Spillover effects on managerial bad news hoarding behavior: Evidence from MD&A textual analysis and stock price crash risk

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Abstract

This paper explores the spillover effects of Management Discussion and Analysis (MD&A) disclosure on the manager's bad news hoarding behavior. We provide strong evidence that the peer firms' optimistic tone in MD&A disclosures is positively associated with firm-specific stock price crash risk. Due to increased competitive pressures caused by the optimism of competitors, managers have larger incentives to hoard negative news from the public to protect themselves. Moreover, we find that the relationship manifests more when the product market is highly competitive and when the stock market is more liquid. Our results are robust, surviving tests for propensity score matching (PSM), change analysis, firm fixed effects model, alternative MD&A narrative tone variables and alternative industry fixed effects model.

Key words: spillover effects, MD&A disclosure, texture analysis, FinBERT, stock price crash risk

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1. Introduction

Prior studies have long examined the spillover effects of disclosures (see for example, Roychowdhury et al., 2019). Firms within a peer group, such as a similar industry, are largely affected by similar economic conditions. If a peer-firm discloses about the firm's important events, then such peer-firm disclosures can help managers make more informed managerial decisions. A growing research has focused on the quantitative information such as financial statement contents of a peer-firm to investigate the spillover effects. For instance, based on the quantitative information such as sales, cost of sales, inventories that are reported in quarterly and annual financial reports, studies find that such information of a peer-firm can explain the firm's future demand and costs (Lundholm and Sloan, 2004; Curtis et al., 2013). In addition, a firm's voluntary disclosure may help managers of peer firms to develop precise estimations of their future corporate decisions such as aggregate demand and supply conditions (Bonsall IV et al., 2013). Spillover effects literature has largely focused on the peer firm's important managerial policies such as investment decisions (Sadka, 2006; Badertscher et al., 2013; Shroff et al., 2017; Durnev and Mangen, 2020). However, relatively little attention has been given to how the disclosure affects the peer-firm manager's bad news hiding and hoarding behavior. In this manner, this paper explores whether a firm's bad news hoarding tendency is influenced by the tone of the peer firms' disclosure.

Among many publicly available firms' disclosure, we specifically use the tone of Management Discussion and Analysis (hereafter, MD&A) narratives. We have the advantage of being able to retrieve the qualitative information of internal managers of peer firms by text analysis of MD&A disclosure. It has the advantage of being able to extract qualitative information of the peer-firm' managers through MD&A disclosure text-analysis. The Securities and Exchange Commission (SEC) required companies to provide a MD&A section which documents the managerial commentary about relevant events that are expected to materially affect liquidity, capital resources and future operations (SEC 1989). The regulation has made the MD&A a rich depository of corporate narratives (Cho and Muslu, 2021). Studies have commonly shown that MD&A narratives reveal firm's operation changes, M&A events, divestitures and other important corporate decisions and policies (Bryan, 1997; Brown and Tucker,

2011). Furthermore, Davis and Tama-Sweet (2012) argue that MD&As do not merely rehash information found elsewhere but provide important information that are related to a firm's earnings. Because this section reveals qualitative information via text sources, studies find MD&A a prominent information source (Marin and Poulter, 2004).

Depending on the peer firm's narratives, the manager's decision to release the negative information to the public may be affected. This spillover effect on manager's bad news hoarding behavior is predictable in two directions. First, peer firms' optimistic forecasts may damage the firm by weakening its market competitiveness (Cho and Muslu, 2021). Thus, rival firms' positive MD&A narratives may motivate the manager to withhold further negative information because disclosing negative information may negatively affect their compensation package or job termination (Kim, 1999; Nagar, 1999). Graham et al. (2005) and Kothari et al. (2009) commonly argue that managers tend to hide and hoard bad news from the public when they confront managerial career concerns, and DeFond and Park (1999) show that managers have higher career concerns when greater market competition harms their firm profitability. In other words, when the peer firm discloses positive and optimistic forecasts about the future, managers may have stronger incentives to conceal negative information from the public. Similarly, Li and Zhan (2019) find that the competition increases uncertainty, inducing managers to be overconfident about their firm prospects, and Fosfuri and Giarratana (2009) show that the new product announcement (positive news) of rival firms decreases a firm's market value. Consequently, an optimistically forecasted rival's MD&A narrative may negatively affect the firm, and this may motivate managers to hoard bad news for their own career concerns.

On the other hand, rival firms' positive forecasts about themselves may reduce the manager's tendency to withhold bad news. One explanation is that peer firms' positive MD&A tone may imply industry-wide opportunities (Cho and Muslu, 2021). Peer firms may reveal a strong potential for the future, and it is also likely to be a positive sign for the firm. Under the general industry growing, managers would have lesser career concerns. Hence, when a rival firm releases positive information on their MD&A narrative, then the manager may be less likely to withhold negative information.

To empirically examine the relationship between the peer firms' MD&A tone and the manager's bad news hoarding tendency, we first calculate stock price crash risk measures. Quantifying unobservable variables, such as hiding bad news from the public, is difficult. Thus, we use stock price crash risk variables to precisely measure a manager's behavior (Hutton et al., 2009; Kothari et al., 2009). Finding the reasons why firms experience sharp stock price shocks has been the topic of a lot of finance research. Proliferating research assumes that managers intentionally hide and hoard bad news. Then, when this negative news is eventually revealed to the market, typically all at once, it has a significant negative effect on the stock price (Hutton et al., 2009; Kothari et al., 2009; Kim et al., 2011a; Kim et al., 2011b; Kim et al., 2016).

Our results shows a positive association between peer-firms' MD&A narrative tone and firm-specific stock price crash risk. In other words, managers' propensity to hide bad news increases as competitors document themselves optimistically. When the rivals provide rather optimistic narratives on their MD&A section, then the managers have larger incentives to hoard bad news to hedge against spillover effects. These results support that optimistic tone by competitors increases competitive pressure and induces managers to hoard bad news. Moreover, we employ several robustness tests. Specifically, we employ propensity score matching (PSM), change analysis, firm fixed effects model, alternative MD&A narrative tone variables and alternative industry fixed effects model. Regardless of the estimation methods, we find a statistically significant positive relationship between the rival firms' MD&A narrative tone and the manager's tendency to withhold negative information.

Next, we conduct several tests to investigate whether the "competition channel" is an underlying mechanism through which managers decide to not release bad news. First, we test the influence of product market threats on the relationship between peer-firms' MD&A narrative tone and the future bad news hiding behavior. If the manager's willingness to withhold negative information is affected by the peer's tone, then the market competitiveness may significantly affect the relationship. That is, if the industry is highly competitive, then the manager would be more sensitive to the rival firm's context of disclosures. Thus, competitive pressure from the product market may aggravate

managers' incentive to withhold bad news (Li and Zhan, 2019). An interaction analysis using product market fluidity and Herfindahl-Hirschman Index (HHI) shows that the positive association between the rival's MD&A narrative sentiment and the future bad news hiding behavior manifests more if the firm belongs to a highly competitive industry.

Second, we investigate how the stock market liquidity influences the relationship between the MD&A narrative sentiment and the managerial dubious behavior. Chang et al. (2017) argue that liquidity induces managers to withhold bad news, fearing that the disclosure of negative information will lead to selling by transient investors. Highly liquid firms have more incentives to hide and hoard negative news. Thus, when the peer firms disclose optimistic and positive statements, their effects on inducing managers toward bad news hoarding may manifest more if the firm is highly liquid to prevent transient investors from selling their shares. An analysis confirms that the baseline relationship is stronger when the firm is highly liquid, indicating that the market liquidity is another potential channel that affects the manager's information managing behavior when the peer firms release rather optimistic forecasts on their MD&A narratives.

The contribution of the research is twofold. First, we contribute to the growing literature on spillover effects of disclosures. Specifically, the research enlightens by empirically examining how textual disclosures have spillover effects on the manager's bad news hoarding behavior. Prior studies have frequently used numerical content of disclosures. However, using a rich text source such as MD&A narrative to investigate the spillover effects is at its infancy. To date, Durnev and Mangen (2020) focus on the tone of MD&A disclosures and document that the association between a firm's investments and the tone of rivals' MD&A narratives is positive. Similarly, Cho and Muslu (2021) also show that a firm's one-year-ahead capital investments and inventory are largely affected by peer firms' MD&A tone. While both studies focused on the firm's investment decisions, research on how rivals' MD&A tone affects the manager's information hiding behavior is not yet explored. With this regard, this research contributes to the literature by showing that the rivals' MD&A narrative tone have significant spillover effects on the manager's bad new hoarding.

Second, this research contributes to the growing literature on managers' asymmetric disclosure of bad news. One view states that managers strategically and systematically hide and hoard negative information (Kothari et al., 2009) for their own benefits. While Kasznik and Lev (1995), Skinner (1997) and Baginski et al. (2002) find that strict regulations on disclosure requirements encourage managers to more promptly release bad news, how the disclosure contents of rival firms affect managers is not well studied. In this manner, we add to the crash risk literature by providing new empirical evidence that positively stated peer firms' MD&A narratives induce managers to withhold bad news.

The rest of the article is organized as follows. Section 2 reviews the literature and develops testable hypotheses. Section 3 then discusses the data and methodologies used in the study. We then provide baseline regression results and other related analysis on Section 4. Section 5 discusses various robustness tests. Section 6 then concludes.

