruptcies in the industry for the moving window is greater than the average number of bankruptcies of all 12-month windows of the sample. Panel D of Table 1 summarizes the bankruptcy

[11]There are only nine denied cases (less than 0.06% of the entire CTOs), and these denied cases do not have information on exhibits associated with the redaction request or redaction expiration date. So, we do not include these cases, and our results are robust to including these denied cases where applicable.

[12] Chapter 15 is the U.S. Bankruptcy Code chapter that covers bankruptcies filed outside the United States by foreign debtors or other related parties.

distribution by sector. The two manufacturing sectors have the largest number followed by firms in the mining and construction and services sectors.

4.2 Descriptive statistics

Table 2 summarizes the sample. The mean and median of *LN(1+CTO_NUMBERS)* are 0.121 and 0.000, respectively. Of the 20,221 firm-year observations over 2009–2017, 13.8 percent have at least one new redaction (*CTO_DUMMY*). The remaining firm-year observations (86.2%) do not appear to have strong concerns for proprietary disclosure costs as indicated by the absence of a redaction and thus, serve as a benchmark. By contrast, the mean and median of *LN(1+GUIDANCE)* are higher at 1.862 and 2.197, respectively. Firms in our sample issue management guidance forecasts more than they use redactions. Of the 20,221 firm-year observations over the same sample period, 79.5 percent have at least one guidance forecast in a year (untabulated). Our sample, therefore, is well linked to the capital markets through voluntary non-proprietary disclosure. For the sample period, each firm-year experiences 0.354 bankruptcies (exp (0.303)-1) on average. For *R&D_INTENSITY*, the mean is 0.315, or approximately one-third of the sample comprises high R&D-intensity firms. The average firm total assets are $660 million (exp(6.492)), and the average firm age is 15 years (exp(2.710)). While the average firm is profitable (mean *ROA* = 7.2%), 33.5 percent of the sample at some point has reported a negative net income (*LOSS*). In addition, the average firm uses limited debt (mean debt to total assets = 21.6%) (*LEV*), and its sales grow on average at 11.5 percent (*SALES_GROWTH*). Appendix A defines the variables.

We also compare these summary statistics to those for the S&P 500 – a common reference group comprising over 80 percent of listed-firm market capitalization. As expected, an untabulated analysis indicates that the non-S&P 500 firms in our sample are smaller, more prone to reporting a loss, more concerned about information spillover, likelier to restrict disclosures in SEC filings using a CTO, and less likely to provide management guidance. Our sampling emphasis to include non-S&P 500 firms is intentional. As an empirical strategy, our tests may have more power to identify the relations when a significant portion of the sample comprises firms whose operations and investments are subject to potentially higher proprietary disclosure costs.

Table 3 reports the correlations among the variables. As expected, they mostly have a sign consistent with our predictions on a univariate basis. For example, *LN(1+CTO NUMBERS)* is positively correlated with industry bankruptcy events, competition, R&D intensity, spillover, and secrecy. In the regression analysis, we naturally consider these correlations in estimating the marginal effect of each variable or interaction term to explain the level of proprietary redaction based on CTOs.

5 Results

5.1 *Effect of firm bankruptcy*

To test whether firm bankruptcy associates with the redaction of information in the SEC filings, we regress firm-year observations of the level of peer firm redaction on *R&D_INTENSITY, FIRM_BANKRUPTCY*, the interaction between the two, controls, and fixed effects. Our model is:

$$LN(1+CTO\_NUMBERS) = \alpha + \beta_1 R\&D\_INTENSITY + \beta_2 FIRM\_BANKRUPTCY + \beta_3 R\&D\_INTENSITY \times FIRM\_BANKRUPTCY + \Sigma_k \beta_k CONTROLS + FIXED\_EFFECTS + \varepsilon. \quad (1a)$$

$$LN(1+CTO\_NUMBERS) = \alpha + \beta_1 R\&D\_INTENSITY + \beta_2 BANKRUPTCY\_WAVE + \beta_3 R\&D\_INTENSITY \times BANKRUPTCY\_WAVE + \Sigma_k \beta_k CONTROLS + FIXED\_EFFECTS + \varepsilon. \quad (1b)$$

Eq. (1a) and Eq. (1b) use a firm-specific bankruptcy event and an industry-wide bankruptcy wave, respectively. *FIRM_BANKRUPTCY* denotes the log of one plus the number of bankruptcies in each 4-digit SIC code industry in a given year (Eq. (1a)). *BANKRUPTCY_WAVE* denotes the log of one plus the number of bankruptcies identified as part of bankruptcy waves in each 4-digit SIC code industry in a given year (Eq. (1b)). *LN(1+CTO_NUMBERS)* is the log of one plus the number of new CTOs (excluding denied CTOs and extensions of the previously granted CTOs) in a given year based on the file dates of filings associated with the CTO redactions.[13]

The first and last three columns of Table 4 present the results of firm-specific bankruptcy and industry-wide bankruptcy wave, respectively. In all six columns of the table, we find the predicted result of a significantly positive coefficient for the relation between peer-firm CTO redaction and the interaction between *R&D_INTENSITY* and *FIRM_BANKRUPTCY*. The β_3 coefficients are all significantly positive ($p<0.01$). Consistent with H1, these coefficients indicate that firm bankruptcy and a bankruptcy wave strengthen the relation between *R&D_INTENSITY* and the number of redactions for peer firms in the same industry. These

[13] Since *LN(1+CTO_NUMBERS)* naturally shifts the value of *CTO_NUMBERS* to address the value of zero, we employ an inverse hyperbolic sine transformation as an alternative transformation of *CTO_NUMBERS*, which is defined for zero values without shifting. Our main results in Table 4 hold with this alternative econometric transform of *CTO_ NUMBERS*, indicating that our results are robust to variations in econometric methods.

results are consistent with a bankruptcy or an industry-wide bankruptcy wave inducing R&D-intensive peer firms in the same industry to withhold proprietary information from rivals and potential future competitors. Because financial distress can have adverse impacts on future sales and profits, this incentivizes R&D-intensive peer-firm managers to increase redaction, consistent with a decrease in proprietary disclosure to protect sales and profits from the costs of knowledge spillover. These results support H1, namely, that after bankruptcy high R&D-intensive peer firms are more prone to redaction than low R&D-intensive peer firms.

5.2 *Effect of industry financial distress*

We test whether firm financial distress also affects R&D-intensive peer firms' redaction of information in their SEC filings in a given industry. Given that bankruptcy is an infrequent event, this test helps us understand whether we can generalize our bankruptcy results to financial distress. We estimate financial distress using the firm default probabilities from the KMV-Merton distance-to-default model. This model is based on the (Merton 1974)'s bond pricing model (Bharath et al. 2008; Correia et al. 2012). We create a dummy variable, *INDUSTRY_EDF*, which is one if the average expected default frequency (*EDF*) of a four-digit SIC code industry in a given year is greater than the sample median and zero otherwise. We regress a firm's redaction on *R&D_INTENSITY, INDUSTRY_EDF,* their interaction, controls, and fixed effects. Our model is:

$$LN(1+CTO\_NUMBERS) = \alpha + \beta_1 R\&D\_INTENSITY + \beta_2 INDUSTRY\_EDF + \beta_3 R\&D\_INTENSITY \times INDUSTRY\_EDF + \Sigma_k \beta_k CONTROLS + FIXED\_EFFECTS + \varepsilon. \quad (2)$$

The control variables and fixed effects are the same as Eq. (1a) and Eq. (1b). Our key interest is the sign and significance of the β_3 coefficient for the interaction of *R&D_INTENSITY* × *INDUSTRY_EDF*. A positive coefficient indicates that overall industry financial distress causes R&D-intensive firms to redact their proprietary information from SEC filings. Col. 2 of Table 5 indicates that the β_3 coefficient is positive and significant ($p<0.05$) for the sample as a whole (col. 1) and firms in high-competition industries (col. 2). This is consistent with peer firms hiding and protecting their proprietary information in response to industry financial distress. Hence, our results in Table 4 also generalize to events of financial distress.

5.3 *Underlying mechanism: The channel of financial contagion*

We next test the ability of the three theoretical scenarios to explain proprietary disclosure. The first is the channel of financial contagion. Financial contagion can heighten predatory risk, thus inducing R&D-intensive

peers to protect their competitive advantage and weather out the financial contagion by hiding their material contract details. In addition to the results in Table 4, we test for financial contagion by splitting the sample into firms with and without negative abnormal cumulative stock returns over days -5 to 5 (CAR (-5,+5)) around the event of a firm bankruptcy in the prior year. We then estimate Eq. (1a) for each group. The results in Panel A of Table 6 indicate that the β_3 interaction coefficient for *R&D_INTENSITY* × *FIRM_BANKRUPTCY* is significantly positive (p<0.01) only for the group with negative cumulative abnormal stock returns around firm bankruptcy.[14] A Wald test of the difference in the interaction coefficient for industries with negative and non-negative industry stock reactions around firm bankruptcies (*DIFF* (a) - (b)) indicates that the coefficient difference is significant (p<0.01). Thus, the positive effect of firm bankruptcy on peer-firm redaction relates only to peer firms experiencing financial contagion, that is, those in a four-digit SIC industry that has median negative stock returns around the bankruptcies in the prior year. These results suggest that our evidence of a positive relation between CTO redaction and R&D intensity for peer firms is induced by the contagion of financial distress from firm bankruptcy, consistent with industry financial contagion. This evidence, thus, also supports H1 (the first scenario).[15]

5.4 Underlying mechanism: The channel of product-market competition

We next examine whether differences in product-market competition explain the effect of firm bankruptcy on peer-firm redaction. We test whether the β_3 interaction coefficients for *R&D_INTENSITY* × *FIRM_BANKRUPTCY* in Table 4 differ for firms in high- versus low-competition industries. Panel B of Table 6 presents the results. Col. 1 indicates that firm bankruptcy has the effect of strengthening the relationship between *R&D_INTENSITY* and redaction for peer firms in high-competition industries. The β_3 interaction coefficient in col. 1 is significantly positive (p<0.01). By contrast, the β_3 interaction coefficient in col. 2 for peer

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[14] We compute the median of the cumulative abnormal stock return over days -5 to 5 of the peer firms in each 4-digit SIC code industry around a firm bankruptcy. If the industry median is less than zero (zero or greater than zero), we assign a negative (positive) contagion effect to that industry. We exclude firm years with no firm bankruptcy in the prior year. CARs that fall in a week window before and after earnings announcements are also excluded in the industry median CAR calculation. Results are robust to including CARs that fall in a week window before and after earnings announcements and using CAR (-2,+2).

[15] Unlike Chapter 7 filings, the bankrupt firm operates under court protection under a Chapter 11 filing. This suggests that the impact of firm bankruptcy on the remaining firms' proprietary redaction could be weaker for Chapter 11 bankruptcy than Chapter 7 bankruptcy, assuming that a Chapter 11 firm can still compete in the industry. We test this prediction but find in untabulated results that the difference in peer firm redactions between the two different kinds of bankruptcy is not significant.

firms in low competition industries is not statistically different from zero. In addition, a Wald test of the difference in the interaction coefficients for high- and low-competition industries (*DIFF* (a) - (b)), indicates that the coefficient difference is positive and significant ($p<0.05$). Thus, we find that a low level of competition moderates the impact of firm bankruptcy on the relation between R&D intensity and redaction in the SEC filings of peer firms. This result supports H2 (the second scenario).

