Does debt maturity affect stock price crash risk?

Viet Anh Dang, Edward Lee, Yangke Liu, and Cheng Zeng*

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* All authors are based at Alliance Manchester Business School, Booth Street West, the University of Manchester, M15 6PB, UK. Viet Anh Dang (*Corresponding author*), Vietanh.Dang@manchester.ac.uk; Edward Lee, Edward.Lee@manchester.ac.uk; Yangke Liu, yangke.liu@postgrad.manchester.ac.uk; Cheng Zeng, Cheng.Zeng@manchester.ac.uk. We are grateful for the helpful comments from Marie Dutordoir, Susanne Espenlaub, Ning Gao, Roberto Mura, Maria Marchica, Konstantinos Stathopoulos, Norman Strong, and Karin Thorburn. All remaining errors are our own.

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ABSTRACT

This paper examines the impact of debt maturity choice on future stock price crash risk. We find that firms with a larger proportion of short-term debt tend to have lower future stock price crash risk, consistent with short-term debt playing an effective monitoring role over managers and constraining their bad news hoarding behavior. Our results also show that the inverse relation between short-term debt and future crash risk is more pronounced among firms with less effective corporate governance, lower institutional ownership, and higher degree of information asymmetry, suggesting that the monitoring effect of short-term debt substitutes for weak governance mechanisms. Overall, our paper shows that short-term debt not only preserves creditors' interests, but also protects the value of shareholders.

JEL Classification: G3, G12, G14.

Keywords: Debt maturity; stock price crash risk; corporate governance; information asymmetry.

1. Introduction

Debt is one of the primary means of capital acquisition for firms in the US and around the world (e.g., Graham et al., 2015). In the context of debt financing, the structure of debt maturity significantly influences the decision making of both firms and investors. Existing academic literature on debt maturity comprises two pathways. One stream of literature has extensively documented the determinants of debt maturity structure (e.g., Brick and Ravid, 1985; Barclay and Smith, 1995; Guedes and Opler, 1996; Stohs and Mauer, 1996). Another strand of literature investigates the impact of debt maturity on investment (e.g., Myers, 1977; Aivazian et al. 2005; Almeida et al. 2011), liquidity risk (Diamond, 1991), cash holdings (Harford et al., 2014), and risk-taking incentives (e.g., Datta et al., 2005; Brockman et al., 2010). Despite a growing awareness of the role of debt maturity in corporate finance and investment behavior, there is relatively limited research on whether and how the reduction of information asymmetry through creditors' monitoring can in turn benefit another important group of stakeholders, i.e., equity investors. Our study adds to this literature by examining the effect of short-term debt on future stock price crash risk.

Stock price crash refers to an extreme collapse in equity value, which causes a severe decline of shareholders' wealth. This downside risk is of serious concern to investors and firms alike because it affects risk management and investment decision making. Prior literature suggests that the primary cause of stock price crash is managers' tendency to hoard and withhold unfavorable information from outsiders in the presence of potential agency problems (e.g., Jin and Myers, 2006; Hutton et al., 2009). Incentivized by career concerns and the maintenance of remuneration, managers may attempt to conceal bad news over an extended time period, and upon subsequent revelation of such accumulated information the market value of their firms would correct sharply downward to generate stock price crashes.

Recent studies show that various internal and external factors can influence firms' stock price crash risk. Among the internal factors identified include executive compensation incentives (Kim et al., 2011a), tax avoidance techniques (Kim et al., 2011b), institutional ownership (An and Zhang, 2013; Callen and Fang, 2013), and accounting conservatism (Kim and Zhang, 2015). Among the external factors documented are such as short-selling (Callen and Fang, 2013), religion (Callen and Fang, 2015a), and accounting standards (IFRS) (Callen and Fang, 2015b; DeFond et al., 2014).