2. Literature Review and Hypothesis Development

2.1. Literature Review

2.1.1. MD&A narrative spillover effects

The SEC has mandated firms to report MD&A via Item 303 (a) of Regulation S-K since 1980. MD&A section described both quantitative and qualitative factors necessary for comprehending the firm in a forward-looking manner. Examples are key shifts in operations such as revenue changes and capital expense plans describing ongoing or any planned projects. Studies have commonly shown that MD&A narratives reveal firm's operation changes, M&A events, divestitures and other important corporate decisions and policies (Bryan, 1997; Brown and Tucker, 2011). Furthermore, Davis and Tama-Sweet (2012) argue that MD&As do not merely rehash information found elsewhere but provide important information that are related to a firm's earnings. Because this section reveals qualitative information via text sources, studies find MD&A a prominent information source (Marin and Poulter, 2004).

Prior literature has well explored the effects of MD&A disclosure quality on their future

outcomes. However, relatively little attention was given to spillover effects of MD&A disclosure, specifically, whether spillover effects from peer firms' MD&A narrative tone can be beneficial for the firm. Recently, Durnev and Mangen (2020) explored spillover effects of MD&A disclosures for investment and investment efficiency. They find a positive association between MD&A disclosure tone and the firm's investments. The authors also find that the relationship is somewhat moderated by the market competition. That is, the spillover effects more evidently manifest when firms operate in industries that have lower entry costs, larger industries and have less substitutable products. Thus, spillover effects of MD&A disclosures are significant and the effects vary according to the industry competition. Similarly, Cho and Muslu (2021) show that a firm's capital investment and inventory increases when the peer firms' MD&A tone becomes positive. While few discussions on examining the spillover effects of MD&A disclosure on the firm's investment do exist, studying the spillover effects on the manager's information disclosure tendency is not yet explored.

2.1.2. Stock price crash risk

The extent to which managers hide and hoard negative news can be explained by a variety of managerial incentives (Healy and Palepu, 2002; Kothari et al., 2009). Among several incentives, the manager's career concern explanation is commonly accepted (Kothari et al., 2009). That is, managers have large incentives to hide bad news intentionally because disclosing negative information may negatively affect their compensation package or job termination (Kim, 1999; Nagar, 1999). Managers may also incur reduction in bonus payments as a result of the stock price decline following the disclosure of bad news, creating incentives to withhold bad news (Kothari et al., 2009). Such considerations of career concerns create incentives for managers to withhold the disclosure of bad news in the hope that it will ultimately be offset by subsequent improvement in firm performance (Graham et al., 2005; Kothari et al., 2009).

Prior studies use various stock price crashes to proxy the manager's bad news hoarding intention. The underlying idea is that the amount of negative information a manager can withhold is limited. When the accumulated negative information reaches a critical threshold, a large amount of

negative information is released to the market all at once, resulting in a crash (Jin and Myers, 2006; Hutton et al., 2009; Kothari et al., 2009; Kim et al., 2011a; Kim et al., 2011b). Then, how does the manager's career concern affect his or her bad news hiding tendency? Jin and Myers (2006) find that the firm's opaqueness to investors allows a manager to capture part of a firm's operating cash flows. In the process, career concerns may induce managers to withhold negative information stemming from temporary bad performance by controlling public access to bad news about the firm's fundamentals. Once the long runs of negative information is reached at its limit, then the negative information is released at once, which again results in a stock price crash.

2.2. Hypothesis Development

Previous literature examining spillover effects of MD&A has largely focused on its effects on the investment decisions (Sadka, 2006; Badertscher et al., 2013; Shroff et al., 2017; Durnev and Mangen, 2020). Taking a step ahead, we attempt to investigate whether a firm's bad news hoarding tendency is influenced by the tone of the peer firms' MD&A disclosure. Depending on the peer firm's narratives, the manager's decision to release the bad news may be affected. Peer firms' optimistic MD&A narrative tones may increase or decrease the manager's tendency to withhold negative information.

The first possible explanation is that rival firms' positive forecasts about themselves reduce managers' tendency to withhold bad news. One explanation is that peer firms' positive MD&A tone may imply industry-wide opportunities (Cho and Muslu, 2021). Peer firms may reveal a strong potential for the future, and it is also likely to be a positive sign for the firm. Under the general industry growing, managers would have lesser career concerns. Hence, when a rival firm releases positive information on their MD&A narrative, then the manager may be less likely to withhold negative information.

However, we conjecture that the peer firms' positive tone in MD&A disclosures is positively associated with manager's bad news hoarding behaviors. Because peer firms' optimistic forecasts may damage the firm by weakening its market competitiveness (Cho and Muslu, 2021). It could increase a

manager's bad news hoarding behavior because a rival's positive forecast may aggravate managerial career concerns, which are one of the fundamental reasons why managers decide to hide negative information from the public (Graham et al., 2005; Kothari et al., 2009). Kothari et al. (2009) argue that managers have large incentives to hide bad news intentionally for their career concerns because disclosing negative information may negatively affect their compensation package or job termination (Kim, 1999; Nagar, 1999). Furthermore, prior studies also postulate that managers have higher career concerns when greater market competition harms their firm profitability (DeFond and Park, 1999). In other words, when the peer firm discloses positive and optimistic forecasts about the future, managers may have stronger incentives to conceal negative information from the public. Furthermore, Li and Zhan (2019) argue that the competition increases uncertainty, inducing managers to be overconfident about their firm prospects, and Kim et al. (2016) empirically show that overconfident CEOs are more likely to hoard negative news. Consequently, an optimistically forecasted rival's MD&A narrative may induce managers to hide and hoard bad news. To formally put, we hypothesize as follows:

Hypothesis: The rival firms' average MD&A narrative tone is positively associated with the future stock price crash risk.

3. Data and Methodology

3.1. MD&A tone measures

The SEC has required firms to disclose their perspectives since 1968. At that time, the SEC requested to provide the discussion of non-recurring components in earnings. They then revised the regulation in 1974 to additionally require firms to discuss trends in operations. Finally in 1989, the SEC provided guidelines clarifying components MD&As. The SEC mandated all public firms to provide managerial commentary about trends and events that are expected to affect their liquidity, capital resources and future operations at MD&A, which is reported on Section 7 of the 10-K report (SEC 1989).

To calculate the tone of MD&A narratives, we first downloaded all public US firms' 10-Ks beginning from 1996.[2] From the 10-Ks, we then extract the MD&A section and remove tables, figures, business descriptions and safe harbor paragraphs that protect against litigation. We also follow Cho and Muslu (2021) by removing MD&A narratives fewer than 250 words. We then employ Loughran and McDonald (2011) dictionary to process firm-year MD&A documents. Among many sentiment dictionaries, we use the Loughran and McDonald dictionary as it is specifically developed for the business context (Loughran and McDonald, 2016). Following Durnev and Mangen (2020), we count the number of positive words and negative words to first compute the firm's MD&A narrative tone (*Firm-tone* $_{i,t}$) as follows:

$$Firm\text{-}tone_{i,t} = (Positive\ words - Negative\ words)\ /\ Total\ words,$$

where, positive (negative) words indicate the number of Loughran and McDonald (2018) positive (negative) words in the MD&A narratives, and total words indicate the total number of words in the MD&A narratives. To measure the spillover effects from rivals' MD&A narrative tone, we calculate the peer firms' average MD&A tone. Specifically, we average the MD&A narrative tones within the same industry (3-digit SIC code) except the firm itself.

3.2. Crash risk measures

In this paper, we use stock price crash risk measures to proxy the manager's bad news hoarding behavior (Hutton et al., 2009; Kim et al., 2011a; Kim et al., 2011b). Specifically, we employ two different crash risk measures following previous literature (Kim et al., 2011a, 2011b). To observe firm-specific factors that contribute to a firm's crash risk, we estimate the firm's weekly returns for each firm and year. We then define *W* as the firm-specific weekly return, which is computed as the natural log of one plus the residual return from the expanded market model regression. The market model regression is expressed

[2] Our data starts from 1996 as most firms filed their 10-Ks electronically with the SEC via EDGAR since then (Durnev and Mangen, 2020).

as follows:

$$r_{j,\tau} = \alpha_j + \beta_{1,j} r_{m,\tau-2} + \beta_{2,j} r_{m,\tau-1} + \beta_{3,j} r_{m,\tau} + \beta_{4,j} r_{m,\tau+1} + \beta_{5,j} r_{m,\tau+2} + \varepsilon_{j,\tau},$$

where r is the return on stock j in week t, r_m,t and is the return on the CRSP value-weighted market index in week t. Following Dimson (1979), we include the lead and lag terms for the market index return to reflect nonsynchronous trading. The firm-specific weekly return for firm j in week t, W, is computed as the log of one plus the residual return, which is formulated as:

$$W_{j,\tau} = ln(1 + \varepsilon_{j,\tau})$$

We define crash weeks in a given fiscal year for each firm as those weeks where the firm's weekly return decreases below 3.09 standard deviations from the mean firm-specific return over the entire fiscal year (Hutton et al., 2009; Kim et al., 2011a, 2011b). The first measure of crash risk is negative conditional return skewness (*NCSKEW*). We largely borrow this idea from Chen et al. (2001) and Kim et al. (2011a, 2011b), where a firm's NCSKEW in a fiscal year is calculated by taking the negative of the third moment of the firm-specific weekly return for each year and dividing it by the standard deviation of the firm-specific weekly return to the third power. Specifically, the *NCSKEW* variable is calculated as follows:

$$NSCKEW_{j,t} = -\frac{\left[n(n-1)^{\frac{3}{2}} \sum W_{j,\tau}^3\right]}{\left[(n-1)(n-2)\left(\sum W_{j,\tau}^2\right)^{\frac{3}{2}}\right]}$$

Following Chen et al. (2001), the second measure is down-to-up volatility (*DUVOL*). For each firm j over a fiscal year period t, we divide all weeks into "down" and "up" weeks, where down weeks indicate all weeks when the firm-specific weekly return is below the annual mean and up weeks indicate all weeks where the firm-specific weekly return is above the annual mean. We then calculate the standard deviation for each group. The *DUVOL* measure is computed as the log of the ratio of the standard deviation in down weeks to the standard deviation in up weeks. More precisely, *DUVOL* is calculated as follows:

$$DUVOL_{j,t} = \log\left\{\frac{\left[(n_u - 1)\sum_{DOWN} W_{j,\tau}^2\right]}{\left[(n_d - 1)\sum_{UP} W_{j,\tau}^2\right]}\right\},$$

where n_u and n_d denote the number of up and down weeks, respectively, during fiscal year t. For both crash risk variables, $NCSKEW_{j,t}$ and $DUVOL_{j,t}$, higher values indicate greater crash risk.