We also estimate the Eq. (1) regressions separately for each year. Figure 1a shows that the β_3 interaction coefficients are positive for high-competition industries for all years except for 2014. Figure 1b shows the 90 percent confidence bands for the interaction coefficients. Six out of nine β_3 coefficients are significantly positive for peer firms in high-competition industries. These results also support the theory of Verrecchia (1990) – that additional disclosure reduces the advantage for a firm to have in a competitive market – and the evidence in Verrecchia and Weber (2006) indicating that redaction use is higher for R&D-active peer firms in competitive industries.[16]

5.5 *Underlying mechanism: The channel of external financing constraints*

We next examine whether the positive coefficients for *R&D_INTENSITY* × *FIRM_BANKRUPTCY* in Table 4 differ for firms with high versus low ex-ante financing constraints. A positive interaction may not occur for firms with ex-ante financing constraints since these firms may strive to mitigate external financial frictions through disclosure of their material contract details. To test this channel, we split our sample firms into firms with low versus high financing constraints one year before firm bankruptcy. We use four proxies for financing constraints: firm size, KZ score (Kaplan and Zingales 1997), the WW index (Whited and Wu 2006), and the SA index (Hadlock and Pierce 2010). Financially constrained firms are characterized as having a higher KZ score, SA index, or WW index and smaller size.

Firm size is small (large) if the firm's total asset is smaller (larger) than the median of all firms in a given year. KZ-Score is calculated as (-1.001909 x Cash Flow/$PP\&E_{t-1}$ + 0.2826389 x Q + 3.139193 x Debt/Total

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[16] An alternative theoretical view – that more competition encourages less redaction (and more disclosure) (e.g., Darrough and Stoughton 1990) – also prevails in the literature. This view, though, is more applicable to new entrants that may wish to gain a toehold in an industry or to existing competitors that may wish to disclose bad news strategically to ward off new entrants. However, this is not the setting of the current research. While new firms may enter our sample during 2009–2017, our context mostly involves the disclosure behavior of a set of R&D-active peer firms with operations common to much of the nine-year study period. The firm age for our sample ranges from nine years (Q1) to 27 years (Q3) (Table 2).

Capital -39.3678 x Dividends/PP&E_{t-1} -1.314759 x Cash/PP&E_{t-1}), where Cash Flows = (Income Before Extraordinary $Items_t$ + Total Depreciation and $Amortization_t$); Q = (Market Capitalizationt + Total Shareholder's $Equity_t$ - Book Value of Common $Equity_t$ - Deferred Tax $Assets_t$)/Total Shareholder's $Equity_t$; Debt = Total Long Term $Debt_t$ + Notes $Payable_t$ + Current Portion of Long Term $Debt_t$; Dividends = Total Cash Dividends $Paid_t$ (common and preferred); and Cash = Cash and Short-Term $Investments_t$). The SA index is a combination of asset size and firm age and is calculated as (-0.737* Assets + 0.043*$Assets^2$ - 0.040 x Age), where Assets is the natural log of inflation-adjusted book assets and is capped at (the natural log of) $4.5 billion, and Age is the number of years a firm is listed with a non-missing stock price on Compustat and is capped at 37 years. WW-Index is calculated as (- cash flow to total assets - sales growth + long-term debt to total assets - log of total assets - dividend policy indicator + the firm's three-digit SIC industry sales growth).

Panel C of Table 6 presents the results for the four partitions. While the β_3 interaction coefficients are significantly positive ($p<0.01$) for smaller firms (col. 1) and for firms with a low *KZ-score* (col. 3), *VW-Index* (col. 5), or *SA-Index* (col. 7), the Wald tests of the difference in the interaction coefficients for high- versus low-financing constraints (*DIFF* (a) – (b)) are insignificant for three of the four proxies. Thus, we find evidence that firm bankruptcy does *not* decrease R&D-intensive peer firms' proprietary disclosure (i.e., prompt a significantly higher level of redaction) when they are more versus less financially constrained.[17]

5.6 Types of content redacted

We sharpen identification by distinguishing between two types of redaction, that is, those more directly related to trade secrecy and material contract information and those less related to them. For each redaction, we link the original SEC filing that contains the redaction exhibit and extract the title and the description of the exhibit. Based on the characteristics of the extracted titles and descriptions of the exhibits, we categorize the redaction into two types. We broadly follow Boone et al. (2016) to classify the type of information contained in each redacted exhibit into those associated with (i) exhibits that are likelier to contain proprietary information related to trade secrecy, covering topics on research, consulting, licensing, royalty, customer-supplier, and peer relations, and (ii) exhibits that are less likely to contain proprietary information and trade secrets, covering topics

[17] We also test whether R&D-intensive firms increase their use of non-proprietary disclosure as a way of gaining access to external capital (Section 5.7).

on employment, financing, leasing, restructuring, ownership, and shareholder. If an R&D-intensive peer firm's redaction is driven by high proprietary disclosure costs and trade secrecy concerns, the effect of firm bankruptcy should be stronger when the redacted information relates more to proprietary information and trade secrecy.

To test this prediction, we regress the two separate peer-firm proprietary disclosure variables on firm bankruptcy and peer R&D-intensity, their interaction, controls, and fixed effects. Our model is:

$$LN(1+CTO\_HP\_NUMBERS) \text{ or } LN(1+CTO\_LP\_NUMBERS) = \alpha + \beta_1 R\&D\_INTENSITY + \beta_2 FIRM\_BANKRUPTCY + \beta_3 R\&D\_INTENSITY \times FIRM\_BANKRUPTCY + \Sigma_k \beta_k CONTROLS + FIXED\ EFFECTS + \varepsilon. \quad (3)$$

The first dependent variable, *LN(1+CTO_HP_NUMBERS)*, is the log of one plus the number of redactions associated with exhibits that are likelier to contain material contract proprietary information and trade secrets. The second dependent variable, *LN(1+CTO_LP_NUMBERS)*, is the log of one plus the number of redactions associated with exhibits that are less likely to contain material contract proprietary information and trade secrets. Our main interest is the β_3 coefficient for *R&D_INTENSITY × FIRM_BANKRUPTCY*. If proprietary disclosure costs related to material contracts and trade secrets drive R&D-intensive peers to redact more information in the event of firm bankruptcy, the β_3 coefficient should be more positive when the dependent variable is *LN(1+CTO_HP_NUMBERS)* versus *LN(1+CTO_ LP_ NUMBERS)*.

Table 7 presents the results of Eq. (3). The β_3 coefficient for the interaction term is significant and positive ($p<0.01$) when the dependent variable is *LN(1+CTO_HP_NUMBERS)* in col. 1. Yet, it is insignificant when the dependent variable is *LN(1+CTO_LP_NUMBERS)* in col. 4. These results support the view that high proprietary disclosure costs are the main driver that induces R&D-intensive peers to redact in response to the contagion of firm bankruptcy. We also examine the effect of industry competition on the above results. As indicated in cols. 2 and 3 of Table 7, the positive and significant β_3 coefficient for *LN(1+CTO_HP_NUMBERS)* is largely driven by peer firms in competitive industries (col. 2) versus concentrated (col. 3) industries. This finding strengthens our identification that the higher proprietary disclosure costs induced by the contagion of firm bankruptcy occur for peer firms in competitive industries.

5.7 Offsetting disclosure

While redaction allows firms to protect their proprietary information from rivals and potential competitors, it can degrade the quality of its informational environment (Boone et al. 2016; Myers and Majluf 1984).

Originating with Leland and Pyle (1977a), others have considered the cost arising from informational frictions when entrepreneurs issue external equity capital. Leland and Pyle (1977a) and Myers and Majluf (1984) illustrate that higher degrees of informational friction can reduce firms' ability to raise external capital and finance their innovative projects. In those situations, firms can be encouraged to offset the cost of frictions with non-proprietary disclosure, which contains less sensitive and more generic financial information. A peer-firm manager's incentive to provide non-proprietary disclosure should strengthen in a setting where economic events such as bankruptcy increase investors' demand for future-oriented management information. We predict that peer firms that reduce disclosure through proprietary redaction in response to firm bankruptcy have incentives to increase non-proprietary voluntary disclosure (see, also, Heinle et al. 2019; Lambert et al. 2011).

To test this prediction, we select a peer firm's decision to issue management guidance to outside parties to proxy for non-proprietary disclosure (Bamber and Cheon 1998). We define management guidance (*GUIDANCE*) as (i) the total number of management guidance that a firm publishes in a year (*LN(1+GUIDANCE)*) and (ii) the number of a particular type of management guidance depending on its specificity: either a specific estimate (*LN(1+SPECIFIC_GUIDANCE)*) or a non-specific open-ended estimate (*LN(1+OPEN-ENDED_GUIDANCE*).[18] Guidance on point and range estimates should be more informative than open-ended guidance. We extract the variables from Thomson Reuters I/B/E/S guidance database. Our model is:

$$GUIDANCE = \alpha + \beta_1 R\&D\_INTENSITY + \beta_2 FIRM\_BANKRUPTCY + \beta_3 R\&D\_INTENSITY \times FIRM\_BANKRUPTCY + \Sigma_k \beta_k CONTROLS + FIXED\_EFFECTS + \varepsilon. \quad (4)$$

In addition to the controls in the previous models, we control for whether a firm is followed by at least one analyst in the same database. We expect a positive β_3 coefficient in Eq. (4) for peer firms in industries with high competition. Table 8 shows the results. The β_3 coefficient is significantly positive in col. 1 ($p<0.10$) and insignificant in col. 2. The difference in the β_3 coefficients between high and low competition groups is also positive and significant ($p<0.10$). Thus, we find results consistent with the view that peer firms increase their non-proprietary disclosure in response to an increase in proprietary redaction mainly in a high-competition industry setting. Untabulated results also show this difference is strongest for *LN(1+OPEN-ENDED_*

[18] Appendix A states the definitions of the guidance variables.

GUIDANCE. These results support H4. They are consistent with R&D-intensive peers balancing their needs to protect proprietary information with their needs to enhance capital market benefits by increasing transparency and reducing information asymmetry.

5.8 *Access to external capital*

A firm's redaction can increase information asymmetry between its manager and external capital providers, thus limiting its access to external capital. Additional non-proprietary disclosure, though, may offset this increase in information asymmetry. We examine this prediction by focusing on peer firms' external capital raising around bankruptcy. Specifically, we estimate the following model that relates the amount of positive equity or debt financing to *LN(1+CTO_NUMBERS)*, *LN(1+GUIDANCE)*, and the interaction between these two variables for peer firms that have at least one intra-industry firm bankruptcy in the prior year:

$$EXTERNAL\_FINANCING_{it} = \beta_0 + \beta_1 LN(1+CTO\_NUMBERS) + \beta_2 LN(1+GUIDANCE) + \beta_3 LN(1+CTO\_NUMBERS) \times LN(1+GUIDANCE) + \Sigma_k\beta_k\, CONTROLS + FIXED\ EFFECTS + \varepsilon \quad (5)$$

EXTERNAL_FINANCING is the net amount of positive equity or debt issuance from two years before and after bankruptcy scaled by the last pre-issue total assets. Following Bradshaw et al. (2006), we measure equity issuance as the net cash received from the net issuance (net of purchases) of common and preferred stock less cash dividends paid and debt issuance as net cash received from the issuance (net of purchases) of debt. Our control variables follow those in Hovakimian (2004). If the increase in peers' non-proprietary disclosure mitigates a potential adverse impact of their redaction upon the access to external capital, we expect $\beta_3 > 0$. Table 9 shows that the interaction coefficient β_3 is significant and positive ($p<0.05$) for the sample as a whole.[19] This indicates that peer firms' external equity and debt capital issued around firm bankruptcy associate with both higher levels of redaction and non-proprietary disclosure using management guidance.