We hypothesize that short-term debt can reduce a firm's stock price crash risk for the following reasons. Compared to long-term debt, short-term debt usually matures in a shorter period and involves more frequent renewals or refinancing (Myers, 1977; Diamond, 1991). As such, it acts as an effective tool to monitor managers' behavior (Ranjan and Winton, 1995; Stulz, 2001; Datta et al., 2005). Since incomplete debt contracts allocate lenders' control rights *ex ante*, lenders have strong incentives to make use of the threat of not renewing the contracts to deter managers' opportunistic behavior (Giannetti, 2003). Short-term lenders, in particular, can protect their rights by requiring managers to provide timely and reliable information about firms' financial conditions or future investments when negotiating the renewal with borrowers. This distinct feature of short-term debt enhances managerial information revelation, curbs the likelihood of bad news hoarding, and hence reduces stock price crash risk. On the contrary, long-term debt lenders are associated with weaker control rights since they can act only when covenant violation occurs (Rajan and Winton, 1995). This reduces long-term debtholders' monitoring effect and ability to curb managerial hoarding of adverse information, which potentially leads to higher crash risk. Overall, our arguments predict that short-maturity debt is negatively related to stock price crash risk.

To test this prediction, we estimate the impact of short-term debt on future stock price crash risk, while controlling for several important firm-specific characteristics and known determinants of crash risk. Consistent with prior studies (e.g., Chen et al., 2001; Hutton et al., 2009; Kim et al., 2011a, 2011b; Kim and Zhang, 2015), we measure stock price crash risk as (i) the negative conditional skewness of firm-specific weekly returns, and (ii) the "down-to-up volatility" of firm-specific weekly returns. Following the debt maturity literature, we measure short-maturity debt as the fraction of debt due within three years, which is a well-established cutoff point for short-term debt in finance studies that examine short-term versus long-term debt (e.g., Barclay and Smith, 1995; Johnson, 2003; Brockman et al., 2010; Gul and Goodwin, 2010).

We find empirical evidence consistent with our hypothesis. Using a sample of 50,088 firm-year observations from 1988 to 2014, we observe that firms using more short-term debt exhibit lower future stock price crash risk. Overall, our evidence is in line with managers being less likely to hoard and conceal bad news in the presence of the monitoring by short-term debt lenders. Our results are also robust to various tests addressing endogeneity concerns and those using alternative measures of crash risk and short-maturity debt. Moreover, through a sub-sample of firms that issued new debt, we also observe a positive relationship between the length of debt maturity structure and stock price crash risk, which further strengthens our main inference.

We further investigate whether creditors monitoring through short-term debt effectively substitutes for weaknesses in corporate governance mechanisms and information environment. These additional empirical analyses are motivated by the extant studies on the agency perspective of debt maturity (Barnea et al., 1980; Datta et al., 2005; Brockman et al., 2010). If short-term debt indeed reduces stock price crash risk due to creditors' monitoring, then we would expect such an effect to make a greater difference among firms more susceptible to agency problems and information asymmetry. Consistent with this expectation, we show that the mitigating effect of short-term debt on crash risk is more pronounced when firms have lower corporate governance ratings, weaker shareholder rights, and a lower proportion of (long-term) institutional ownership. In addition, we find that the negative relation between short-term debt and future crash risk is stronger among firms with a high degree of information asymmetry, measured by the level of analyst covering, the dispersion of analyst forecasting, and R&D intensity. These findings also help mitigate the concern that firms with short-term debt have less price crash risk because they are endogenously associated with better governance mechanisms or information environment.

We contribute to two strands of literature. First, to our best knowledge, this is the first study to investigate the economic consequences of debt maturity by focusing on its impact on high moments of stock return distribution. Prior research suggests that debt maturity structure plays a significant role in reducing agency costs (Myers, 1977; Barclay and Smith, 1995; Guedes and Opler, 1996; Datta et al., 2005) and firm risk (Barnea et al., 1980; Leland and Loft, 1996) by increasing the frequency of monitoring (Rajan and Winton, 1995; Stulz, 2001). Our empirical evidence extends this literature by showing that short-term debt can reduce stock price crash risk by curbing managers' bad news hoarding behavior. Second, our study enriches a growing stream of research on stock price crash risk. As a special feature of stock return distribution, the issue of stock price crash risk is attracting increasing attention among academics and practitioners. Our study extends prior research on factors that could predict future stock price crash risk (e.g., Chen et al., 2001; Hutton et al., 2009; Kim et al., 2011a, 2011b; Callen and Fang, 2013, 2015a, 2015b). Our results suggest that shareholders can also benefit from the monitoring function of external creditors, and imply that debt maturity has implications for stock selection by equity investors.

The paper is organized as follows. Section 2 reviews prior research on debt maturity and stock price crash risk, and develops our hypotheses. Section 3 describes the sample and research design. Section 4 presents the empirical results. Section 5 concludes.