3.3. Control variables

We control for other factors that may affect the relationship between the rivals' MD&A tone and the future stock price crash risk likelihood. We follow prior crash risk literature to select control variables (Kim et al., 2011a; 2011b + Add more recent crash risk paper). Specifically, we include lagged negative conditional skewness, lagged stock turnover, lagged firm-specific average weekly return, lagged stock return volatility, lagged return on assets, lagged log of assets, lagged market-to-book ratio, lagged leverage ratio and lagged accruals. Furthermore, we lag all control variables and MD&A tone variables to more precisely observe the spillover effects on future managerial bad news hoarding tendency. To omit outliers from the sample, we winsorize at the 1% level.

3.4. Empirical model

We use the following regression model to first analyze the spillover effects of MD&A tone on the future stock price crash risk:

$$NCSKEW(DUVOL)_{i,t+1} = \beta_0 + \beta_1 Rival\text{-}tone_{\ i,t} + \beta_2 Firm\text{-}tone_{\ i,t} + \gamma' CONTROLS_{i,t} + \varepsilon_{i,t},$$

where *Rival-tone* indicates rival firms' average MD&A narrative tone, *Firm-tone* indicates firm's MD&A tone, and *Controls* indicate a set of control variables. Although we include several control variables, the narrative tone measure itself may contain endogeneity concerns, such as the correlation between firm and rival tones. Therefore, we further employ a two-step analysis to somewhat mitigate the endogeneity problem. First, we regress rivals' average MD&A tone on the market MD&A tone and other control variables used in the main analysis to retrieve the residual value, which we define as

E(Rival-tone):

$$E(Rival-tone) = Rival\text{-}tone_{\ i,t} - (\beta_0 + \beta_1 Market\text{-}tone_{\ i,t} + \gamma' CONTROLS_{i,t})$$

where *E(Rival-tone)* and *E(Firm-tone)* imply residual values generated from the first step. Next, we regress crash risk measures on two residual values from the first stages.[3] Furthermore, we commonly use industry and year fixed effects. All errors are clustered at the firm level. To formally put:

$$NCSKEW(DUVOL)_{i,t+1} = \beta_0 + \beta_1 E(Rival\text{-}tone)_{\ i,t} + \beta_2 E(Firm\text{-}tone)_{\ i,t} + \gamma' CONTROLS_{i,t} + \varepsilon_{i,t}$$

3.5. Sample and descriptive statistics

Overall sample spans from 1996 to 2017. After matching all firm level control variables, MD&A tone measures and crash risk measures, we are left with 22,652 firm-year observations. All variables used in the research are defined in Appendix A. Please refer to Appendix A section for data description and their sources.

[PLEASE INSERT TABLE 1 AROUND HERE]

Table 1 reports the descriptive statistics. Table 1 provides the summary statistics. We find that both the average firm's MD&A tone and rival firms' MD&A tone are -0.808 with the standard deviation of 0.391 and 0.733, respectively. This indicates that in general, MD&A disclosures are negatively stated. Furthermore, relatively large standard deviations imply that there exists a significant deviation in the MD&A tone among sample firms. We also find that the descriptive statistics of other control variables and crash risk measures are similar to those of other crash risk literature that uses the US sample.

4. Empirical Results

[3] Following an identical approach, we measure the firm-specific MD&A tone. On the first stage, we first regress the firm's MD&A tone on the average rival firms' MD&A tone, average market MD&A tone and other control variables. This leaves us a residual variable, which we define as *E(Firm-tone).*

4.1. Baseline regression

To test the conjecture, we first regress future crash risk likelihood measures on the rival firms' MD&A tone, firm's MD&A tone and other control variables. The baseline regression results are reported in Table 2. Columns (1) and (2) report the estimation results for NCSKEW and DUVOL, respectively. Columns (3) and (4) report the identical results, but we use the two-stage estimation where we use the residuals of rival-tone and firm-tone measures as specified in subsection 3.4. Regardless of the specifications, we commonly find a positive and statistically significant association between the rival firms' average MD&A narrative tone and the future managerial bad news hoarding behavior. Results support the hypothesis that due to increased managerial career concerns from rival's optimistic and positive forecasts, managers have larger incentives to withhold negative information from the public. Furthermore, we find that coefficients are stable after adopting the two-stage model. Note that the coefficients slightly increased from 0.061 (Column (1)) to 0.065 (Column (3)) for NCSKEW, and 0.022 (Column (2)) to 0.024 (Column (4)) for DUVOL. This indicates that the baseline estimation is potentially not driven by endogeneity.

We also find a positive and significant association between the firm-specific MD&A tone and future stock price crash risk measures. The findings imply that managers who optimistically forecast their own businesses are also more likely to engage in bad news hoarding. One explanation may be that those managers overestimate the returns and misperceive negative information. As a result, negative information is kept for a long period, and their bad performance accumulates, which can lead to stock price crashes (Kim et al., 2016).

[PLEASE INSERT TABLE 2 AROUND HERE]

Overall, there are competing views in interpreting whether managers would have higher or lesser career concerns when their rival firms optimistically forecast their future. In this manner, our estimation model confirms that managers tend to have more concerns than reliefs, thus increasing negative information hiding tendency.

4.2. Subsample analysis

In this section, we investigate several subsample tests through which managers decide to withhold negative information when their rival firms publish positive MD&A narratives. Specifically, we discuss how the product market threats, stock market liquidity, institutional ownership concentration and EPS dispersion affect the relationship between the rival firms' MD&A narrative tone and the managerial dubious behavior.

4.2.1. Moderating effect of product market threats

We first investigate the effects of product market threats. If the manager's willingness to withhold negative information is affected by the peer's tone, then the market competitiveness may significantly affect the relationship. That is, if the industry is highly competitive, then the manager would be more sensitive to the rival firm's context of disclosures. Thus, competitive pressure from the product market may aggravate managers' incentive to withhold bad news (Li and Zhan, 2019). To empirically examine the product market competition effects, we calculate two popular measures: product market fluidity (Hoberg et al., 2014; Li and Zhan, 2019) and Herfindahl-Hirschman Index (HHI). For product market fluidity measures, we set the value as 1 if the fluidity is above median and 0, otherwise. For HHI, higher values indicate lower market competition.

[PLEASE INSERT TABLE 3 AROUND HERE]

The interaction analysis on examining product market threat effects is reported in Table 3. Columns (1) and (2) provide estimation results for product market fluidity on *NCSKEW* and *DUVOL*, respectively. Similarly, Columns (3) and (4) show results for HHI. An interaction analysis using product market fluidity and Herfindahl-Hirschman Index (HHI) commonly shows that a positive association between the rival firms' MD&A narrative sentiment and the future bad news hiding behavior manifests

more severely if the firm belongs to a highly competitive industry. Statistically significant results imply that the product market threat is one potential channel that encourages managers to hide and hoard bad news when rival firms make positive disclosure.

4.2.2. Moderating effect of stock market liquidity

In this subsection, we further analyze the role of stock market liquidity in influencing the relationship between rival-tone and future crash risk. Chang et al. (2017) argue that liquidity induces managers to withhold bad news, fearing that the disclosure of negative information will lead to selling by transient investors. Highly liquid firms have more incentives to hide and hoard negative news. Thus, when the peer firms disclose optimistic and positive statements, their effects on inducing managers toward bad news hoarding may manifest more if the firm is highly liquid to prevent transient investors from selling their shares. We use two stock market liquidity measures. First measure is the Amihud illiquidity measure (Amihud, 2002). We multiply negative one to the Amihud illiquidity measure for easier understanding, and a higher value indicates higher liquidity. We set the value as one if the measure is above median, and zero, otherwise. The second measure is a zero trade measure which is calculated as a turnover weighted number of zero trading days in a year (Liu, 2006). Higher value indicates a higher liquidity.

[PLEASE INSERT TABLE 4 AROUND HERE]

Regression analysis using two stock market liquidity proxies is provided in Table 4. Columns (1) to (2) show results for *NCSKEW* and *DUVOL* where we use Amihud's iliquidity as a channel, respectively. Columns (3) and (4) present identical results on the zero trade measure. An analysis confirms that the baseline relationship is stronger when the firm is highly liquid, indicating that the market liquidity is another potential channel that affects the manager's information managing behavior when the peer firms release rather optimistic forecasts on their MD&A narratives.