5.9 *The nature and consequence of redactions*

A challenge to our main finding is that peer firms may redact more in response to firm bankruptcy to conceal bad news from stakeholders rather than suppress proprietary information (e.g., Bao et al. 2021; Hui et al. 2019). Redactions, however, are subject to SEC approval. The SEC staff tends to reject or request to modify

[19] Different from Panel C of Table 6, which shows that peer firms with financing constraints do not increase their level of redaction in response to firm bankruptcy, Table 9 documents that guidance increases and redaction increases as an interaction effect for R&D-intensive firms in general.

the redaction requests that attempt to hide unwarranted information for not meeting the criteria for redaction of immateriality or competitive harm (Hui et al. 2019). Panel A of Table 10 tests this idea. First, we calculate the ratio of redactions modified later to have fewer redactions after the SEC review in a given year (*CTO MODIFICATION RATE*). To support the idea of information concealment, we should observe a greater modification rate for peer firms affected by firm bankruptcy. Panel A of Table 10 indicates that firm bankruptcy does not significantly increase R&D-intensive peers' modification rate (or a binary indicator for peer firms with at least one redaction modification in a year). Rather, the coefficients for *R&D_INTENSITY* × *FIRM_BANKRUPTCY* in cols. 1 and 2 are negative and significant ($p<0.10$).[20]

Second, having established that R&D-intensive peer firms increase proprietary redaction after firm bankruptcy, we now investigate whether and how the bankruptcy alters the level and quality of innovation and the level of financial distress risk in the next three years. We measure the productivity of innovation using research quotient (*RQ*) from WRDS and the number of patents (*Patent*) from Kogan et al. (2017). To test H5, we regress innovation output (*RQ* or *Patent*) over the next three years after bankruptcy (the redaction year and the two subsequent years)[21] on the number of redactions and control variables:

$$RQ_{t+3} \text{ or } Patent_{t+3} = \beta_0 + \beta_1 LN(1+CTO\ NUMBER) + \Sigma_\kappa \phi_\kappa FirmChar_\kappa + \varepsilon. \quad (6)$$

The variable of interest is *LN(1+CTO NUMBER)*. Results supportive of redactions withholding favorable proprietary information would indicate that $\beta_1 > 0$, implying that when peer firms remain silent (i.e., redact proprietary information from material contracts), they enjoy higher future productivity of their investments in innovation. By contrast, results supportive of redactions hiding unfavorable information through the pretext of redaction would indicate that $\beta_1 < 0$. Panel B of Table 10 summarizes the results of Eq. (6). Cols.1 and 2 both indicate that peer firms with redactions have a greater likelihood of exhibiting superior innovation productivity in the future. The coefficient estimates for *LN(1+CTO NUMBER)* are positive and significant for both RQ_{t+3} and $PATENT_{t+3}$ (at most $p<0.05$). Taken together, Panels A and B suggest that R&D-active peer firm redactions reflect mainly positive information. These results support H5. This evidence rules out the alternative hypothesis that peer firms redact more in response to firm bankruptcy to conceal bad news.

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[20] To be included in the sample, there should be at least one CTO in a given firm-year.
[21] In conducting this test, we require that another industry bankruptcy does not occur within the three-years, as such might further affect the disclosure strategy of the peers in an industry.

5.10 Peer firms' future financial distress risk

We also test whether peer firms' redaction in the SEC filings in response to intra-industry firm bankruptcy associates with their likelihood of surviving beyond what other considerations such as organizational innovation and efficiency would indicate. Neoclassical economic theory indicates that the survival and growth of a firm should be completely driven by its innovation characteristics (Hall, 2002). However, even the most innovative firm faces predation risk, potentially eroding its monopoly rent from innovation and jeopardizing its survival in the product market. If redactions suppress good news, industry peers with proprietary redaction should also better survive the financial contagion of firm bankruptcy. To test this prediction, we focus on industry peers that experience firm bankruptcy and then observe whether their redaction alters financial distress risk in the next three years. That is, we regress peer firms' financial distress risk in the next five years following firm bankruptcy on an indicator of the use of redactions, controls, and fixed effects. Our model is:

$$FINANCIAL\_DISTRESS_{t+3} = \alpha + \beta_1 LN(1+CTO\_NUMBER) + \Sigma_k \beta_k CONTROLS + FIXED\_EFFECTS + \varepsilon. \quad (7)$$

FINANCIAL_DISTRESS is the average of expected default frequency during the year of the redaction and the two subsequent years (denoted as EDF_{t+3}). In Eq. (7), our main interest is the sign and significance of the coefficient for *LN*(1+*CTO_NUMBER)*. A positive coefficient of β_1 would indicate that peer firms' proprietary redaction leads to lower financial distress risk in the future. Panel C of Table 10 presents the results of estimating Eq. (7). The coefficient for *LN(1+CTO_NUMBER)* is negative and significant ($p<0.10$). This result suggests that the most secretive are likelier to survive industry-wide financial contagion and distress.

5.11 Alternative measures of redaction

To address a concern that our redaction proxy (the log of one plus the number of new CTOs in a given year based on the file dates of SEC filings associated with the CTO redactions) is potentially subject to measurement errors and bias, we use additional proxies for firm redaction, including *CTO_DUMMY*, *LN(1+CTO_EXHIBIT_NUMBERS)*, and *LN(1+CTO LENGTH)*. *CTO_DUMMY* denotes an indicator variable that is one if a firm has at least one new redaction in a year based on the file dates of SEC filings and zero otherwise. *LN(1+CTO_EXHIBIT_NUMBERS)* denotes the log of one plus the number of exhibits in the filings associated with new redactions in a given year based on the file dates of SEC filings.

LN(1+CTO_LENGTH) denotes the log of one plus the average redaction period of new redactions in days in a given year based on the file dates of SEC filings.

Panels A and B of Table A1 present the results of firm-specific bankruptcy and industry-wide bankruptcy wave, respectively. In all three columns of Panel A, we find the predicted result of a significantly positive coefficient for the relation between peer-firm redaction and the interaction between *R&D_INTENSITY* and *FIRM_BANKRUPTCY*. The coefficients are all significantly positive (at most $p<0.05$). Similarly, Panel B shows that the relation between peer-firm redaction and the interaction between *R&D_INTENSITY* and *BANKRUPTCY_WAVE* is also significant and positive (at most $p<0.05$) in all three columns. Overall, our results are robust to alternative proxies for firm redaction.

5.12 Alternative proxies for high proprietary disclosure costs

Our proxy for firms with high proprietary disclosure costs based on R&D expenditure has two shortcomings. R&D expenditure reflects managerial discretion (Kothari et al. 2015), and many firms show missing values for R&D expenditure possibly combining it with other items (Koh and Reeb 2015).[22] To address these shortcomings, we employ three alternative proxies for variation in proprietary disclosure costs. The first is *SECRECY,* representing the extent to which a firm in a given industry relies on secrecy to generate its profits. We define *SECRECY* as an indicator variable equal to one if the firm's industry-level secrecy, based on Erkens (2011) secrecy measure, is above the median and zero otherwise. Erkins (2011) develops an industry-level proxy for firms' dependence on secrecy to yield profits from R&D expenditure. Specifically, we utilize industry-level survey results documented by Cohen et al. (2000) and construct the secrecy proxy. Cohen et al. (2000) extract their data from the 1994 Carnegie Mellon Survey on Industrial R&D (CMS). The CMS survey covers only R&D managers at manufacturing firms and asks respondents to report the percentage of their product and process innovations for which the following methods are successfully protected: Secrecy, Lead time, Complementary Manufacturing, Complementary Sales/Services, Patents and Other Legal. We use these mean industry-level scores to construct our proxy for how much industries are dependent upon secrecy to profit from R&D.

The second proxy is the extent of firm technological information spillover to other industry peers. Bloom et al. (2013) posit that the distribution of a firm's patents across technology fields distinguishes its position in

[22] We set those missing values to zero, as in our previous analyses.

the technology market. They measure technology spillover as the patent-weighted average of peer firms with R&D, which quantifies the pool of outside knowledge available to the firm of technologically similar R&D. Following Bloom et al. (2013) and using their measure of technology proximity measure available from Bloom's website, we create a variable of technology based on the Fama and French (1997) industry classifications and categorize firms in our sample into low versus high technological spillover groups depending on their industry classification. Accordingly, we define *SPILLOVER* as an indicator variable equal to one if the firm's industry-level technology spillover is above the median in a given year and zero otherwise. This variable is limited to firms in the manufacturing sector and thus the sample size for the analysis using *SPILLOVER* is smaller.

The third proxy is the importance of trade secrets at the industry level. The Census Business Enterprise Research and Development Survey (BERD) covers firms that performed or funded R&D and asks respondents to report whether trade secrets are very important to their firm. Although the survey is conducted almost every year, the survey question regarding trade secrets is limited to more recent years including 2014, 2015, and 2018. We use the 2014 and 2015 data to calculate the average percentage of firms in each NAICS-code industry that reported that trade secrets are very important (*SECRET_IMPORTANCE*). *SECRET_IMPORTANCE* is an industry-specific variable that ranges between 0 and 1.

When *SECRECY, SPILLOVER,* and *SECRET_IMPORTANCE* are high (or equal to one), we should observe more proprietary redaction in peer firms' SEC filings. Moreover, this relation should be stronger when industry competition is high, that is, proprietary redaction should increase in the level of industry competition (Verrecchia 1990; Verrecchia and Weber 2006). Table A2 presents the results from testing this prediction. Col. 1 of all three panels shows that the coefficients for the interaction term between *FIRM_BANKRUPTCY* and one of the three proprietary-cost measures are positive and significant (at most $p<0.05$). Additionally, we test the effect of industry competition by dividing the sample into high and low competition groups. The relations between one of the proprietary-cost measures and redaction are more positive when industry competition is high (col. 2). Those relations are not significant when industry competition is low (col. 3).

5.13 Bankrupt firm location

The effect of firm bankruptcy on peer-firm proprietary disclosure may be further influenced by bankrupt firm location relative to the peer firms. To use the shopping-mall analogy (Benmelech et al. 2018), stores in the mall close to the bankrupt anchor store will lose traffic whereas those farther away may be better off and gain market share. For the geographic proximity to a bankrupt firm, we count the number of bankruptcies in the state of operations of the remaining firms in the industry. We then define *BANKRUPT_FIRM_ LOCATION* as the natural logarithm of one plus the weighted average number of bankruptcies in a given firm's four-digit SIC code industry in a given year in the states where the firm operates. The applied weight represents the importance of each state in the geographic dispersion measure of García and Norli (2012) at the beginning of our sample period. Table A3 tests whether peer firms with operations closer to the bankrupt firm increase their level of proprietary redaction. The results corroborate this prediction for the sample as a whole (col. 1) ($p<0.01$) and for peer firms in high-competition industries (col. 2) ($p<0.01$). The difference in the coefficients for the two levels of competition (*DIFF* (a) - (b)) is also significant ($p<0.10$). Thus, peer-firm proprietary disclosure relates to bankrupt firm location for firms in competitive industries.

5.14 Industry shocks

A potential concern is that the observed increase in R&D-intensive peer firm redaction may be endogenously driven by shifts to a firm's business environment rather than firm bankruptcy (Guay et al. 2015; Leary and Roberts 2014). We alleviate this in two ways: (i) we control for industry-specific shocks related to firm business environments and (ii) we orthogonalize industry financial contagion onto industry idiosyncratic characteristics. Following Guay et al. (2015), we construct indicators for seven industry-year level shocks related to industry investments, growth opportunities, and product markets as defined in Guay et al. (2015). These industry-shock proxies capture shifts to the business environments including investments and growth opportunities (industry assets, research and development, capital expenditure, and market-to-book assets) and product markets (industry sales, profitability, and loss).[23] As shown in cols. 1 and 2 of Table A4, our results are robust to controlling for all these industry shocks. We then take the residuals from a regression of *FIRM_BANKRUPTCY* on the seven industry shocks and include the orthogonalized version of *FIRM_BANKRUPTCY* in lieu of *FIRM_BANKRUPTCY* in our main regression model (Eq. (1a)). We find in col. 3 of Table A4 that our results hold after purging out those

[23] Guay et al. (2015) construct these proxies for industry shocks based on key corporate practices examined in the Bertrand and Schoar (2003) analysis of CEO "styles," and the management literature on organizational shifts (e.g., Wiersema and Bantel 1993).

industry shock measures. Overall, these results indicate that it is industry financial contagion following firm bankruptcy that drives our findings rather than other industry characteristics.