2. Related literature and hypotheses

2.1. Short-term debt

The finance literature has identified various benefits of short-term debt. Due to incomplete debt contracting, lenders may not exert control rights over every future contingency in light of initial contract terms. Short-term debt, however, provides better protection of creditor rights in that lenders can threaten borrowers with rejection of refinancing (Giannetti, 2003). The frequent renegotiations associated with short-term debt can fill the void of contractual incompleteness by allocating lenders' control rights (Roberts and Sufi, 2009; Roberts, 2015). This advantage of short-term debt is consistent with Myers' (1977) argument that "permanent debt capital is best obtained by a policy of rolling over short maturity debt claims". With the *ex post* control rights that short-term debt grants, lenders could effectively monitor borrowers and access firms' verifiable information on operation performance before making lending decisions. Myers (1977) argues that short-term debt plays a role in reducing agency costs associated with managers' underinvestment problem. Barnea et al.'s (1980) framework further shows that short maturity debt can not only address the problem of suboptimal investment but also mitigate agency costs associated with informational asymmetry and managerial risk-taking incentives. This is because the value of short-term debt is less sensitive to firms' information revelation and risk of assets than that of long-term debt. Leland and Toft (1996) corroborate Barnea et al. (1980) by showing that short-term debt reduces the agency costs associated with equity holders' incentives to increase firm risk through asset substitution. Brockman et al. (2010) find that short-term debt mitigates the agency costs related to executive compensation. Since short-term debt can curb managers' appetite for risk, the sensitivity of executive compensation to share prices is shown to be positively associated with debt maturity, while the sensitivity of compensation to stock return volatility is negatively related to debt maturity.

Existing research suggests an important reason why short-term debt can reduce the agency costs and information asymmetry is that it subjects managers to more frequent monitoring. Rajan and Winton (1995) argue that short-maturity loans have unmatched priority in protecting lenders' interests because they give the bank the flexibility to get involved, even though the covenants have not been violated. As such, while the frequent monitoring of short-term lenders contributes to the scrutiny of borrowers and the revelation of more comprehensive information, long-term lenders can only rely on *ex ante* covenant terms to gather limited verifiable information (Rajan and Winton, 1995). Due to its monitoring role, short-maturity debt can improve the alignment of the interests between managers and shareholders. Datta et al. (2005) examine the link between managerial stock ownership and debt maturity. They contend that managers with more equity ownership have better alignment of interests with shareholders, and are more likely to issue short-term debt that subjects them to more external monitoring. Conversely, managers with less ownership are more likely to choose long-term debt for the purpose of entrenching themselves and escaping from frequent monitoring before the debt expires. The benefit of the monitoring role of short-term debt is further highlighted by Gul and Goodwin (2010). They suggest that short-term debt is negatively related to audit risk for rated firms, and this relation is more pronounced for firms with low-quality ratings than those with high-quality ratings. This implies that the monitoring effect of short-term debt contributes more to the transparency of firms considered more uncertain and risky by credit rating agencies.

2.2. Stock price crash risk

There is a large and growing literature on stock price crash risk, which reflects the importance of this issue to academics and practitioners. Chen et al. (2001) find that the trading volumes and returns over the past several months are able to forecast future crashes. Jin and Myers (2006) theoretically show that inside managers who are in charge of revealing firm-specific information have incentives to absorb certain downside risk by withholding bad news. However, once the hoarded bad news reaches a threshold level, managers may no longer be able to conceal further and the revelation of such information to the public becomes inevitable. This revelation in turn leads to extreme downward stock price corrections or crashes that are manifested as a long left-tail in the distribution of returns. Using data from international stock markets, Jin and Myers (2006) provide evidence that opaque stocks are more prone to crash due to a lower level of transparency.

Based on the bad news hoarding argument, some empirical studies focus on identifying firm-specific determinants of stock price crash. For instance, Hutton et al. (2009) suggest that a firm’s opacity, measured as discretionary accruals, leads to higher stock price crash risk. Kim and Zhang (2015) document a negative association between accounting conservatism and future crash risk since a high degree of conditional conservatism neutralizes managers’ tendency to delay bad news and accelerates good news recognition. Kim et al. (2011a) find that equity incentives induce managers to purposely hide negative information and manipulate market expectations, leading to an increase in stock price crash risk. Kim et al. (2011b) show that corporate tax avoidance increases crash risk because the tax avoidance techniques used by managers reduce information transparency of firms. On the other hand, Kim et al. (2014) argue that managers committed to corporate social responsibility (CSR) tend to maintain greater transparency and so have less incentive to withhold bad news, which, in turn, leads to a lower probability of price crashes.