4.2.3. Moderating effect of institutional ownership concentration

We investigate how the institutional ownership concentration affects the manager's tendency to withhold negative information when the rival-tone is positive. Callen and Fang (2013) present that institutional ownership is negatively associated with the future stock price crash risk likelihood. Authors use the monitoring theory of institutional investors to explain the relationship. Following their ideas, if the institutional investors are significant bodies to monitor managers from hiding and hoarding bad news, then their effects should also manifest when rival firms' positive MD&A narratives concern the manager's career. Among many proxies to measure institutional ownership, we follow Porras et al. (2016) who suggest the concentration of institutional ownership. Porras et al. (2016) consider the concentration of institutional ownership, measured as the Hirschman-Herfindahl Index (normalized to be between 0 and 1) of institutions' holding of the stock using 13F filings. A more concentrated ownership structure, or a structure including larger single institutional investors, such as block holders, results in shareholders having a greater influence in the equity lending market vis-à-vis a highly dispersed ownership structure.

[PLEASE INSERT TABLE 5 AROUND HERE]

The results are presented in Table 5. Columns (1) to (2) provide results of institutional ownership concentration effects on the relationship between the rivals' MD&A narrative tone on the future managerial bad news hoarding behavior. We find that managers' incentives to withhold negative information significantly decrease when the firm is monitored by institutions. Results imply that even when rivals provide positive forecasts on their businesses, managers' intentions to hide bad news for their own career path are somewhat monitored by a large block of institutions.

4.2.4. Moderating effect of EPS dispersion

Finally, we examine the effects of the EPS dispersion on the managerial dubious behavior. It is a commonly accepted notion that the EPS dispersion is associated with the information transparency (Diether et al., 2002; Cheong and Thomas, 2011). That is, literature uses and interprets dispersion in analysts' forecasts as a proxy for differences in opinion about a stock. DeFond et al. (2015) find that information transparency plays a vital role in affecting managers to hide and hoard bad news. Furthermore, Kim et al. (2019) argue that investors recognize analysts as important information intermediaries and monitors and, thus, that analyst coverage influences the underlying stock's expected crash risk. We follow Diether et al. (2002) and Boehme et al. (2006) to compute the EPS dispersion as the standard deviation in the EPS forecasts divided by the average value of the EPS forecasts. Higher value indicates higher dispersion. Since the *EPS dispersion* measures the firm's information transparency, we should observe a more evident relationship between manager's tendencies to withhold negative information when there is less consensus made among analysts. Results are reported in Columns (3) to (4) of Table 5. Consistent with the conjecture, we find that the manager's likelihood to withhold negative information when the rival tone is positive manifests more when the *EPS dispersion* is high. This result implies that an information transparency environment is one important source that affects the manager's decision to hide the firm's negative news.

4.3. Spillover effect on firm's financial performance

In this section, we investigate how the rival-tone affects the firm's financial performance. We argue that rivals' positive MD&A tone may negatively affect the firm value. Then, because of the increased career concerns, managers are more likely to withhold negative information. For this assumption to hold strong, we should also examine whether the rival's positive MD&A tone actually has a negative impact on the firm's financial performance. Among a large set of measures, we use two commonly used measures: Tobin's Q and financial statement score (Pitroski, 2000). Pitroski (2000) categorizes 9 indicator variables to measure the firm's financial statement health. We then sum the values of 9 indicator variables to form fundamental health scores. For both Tobin's Q and financial statement score, larger value indicates positive performances.

[PLEASE INSERT TABLE 6 AROUND HERE]

Regression results are presented in Table 6. Column (1) reports the estimation result on Tobin's Q and Column (2) reports the estimation result on the financial statement score. Consistent with the hypothesis, we find that the rival firms' positive sentiment significantly decreases the firm's future Tobin's Q and the overall health of the financial statement. This result also implies that the positive forecasts made by rival firms are likely to increase the manager's career concerns, and that the managers are thus more likely to withhold negative information.

5. Robustness Tests

Although our baseline regression model consistently provides evidence that the rival firms have spillover effects on the managerial bad news hoarding behavior, the result may be biased due to some endogeneity concerns. Therefore, in this subsection, we employ several robustness tests to show that the baseline estimation results are not potentially due to endogeneity.

5.1. Alternative tone measurements using Machine learning based and Simple modified models

In this subsection, we address potential concerns regarding the MD&A tone measures. It may be possible that the calculated MD&A tone measure is misspecified thus the estimation results are driven by misspecification error. To address such concerns, we use other alternative calculation methods to calculate the firm's MD&A narrative tone and use those new measures to re-run the baseline regression model.

First, we employ a machine learning method, FinBERT, to re-calculate the MD&A disclosures tone. FinBERT is a pre-trained NLP model for sentiment analysis in financial texts. It is modeled by further training the BERT (Bidirectional Encoder Representations from Transformers) language method in finance area using a large financial corpus and fine-tuning it for financial sentiment

classification. We borrow the pre-trained model of HKUST trained with a litany 10-K and 10-Q filings with earnings call transcripts and analyst reports to analysis our MD&A disclosures (Yang, Uy and Huang, 2020).

Furthermore, we follow Henry and Leone (2016) to construct simple modified MD&A tone measures. We calculate the firm's MD&A tone as the number of positive words minus the number of negative words divided by the sum of the number of positive and negative words. For rival-tone, we average the newly calculated firm-tone within the same industry (SIC 3 digit) except the firm itself. Furthermore, we also use the two-stage regression to mitigate endogeneity issues. To formally put:

$$Firm\text{-}tone - HL_{i,t} = (Positive\ \ words - Negative\ \ words)\ /\ (Positive\ \ words + Negative\ \ words)$$

[PLEASE INSERT TABLE 7 AROUND HERE]

Regression results using alternative MD&A tone measures are reported in Table 7. Panel A and B report the results of baseline regression with machine learning based and Henry and Leone (2016)'s sentiment variables, respectively. Columns (3) and (4) of Panel A and B report the same results but using the two-stage model. We find consistent results with the baseline model. Results imply that the positive association between rival-tone and the future stock price crash risk are not potentially driven by misspecification bias.

5.2. Applying text-based Network Industry Classifications

In this section, we use an alternative industry fixed effects model. Hoberg and Phillips (2018) investigate how firms differ from their competitors using new time-varying measures of product similarity based on text-based analysis of firm 10-K product descriptions. Authors then generated a new set of industries in which firms can have their own distinct set of competitors. While we used SIC 3-digit code to calculate the rivals' MD&A tone, using Hoberg and Phillips (2018) text-based network

industry classifications may be more suitable for our research. Therefore, we recalculate the rival-tone based on the Hoberg and Phillips (2018) network industry classification (icode 300) and also use network industry classification fixed effects[4].

[PLEASE INSERT TABLE 8 AROUND HERE]

Estimation results using text-based network industry classification (Hoberg and Phillips, 2018) are reported in Table 8. The main variable of interest, rival-tone, is calculated by the average of firm-tone within the same industry (icode300) except the firm itself. Columns (1) and (2) present results for NCSKEW and DUVOL, respectively. We again find a positive association between the rivals' MD&A narrative tone and the future stock price crash risk measures. The results imply that managers have higher career concerns thus withhold negative information when their rival firms - determined by text-based network classification - disclose optimistic forecasts.

5.3. Propensity score matching

We use PSM to mitigate further potential endogeneity concerns (Rosenbaum and Rubin, 1984), that is, to rule out that the result may be driven by unobserved heterogeneity. One potential method to address this concern is PSM. Armstrong et al. (2010) find that using propensity scores to generate matched pairs with maximum variation with the causal variable of interest, while minimizing the variation in the controls, is a superior econometric approach to match the outcome variable and rely on a linear or some other assumed functional form to control for confounding variables. Therefore, we match sample firms with above median rival-tones and those below-median rival-tones with other controls, industry code, and fiscal year as confounding variables. This matching process enables us to identify direct effects of

[4] We use the 300 industries classification (icode 300) as it is most analogous to popular alternatives including three-digit SIC codes and four-digit NAICS codes, which have 274 and 331 industries, respectively.

rival firms' MD&A narrative tone on the future stock price crash risk. For the matching procedure, we use one-to-one, one-to-two, and one-to-three nearest neighborhood matching.

[PLEASE INSERT TABLE 9 AROUND HERE]

Regression results using the matched samples are reported in Table 9. Columns (1) and (2) provide results for NCSKEW and DUVOL where we use a one-to-one nearest neighborhood matching process, respectively. Columns (3) to (4) and (5) to (6) show identical results but on one-to-two and one-to-three nearest neighborhood matching procedure. We find a positive and significant association between the average rival firms' MD&A tone and the future stock price crash risk likelihood. Thus, PSM approach mitigates concerns that the results are potentially due to unobserved variables.

5.4. Change analysis

The next robustness test is a change analysis. Another potential endogeneity may be due to time-invariant and firm-specific omitted variables that are highly associated with the MD&A disclosure sentiment. To alleviate this concern, we perform a change analysis following prior literature (Chen et al., 2020). The idea is to examine whether a marginal change in the crash risk measures is attributed exclusively to the incremental change in the rival's MD&A disclosure tone. The incremental analysis is conducted for the full sample, and all control variables are identical to the ones used for the baseline regression.

[PLEASE INSERT TABLE 10 AROUND HERE]

The change analysis results are reported in Table 10. Columns (1) and (2) provide the analysis result, where we calculate the changes in crash measures as the difference of the variable between year t and year t-1 and MD&A tone measures and the control variables between year t-1 and year t-2. Column (1) presents the estimation results for NCSKEW while Columns (2) reports the results for DUVOL. We

find consistent results with the baseline regression, where the increment of rivals' MD&A tone is positively associated with the manager's tendency to withhold negative information, measured by changes of stock price crash risk.