6 Conclusion

Firm-level events have significant impacts that generate externalities for the other (peer) firms in an industry. The literature thus far has considered impacts on capital structure, credit spreads, employment, lending choices, merger decisions, sentiment, and stock price. If we are to understand more fully how firm-level events affect peer-firm economic activity, this requires that we consider how peer firms learn and respond to these events through information disclosure. In this study, we select the event of firm bankruptcy. We also consider financial distress as a precursor to firm bankruptcy. We then narrow the focus and examine how the disclosures of R&D-intensive peers in the same industry, potentially facing high proprietary disclosure costs for trade secrecy-related information, respond to the financial contagion of firm bankruptcy or financial distress. To mitigate high proprietary disclosure costs, R&D-intensive peer firms may seek relief from the regulator to redact portions of their regulatory filings. We examine whether those redactions change in response to the external shock of industry bankruptcy or an indication of industry financial distress.

We design tests around three channels through which firm bankruptcy or financial distress potentially affects the proprietary disclosure strategy of the peer firms in an industry. These are the channels of industry financial contagion, product-market competition, and external financing constraints. Our tests corroborate the predictions associated with these channels. Proprietary redaction by the peer firms in an industry also varies positively with R&D intensity and occurs more often for peer firms in competitive industries. Industry peers that redact also reflect a higher level and quality of innovation and reduced financial distress risk in the next three years. Thus, while the fittest and most secretive are better innovators in the long term, those that redact material contract information also appear to survive better an industry-related financial contagion after firm bankruptcy. To our knowledge, these findings are the first to show that the contagion of firm bankruptcy or industry financial distress significantly shapes the strategy of the remaining peer firms in an industry to disclose proprietary information in SEC filings.

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Appendix A: Variable Definitions*

BANKRUPT_FIRM_LOCATION	The log one plus the weighted average number of bankruptcies in each 4-digit SIC code industry in a given year in the states where the firm operates (the weight represents the importance of each state based on the geographic dispersion measure (García and Norli 2012) at the beginning of our sample period).
BANKRUPTCY_WAVE	The log of one plus the number of bankruptcies identified as part of bankruptcy waves in each 4-digit SIC code industry in a given year. The bankruptcy waves are any 12-month moving windows for each industry where the numbers of bankruptcies in the industry for the moving windows are greater than the average number of bankruptcies of all 12-month windows of the sample.
BTM	The ratio of the book value of the equity to the market value of the equity in a given year based on the fiscal year end market value of equity.
CTO_DUMMY	An indicator variable that is one if the firm has at least one new CTO based on form filing dates associated with CTO redaction and zero otherwise
CTO MODIFICATION INDICATOR	An indicator variable that is one if the firm has at least one CTR later modified to have fewer redactions after the SEC staff review in a given year and zero otherwise.
CTO MODIFICATION RATE	The ratio of CTRs later modified to have fewer redactions after the SEC staff review in a given year.
DEBT	An indicator variable that is one if the firm issues new long-term debt in a given year and zero otherwise.
EDF_{t+3}	The average expected default frequency during the year of the redaction and the two subsequent years. A firm's expected default frequencies are from the KMV-Merton distance-to-default model that is based on the Merton (1974)'s bond pricing model (Bharath et al., 2008; Correia et al., 2012)
EPS_DILUTION_DUMMY	An indicator variable that is one if issuing equity dilutes the firm's earnings per share (EPS) more than issuing debt does in a given year.
EXTERNAL_FINANCING	The sum of equity and debt issued, scaled by the last pre-issue total assets. Following Bradshaw et al. (2006), we measure equity issuance as net cash received from the sale (and/or purchase) of common and preferred stock less cash dividends paid, and debt issuance as net cash received from the issuance (and/or reduction) of debt.
FIRM_BANKRUPTCY	The log of one plus the number of bankruptcies in each 4-digit SIC code industry in a given year.
INDUSTRY_COMPETITION	High (low) if a firm is in the highest (lowest) tercile in industry competition using Hoberg and Phillips (2016) Text-based Network Industry Classifications (TNIC) competition measure. TNIC competition is based on firm pairwise similarity scores from a textual analysis of firm 10-K product descriptions in Item 1.
INDUSTRY_EDF	An indicator variable that is one if the average expected default frequency of a four-digit SIC code industry in a given year is greater than the sample median and zero otherwise.
INDUSTRY MEDIAN CAR	The median cumulative abnormal return (CAR) in each 4-digit SIC code industry that is adjusted by Fama-French's three risk factors for five days around a firm bankruptcy date in the prior year. Firm years with no firm bankruptcy in the prior year are excluded. CARs that fall in a week window before and after earnings announcements are also excluded in the industry median CAR calculation.
INTANGIBLE	The ratio of intangibles to total assets in a given year.
LEV	The ratio of long-term debt plus debt in current liabilities to total assets in a given year.
LEV_MEDIAN	The median leverage ratio of firms in the same three-digit SIC code industry in a given year.
LN AGE	The log of one plus the number of years since CRSP listing.
LN(1+CTO_EXHIBIT_NUMBERS)	The log of one plus the number of exhibits in the filings associated with new CTOs in a given year based on form filing dates.
LN(1+CTO_LENGTH)	The log of one plus the average redaction period of new CTOs in days in a given year based on form filing dates associated with CTO redactions.
LN(1+CTO_NUMBERS)	The log of one plus the number of new CTOs (excluding extensions of the previously granted CTOs and CTOs rejecting requests) in a given year based on form filing dates associated with CTO redactions.
LN(1+CTO_HP_NUMBERS)	*LN(1+CTO_NUMBERS)* for CTOs associated with exhibits that are likelier to contain proprietary information and trade secrets covering topics on research, consulting, licensing, royalty, customer-supplier, and peer relations.
LN(1+CTO_LP_NUMBERS)	*LN(1+CTO_NUMBERS)* for CTOs associated with exhibits that are less likely to contain proprietary information and trade secrets covering topics on employment, financing, leasing, restructuring, ownership, and shareholder.
LN(1+GUIDANCE)	The log of one plus the number of management guidance in a given year.
LN_ALL_FILINGS	The log one plus the total number of SEC filings except amendment filings filed by the firm in a given year.
NOLC	The net operating loss carryforwards scaled by total assets in a given year.

LOSS	An indicator variable that is one if the firm reports negative net income in a given year and zero otherwise.
MB_DUMMY	An indicator variable that is one if the market-to-book (MTB) ratio exceeds one in a given year.
MTB	The ratio of total assets - book value of equity + market value of equity to total assets in a given year.
$PATENT_{t+3}$	The average log one plus the number of patents filed by a firm during the year of the redaction and the two subsequent years. The patent count data are from Kogan et al. (2017).
R&D_EXP	The ratio of research and development expenses to sales in a given year.
R&D_INTENSITY	An indicator variable that is one if the firm's R&D expenditures to assets is in the highest tercile and zero otherwise.
RQ_{t+3}	The average Research Quotient (RQ) during the year of the redaction and the two subsequent years. RQ is defined as percentage increase in revenue from a 1% increase in R&D (Knott, 2008.
ROA	The ratio of the EBITDA (earnings before interest, taxes, depreciation, and amortization) in a given year to the one-year lagged total assets.
SALES_GROWTH	The ratio of sales in a given year to one-year lagged sales.
S&A_EXP	The ratio of the selling and administrative expenses to sales in a given year.
SECRECY	An indicator variable that is one if the firm's industry-level secrecy, based on the Erkins (2011) secrecy measure, is above the median and zero otherwise.
SECRET_IMPORTANCE	The percentage of firms in an industry that performed or funded R&D reporting trade secrets as very important to their company from the Census's Business Enterprise Research and Development Survey (BERD).
SEO	An indicator variable that is one if the firm issues equity in a given year and zero otherwise.
SIZE	The log of total assets in a given year.
SPILLOVER	An indicator variable that is one if the firm's industry-level technology spillover, based on Bloom et al. (2013), is above the median in a given year and zero otherwise. Missing years are filled with the most current available value.
SHOCK_AT	The percentage change in industry total assets. Firm-level variables are averaged out to the industry-level variable at each 4-digit SIC code industry and year.
SHOCK_CAPX	The percentage change in industry capital expenditures.
SHOCK_XRD	The percentage change in industry R&D expenditures after setting a missing R&D value as zero.
SHOCK_MB	The percentage change in industry market-to-book, which is the share price at the fiscal year end times the number of shares outstanding divided by the book value of the equity.
SHOCK_SALE	The percentage change in industry sales.
SHOCK_ROA	The percentage change in industry return on assets.
SHOCK_LOSS	The percentage change in the industry average of an indicator that is one if net income is negative and zero otherwise.
SRET	The split- and dividend-adjusted return over the last pre-issue year in a given year.
TANGIBLE_ASSETS_RATIO	The ratio of property, plant, and equipment) to total assets in a given year.

* Includes definitions of variables in the Online Appendix.

Fig. 1. The Coefficient of *R&D_INTENSITY* x *FIRM_BANKRUPTCY* over Time

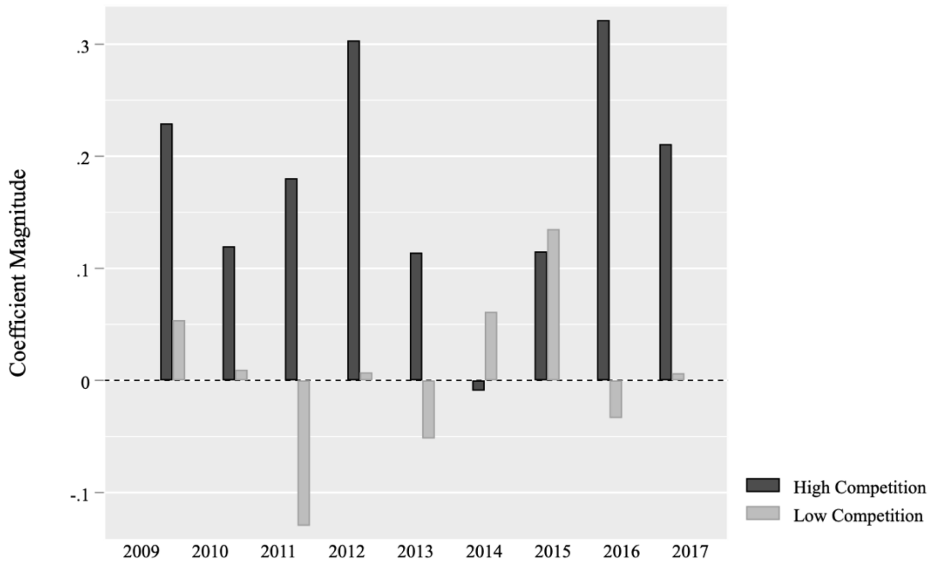

Fig 1a. The level of the interaction coefficient (*R&D_INTENSITY x FIRM_BANKRUPTCY*) from Eq. (1a) over time. All of the high-competition coefficients (the black columns) except year 2014 are positive.

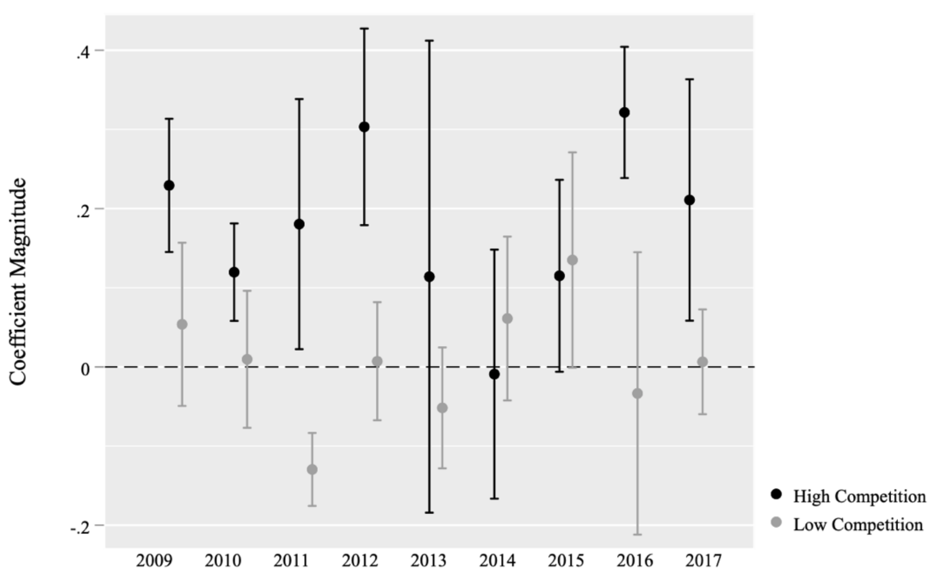

Fig. 1b. Confidence intervals for level of the interaction coefficient (*R&D_INTENSITY x FIRM_BANKRUPTCY*) from Eq. (1a) over time. Six of the nine interaction coefficients are positive $p<0.10$.