In parallel, other studies highlight the influence of external mechanisms on future stock price crash risk. For instance, DeFond et al. (2014) find that the adoption of better accounting standards increases reporting transparency by improving the disclosure of firm-specific information and comparability, which in turn reduces managers' bad news hoarding behavior. In addition, the presence of institutional investors can also affect crash risk (An and Zhang, 2013; Callen and Fang, 2013). Specifically, institutional ownership of dedicated investors can limit managers' ability to conceal unfavorable news, while transient institutional holdings are positively related to stock price crash as managers are more likely to hide bad news to prevent transient investors from large short-term selling. Similarly, Callen and Fang (2015b) assume that sophisticated short sellers can identify managers' bad news hoarding and seek profit from those firms. As a result, high levels of short-selling can influence future price crash risk. Finally, Callen and Fang (2015a) find that strong religion acting as social norms can inhibit managers' bad news hoarding activities and render lower stock price crash risk.

2.3. Hypotheses

We formulate our hypotheses by intersecting the intuitions associated with the two strands of literature reviewed above, i.e., those on debt maturity and stock price crash risk. Short-term debt can subject managers to frequent monitoring and thereby reduce managerial discretion (Rajan and Winton, 1995; Stulz, 2001; Datta et al., 2005). Since lenders are more sensitive to decreases in firm value than increases in firm value, they have strong incentives to react with respect to negative information released by borrowers (Barnea et al., 1980). Other investors and rating agencies may also respond to the rollover of short-term debt (Datta et al., 2005) because whether firms can renew the contracts may provide signals about firms' future performance and solvency to the capital market. Thus, the frequent renegotiations and monitoring of short-term debt require firms to release information in a timely manner and restrain managers from arbitrarily concealing information. In other words, short-term debt gives managers fewer opportunities to withhold bad news, which in turn helps the reflection of such information in stock prices on a more timely and regular basis. To the extent that bad news hoarding contributes to stock price crash risk (Jin and Myers, 2006; Hutton et al., 2009; Kim and Zhang, 2015), the decrease of bad news hoarding opportunities under short-term debt should, therefore, contribute to the reduction of extreme downward price corrections upon sudden revelation of the previously concealed and accumulated negative information. Thus, we formulate our first hypothesis as follows:

> ***H1:*** *Firms with a higher proportion of short-term debt are associated with lower future stock price crash risk.*

If empirical evidence consistent with hypothesis *H1* is indeed attributed to the monitoring role of short-term debt in reducing bad news hoarding by opportunistic and self-serving managers, then we expect such findings to be more pronounced among firms with greater agency problem or information asymmetry. The benefit of frequent monitoring arising from short-term debt is likely to make a greater difference on corporate transparency among firms with managers that are harder to discipline and scrutinize. In firms with weaker governance mechanisms, managers would be less accountable for disclosing information on a less timely basis (Bhojraj and Sengupta, 2003) and for providing lower quality information (Bae et al., 2006). Meanwhile, in firms that are less transparent, investors are less able to monitor managerial performance (Bushman and Smith, 2001) and are more likely to misprice securities (Lee et al., 2014). To the extent that creditors' monitoring role associated with short-term debt substitutes and compensates for weak governance mechanisms and information environment, it should exert a greater impact on stock price crash risk among such firms. These arguments lead to two further hypotheses:

H2: *The relation between short-term debt and future stock price crash risk is stronger for firms with weaker governance.*

H3*: The relation between short-term debt and future stock price crash risk is stronger for firms with a higher degree of information asymmetry.*

3. Research design

3.1. Sample and data

We measure U.S. firms' crash risk using weekly return data from the Centre for Research in Security Prices (CRSP) from 1988 to 2014. Our sample period starts in 1988 because our control variables (lagged by one year) are computed from 1987, the first year for which the historical SIC data in the Compustat is available. Following Kim et al. (2011b), each firm's weekly stock returns are assigned to the 12-month period ending three months after its fiscal year-end so that investors are able to assess the firm's financial data in year *t* and predict its future crash risk in the next period. Our debt maturity measure is calculated based on Compustat data. Following previous research (e.g., Hutton et al., 2009), we exclude firms (i) with year-end share prices below $1, (ii) with fewer than 26 weeks of stock return data in each fiscal year, (iii) with negative total assets and book values of equity, (iv) operating in financial or public utility industries, and (v) with insufficient data to calculate the variables used in our regressions. Our final sample consists of 50,088 firm-year observations.