5.5. Firm fixed effects estimates

One potential concern is that having industry and year fixed effects may still not account for unobservable heterogeneity among firms. To alleviate this concern, we further employ a firm fixed effects model. All other control variables are identical to the variables used in the baseline regression model.

[PLEASE INSERT TABLE 11 AROUND HERE]

The firm fixed effects model results are provided in Table 11. Consistent with the hypothesis, we find a positive association between the rivals' MD&A narrative tone and the bad news hoarding behavior, measured by two crash risk measures. Statistically significant results imply that omitted firm characteristics are not significant enough to drive the association between peer firms' MD&A narrative tone and the firm's future stock price crash risk likelihood.

5.6. Non-stock based managerial agency problem measurement

We discuss how the rival firms' positive MD&A narratives affect the manager's bad news hiding behavior using the stock price crash risk. However, stock-based bad news hiding behavior variables may have endogeneity problems. In this subsection, we test how the rival tone affects the firm's earning management directly. If the relationship is true and that the managers do hide negative information, then such behavior should be reflected on the earnings management. Specifically, the rival firms' MD&A tone should negatively affect the firm's earning management. Following prior literature, we use accruals to proxy the earning management (Lo et al., 2017; Ni, 2020).

[PLEASE INSERT TABLE 12 AROUND HERE]

Results are provided in Table 11. Columns (1) to (3) present the effects of rival-tone on the discretionary accruals suggested by Jones (1991), modified Jones model (Dechow et al., 1995) and Kothari et al. (2005), respectively. Columns (1) and (2) show positive and significant association between the rival's MD&A tone and the future opacity. Although the estimation results using the discretionary accruals measured by Kothari et al. (2005) are not statistically significant, we note that the direction is positive. Overall results imply that when the rival firms make positive forecasts on their MD&A narratives, then this fact affects managers to make more earning management. Results also complement Hutton et al. (2006) who argue that opaque firms are more prone to stock price crashes, consistent with the prediction of the Jin and Myers (2006).

6. Conclusion

In this research, we examine the spillover effects on the future stock price crash risk. In particular, we use the MD&A narrative tone of rival firms to investigate how the rival firms' forecast tone affects the manager's bad news hoarding behavior. A strand of literature has long investigated causes that induce managers to withhold information from the public. One explanation is that the managers intentionally hide negative information for their own career concern (Graham et al., 2005; Kothari et al., 2009). A rival firm's positive tone may aggravate managerial career concerns. DeFond and Park (1999) argue that managers have higher career concerns when greater market competition harms their firm profitability. That is, when the peer firm discloses positive and optimistic forecasts about the future, managers may have stronger incentives to conceal negative information from the public. Our regression analysis supports the conjecture showing that an optimistically forecasted rival's MD&A narrative induces managers to hide and hoard bad news, proxied by stock price crash risk measures.

The study has several implications to the literature. First, we contribute to the studies on spillover effects. Taking a step ahead from the prior literature which dominantly facilitated numerical contents of disclosures, we use a rich text source to investigate the spillover effects from MD&A narrative tone. While Durnev and Mangen (2020) and Cho and Muslu (2021) investigate the relationship between MD&A narrative spillover effects on the firm's investment strategies, how peer firms' MD&A tone affects manager's information disclosure tendency is not yet explored. With this regard, this research contributes to the literature by showing that the rivals' MD&A narrative tone have significant spillover effects on the manager's bad new hoarding. Furthermore, this study explores channels that potentially moderate the spillover effects on the bad news hoarding behavior. We find that the product market threats, stock market liquidity, institutional ownership concentration and EPS dispersion are potential channels that affect the manager's decision to withhold negative information when their peers narrate optimistic and positive comments on their MD&A section.

Another contribution is that the paper further sheds a light on the growing literature on managers' asymmetric disclosure of bad news. One view states that managers strategically and systematically hide and hoard negative information (Kothari et al., 2009) for their own benefits. While Kasznik and Lev (1995), Skinner (1997) and Baginski et al. (2002) find that strict regulations on disclosure requirements encourage managers to more promptly release bad news, how the disclosure contents of rival firms affect managers is not well studied. In this manner, we add to the crash risk literature by providing new empirical evidence that positively stated peer firms' MD&A narratives induce managers to withhold bad news.

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Appendix A. Variable definitions

Variables	Definitions	Database
NCSKEW	The negative skewness of firm-specific weekly returns over year t + 1, calculated by taking the negative of the third moment of firm-specific weekly returns for the year and normalizing it by the standard deviation of firm-specific weekly returns raised to the third power	CRSP/ Compustat
DUVOL	The down-to-up volatility. For any stock in year t + 1, we separate all the weeks with firm-specific weekly returns below the annual mean (down weeks) from those with firm-specific weekly returns above the period mean (up weeks) and compute the standard deviation for each of these subsamples separately. The down-to-up volatility is measured as the natural logarithm of the ratio of the standard deviation in the down weeks to the standard deviation in the up weeks.	CRSP/ Compustat
Firm-Tone	Firm specific MD&A tone. Number of positive words per 100 words in a firm's MD&A minus number of negative words per 100 words, measured using the word list from Loughran and McDonald (2011).	SEC EDGAR
Rival-Tone	Peer firms' average MD&A tone. The average of MD&A narrative tones within the same industry (3-digit SIC code) except the firm itself.	SEC EDGAR
E(Firm-Tone)	Expected value of firm specific MD&A tone. We regress the firm's MD&A tone on the average rival firms' MD&A tone, average market MD&A tone and other control variables specified in subsection 3.3. This leaves us a residual variable, which we define as E(Firm-tone).	SEC EDGAR
E(Rival-Tone)	Expected value of firm specific MD&A tone. We regress the firm's MD&A tone on the average market MD&A tone and other control variables specified in subsection 3.3. This leaves us a residual variable, which we define as E(Rival-Tone).	SEC EDGAR
Dturn	Average monthly share turnover over the fiscal year T minus the average monthly share turnover over the previous year, where monthly share turnover is calculated as the monthly share trading volume divided by the number of shares outstanding over the month.	CRSP/ Compustat
Ret	Mean of firm-specific daily returns over the fiscal year, times 100	CRSP/ Compustat
Sigma	Standard deviation of firm-specific daily returns over the fiscal year.	CRSP/ Compustat
ROA	Income before extraordinary items divided by total assets	CRSP/ Compustat
Size	The natural logarithm of the book value of total assets	CRSP/ Compustat
MB	Ratio of the market value of equity to the book value of equity	CRSP/ Compustat
Leverage	Book value of all liabilities divided by total assets	CRSP/ Compustat
DCA	Discretionary accruals estimated by year and industry (two-digit-SIC code) from the modified Jones model (Dechow et al., 1995) that regresses total accruals on sales growth net of the change in accounting receivables, net property, plant and equipment (PPE), and operating cash flows from t−1 to t + 1.	CRSP/ Compustat
DCA-Jones $_t$	Discretionary accruals estimated using the Jones (1991) model	CRSP/ Compustat
DCA-Kothari $_t$	Discretionary accruals estimated using the performance-matched model of Kothari et al. (2005).	CRSP/ Compustat

Tobin Q	The market value of common equity plus the book value of debts divided by total assets	CRSP/ Compustat
F_Score	Following Piotroski (2000), we calculate a firm's annual F-Score (F_Score) as the sum of nine accounting variables that collectively measure the firm's financial strength.	CRSP/ Compustat
Prodmkt fluidity	Firm-specific competitive pressure developed by Hoberg et al. (2014). The similarity between a firm's products and the changes of the products made by competitors in the firm's product market. For the subsample analysis, we set the value as 1 if the measure is **above** median and 0, otherwise.	Hoberg–Phillips Data Library
HHI	Herfindahl-Hirschman Index. The sum of the squares of market shares of the firms within the same 3-digit SIC code industry in a given year, where market share is defined as a ratio of a firm's sales to the sum of sales of the industry. For the subsample analysis, we set the value as 1 if the measure is **below** median and 0, otherwise.	CRSP/ Compustat
Amihud	Amihud (2002) liquidity measure. The average ratio of daily stock returns (absolute value) to daily trading volume. We multiply negative one to the Amihud illiquidity measure for easier understanding, and a higher value indicates higher liquidity. For the subsample analysis, we set the value as 1 if the measure is **above** median and 0, otherwise.	CRSP/ Compustat
Zero trade	Zero trade measure (Liu, 2006). Turnover weighted number of zero trading days. For the subsample analysis, we set the value as 1 if the measure is **above** median and 0, otherwise.	CRSP/ Compustat
Institution concentration	The concentration of institutional ownership, measured as the Hirschman-Herfindahl Index (normalized to be between 0 and 1) of institutions' holding of the stock using 13F filings. For the subsample analysis, we set the value as 1 if the measure is **above** median and 0, otherwise.	I/B/E/S
EPS dispersion	Standard deviation of analyst forecasts in month prior to fiscal period end date divided by the absolute value of the mean forecast; if meanest = 0, then scalar set to 1. For the subsample analysis, we set the value as 1 if the measure is **above** median and 0, otherwise.	I/B/E/S