Table 1: Sample Distribution

Panel A: Sample distribution by industry

Fama-French 48 Industry (industry number)	Frequency	Percent
Agriculture (1)	74	0.37
Aircraft (24)	157	0.78
Almost Nothing (48)	329	1.63
Apparel (10)	292	1.44
Automobiles and Trucks (23)	370	1.83
Beer & Liquor (4)	101	0.50
Business Services (34)	2,934	14.51
Business Supplies (38)	178	0.88
Candy & Soda (3)	90	0.45
Chemicals (14)	512	2.53
Coal (29)	51	0.25
Communication (32)	676	3.34
Computers (35)	749	3.70
Construction (18)	358	1.77
Construction Materials (17)	412	2.04
Consumer Goods (9)	261	1.29
Defense (26)	56	0.28
Electrical Equipment (36)	351	1.74
Electronic Equipment (22)	1,565	7.74
Entertainment (7)	362	1.79
Fabricated Products (20)	48	0.24
Food Products (2)	413	2.04
Healthcare (11)	485	2.40
Machinery (21)	739	3.65
Measuring and Control Equipment (37)	513	2.54
Medical Equipment (12)	887	4.39
Non-Metallic and Industrial Metal Mining (28)	142	0.70
Personal Services (33)	304	1.50
Petroleum and Natural Gas (30)	1,044	5.16
Pharmaceutical Products (13)	1,912	9.46
Precious Metals (27)	50	0.25
Printing and Publishing (8)	111	0.55
Recreation (6)	94	0.46
Restaurants, Hotels, Motels (43)	464	2.29
Retail (42)	1,233	6.10
Rubber and Plastic Products (15)	87	0.43
Shipbuilding, Railroad Equipment (25)	70	0.35
Shipping Containers (39)	78	0.39
Steel Works Etc. (19)	226	1.12
Textiles (16)	40	0.20
Tobacco Products (5)	29	0.14
Transportation (40)	608	3.01
Wholesale (41)	766	3.79
Total	20,221	100.00

Panel B: Sample distribution by year

Year	Number of sample firms
2009	2,500
2010	2,360
2011	2,268
2012	2,195
2013	2,178
2014	2,162
2015	2,175
2016	2,198
2017	2,185
Total	20,221

Panel C: Bankruptcy distribution by year

	All Bankruptcies				Bankruptcies in Waves Only			
Year	Bankruptcies	Chapter 7	Chapter 11	Chapter 15	Bankruptcies	Chapter 7	Chapter 11	Chapter 15
2008	70	18	52	0	54	15	39	0
2009	134	17	116	1	113	17	95	1
2010	44	9	35	0	38	12	26	0
2011	42	7	34	1	23	5	18	0
2012	37	10	27	0	26	6	20	0
2013	31	6	24	1	13	1	11	1
2014	27	4	22	1	14	1	12	1
2015	34	1	33	0	23	0	23	0
2016	67	6	59	2	40	4	36	0
Total	486	78	402	6	344	61	280	3

Panel D: Bankruptcy distribution by industry sector

1-digit SIC	Description	Bankruptcies	Chapter 7	Chapter 11	Chapter 15
0	Agriculture, Forestry, Fishing	2	0	2	0
1	Mining, Construction	86	3	82	1
2	Manufacturing	101	18	83	0
3	Manufacturing	107	20	85	2
4	Transportation	47	3	43	1
5	Wholesale, Retail Trade	53	11	42	0
7	Services	60	10	50	0
8	Services	12	6	5	1
9	Public Administration	18	7	10	1
Total		486	78	402	6

Panels A and B describe the main sample by industry and year. The main sample consists of 20,221 firm-year observations for the sample period of 2009–2017. Panels C and D summarize the sample of bankruptcies by year, type, and industry sector. The largest number of bankruptcies occurs in 2009 following the global financial crisis. The largest proportions of bankruptcies are for firms in the manufacturing sectors. A peer firm in the main sample in Panels A and B is required to have the same four-digit SIC code in the same year as a firm in the bankruptcy sample in Panels C and D.

Table 2: Descriptive Statistics

Variable	Mean	Q1	Median	Q3	Std Dev.
LN(1+CTO_NUMBERS)	0.121	0.000	0.000	0.000	0.321
CTO_DUMMY	0.138	0.000	0.000	0.000	0.345
LN(1+CTO_EXHIBIT_NUMBERS)	0.153	0.000	0.000	0.000	0.430
LN(1+CTO_LENGTH)	1.011	0.000	0.000	0.000	2.546
LN(1+GUIDANCE)	1.862	0.693	2.197	2.833	1.175
INDUSTRY COMPETITION	0.033	0.017	0.025	0.038	0.033
FIRM_BANKRUPTCY	0.303	0.000	0.000	0.693	0.520
BANKRUPTCY_WAVE R&D_INTENSITY	0.252	0.000	0.000	0.000	0.518
EXTERNAL FINANCING	0.315	0.000	0.000	1.000	0.465
RQ	0.053	0.000	0.000	0.010	0.213
CTO MODIFICATION RATE	0.096	0.076	0.092	0.114	0.046
CTO MODIFICATION INDICATOR	0.021	0.000	0.000	0.000	0.136
PATENT	0.026	0.000	0.000	0.000	0.160
EDF	0.776	0.000	0.000	1.099	1.416
SIZE	0.069	0.000	0.002	0.043	0.151
LN_AGE	6.492	5.068	6.473	7.880	2.056
ROA	2.710	2.197	2.833	3.296	0.789
LEV	0.072	0.043	0.115	0.178	0.228
LOSS	0.216	0.008	0.172	0.339	0.219
DEBT	0.335	0.000	0.000	1.000	0.472
SEO	0.505	0.000	1.000	1.000	0.500
BTM	0.094	0.000	0.000	0.000	0.292
SALES_GROWTH	0.568	0.241	0.441	0.750	0.608
INTANGIBLE	1.115	0.954	1.053	1.172	0.463
LN_ALL_FILINGS	0.194	0.015	0.123	0.320	0.206
SHOCK_AT	4.192	3.871	4.220	4.554	0.570
SHOCK_CAPX	0.083	-0.001	0.067	0.144	0.193
SHOCK_XRD	0.075	-0.089	0.046	0.197	0.331
SHOCK_MB	0.069	-0.037	0.063	0.155	0.325
SHOCK_SALE	0.105	-0.458	-0.047	0.270	2.213
SHOCK_ROA	0.055	-0.041	0.050	0.131	0.186
SHOCK_LOSS	-0.031	-0.239	-0.041	0.152	1.222
SERT	0.070	-0.154	0.000	0.195	0.547
TANGIBLE_ASSETS_RATIO	0.234	-0.148	0.106	0.396	0.988
S&A_EXP	0.234	0.059	0.148	0.336	0.232
R&D_EXP	0.580	0.000	0.133	0.324	18.804
LEV_MEDIAN	2.770	0.000	0.000	0.046	99.934
EPS_DILUTION_DUMMY	0.179	0.104	0.142	0.244	0.104
MB_DUMMY	0.404	0.000	0.000	1.000	0.491
SPILLOVER	0.870	1.000	1.000	1.000	0.336
SECRECY	0.622	0.000	1.000	1.000	0.485
SECRET_IMPORTANCE	0.462	0.000	0.000	1.000	0.499
BANKRUPT_FIRM_LOCATION	0.590	0.505	0.602	0.663	0.112

This table reports the descriptive statistics for selected variables. The sample consists of 20,221 firm-year observations over 2009–2017. Appendix A states the variable definitions.

Table 3: Correlations Among Selected Variables

	LN(1+CTO _NUM)	*LN(1+ GUID)*	*FIRM_ BANKRUPT*	*INDUSTRY_ COMPET*	*R&D_ INTENSITY*	*EXT FINANCING*	*CTO MOD. RATE*	RQ_{t+3}	$PATENT_{t+3}$	EDF_{t+3}	*SPILL*	*SECRECY*	*SECRET_ IMPORT*
LN(1+CTO NUMBERS)	1	-0.088	0.144	0.165	0.214	0.148	0.404	0.072	0.087	0.041	0.099	0.194	0.100
LN(1+GUIDANCE)	-0.093	1	-0.081	-0.132	-0.027	-0.172	-0.023	0.069	0.211	-0.185	0.015***	-0.212	-0.038
FIRM_BANKRUPTCY	0.134	-0.097	1	0.223	0.297	0.145	0.046	0.070	0.063	0.024	0.134	0.216	0.130
INDUSTRY_COMPETITION	0.142	-0.159	0.175	1	0.116	0.122	0.047	0.101	-0.009*	0.051	-0.017***	0.271	0.002*
R&D_INTENSITY	0.209	-0.056	0.245	0.103	1	0.228	0.080	0.059	0.380	-0.067	0.375	-0.088	0.346
EXTERNAL FINANCING	0.112	-0.184	0.126	0.163	0.206	1	0.061	0.005*	-0.005*	0.120	0.084	0.095	0.103
CTO MODIFICATION RATE	0.334	-0.019	0.028	0.022	0.068	0.040	1	0.032	0.032	0.028	0.038	0.051	0.037
RQ_{t+3}	0.063	0.106	0.062	-0.011*	0.032	-0.103	0.033	1	0.083	-0.011*	-0.019**	0.031***	0.092
$PATENT_{t+3}$	0.037	0.232	0.026	-0.042	0.311	-0.026	0.019	0.052	1	-0.160	0.219	-0.201	0.284
EDF_{t+3}	0.012	-0.174	0.029	0.021	0.006*	0.042	0.008*	-0.019**	-0.133	1	0.011*	0.019	0.025
SPILLOVER	0.100	-0.005*	0.087	0.022	0.375	0.086	0.029	-0.016*	0.197	0.020	1	-0.019***	0.263
SECRECY	0.200	-0.220	0.232	0.252	-0.088	0.146	0.027	-0.012*	-0.207	-0.010*	-0.019***	1	0.112
SECRET_IMPORTANCE	0.074	-0.033	0.010	-0.010*	0.313	0.093	0.024	0.056	0.252	0.028	0.256	0.108	1

This table presents the Pearson (lower triangle) and Spearman correlations (upper triangle) among selected variables. No mark, ***, **, and * indicate significance levels of 1%, 5%, 10%, and insignificant at 10%, respectively. Appendix A states the variable definitions.