3.2. Measuring debt maturity

Following prior studies on debt maturity (e.g., Johnson, 2003; Datta et al., 2005; Brockman et al., 2010), our main proxy for short-maturity debt is the proportion of total debt maturing in three years or less, *ST3*. In our robustness tests, we also consider alternative measures of short-term debt, namely debt due within one and two years.

3.3. Measuring stock price crash risk

Stock price crash risk reflects the tendency of extreme negative returns on individual firms. We follow Chen et al. (2001) and employ two alternative measures of crash risk based on firm-specific weekly returns. To compute those weekly returns, we first estimate the following expanded market model:

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

where $r_{j,\tau}$ is the return on stock j in week τ, and $r_{m,\tau}$ is the return on CRSP value-weighted market index in week τ. Following Dimson (1979), we include the lead and lag terms to correct for nonsynchronous trading. The firm-specific return for stock j in week τ ($W_{j,\tau}$) is measured by the natural log of one plus the residual return from Eq. (1).

Our first crash risk measure is the negative conditional skewness of firm-specific weekly returns (*NCSKEW*). We calculate *NCSKEW* for firm j over fiscal year t by taking the negative of the third moment of firm-specific weekly returns for each year and dividing it by the standard deviation of firm-specific weekly returns raised to the third power. A stock with high *NCSKEW* represents a highly left-skewed return distribution and a high probability of a price crash. The formula for the negative conditional skewness for firm j in year t is as follows:

$$NCSKEW_{j,t} = -[n(n-1)^{3/2} \sum W_{j,\tau}^3] / [(n-1)(n-2)(\sum W_{j,\tau}^2)^{3/2}], \quad (2)$$

where $W_{j,\tau}$ is the firm-specific weekly return as defined above, and n is the number of weekly returns in fiscal year t.

Our second measure of firm-specific crash risk is "down-to-up volatility", which is calculated as follows:

$$DUVOL_{j,t} = log\{(n_u - 1)\sum_{Down} W_{j,\tau}^2 / (n_d - 1)\sum_{Up} W_{j,\tau}^2\}, \quad (3)$$

where n_u and n_d are the number of up and down days over the fiscal year t, respectively. For each firm j over year t, we separate firm-specific weekly returns into down (up) weeks when the weekly returns are below (above) the annual mean. We separately calculate the standard deviation of firm-specific weekly returns for each of the two groups. Then, *DUVOL* is the natural logarithm of the ratio of the standard deviation in the down weeks to the standard deviation in the up weeks. Chen et al. (2001) suggest that a high *DUVOL* indicates a more left-skewed distribution. We note that *DUVOL* is less likely to be affected by the number of extreme returns as it does not involve third moments.

3.4. Control variables

Following prior studies (e.g., Chen et al., 2001; Jin and Myers, 2006), we employ the following set of control variables: stock turnover (*DTURN*), stock return volatility (*SIGMA*), firm size (*SIZE*), market-to-book (*MB*), leverage (*LEV*), return on assets (*ROA*), lagged negative conditional skewness ($NCSKEW_{t-1}$), and earnings quality (*ACCM*). The control variables are all lagged one period and measured as follows: $DTURN_{t-1}$ is the difference between the average monthly share turnover over fiscal year *t-1* and *t-2*. $SIGMA_{t-1}$ is the standard deviation of firm-specific weekly returns in fiscal year *t-1*. RET_{t-1} is the average firm-specific weekly returns in fiscal year *t-1*. $SIZE_{t-1}$ is the log of total assets in year *t-1*.[2] MB_{t-1} is the market value of equity divided by the book value of equity in year *t-1*. LEV_{t-1} is the book value of total liabilities scaled by total assets in fiscal year *t-1*. ROA_{t-1} is income before extraordinary items divided by total assets at the end of fiscal year *t-1*. $NCSKEW_{t-1}$ is the negative conditional skewness for firm-specific weekly returns in fiscal year *t-1*. $ACCM_{t-1}$ is defined as the absolute value of discretionary accruals, where discretionary accruals are the

[2] Our main results are qualitatively the same if we define *SIZE* as the natural logarithm of the market value of equity.

residuals estimated from the modified Jones model (Hutton et al. 2009). Finally, we control for Fama and French 48-industry and year effects. We provide detailed variable definitions in the Appendix.