Table1. Summary statistics

	Mean	Std. D	min	p25	Median	p75	max
$NCSKEW_{t+1}$	0.052	1.116	-2.775	-0.649	-0.003	0.668	3.511
$DUVOL_{t+1}$	0.019	0.408	-0.933	-0.254	0.005	0.276	1.102
$Firm\text{-}Tone_t$	-0.808	0.391	-1.890	-1.022	-0.785	-0.540	0.142
$Rival\text{-}Tone_t$	-0.808	0.733	-2.862	-1.260	-0.752	-0.312	0.924
$E(Firm\text{-}Tone)_t$	0.001	0.275	-0.880	-0.145	0.008	0.148	0.810
$E(Rival\text{-}Tone)_t$	0.000	0.380	-1.173	-0.212	0.017	0.233	1.003
$Firm\text{-}Tone\ 1_t$	-0.283	0.118	-0.557	-0.359	-0.293	-0.207	0.077
$Rival\text{-}Tone\ 1_t$	-0.283	0.234	-0.734	-0.451	-0.313	-0.145	0.430
$NCSKEW_t$	0.031	1.092	-2.755	-0.657	-0.016	0.637	3.470
$Dturn_t$	2.975	117.617	-450.773	-33.580	-0.362	34.588	485.772
Ret_t	0.003	0.012	-0.028	-0.003	0.003	0.009	0.041
$Sigma_t$	0.080	0.043	0.023	0.049	0.070	0.100	0.243
ROA_t	0.816	4.108	-20.625	0.253	0.974	1.443	20.402
$Size_t$	5.577	1.965	1.728	4.075	5.452	6.925	10.468
MB_t	3.180	5.374	-17.058	1.184	2.099	3.838	33.678
$Leverage_t$	0.472	0.262	0.047	0.271	0.450	0.629	1.383
DCA_t	0.363	0.985	0.001	0.034	0.090	0.249	7.396
N	22,652						

Note: Overall sample spans from 1996 to 2017. After matching all firm level control variables, MD&A tone measures and crash risk measures, we are left with 22,652 firm-year observations. All detail descriptions and data sources for these variables are provided in Appendix A.

Table2. The spillover effect of peer firms' Md&A tones on stock price crash risk

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $NCSKEW_{t+1}$	(4) $DUVOL_{t+1}$
Rival-Tone $_t$	0.062**	0.022**		
	(2.479)	(2.453)		
Firm-Tone $_t$	0.024**	0.012***		
	(2.246)	(3.185)		
E(Rival-Tone) $_t$			0.066***	0.024***
			(2.623)	(2.590)
E(Firm-Tone) $_t$			0.053***	0.026***
			(2.801)	(3.824)
NCSKEW $_t$	0.042***	0.011***	0.042***	0.012***
	(4.689)	(3.598)	(4.723)	(3.629)
Dturn $_t$	0.000**	0.000**	0.000**	0.000**
	(2.247)	(2.050)	(2.331)	(2.159)
Ret $_t$	9.688***	3.434***	9.892***	3.530***
	(11.485)	(11.261)	(11.734)	(11.581)
Sigma $_t$	-1.817***	-0.615***	-1.941***	-0.674***
	(-7.786)	(-7.146)	(-8.488)	(-7.965)
ROA $_t$	-0.000	0.000	-0.000	0.000
	(-0.172)	(0.189)	(-0.175)	(0.187)
Size $_t$	0.058***	0.018***	0.057***	0.018***
	(12.397)	(10.560)	(12.258)	(10.391)
MB $_t$	0.005***	0.002***	0.005***	0.002***
	(3.039)	(3.637)	(3.043)	(3.644)
Leverage $_t$	-0.148***	-0.049***	-0.149***	-0.050***
	(-4.486)	(-4.195)	(-4.543)	(-4.279)
DCA $_t$	-0.003	0.001	-0.003	0.001
	(-0.331)	(0.212)	(-0.328)	(0.214)
Constant	-0.032	0.000	-0.089**	-0.021
	(-0.779)	(0.026)	(-2.397)	(-1.568)
Observations	22,652	22,652	22,652	22,652
Adjusted R-squared	0.036	0.036	0.036	0.036
Industry FE	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes
Firm Cluster	Yes	Yes	Yes	Yes

Notes: This table presents the relationship between the peer firms' tone and stock price crash risks. The main independent variable is rivals' MD&A narrative tone *Rival-Tone* and estimated rivals' MD&A narrative tone *E(Rival-Tone)*. Dependent variables, *NCSKEW* and *DUVOL*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. All the results are provided after controlling for industry-fixed and year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 3. Subsample analysis 1: Product market threats

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $NCSKEW_{t+1}$	(4) $DUVOL_{t+1}$
*E(Rival-Tone) * Prodmkt fluidity* $_t$	0.130***	0.052***		
	(3.460)	(3.808)		
Prodmkt fluidity(high=1) $_t$	0.075***	0.028***		
	(4.087)	(4.281)		
*E(Rival-Tone) * HHI* $_t$			0.075**	0.030**
			(2.015)	(2.144)
HHI(low=1) $_t$			0.082***	0.033***
			(3.136)	(3.466)
E(Rival-Tone) $_t$	0.070***	0.025***	0.064**	0.023**
	(2.758)	(2.648)	(2.518)	(2.476)
E(Firm-Tone) $_t$	-0.008	0.002	0.016	0.012
	(-0.321)	(0.244)	(0.617)	(1.223)
NCSKEW $_t$	0.040***	0.011***	0.042***	0.011***
	(4.368)	(3.316)	(4.658)	(3.560)
Dturn $_t$	0.000**	0.000**	0.000**	0.000**
	(2.466)	(2.292)	(2.288)	(2.112)
Ret $_t$	10.074***	3.612***	9.919***	3.542***
	(11.936)	(11.845)	(11.771)	(11.627)
Sigma $_t$	-2.162***	-0.755***	-1.951***	-0.678***
	(-9.312)	(-8.770)	(-8.547)	(-8.011)
ROA $_t$	-0.000	0.000	-0.000	0.000
	(-0.113)	(0.173)	(-0.188)	(0.156)
Size $_t$	0.056***	0.017***	0.058***	0.018***
	(11.765)	(10.020)	(12.317)	(10.425)
MB $_t$	0.005***	0.002***	0.005***	0.002***
	(2.846)	(3.422)	(3.056)	(3.684)
Leverage $_t$	-0.138***	-0.045***	-0.152***	-0.051***
	(-4.169)	(-3.777)	(-4.617)	(-4.343)
DCA $_t$	-0.003	0.001	-0.003	0.001
	(-0.325)	(0.231)	(-0.373)	(0.162)
Constant	-0.107***	-0.029**	-0.130***	-0.038***
	(-2.892)	(-2.167)	(-3.277)	(-2.616)
Observations	22,652	22,652	22,369	22,369
Adjusted R-squared	0.040	0.040	0.037	0.038
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm Cluster	Yes	Yes	Yes	Yes

Notes: This table presents the results of moderating effects of the product market threats on the relationship between the peer firms' tone and stock price crash risks. Column (1) and (2) provide the results for the subsamples divided by the median value of product market fluidity, *Prodmkt fluidity*, (Hoberg et al., 2014; Li and Zhan, 2019). Column (3) and (4) provide the results for the subsamples divided by the median value of Herfindahl-Hirschman Index (*HHI*). The main independent variable is estimated rivals' MD&A narrative tone *E(Rival-Tone)*. Dependent variables, *NCSKEW* and *DUVOL*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. And all the results are provided after controlling for industry-fixed and year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4. Subsample analysis 2: Stock market liquidity

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $NCSKEW_{t+1}$	(4) $DUVOL_{t+1}$
*E(Rival-Tone) * Amihud* $_t$	0.080**	0.032**		
	(2.087)	(2.285)		
Amihud $_t$	0.156***	0.061***		
	(7.286)	(7.812)		
*E(Rival-Tone) * Zero trade* $_t$			0.109***	0.031**
			(2.801)	(2.136)
Zero trade $_t$			0.150***	0.054***
			(8.474)	(8.526)
E(Rival-Tone) $_t$	0.068***	0.024***	0.067***	0.024***
	(2.669)	(2.632)	(2.660)	(2.636)
E(Firm-Tone) $_t$	0.008	0.008	-0.004	0.010
	(0.286)	(0.832)	(-0.148)	(1.073)
NCSKEW $_t$	0.037***	0.010***	0.035***	0.009***
	(4.162)	(3.018)	(3.900)	(2.804)
Dturn $_t$	0.000*	0.000*	0.000*	0.000
	(1.867)	(1.674)	(1.687)	(1.545)
Ret $_t$	9.640***	3.432***	9.755***	3.481***
	(11.435)	(11.256)	(11.582)	(11.424)
Sigma $_t$	-1.937***	-0.672***	-2.467***	-0.864***
	(-8.495)	(-7.980)	(-10.523)	(-9.972)
ROA $_t$	-0.001	0.000	-0.000	0.000
	(-0.309)	(0.025)	(-0.234)	(0.112)
Size $_t$	0.026***	0.006**	0.037***	0.011***
	(4.138)	(2.430)	(7.242)	(5.592)
MB $_t$	0.003**	0.002***	0.004**	0.002***
	(2.168)	(2.713)	(2.535)	(3.165)
Leverage $_t$	-0.115***	-0.037***	-0.122***	-0.040***
	(-3.482)	(-3.114)	(-3.705)	(-3.426)
DCA $_t$	-0.003	0.001	-0.003	0.001
	(-0.325)	(0.219)	(-0.331)	(0.217)
Constant	-0.003	0.012	-0.020	0.004
	(-0.072)	(0.858)	(-0.522)	(0.275)
Observations	22,652	22,652	22,652	22,652
Adjusted R-squared	0.038	0.039	0.039	0.039
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm Cluster	Yes	Yes	Yes	Yes