Table 4: Effect of R&D Intensity on Peer-Firm Redaction after Firm Bankruptcy

Dep. Variable	Pred. Sign	*LN(1+CTO NUMBERS)*					
BANKRUPTCY =		*FIRM_BANKRUPTCY*			*BANKRUPTCY_WAVE*		
		(1)	(2)	(3)	(4)	(5)	(6)
BANKRUPTCY		0.00439	-0.0108**	-0.00993*	0.00631	-0.00755	-0.00526
		(0.58)	(-2.24)	(-1.71)	(0.73)	(-1.43)	(-0.81)
R&D_INTENSITY		0.0769***	0.0189	0.0121	0.0839***	0.0180	0.0118
		(5.01)	(1.38)	(0.87)	(5.66)	(1.34)	(0.86)
R&D_INTENSITY × BANKRUPTCY	+	0.135***	0.0340***	0.0349***	0.141***	0.0450***	0.0450***
		(4.69)	(3.19)	(2.89)	(5.01)	(3.71)	(3.20)
SIZE				-0.0107			-0.0103
				(-1.46)			(-1.40)
LN_AGE				-0.0267**			-0.0262**
				(-2.34)			(-2.30)
ROA				0.0572			0.0584*
				(1.62)			(1.65)
LEV				-0.00643			-0.00624
				(-0.24)			(-0.23)
LOSS				0.00921			0.00883
				(1.50)			(1.44)
DEBT				-0.00396			-0.00381
				(-0.74)			(-0.71)
SEO				-0.0145			-0.0143
				(-1.39)			(-1.38)
BTM				0.00744			0.00765
				(1.40)			(1.43)
SALES_GROWTH				-0.00978*			-0.00972*
				(-1.71)			(-1.70)
INTANGIBLE				-0.0263			-0.0278
				(-0.74)			(-0.79)
LN_ALL_FILINGS				0.0537***			0.0539***
				(6.63)			(6.65)
Firm fixed effects		No	Yes	Yes	No	Yes	Yes
Year fixed effects		No	Yes	Yes	No	Yes	Yes
Num. of obs.		22,076	21,592	19,374	22,076	21,592	19,374
Adjusted R-square		0.061	0.492	0.498	0.064	0.492	0.498

This table regresses peer-firm proprietary non-disclosure on firm bankruptcy in the same 4-digit SIC code industry and peer-firm R&D-intensity, along with their interactions and controls. We consider two bankruptcy measures, *FIRM_BANKRUPTCY* and *BANKRUPTCY_WAVE*. *FIRM_BANKRUPTCY* = log one plus the number of bankruptcies in each 4-digit SIC code industry. *BANKRUPTCY_WAVE* = log of one plus the number of bankruptcies identified as part of bankruptcy waves in each 4-digit SIC code industry in a given year. The bankruptcy waves are any 12-month moving windows for each industry where the numbers of bankruptcies in the industry for the moving windows are greater than the average number of bankruptcies of all 12-month windows of the sample. *R&D INTENSITY* = one if the ratio of R&D expenditures to assets is in the highest tercile and zero otherwise. *LN(1+CTO_NUMBERS)* = log of one plus the number of new CTOs (excluding extensions of the previous CTOs and CTOs rejecting requests) based on the form filing dates associated with the CTO redactions. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table 5: Effect of Firm Financial Distress on Peer-Firm Redaction

Dep. Variable	Pred. Sign	*LN(1+CTO_NUMBERS)*		
Industry Competition =		All	High	Low
		(1)	(2)	(3)
INDUSTRY_EDF		-0.00534	-0.00700	0.00159
		(-1.04)	(-0.73)	(0.18)
R&D_INTENSITY		0.0106	0.0466	-0.00660
		(0.76)	(0.79)	(-0.28)
R&D_INTENSITY × INDUSTRY_EDF	+	0.0233**	0.0584**(a)	0.00986(b)
		(1.97)	(2.43)	(0.56)
DIFF (a) – (b)	+			0.04854*
F-stat				(2.92)
Firm-level controls		Yes	Yes	Yes
Firm fixed effects		Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes
Num. of obs.		19,305	5,759	6,340
Adjusted R-squared		0.498	0.547	0.435

This table regresses firm proprietary non-disclosure on the average expected default frequency (*EDF*) in a given firm's four-digit SIC code industry in a given year and R&D-intensity, along with their interactions and controls. *INDUSTRY_EDF* = one if the average expected default frequency of a given firm's four-digit SIC code industry in a given year is greater than the sample median, zero otherwise. Firm expected default frequencies are from the KMV-Merton distance-to-default model that is based on the Merton (1974)'s bond pricing model (Bharath et al. 2008; Correia et al. 2012). *R&D_INTENSITY* = one if the ratio of R&D expenditures to assets is in the highest tercile and zero otherwise. *LN(1+CTO_NUMBERS)* = log of one plus the number of new CTOs (excluding extensions of the previous CTOs and CTOs rejecting requests) based on the form filing dates associated with the CTO redactions. *Industry competition* is high (low) if the firm is in the highest (lowest) tercile in industry competition using the Hoberg and Phillips (2016) Text-based Network Industry Classifications (TNIC) competition measure. TNIC competition is based on firm pairwise similarity scores from a textual analysis of firm 10-K product descriptions in Item 1. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table 6: Underlying Mechanism: Effect of R&D Intensity on Peer-Firm Redaction after Firm Bankruptcy

Panel A: Effect of Financial Contagion on Peer-Firm Redaction after Firm Bankruptcy

Dep. Variable	Pred. Sign	*LN(1+CTO_NUMBERS)*	
Industry Median CAR (-5, +5) =		*Negative*	*Non-negative*
		(1)	(2)
FIRM_BANKRUPTCY		-0.0189	0.00567
		(-1.09)	(0.37)
R&D_INTENSITY		-0.121**	0.105**
		(-2.06)	(2.47)
R&D_INTENSITY × FIRM_BANKRUPTCY	+	0.147***(a)	-0.0432(b)
		(5.53)	(-1.18)
DIFF (a) - (b)	+		0.1902***
F-Stat			(18.81)
Firm-level controls		Yes	Yes
Firm fixed effects		Yes	Yes
Year fixed effects		Yes	Yes
Num. of obs.		2,176	1,040
Adjusted R-square		0.516	0.595

Panel B: Increased Market Share/Power in Concentrated Industries

Dep. Variable	Pred. Sign	*LN(1+CTO_NUMBERS)*	
Industry competition =		*High*	*Low*
		(1)	(2)
FIRM_BANKRUPTCY		-0.0237***	0.000470
		(-2.60)	(0.04)
R&D_INTENSITY		0.0535	-0.00267
		(0.91)	(-0.12)
R&D_INTENSITY × FIRM_BANKRUPTCY	+	0.0793***(a)	0.00469(b)
		(2.74)	(0.25)
DIFF (a) - (b)	+		0.07434**
F-Stat			(6.22)
Firm-level controls		Yes	Yes
Firm fixed effects		Yes	Yes
Year fixed effects		Yes	Yes
Num. of obs.		5,779	6,380
Adjusted R-square		0.548	0.436

Table 6, contd. Underlying Mechanism

Panel C: External Financing constraints

Dep. Variable		*Firm Size*		*KZ-Score*		*WW-Index*		*SA Index*	
		Small	*Large*	*Low*	*High*	*Low*	*High*	*Low*	*High*
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FIRM_BANKRUPTCY		-0.00367	-0.0199**	-0.0196**	-0.00322	-0.00664	-0.0158*	-0.0147*	-0.00838
		(-0.46)	(-2.31)	(-2.24)	(-0.36)	(-0.84)	(-1.70)	(-1.80)	(-1.01)
R&D_INTENSITY		0.0191	0.00730	0.00543	0.0162	0.00736	0.00866	0.00725	0.0144
		(0.99)	(0.33)	(0.25)	(0.71)	(0.42)	(0.37)	(0.34)	(0.80)
R&D_INTENSITY	+	0.0391***(a)	0.0272(b)	0.0466**(a)	0.0317**(b)	0.0384***(a)	0.0185(b)	0.0588***(a)	0.00613(b)
× *FIRM_BANKRUPTCY*		(2.73)	(1.55)	(2.43)	(2.05)	(2.67)	(1.04)	(3.91)	(0.39)
DIFF (a) – (b)	+		0.0119		0.0149		0.0199		0.0527*
F-Stat			(0.43)		(0.68)		(1.59)		(4.26)
Firm-level controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Num. of obs.		9,096	10,103	9199	9370	8885	9526	8733	10524
Adjusted R-square		0.488	0.509	0.524	0.479	0.489	0.463	0.495	0.481

This table presents results testing the three underlying mechanisms through which firm bankruptcy affects its R&D-intensive peers' redaction. Panel A reports results on intra-industry financial contagion after firm bankruptcy in the same 4-digit SIC code industry. We categorize the sample into two subsamples, based on the sign of the median cumulative abnormal return (CAR) in each 4-digit SIC code industry of peer firms adjusted by Fama-French's three risk factors for days -5 to 5 around a firm bankruptcy date in the prior year. We exclude firm years with no firm bankruptcy in the prior year. CARs that fall in a week window before and after earnings announcements are also excluded in the industry median CAR calculation. Results are robust to including CARs that fall in a week window before and after earnings announcements and using CAR [-2,+2]. *FIRM_BANKRUPTCY* = log one plus the number of bankruptcies in each 4-digit SIC code industry. Panel B reports results on external financial frictions. We categorize the sample into two subsamples, based on firm's financing constraint one year before firm bankruptcy— *Firm size*, *WW-Index* and *SA Index*. *Firm size* is small (large) if the firm's total asset is smaller (larger) than the median of all firms in a given year. *KZ-Score* is calculated as (-1.001909 x Cash Flows / PP&E$_{t-1}$ + 0.2826389 x Q + 3.139193 x Debt / Total Capital -39.3678 x Dividends / PP&E$_{t-1}$ -1.314759 x Cash / PP&E$_{t-1}$), where Cash Flows = (Income Before Extraordinary Itemst + Total Depreciation and Amortizationt); Q = (Market Capitalization$_t$ + Total Shareholder's Equity$_t$ - Book Value of Common Equity$_t$ - Deferred Tax Assets$_t$) / Total Shareholder's Equity$_t$; Debt = Total Long Term Debt$_t$ + Notes Payable$_t$ + Current Portion of Long Term Debt$_t$; Dividends = Total Cash Dividends Paid$_t$ (common and preferred); and Cash = Cash and Short-Term Investmentst). *SA Index* is calculated as (−0.737* Assets + 0.043*Assets2 − 0.040*Age), where Assets is the natural log of inflation-adjusted book assets and is capped at (the natural log of) $4.5 billion, and Age is the number of years a firm is listed with a non-missing stock price on Compustat and is capped at 37 years. *WW-Index* is calculated as (−cash flow to total assets −sales growth + long-term debt to total assets − log of total assets − dividend policy indicator + the firm's three-digit SIC industry sales growth). Panel C reports results on an increased market share/power in a concentrated industry after firm bankruptcy. We categorize the sample into two subsamples, based on industry-level product-market competition. *Industry competition* is high (low) if the firm is in the highest (lowest) tercile in industry competition using the Text-based Network Industry Classification (*TNIC*) competition measure (Hoberg and Phillips 2010, 2016). *TNIC* competition is based on firm pairwise similarity scores from a textual analysis of firm 10-K product descriptions in Item 1. In the three panels, we regress peer firms' proprietary non-disclosure on firm bankruptcy and R&D-intensity, along with their interactions and controls for the corresponding subsamples, separately. *R&D_INTENSITY* = one if the ratio of R&D expenditures to assets is in the highest tercile and zero otherwise. *LN(1+CTO_NUMBERS)* = log of one plus the number of new CTOs (excluding extensions of the previous CTOs and CTOs rejecting requests) based on the form filing dates associated with the CTO redactions. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table 7: Material Contract Versus Non-Material Contract Peer-Firm Redaction after Firm Bankruptcy

Dep. Variable	Pred. Sign	*LN(1+CTO_HP_NUMBERS)*			*LN(1+CTO_LP_NUMBERS)*		
Industry competition =		All	High	Low	All	High	Low
		(1)	(2)	(3)	(4)	(5)	(6)
FIRM_BANKRUPTCY		-0.00427	-0.00357	-0.00448	-0.00162	-0.00121	-0.000482
		(-0.97)	(-0.41)	(-0.59)	(-0.72)	(-0.29)	(-0.16)
R&D_INTENSITY		0.00886	0.0423	0.00377	-0.00208	0.00612	0.00916
		(0.70)	(0.65)	(0.27)	(-0.27)	(0.41)	(1.45)
R&D_INTENSITY ×	+	0.0349***	0.0742***(a)	-0.0126(b)	0.00186	-0.00197(a)	0.00402(b)
FIRM_BANKRUPTCY		(2.84)	(2.73)	(-0.95)	(0.51)	(-0.28)	(0.98)
DIFF (a) – (b)				0.0868***			-0.00599
F-Stat				(11.80)			(0.59)
Firm-level controls		Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects		Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes	Yes	Yes	Yes
Num. of obs.		18,078	5,334	5,975	18,078	5,334	5,975
Adjusted R-squared		0.479	0.537	0.399	0.203	0.223	0.261