4. Empirical results

4.1. Descriptive statistics

Panel A of Table 1 presents the descriptive statistics for all the variables used in our regressions. The mean value of two stock price crash risk measures, *NCSKEW* and *DUVOL*, are -0.092 and -0.060, respectively, which are quite similar to those reported in Kim et al. (2011a) and An and Zhang (2013). Short-term debt, *ST3*, has a mean value of 0.519, which is in line with the reported means in Johnson (2003) and Custodio et al. (2013).[3] The summary statistics of the other variables are largely consistent with those reported in prior research, and so are not discussed to preserve space.

Panel B of Table 1 reports the Pearson correlation matrix for the variables used in our regression analysis. The two crash risk measures are significantly and negatively correlated with short-maturity debt; their correlation coefficients are -0.050 and -0.054, respectively. This finding lends initial support to our prediction that short-term debt induces a lower probability of future stock price crashes. Consistent with prior research, we find the two crash measures to be positively correlated with each other, with a very high correlation coefficient of 0.961.

[Insert Table 1 about here]

[3] Custodio et al. (2013) employ a complement measure of debt maturity, that is, 1−*ST3*.

4.2. Test of Hypothesis H1

We examine the impact of short-term debt on future stock price crash risk by estimating the following regression model:

$$
\begin{aligned}
Crash\ Risk_{j,t} = {} & \beta_0 + \beta_1 ST3_{j,t-1} + \beta_2 DTURN_{j,t-1} + \beta_2 SIGMA_{j,t-1} + \beta_3 RET_{j,t-1} \\
& + \beta_4 SIZE_{j,t-1} + \beta_5 MB_{j,t-1} + \beta_6 LEV_{j,t-1} + \beta_7 ROA_{j,t-1} + \beta_8 NCSKEW_{j,t-1} \\
& + \beta_9 ACCM_{j,t-1} + \varepsilon_{j,t}. \qquad (4)
\end{aligned}
$$

Table 2 presents the regression results for this model. In Columns (1) and (4), we regress two crash risk measures, *NCSKEW* and *DUVOL*, on short-maturity debt, *ST3*, and the control variables. In Columns (2) and (5), we include year fixed effects to control for a secular increase in short-term debt (Custodio et al., 2013). We next control for both year and industry fixed effects in Columns (3) and (6). The results across the table show that short-term debt is significantly and negatively associated with one-year ahead stock price crash risk. For example, in our preferred baseline models in Columns (3) and (6), the coefficients on *ST3* are -0.044 (*t*-stat=-3.97) and -0.024 (*t*-stat=-4.43), respectively. This finding suggests that firms with more short-term debt experience lower future stock price crash risk, consistent with the notion that the monitoring role of short-maturity debt restricts managers from hiding bad news, thus leading to a lower likelihood of firms' future stock price crashes. We conclude that our baseline regression results provide strong support for *Hypothesis H1*.[4]

The results regarding the control variables are generally consistent with prior studies. The coefficients on stock turnover (*DTURN*) and stock return volatility (*SIGMA*) are

[4] An alternative view on the role of short-term debt would argue that the refinancing risk associated with short-term debt could incentivize managers to conceal negative information. However, this argument would imply a positive effect of short-term debt on crash risk and, if anything, would bias against our results regarding a negative association between the two variables. Our evidence of a significant and negative impact of short-term debt on stock price crash risk is inconsistent with this view, while providing support for our hypothesis.

significant and positive, which is consistent with the findings of Chen et al. (2001) and indicates that stocks with higher turnover and return volatility are more likely to experience future price crashes. The coefficients on past returns (*RET*) and market-to-book ratio (*MB*) are also significantly positive, in line with Harvey and Siddique (2000) and Chen et al. (2001). To the extent that high stock returns and market-to-book signal the buildup of a stock price bubble, these variables are likely to be associated with higher future crash risk. The results also show that the coefficient on leverage (*LEV*) is negative, while those on firm size (*SIZE*), lagged crash risk ($NCSKEW_{t-1}$), and earnings quality (*ACCM*) are positive, which are consistent with the evidence documented in prior studies (e.g., Chen et al. 2001; Hutton et al., 2009). Finally, we find a positive association between profitability (*ROA*) and crash risk, corroborating the findings of Callen and Fang (2015b) and Kim et al. (2014).