Notes: This table presents the results of moderating effects of the product market threats on the relationship between the peer firms' tone and stock price crash risks. Column (1) and (2) provide the results for the subsamples divided by the median value of the Amihud measure (*Amihud* is one if the liquidity is high, and zero otherwise). Column (3) and (4) provide the results for the subsamples divided by the median value of Zero trade measure (*Zero trade* is one if the liquidity is high, and zero otherwise). The main independent variable is estimated rivals' MD&A narrative tone *E(Rival-Tone)*. Dependent variables, *NCSKEW* and *DUVOL*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. And all the results are provided after controlling for industry-fixed and year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5. Subsample analysis 3: Institutional ownership concentration and EPS dispersion

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $NCSKEW_{t+1}$	(4) $DUVOL_{t+1}$
E(Rival-Tone) * *Institution concentration* $_t$	-0.063*	-0.027**		
	(-1.701)	(-1.989)		
Institution concentration(high=1) $_t$	-0.028	-0.014**		
	(-1.624)	(-2.264)		
E(Rival-Tone) * *EPS dispersion* $_t$			0.095**	0.037***
			(2.514)	(2.651)
EPS dispersion(high=1) $_t$			0.150***	0.046***
			(9.197)	(7.922)
E(Rival-Tone) $_t$	0.064**	0.023**	0.066***	0.024**
	(2.532)	(2.491)	(2.611)	(2.550)
E(Firm-Tone) $_t$	0.087***	0.041***	0.008	0.009
	(3.227)	(4.102)	(0.296)	(0.903)
NCSKEW $_t$	0.042***	0.011***	0.036***	0.009***
	(4.674)	(3.568)	(3.978)	(2.970)
Dturn $_t$	0.000**	0.000**	0.000**	0.000**
	(2.237)	(2.029)	(2.295)	(2.128)
Ret $_t$	9.754***	3.462***	9.794***	3.498***
	(11.514)	(11.293)	(11.619)	(11.471)
Sigma $_t$	-1.902***	-0.655***	-2.098***	-0.721***
	(-8.304)	(-7.718)	(-9.208)	(-8.521)
ROA $_t$	-0.000	0.000	-0.000	0.000
	(-0.209)	(0.125)	(-0.173)	(0.155)
Size $_t$	0.054***	0.016***	0.043***	0.013***
	(10.478)	(8.536)	(8.774)	(7.426)
MB $_t$	0.005***	0.002***	0.005***	0.002***
	(3.000)	(3.608)	(2.958)	(3.604)
Leverage $_t$	-0.145***	-0.048***	-0.133***	-0.045***
	(-4.394)	(-4.059)	(-4.081)	(-3.849)
DCA $_t$	-0.003	0.001	-0.003	0.001
	(-0.296)	(0.252)	(-0.315)	(0.224)
Constant	-0.061	-0.007	-0.077**	-0.018
	(-1.463)	(-0.471)	(-2.099)	(-1.337)
Observations	22,652	22,652	22,652	22,652
Adjusted R-squared	0.036	0.036	0.040	0.039
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm Cluster	Yes	Yes	Yes	Yes

Notes: This table presents the results of moderating effects of the product market threats on the relationship between the peer firms' tone and stock price crash risks. Column (1) and (2) provide the results for the subsamples divided by the median value of *Institution concentration*. Column (3) and (4) provide the results for the subsamples divided by the median value of *EPS dispersion*. The main independent variable is estimated rivals' MD&A narrative tone *E(Rival-Tone)*. Dependent variables, *NCSKEW* and *DUVOL*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. And all the results are provided after controlling for industry-fixed and year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6. The spillover effect of peer firms' Md&A tones on corporate financial performance

	(1) *Tobin Q* $_{t+1}$	(2) *Financial statements score* $_{t+1}$
E(Rival-Tone) $_t$	-0.092*	-0.124***
	(-1.880)	(-2.921)
E(Firm-Tone) $_t$	0.166***	0.013
	(3.789)	(0.390)
ROA $_t$	0.005	-0.001
	(1.326)	(-0.285)
Size $_t$	-0.103***	0.184***
	(-6.626)	(21.419)
MB $_t$	0.157***	-0.000
	(11.203)	(-0.120)
Leverage $_t$	-0.479***	0.559***
	(-3.972)	(9.337)
Constant	2.466***	3.369***
	(23.018)	(60.936)
Observations	17,256	17,256
Adj. R-squared	0.137	0.153
Industry FE	Yes	Yes
Year FE	Yes	Yes
Firm Cluster	Yes	Yes

Notes: This table presents the relationship between the peer firms' tone and the financial performance. The main independent variable is estimated rivals' MD&A narrative tone *E(Rival-Tone)*. Dependent variables, *Tobin Q* and *Financial statements score*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. All detail descriptions and data sources for these variables are provided in Appendix A. All the results are provided after controlling for industry-fixed and year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 7. Alternative tone variables using machine learning based and simple modified models

Panel A. Machine learning based sentiment model				
	(1)	(2)	(3)	(4)
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
Rival-Tone-ML $_t$	0.542***	0.247***		
	(2.914)	(3.557)		
Firm-Tone- ML $_t$	0.273***	0.103***		
	(3.140)	(3.238)		
E(Rival-Tone-ML) $_t$			0.601***	0.267***
			(3.185)	(3.788)
E(Firm-Tone-ML) $_t$			0.548***	0.215***
			(3.602)	(3.862)
$NCSKEW_t$	0.038***	0.010***	0.038***	0.011***
	(4.271)	(3.294)	(4.274)	(3.303)
Dturn $_t$	0.000**	0.000**	0.000**	0.000**
	(2.362)	(2.159)	(2.573)	(2.385)
Ret $_t$	9.461***	3.409***	9.796***	3.541***
	(11.089)	(11.027)	(11.560)	(11.531)
Sigma $_t$	-1.788***	-0.615***	-1.997***	-0.698***
	(-7.554)	(-7.066)	(-8.723)	(-8.258)
ROA $_t$	-0.001	-0.000	-0.000	0.000
	(-0.384)	(-0.112)	(-0.231)	(0.057)
Size $_t$	0.058***	0.018***	0.058***	0.018***
	(12.210)	(10.320)	(12.288)	(10.365)
MB $_t$	0.005***	0.002***	0.005***	0.002***
	(3.186)	(3.747)	(3.276)	(3.844)
Leverage $_t$	-0.154***	-0.053***	-0.156***	-0.053***
	(-4.663)	(-4.440)	(-4.701)	(-4.475)
DCA $_t$	-0.004	0.000	-0.004	0.001
	(-0.468)	(0.116)	(-0.417)	(0.176)
Constant	-0.108***	-0.029**	-0.086**	-0.019
	(-2.874)	(-2.086)	(-2.307)	(-1.416)
Observations	22,418	22,418	22,418	22,418
Adjusted R-squared	0.037	0.037	0.037	0.037
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm Cluster	Yes	Yes	Yes	Yes
Panel B. Simple modified sentiment model				
	(1)	(2)	(3)	(4)
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
Rival-Tone-HL $_t$	0.205**	0.075**		
	(2.516)	(2.515)		
Firm-Tone-HL $_t$	0.071**	0.033***		
	(2.193)	(2.838)		
E(Rival-Tone-HL) $_t$			0.182**	0.066**
			(2.451)	(2.460)
E(Firm-Tone-HL) $_t$			0.129***	0.061***
			(2.792)	(3.543)
$NCSKEW_t$	0.042***	0.011***	0.042***	0.011***
	(4.681)	(3.585)	(4.694)	(3.591)
Dturn $_t$	0.000**	0.000**	0.000**	0.000**
	(2.325)	(2.152)	(2.381)	(2.220)
Ret $_t$	9.695***	3.443***	9.875***	3.523***
	(11.485)	(11.282)	(11.711)	(11.550)
Sigma $_t$	-1.860***	-0.638***	-1.949***	-0.678***

	(-8.063)	(-7.491)	(-8.534)	(-8.018)
ROA $_t$	-0.000	0.000	-0.000	0.000
	(-0.155)	(0.220)	(-0.152)	(0.224)
Size $_t$	0.057***	0.018***	0.057***	0.018***
	(12.231)	(10.359)	(12.262)	(10.398)
MB $_t$	0.005***	0.002***	0.005***	0.002***
	(3.035)	(3.641)	(3.047)	(3.655)
Leverage $_t$	-0.147***	-0.049***	-0.150***	-0.050***
	(-4.478)	(-4.200)	(-4.557)	(-4.301)
DCA $_t$	-0.003	0.001	-0.003	0.001
	(-0.355)	(0.188)	(-0.335)	(0.208)
Constant	-0.019	0.006	-0.089**	-0.021
	(-0.427)	(0.390)	(-2.413)	(-1.572)
Observations	22,652	22,652	22,652	22,652
Adjusted R-squared	0.036	0.036	0.036	0.036
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm Cluster	Yes	Yes	Yes	Yes

Notes: This table presents the results of the relation between the peer firms' tone and stock price crash risks using alternative tone calculations. The first alternative independent variable is rivals' MD&A narrative tone variables using machine learning model, *Rival-Tone-ML* and *E(Rival-Tone-ML)* in Panel A. The second alternative independent variable is rivals' MD&A narrative tone variables following Henry and Leone (2016), *Rival-Tone-HL* and *E(Rival-Tone-HL)* in Panel A. Dependent variables, *NCSKEW* and *DUVOL*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. All the results are provided after controlling for year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 8. Applying text-based Network Industry Classifications