This table regresses two separate peer-firm proprietary non-disclosure variables on firm bankruptcy in the same 4-digit SIC code industry and peer-firm R&D-intensity, along with their interactions and controls. The first dependent variable, *LN(1+CTO_HP_NUMBERS),* is *LN(1+CTO_NUMBERS)* for CTOs associated with exhibits that are likelier to contain proprietary information and trade secrets and material contracts covering topics on research, consulting, licensing, royalty, customer-supplier, and peer relations. The second dependent variable, *LN(1+CTO_LP NUMBERS),* is *LN(1+CTO NUMBERS)* for CTOs associated with exhibits that are less likely to contain material contract proprietary information and trade secrets covering topics on employment, financing, leasing, restructuring, ownership, and shareholder. We broadly follow Boone et al. (2016) to classify the type of information contained in each redacted exhibit. *FIRM_BANKRUPTCY* = log of one plus the number of bankruptcies in each 4-digit SIC code industry. *R&D_INTENSITY* = one if the ratio of R&D expenditures to assets is in the highest tercile and zero otherwise. *Industry competition* is high (low) if the firm is in the highest (lowest) tercile in industry competition using the Hoberg and Phillips (2016) text-based network industry classifications (*TNIC*) competition measure. *TNIC* competition is based on firm pairwise similarity scores from a textual analysis of firm 10-K product descriptions. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table 8: Effect of Guidance Disclosure on Peer-Firm Redaction after Firm Bankruptcy

Dep. Variable	Pred. Sign	*LN(1+ GUIDANCE)*	*LN(1+ GUIDANCE)*
Industry competition =		High	Low
		(1)	(2)
FIRM_BANKRUPTCY		0.000434	0.0135
		(0.02)	(0.39)
R&D_INTENSITY		-0.229**	-0.0210
		(-2.13)	(-0.40)
R&D_INTENSITY× FIRM_BANKRUPTCY	+	0.0681*(a)	-0.0511(b)
		(1.73)	(-1.05)
DIFF (a) – (b)	+		0.1192*
F-Stat			(3.33)
Firm-level controls		Yes	Yes
Firm fixed effects		Yes	Yes
Year fixed effects		Yes	Yes
Num. of obs.		5,402	5,473
Adjusted R-squared		0.816	0.812

This table regresses peer-firm management guidance on firm bankruptcy in the same 4-digit SIC code industry and peer-firm R&D-intensity, along with their interactions and controls. *LN(1+ GUIDANCE)* = log one plus the number of management guidance in a given year. *FIRM_BANKRUPTCY* = log one plus the number of bankruptcies in each 4-digit SIC code industry. *R&D_INTENSITY* = one if the ratio of R&D expenditures to assets is in the highest tercile and zero otherwise. *Industry competition* is high (low) if the firm is in the highest (lowest) tercile in industry competition using the Hoberg and Phillips (2016) Text-based Network Industry Classifications (*TNIC*) competition measure. *TNIC* competition is based on firm pairwise similarity scores from a textual analysis of firm 10-K product descriptions in Item 1. Appendix A states the definition of management guidance variables and the other variables. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table 9: External Capital Raising

Dep. Variable	Pred. Sign	*EXTERNAL_FINANCING*
LN(1+CTO_NUMBERS)		-0.0513**
		(-2.53)
LN(1+ GUIDANCE)		-0.000952
		(-0.31)
LN(1+CTO_NUMBERS) × *LN(1+ GUIDANCE)*	+/-	0.0187**
		(2.07)
SIZE		-0.0337***
		(-3.05)
LN_AGE		-0.0185
		(-1.60)
ROA		-0.0228
		(-0.57)
LEV		-0.144***
		(-6.69)
LOSS		-0.00170
		(-0.31)
BTM		-0.0179**
		(-2.40)
SALES_GROWTH		-0.00179
		(-0.22)
INTANGIBLE		-0.00191
		(-0.07)
SRET		0.0262***
		(2.88)
TANGIBLE_ASSETS_RATIO		0.213***
		(3.87)
S&A_EXP		-0.0252
		(-1.10)
R&D_EXP		0.00614
		(0.75)
LEV_MEDIAN		0.0703
		(0.57)
EPS_DILUTION_DUMMY		0.00991**
		(2.56)
MB_DUMMY		0.00461
		(0.72)
Firm fixed effects		Yes
Year fixed effects		Yes
Num. of obs.		6,484
Adjusted R-square		0.338

This table regresses external capital raising on proprietary non-disclosure and non-proprietary disclosure for peer firm-years within a [-2, 2] window around firm bankruptcy in the same 4-digit SIC code industry, along with their interactions and controls. *EXTERNAL_FINANCING* = sum of equity and debt issued, scaled by the last pre-issue total assets. Following Bradshaw et al. (2006), we measure equity issuance as net cash received from the sale (and/or purchase) of common and preferred stock less cash dividends paid, and debt issuance as net cash received from the issuance (and/or reduction) of debt. Proprietary non-disclosure is proxied by *LN(1+CTO_NUMBERS)* = log of one plus the number of new CTOs (excluding extensions of the previously granted CTOs and CTOs rejecting requests) based on the form filing dates associated with the CTO redactions. Non-proprietary disclosure is proxied by *LN(1+ GUIDANCE)* = log one plus the number of management guidance in a given year. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table 10: Redaction Contents and Consequences

Panel A: CTR Modification after SEC Review

Dep. Variable =	Pred. Sign	*CTO MODIFICATION RATE*	*CTO MODIFICATION INDICATOR*
		(1)	(2)
FIRM_BANKRUPTCY		0.0211	0.0154
		(0.73)	(0.42)
R&D_INTENSITY		0.0552	0.0616
		(1.06)	(0.88)
R&D_INTENSITY × FIRM_BANKRUPTCY	?	-0.0572*	-0.0744*
		(-1.87)	(-1.89)
Firm-level controls		Yes	Yes
Firm fixed effects		Yes	Yes
Year fixed effects		Yes	Yes
Num. of obs.		2,255	2,255
Adjusted R-squared		0.074	0.060

Panel B: Peer Firm's Future Innovation Performance

Dep. Variable =	Pred. Sign	RQ_{t+3}	$PATENT_{t+3}$
		(1)	(2)
LN(1+CTO_NUMBERS)	+	0.00491***	0.0339**
		(2.67)	(2.03)
SIZE		0.00103	0.0954***
		(0.68)	(5.05)
LN_AGE		-0.0100***	-0.0269
		(-3.73)	(-0.96)
ROA		0.0106**	-0.0161
		(2.00)	(-0.42)
LEV		-0.00906	-0.0207
		(-1.56)	(-0.45)
LOSS		-0.0000994	-0.0126
		(-0.08)	(-0.87)
DEBT		-0.000145	-0.00274
		(-0.17)	(-0.23)
SEO		0.00174	0.0249*
		(1.03)	(1.73)
BTM		-0.000712	-0.0105
		(-0.71)	(-1.25)
SALES_GROWTH		0.000800	-0.00785
		(0.51)	(-0.92)
INTANGIBLE		0.00789*	-0.155**
		(1.74)	(-2.33)
Firm fixed effects		Yes	Yes
Year fixed effects		Yes	Yes
Num. of obs.		4,782	10,963
Adjusted R-square		0.862	0.939

Panel C: Peer Firm's Future Financial Distress Risk

Dep. Variable =	Pred. Sign	EDF_{t+3}
LN(1+CTO_NUMBERS)	--	-0.00736*
		(-1.67)
SIZE		0.0114***
		(2.63)
LN_AGE		-0.0104
		(-1.06)
ROA		-0.0186
		(-1.51)
LEV		0.101***
		(7.25)
LOSS		0.0129***
		(3.13)
DEBT		-0.00244
		(-0.76)
SEO		-0.00889*
		(-1.81)
BTM		0.0164***
		(3.94)
SALES_GROWTH		-0.00132
		(-0.48)
INTANGIBLE		-0.0113
		(-0.65)
Firm fixed effects		Yes
Year fixed effects		Yes
Num. of obs.		9,057
Adjusted R-square		0.674

This table examines contents and consequences of peer firm redaction. Panel A assesses whether peer firm redaction is associated with the level of CTR modification following the SEC staff's review. To identify a modification, we limit the sample to firm-years that have at least one CTO. A high level of CTO modification could occur if firms apply CTR that does not satisfy the eligibility of CTO such as hiding negative news. *CTO MODIFICATION RATE* = the ratio of CTRs later modified to have fewer redactions after the SEC staff review in a given year. *CTO MODIFICATION INDICATOR* = one if the firm has at least one CTR later modified to have fewer redactions after the SEC staff review in a given year and zero otherwise. Panel B assesses whether redaction is associated with the level of future innovation for peer firm-years within a [-2, 2] window around firm bankruptcy in the same 4-digit SIC code industry. RQ_{t+3} denotes the average Research Quotient (RQ) (Knott, 2008) during the year of the redaction and the two subsequent years. *RQ* is computed as a percentage increase in revenue from a 1% increase in R&D. *RQ* is the output elasticity of R&D and offers a universal, uniform, and reliable measure of a firm's R&D productivity. $PATENT_{t+3}$ denotes the average log one plus the number of patents filed by a firm during the year of the redaction and the two subsequent years. The patent count data are from Kogan et al. (2017). Panel C assesses whether redaction is associated with the level of future financial distress for peer firm-years within a [-2, 2] window around firm bankruptcy in the same 4-digit SIC code industry. EDF_{t+3} denotes the average expected default frequency during the year of the redaction and the two subsequent years. A firm's expected default frequencies are from the KMV-Merton distance-to-default model that is based on the Merton (1974)'s bond pricing model (Bharath et al. 2008; Correia et al. 2012). Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Survival of the most secretive: Firm bankruptcy and peer firm contract redactions

Online Appendix

Table A1: Alternative Measures of Peer-Firm Redaction

Panel A: Firm bankruptcy

Dep. Variable	Pred. Sign	*CTO_DUMMY*	*LN(1+CTO_EXHIBIT_ NUMBERS)*	*LN(1+ CTO_LENGTH)*
		(1)	(2)	(3)
FIRM_BANKRUPTCY		-0.00926	-0.0143*	-0.0639
		(-1.43)	(-1.87)	(-1.32)
R&D_INTENSITY		0.0183	0.0163	0.132
		(1.04)	(0.85)	(1.02)
R&D_INTENSITY × FIRM_BANKRUPTCY	+	0.0300**	0.0405**	0.215**
		(2.49)	(2.54)	(2.38)
SIZE		-0.0107	-0.0150	-0.0805
		(-1.31)	(-1.44)	(-1.32)
LN_AGE		-0.0261**	-0.0365**	-0.186**
		(-1.97)	(-2.29)	(-1.98)
ROA		0.0661*	0.0635	0.513*
		(1.71)	(1.36)	(1.80)
LEV		0.0106	-0.00843	0.0889
		(0.38)	(-0.27)	(0.41)
LOSS		0.0128*	0.00772	0.0993**
		(1.90)	(1.01)	(2.03)
DEBT		-0.00854	-0.00263	-0.0622
		(-1.42)	(-0.37)	(-1.40)
SEO		0.000628	-0.0199	0.0104
		(0.06)	(-1.40)	(0.14)
BTM		0.00833	0.00898	0.0555
		(1.34)	(1.27)	(1.23)
SALES_GROWTH		-0.00544	-0.0116	-0.0428
		(-0.90)	(-1.46)	(-0.92)
INTANGIBLE		-0.0460	-0.0354	-0.307
		(-1.21)	(-0.69)	(-1.07)
LN_ALL_FILINGS		0.0505***	0.0705***	0.366***
		(6.18)	(6.58)	(6.01)
Firm fixed effects		Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes
Num. of obs.		19,374	19,374	19,374
Adjusted R-square		0.422	0.511	0.417

Table A1: Continued.