[Insert Table 2 about here]

4.2.1. Endogeneity

One major concern about the baseline results reported in Table 2 is that debt maturity structure could be endogenous, in which case the estimated negative effect of short-term debt on future stock price crash risk would be biased and inconsistent, thus invalidating our inference. The main source of this endogeneity is the potential presence of omitted variables as short-term debt could be correlated with unobserved firm-specific characteristics that would affect future crash risk.[5] To address this potential endogeneity problem and mitigate the omitted-variable bias, we employ three estimation approaches.

First, we run fixed-effects (FE) and first-difference (FD) regressions in order to control for time-invariant unobserved firm fixed-effects. The regression results in Panel A of

[5] We note, however, that other common sources of endogeneity such as reverse causality and simultaneity are unlikely to affect our results because in our regression framework, we examine the impact of *current* short-term debt on *future* stock price crash risk. It is not likely that future crash risk can explain variation in current short-term debt or that the two variables are jointly determined.

Table 3 show that the relation between short-term debt and future crash risk remains negative and significant at 5% for *DUVOL* and 10% for *NCSKEW*. This suggests that our main findings continue to hold after controlling for unobserved heterogeneity.[6]

We further tackle the potential endogeneity problem by employing the instrumental variable (IV) and two-stage least squares (2SLS) approach. The instrument we use for short-maturity debt is the term structure of interest rates (*TERMSTR*), measured as the difference between the yield on 10-year Government bonds and the yield on the 6-month Treasury bills. In our setting we argue that this instrument meets both the relevance and exclusion conditions of a valid IV. First, term structure is one of the most common determinants of short-term debt. Brick and Ravid (1985) predict that when the term structure of interest rates is upward sloping, firms will increase the proportion of debt payments allocated to long-term debt in order to achieve accelerated interest tax shields. Alternatively, empirical studies suggest that firms would prefer short-maturity debt to long-maturity debt because the former source of debt financing is typically less costly, unless the yield curve is inverted (e.g., Barclay and Smith, 1995; Johnson, 2003; Brockman et al., 2010). Notwithstanding these conflicting views, existing evidence in the literature shows that term structure and short-maturity debt have a significant relationship. Second, term structure and stock price crash risk are not likely to be correlated unless via the debt maturity channel. This is because the changing patterns of the yield curve are unlikely to affect managers' bad news hording behavior directly.

In Panel B of Table 3, we report the results from our IV/2SLS regressions. We perform the first-stage regression of short-maturity debt on term structure, our instrument, and the other control variables. The results show that term structure has a significant and

[6] We also examine the marginal effect of short-term debt on stock price crash risk by regressing the change in crash risk on the change in short-term debt, while controlling for other regressors in levels. The unreported results are in line with our main findings.

positive impact on short-term debt, consistent with Barclay and Smith (1995), Johnson (2003), and Brockman et al. (2010). More importantly, the results from the second-stage regressions show that short-term debt remains significantly and negatively related to both measures of future stock price crash risk.

Our third strategy to address endogeneity involves using the dynamic System Generalized Method of Moments (SYSGMM) approach (Blundell and Bond 1998), which takes into account the dynamics of stock price crash risk, while accounting for other sources of endogeneity in the model (e.g., Kim et al. 2014). The use of the SYSGMM estimator is motivated by the fact our estimated model of stock price crash risk is a dynamic panel data model that includes lagged crash risk as a regressor ($NCSKEW_{t-1}$). Using the traditional OLS method for estimating the model could lead to biased and inconsistent estimates of the coefficients because the dynamic term, lagged crash risk, could be correlated with unobservable firms-specific factors and this potential correlation would not be eliminated in the FE and FD regressions (Baltagi, 2013). In applying the SYSGMM, we estimate Eq. (3) in both levels and first-differences using appropriate instruments for the two endogenous variables, crash risk ($NCSKEW_{t-1}$) and short-term debt ($ST3_{t-1}$). In the levels equations, our instruments for $NCSKEW_{t-1}$ and $ST3_{t-1}$ include their lagged values in first-differences. In the first-differences equations, our instruments for $\Delta NCSKEW_{t-1}$ and $\Delta ST3_{t-1}$ are the lagged values of $NCSKEW_{t-1}$ and $ST3_{t-1}$, both in levels.[7] We report the results from our system GMM regressions in Panel C of Table 3. The coefficient on short-term debt is significantly negative in both models (-0.044, *t*-stat=-1.71 and -0.030, *t*-stat=-2.41). In terms of diagnostic tests, the second-order autocorrelation (*AR2*) and Sargan tests provide no evidence of second order