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$
E(Rival-Tone) $_t$	0.048**	0.024***
	(2.010)	(2.653)
E(Firm-Tone) $_t$	0.047**	0.025***
	(2.501)	(3.622)
$NCSKEW_t$	0.039***	0.011***
	(4.369)	(3.329)
Dturn $_t$	0.000**	0.000**
	(2.374)	(2.476)
Ret $_t$	9.807***	3.488***
	(11.579)	(11.418)
Sigma $_t$	-2.012***	-0.694***
	(-8.595)	(-8.032)
ROA $_t$	-0.000	0.000
	(-0.083)	(0.284)
Size $_t$	0.056***	0.018***
	(11.790)	(10.283)
MB $_t$	0.004***	0.002***
	(2.725)	(3.182)
Leverage $_t$	-0.140***	-0.046***
	(-4.221)	(-3.918)
DCA $_t$	-0.008	-0.001
	(-0.916)	(-0.429)
Constant	-0.074**	-0.020
	(-1.961)	(-1.459)
Observations	22,401	22,401
Adjusted R-squared	0.038	0.038
icode300 FE	Yes	Yes
Year FE	Yes	Yes
Firm Cluster	Yes	Yes

Notes: This table presents the results of the relation between the peer firms' tone and stock price crash risks using text-based Network Industry Classifications (Hoberg and Phillips, 2018). The main independent variable is estimated rivals' MD&A narrative tone *E(Rival-Tone)* based on text-based Network Industry Classifications. Dependent variables, *NCSKEW* and *DUVOL*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. All the results are provided after controlling for year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 9. Propensity score matching analysis

	1:1 matched		1:2 matched		1:3 matched	
	(1)	(2)	(3)	(4)	(5)	(6)
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
E(Rival-Tone) $_t$	0.090***	0.030**	0.070**	0.023**	0.071**	0.024**
	(2.709)	(2.382)	(2.328)	(2.031)	(2.488)	(2.231)
E(Firm-Tone) $_t$	0.033	0.020**	0.041*	0.021**	0.047**	0.023***
	(1.276)	(2.138)	(1.797)	(2.543)	(2.210)	(3.030)
$NCSKEW_t$	0.039***	0.010**	0.042***	0.011***	0.040***	0.011***
	(3.244)	(2.368)	(4.031)	(3.082)	(4.026)	(3.123)
Dturn $_t$	0.000**	0.000**	0.000***	0.000**	0.000***	0.000**
	(2.488)	(2.111)	(2.675)	(2.493)	(2.704)	(2.540)
Ret $_t$	10.469***	3.753***	10.041***	3.596***	9.716***	3.476***
	(9.290)	(9.185)	(10.072)	(10.088)	(10.308)	(10.247)
Sigma $_t$	-1.882***	-0.636***	-1.846***	-0.643***	-1.874***	-0.652***
	(-6.186)	(-5.571)	(-6.806)	(-6.223)	(-7.359)	(-6.742)
ROA $_t$	0.003	0.001	0.000	0.000	0.001	0.000
	(1.101)	(1.131)	(0.207)	(0.255)	(0.546)	(0.536)
Size $_t$	0.057***	0.018***	0.055***	0.017***	0.057***	0.018***
	(8.924)	(8.055)	(9.616)	(8.314)	(10.650)	(9.318)
MB $_t$	0.002	0.001	0.004*	0.002**	0.004**	0.002***
	(0.979)	(1.223)	(1.851)	(2.305)	(2.305)	(2.786)
Leverage $_t$	-0.132***	-0.046***	-0.135***	-0.045***	-0.155***	-0.053***
	(-2.993)	(-2.906)	(-3.285)	(-3.099)	(-4.041)	(-3.889)
DCA $_t$	0.005	0.004	-0.001	0.002	0.001	0.002
	(0.385)	(0.806)	(-0.055)	(0.420)	(0.080)	(0.615)
Constant	-0.085*	-0.025	-0.077*	-0.018	-0.084**	-0.021
	(-1.709)	(-1.374)	(-1.718)	(-1.117)	(-2.005)	(-1.372)
Observations	17,501	17,501	20,262	20,262	21,595	21,595
Adjusted R^2	0.039	0.039	0.037	0.037	0.037	0.037
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Cluster	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents the results from the OLS regression for the relation between the peer firms' tone and stock price crash risks using the propensity score matched sample. Columns (1) and (2) contain the results for the regressions with the high Rival-Tone firms (*E(Rival-Tone)*>median) and control sample using 1:1 matching. Columns (3) and (4) contain the results for the regressions 1:2 matching. Columns (3) and (4) contain the results for the regressions 1:3 matching. The main independent variable is estimated rivals' MD&A narrative tone *E(Rival-Tone)*. Dependent variables, *NCSKEW* and *DUVOL*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. All the results are provided after controlling for industry-fixed and year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 10. Change analysis

	(1) $\Delta NCSKEW_{t+1}$	(2) $\Delta DUVOL_{t+1}$
$\Delta E(Rival\text{-}Tone)_t$	0.075**	0.028**
	(2.207)	(2.135)
$\Delta E(Firm\text{-}Tone)_t$	0.081***	0.029***
	(3.078)	(2.864)
$\Delta NCSKEW_t$	-0.494***	-0.147***
	(-53.909)	(-41.579)
$\Delta Dturn_t$	0.000***	0.000***
	(3.996)	(2.777)
ΔRet_t	1.386	4.422***
	(1.505)	(12.519)
$\Delta Sigma_t$	-3.139***	-1.270***
	(-9.403)	(-10.137)
ΔROA_t	0.001	0.001
	(0.348)	(0.662)
$\Delta Size_t$	0.356***	0.141***
	(14.429)	(15.426)
ΔMB_t	0.004*	0.002***
	(1.841)	(2.759)
$\Delta Leverage_t$	-0.127*	-0.039
	(-1.649)	(-1.412)
ΔDCA_t	-0.012	-0.004
	(-1.132)	(-1.117)
Constant	-0.020***	-0.006**
	(-2.809)	(-2.447)
Observations	17,256	17,256
Adjusted R-squared	0.240	0.223
Industry FE	Yes	Yes
Year FE	Yes	Yes
Firm Cluster	Yes	Yes

Notes: This table reports OLS regression estimates of changes in stock price crash risks on changes in the peer firms' tone. The dependent variables $\Delta NCSKEW_{t+1}$ and $\Delta DUVOL_{t+1}$ are measured as the difference of the dependent variable between year t+1 and year t. Independent variables are measured as the difference of the variable between year t and year t-1. All detail descriptions and data sources for these variables are provided in Appendix A. All the results are provided after controlling for industry-fixed and year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 11. Firm fixed effects estimation

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$
E(Rival-Tone) $_t$	0.059*	0.020*
	(1.867)	(1.695)
E(Firm-Tone) $_t$	0.064**	0.024**
	(2.541)	(2.537)
$NCSKEW_t$	-0.143***	-0.041***
	(-14.168)	(-11.358)
Dturn $_t$	0.000***	0.000***
	(3.707)	(2.982)
Ret $_t$	7.313***	4.013***
	(7.462)	(11.149)
Sigma $_t$	-3.462***	-1.455***
	(-10.732)	(-12.066)
ROA $_t$	0.000	0.000
	(0.201)	(0.537)
Size $_t$	0.244***	0.101***
	(13.893)	(15.396)
MB $_t$	0.005**	0.002***
	(2.427)	(2.980)
Leverage $_t$	-0.145**	-0.055**
	(-2.374)	(-2.517)
DCA $_t$	-0.004	-0.000
	(-0.370)	(-0.126)
Constant	-1.013***	-0.426***
	(-9.126)	(-10.281)
Observations	22,652	22,652
Adjusted R-squared	0.066	0.055
Firm FE	Yes	Yes
Year FE	Yes	Yes
Firm Cluster	Yes	Yes

Notes: This table presents the results of the relation between the peer firms' tone and stock price crash risks after controlling for firm-fixed effects. The main independent variable is estimated rivals' MD&A narrative tone *E(Rival-Tone)*. Dependent variables, *NCSKEW* and *DUVOL*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. All the results are provided after controlling for year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 12. The spillover effect of peer firms' Md&A tones on earnings managements

	(1) *Discretionary Accruals Jones 1991* $_{t+1}$	(2) *Discretionary Accruals Modified Jones 1991* $_{t+1}$	(3) *Discretionary Accruals Kothari* $_{t+1}$
E(Rival-Tone) $_t$	0.106*	0.101*	0.001
	(1.917)	(1.853)	(0.192)
E(Firm-Tone) $_t$	0.082*	0.090*	-0.005*
	(1.719)	(1.775)	(-1.935)
ROA $_t$	0.001	0.001	0.000
	(0.174)	(0.187)	(1.003)
Size $_t$	0.008	0.003	-0.008***
	(0.840)	(0.259)	(-10.253)
MB $_t$	-0.002	-0.002	-0.000
	(-0.658)	(-0.487)	(-1.094)
Leverage $_t$	-0.054	-0.008	0.026***
	(-0.481)	(-0.062)	(3.843)
Constant	0.071	0.094	0.040***
	(1.125)	(1.378)	(8.903)
Observations	17,256	17,256	17,256
Adj. R-squared	0.009	0.015	0.015
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm Cluster	Yes	Yes	Yes

Notes: This table presents the relationship between the peer firms' tone and the earning management. The main independent variable is estimated rivals' MD&A narrative tone *E(Rival-Tone)*. Dependent variables, *Discretionary Accruals Jones 1991*, *Discretionary Accruals Modified Jones 1991* and *Discretionary Accruals Kothari*, are measured in year t + 1, and all independent variables are measured in year t. All detail descriptions and data sources for these variables are provided in Appendix A. All detail descriptions and data sources for these variables are provided in Appendix A. All the results are provided after controlling for industry-fixed and year-fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

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