Panel B: Industry bankruptcy wave

Dep. Variable	Pred. Sign	*CTO_DUMMY*	*LN(1+CTO_EXHIBIT_NUMBERS)*	*LN(1+ CTO_LENGTH)*
		(1)	(2)	(3)
BANKRUPTCY_WAVE		-0.00361	-0.00694	-0.0273
		(-0.51)	(-0.79)	(-0.51)
R&D_INTENSITY		0.0183	0.0155	0.128
		(1.06)	(0.81)	(1.00)
R&D_INTENSITY × BANKRUPTCY_WAVE	+	0.0379***	0.0540***	0.287***
		(2.86)	(2.77)	(2.88)
SIZE		-0.0103	-0.0144	-0.0771
		(-1.27)	(-1.38)	(-1.26)
LN_AGE		-0.0256*	-0.0358**	-0.182*
		(-1.94)	(-2.25)	(-1.95)
ROA		0.0674*	0.0652	0.521*
		(1.74)	(1.40)	(1.83)
LEV		0.0107	-0.00832	0.0897
		(0.38)	(-0.26)	(0.42)
LOSS		0.0124*	0.00714	0.0964**
		(1.83)	(0.94)	(1.96)
DEBT		-0.00840	-0.00246	-0.0612
		(-1.40)	(-0.34)	(-1.38)
SEO		0.000749	-0.0197	0.0116
		(0.07)	(-1.39)	(0.15)
BTM		0.00852	0.00923	0.0569
		(1.37)	(1.30)	(1.26)
SALES_GROWTH		-0.00535	-0.0115	-0.0423
		(-0.89)	(-1.45)	(-0.91)
INTANGIBLE		-0.0474	-0.0372	-0.316
		(-1.25)	(-0.73)	(-1.10)
LN_ALL_FILINGS		0.0507***	0.0708***	0.367***
		(6.20)	(6.58)	(6.03)
Firm fixed effects		Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes
Num. of obs.		19,374	19,374	19,374
Adjusted R-square		0.422	0.512	0.418

This table regresses peer-firm proprietary non-disclosure on firm bankruptcy in the same 4-digit SIC code industry and peer-firm R&D-intensity, along with their interactions and controls. We consider two bankruptcy measures, *FIRM_BANKRUPTCY* (Panel A) and *BANKRUPTCY_WAVE* (Panel B). *FIRM_BANKRUPTCY* = log one plus the number of bankruptcies in each 4-digit SIC code industry. *BANKRUPTCY_WAVE* = log of one plus the number of bankruptcies identified as part of bankruptcy waves in each 4-digit SIC code industry in a given year. The bankruptcy waves are any 12-month moving windows for each industry where the numbers of bankruptcies in the industry for the moving windows are greater than the average number of bankruptcies of all 12-month windows of the sample. *R&D_INTENSITY* = one if the ratio of R&D expenditures to assets is in the highest tercile and zero otherwise. *CTO_DUMMY* = one if the firm has at least one new CTO based on form filing dates associated with CTO redaction and zero otherwise. *LN(1+CTO_EXHIBIT NUMBERS)* = log of one plus the number of exhibits in the filings associated with new CTOs based on the form filing dates. *LN(1+CTO_LENGTH)* = log of one plus the average redaction period of new CTOs in days based on the form filing dates associated with CTO redactions. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table A2: Alternative Proxies for High Proprietary Costs

Dep. Variable	Pred. Sign	*LN(1+CTO_NUMBERS)*		
Industry competition =		All	High	Low
Panel A: Industry secrecy (Erkins 2011)		(1)	(2)	(3)
FIRM_BANKRUPTCY		0.000544	-0.0238	-0.0114
		(0.06)	(-1.03)	(-0.67)
SECRECY × FIRM_BANKRUPTCY	+	0.0377***	0.0723**(a)	0.0210(b)
		(2.78)	(2.29)	(0.68)
DIFF (a) - (b)	+			0.0513
F-Stat				(1.24)
Num. of obs.		9,875	2,732	3,501
Adjusted R-squared		0.483	0.495	0.324
Panel B: Technological spillover (Bloom et al. 2013)		(1)	(2)	(3)
FIRM_BANKRUPTCY		-0.0162**	-0.0179*	0.00622
		(-2.32)	(-1.82)	(0.51)
SPILLOVER		-0.00879	0.0105	-0.000225
		(-0.63)	(0.53)	(-0.01)
SPILLOVER × FIRM_BANKRUPTCY	+	0.0341***	0.0521**(a)	-0.00560(b)
		(3.49)	(2.43)	(-0.34)
DIFF (a) - (b)	+			0.0577**
F-Stat				(4.31)
Num. of obs.		19,278	5,745	6,370
Adjusted R-squared		0.499	0.548	0.436
Panel C: Trade-secret Importance		(1)	(2)	(3)
FIRM_BANKRUPTCY		-0.0889***	-0.129**	-0.0666
		(-3.23)	(-2.11)	(-1.11)
SECRET_IMPORTANCE × FIRM_BANKRUPTCY	+	0.154***	0.222**(a)	0.113(b)
		(3.38)	(2.08)	(1.12)
DIFF (a) - (b)	+			0.109
F-Stat				(0.52)
Num. of obs.		18,667	5,568	6,120
Adjusted R-squared		0.500	0.546	0.436
Firm-level controls		Yes	Yes	Yes
Firm fixed effects		Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes

This table regresses peer-firm proprietary non-disclosure on the log number of bankruptcies in the same 4-digit SIC code industry in a given year and an alternative proxy for peer-firm R&D-intensity, along with their interactions and controls. Panel A uses industry secrecy. *SECRECY* = one if the firm's industry-level trade secrecy, based on the Erkins (2011) secrecy measure, is above the median and zero otherwise. Panel B uses technological spillover. *SPILLOVER* = one if the firm's industry-level technology spillovers, based on Bloom et al. (2013), is above the median in a given year and zero otherwise. Panel C uses trade-secret importance. *SECRET_IMPORTANCE* = the percentage of firms in an industry that performed or funded R&D reporting trade secrets as very important to their company from the Census's Business Enterprise Research and Development Survey (BERD). *FIRM_BANKRUPTCY* = log one plus the number of bankruptcies in each 4-digit SIC code industry. *LN(1+CTO NUMBERS)* = log of one plus the number of new CTOs (excluding extensions of the previously granted CTOs and CTOs rejecting requests) based on the form filing dates associated with the CTO redactions. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table A3: Effect of Bankrupt Firm Location on Peer-Firm Redaction after Firm Bankruptcy

Dep. Variable	Pred. Sign	*LN(1+CTO NUMBERS)*		
Industry competition =		All	High	Low
		(1)	(2)	(3)
BANKRUPT_FIRM_LOCATION		-0.0142	-0.0276	-0.0131
		(-0.90)	(-1.59)	(-0.43)
R&D_INTENSITY		0.0291**	0.0604	0.0105
		(2.08)	(1.07)	(0.44)
R&D_INTENSITY × *BANKRUPT_FIRM_LOCATION*	+	0.123***	0.212***(a)	0.00235(b)
		(2.75)	(3.16)	(0.03)
DIFF (a) – (b)	+			0.20965*
F-Stat				(3.47)
Firm-level controls		Yes	Yes	Yes
Firm fixed effects		Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes
Num. of obs.		16,334	4,627	5,651
Adjusted R-squared		0.483	0.556	0.399

This table regresses firm proprietary non-disclosure on the log number of bankruptcies in a given firm's 4-digit SIC code industry in a given year and R&D-intensity conditional on bankrupt firm location, along with their interactions and controls. *BANKRUPT_FIRM_LOCATION* = log one plus the weighted average number of bankruptcies in a given firm's 4-digit SIC code industry in a given year in the states where the firm operates (the weight is the importance of each state based on the geographic dispersion measure (García and Norli 2012) at the beginning of our sample period). *R&D_INTENSITY* = one if the ratio of R&D expenditure to asset is in the highest tercile and zero otherwise. *LN(1+CTO NUMBERS)* = log of one plus the number of new CTOs (excluding extensions of the previously granted CTOs and CTOs rejecting requests) based on the form filing dates associated with the CTO redactions. *Industry competition* is high (low) if the firm is in the highest (lowest) tercile in industry competition using the Hoberg and Phillips (2016) Text-based Network Industry Classifications (*TNIC*) competition measure. *TNIC* competition is based on firm pairwise similarity scores from a textual analysis of firm 10-K product descriptions in Item 1. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

Table A4: After Controlling for Industry Shocks (Guay et al., 2015)

Dep. Variable	Pred. Sign	*LN(1+CTO_NUMBERS)*		
		(1)	(2)	(3)
FIRM_BANKRUPTCY		-0.00662	-0.00474	-0.00600
		(-1.21)	(-0.75)	(-0.95)
R&D_INTENSITY		0.0235	0.0164	0.0277**
		(1.58)	(1.09)	(1.96)
R&D_INTENSITY × FIRM_BANKRUPTCY	+	0.0292***	0.0284**	0.0324***
		(2.63)	(2.27)	(2.72)
SHOCK_AT		-0.0230	-0.0203	
		(-1.25)	(-1.19)	
SHOCK_CAPX		0.00952	0.00918	
		(0.85)	(0.94)	
SHOCK_XRD		-0.00304	-0.00292	
		(-0.46)	(-0.43)	
SHOCK_MB		-0.00138	-0.000928	
		(-1.32)	(-0.86)	
SHOCK_SALE		0.0191	0.0217	
		(1.12)	(1.27)	
SHOCK_ROA		-0.00197	-0.00175	
		(-1.41)	(-1.24)	
SHOCK_LOSS		0.00464	0.00312	
		(1.20)	(0.79)	
SIZE			-0.0135	-0.0132
			(-1.61)	(-1.57)
LN_AGE			-0.0415***	-0.0417***
			(-2.93)	(-2.94)
ROA			0.0586	0.0587
			(1.48)	(1.49)
LEV			-0.00859	-0.00871
			(-0.27)	(-0.28)
LOSS			0.00375	0.00392
			(0.51)	(0.54)
DEBT			-0.00454	-0.00464
			(-0.68)	(-0.70)
SEO			-0.0203*	-0.0204*
			(-1.69)	(-1.70)
BTM			0.0103	0.0100
			(1.56)	(1.52)
SALES_GROWTH			-0.00924	-0.00878
			(-1.51)	(-1.46)
INTANGIBLE			-0.0400	-0.0407
			(-0.97)	(-0.99)
LN_ALL_FILINGS			0.0581***	0.0578***
			(5.83)	(5.79)
Firm fixed effects		Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes
Num. of obs.		16,611	14,720	14,720
Adjusted R-square		0.487	0.493	0.493

This table regresses peer-firm proprietary non-disclosure on firm bankruptcy in the same 4-digit SIC code industry and peer-firm R&D-intensity, along with their interactions and controls, after controlling for industry shocks. *FIRM_BANKRUPTCY* = log one plus the number of bankruptcies in each 4-digit SIC code industry. *R&D_INTENSITY* = one if the ratio of R&D expenditures to assets is in the highest tercile and zero otherwise. We calculate industry shocks by aggregating firm-level variables to the industry-level by using seven industry variables related to the industry's business environment and product market (Guay et al., 2015). Industry shocks are the absolute value of the percentage change in the respective industry-level variables. *SHOCK_AT*, *SHOCK_CAPX*, *SHOCK_XRD*, *SHOCK_MB*, *SHOCK_SALE*, *SHOCK_ROA,* and *SHOCK_LOSS* denote a change in industry assets, industry capital expenditure, industry research and development expense, industry market-to-book ratio, industry sales, industry profitability, and industry losses, respectively. Appendix A states the other variable definitions. *t*-statistics in parentheses are based on robust standard errors clustered by industry and year. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.