[7] Specifically, in the levels equations, we use $\Delta NCSKEW_{t-2}$, $\Delta NCSKEW_{t-3}$,…, $\Delta NCSKEW_{1}$ as instruments for $NCSKEW_{t-1}$. In the first-differences equations, we use $NCSKEW_{t-2}$, $NCSKEW_{t-3}$,…, $NCSKEW_{1}$ as instruments for $\Delta NCSKEW_{t-1}$.

autocorrelation and over-identification concerns. This suggests that our instruments are valid and that the specifications we use are appropriate.

In summary, the results from the above tests controlling for heterogeneity and endogeneity bias all show that short-term debt exerts a negative impact on future stock price crash risk. This finding is consistent with our baseline results and provides further support for *Hypothesis H1*.

[Insert Table 3 about here]

4.2.2. Alternative measures of crash risk and debt maturity

We further conduct a set of robustness checks using alternative measures of stock price crash risk and short-term debt. Motivated by Barclay and Smith (1995), we also measure short-term debt as the proportion of total debt maturing within one year (*ST1*) or within two years (*ST2*).[8] Following Huang et al. (2016), we define very short-term debt (*STNP1*) as the ratio of debt in current liabilities minus long-term debt due in one year to total debt. By using *STNP1*, we can rule out the effect of previously-issued long-term debt due within less than one year. Panel A of Table 4 reports the results for alternative measures for short-term debt. We find that the coefficients on three alternative measures, namely *ST1, ST2*, and *STNP1*, are all significant and negative for both crash risk measures.

Following Hutton et al. (2009) and Kim et al. (2011b), we further measure future stock price crash risk as the likelihood that a firm experiences more than one price crash weeks in a fiscal year (*CRASH*). We first define crash weeks in a fiscal year as those during which a firm experiences firm-specific weekly returns 3.17 standard deviations below the mean firm-specific weekly returns over the whole fiscal year, with 3.17 chosen to generate a

[8] We also employ the ratio of debt maturing within five years and obtain consistent but relatively weak results.

frequency of 0.1% in the normal distribution. We perform logistic regressions to estimate the effects of various measures of short-term debt on the *CRASH* dummy variable. The results reported in Panel B of Table 4 show that *ST1*, *ST2*, and *ST3* are significantly and negatively related to *CRASH*. The coefficient on *STNP1* is negative, although marginally insignificant (*t*-stat=-1.55). Overall, these results confirm that our main findings are robust to alternative measures of short-maturity debt and stock price crash risk.

[Insert Table 4 about here]

4.2.3. New debt issues

Although our approach of calculating short-maturity debt based on balance sheet data is widely used and accepted in the literature, one concern about this approach is that the short-term debt ratio may be affected by the proportion of long-term debt that was issued in the past but is coming due. This fraction of long-maturity debt is unlikely to have the desired monitoring effect on managers' bad news holding behavior as our hypothesis would predict. We note that in one of our robustness checks above, we have, to an extent, addressed this concern by focusing on very short-term debt due within one year, *STNP1*. In this section, we follow prior research (e.g., Guedes and Opler, 1996; Brockman et al. 2010; Custodio et al. 2013) and further use an incremental approach in which we focus on new debt issues data rather than balance sheet data. This incremental approach can better capture the relations between debt maturity structure and firm-specific variables (Guedes and Opler, 1996). It also allows us to investigate the effect of new debt issues on crash risk at all points of the maturity spectrum.

Following Custodio et al. (2013), we obtain data on both bond issues and private loan issues. Data on new bonds are from the Mergent Fixed Income Securities Database (FISD) and data on new loans from the Loan Pricing Corporation's Dealscan database, which contains issuance-level information on syndicated bank loans. We construct both consolidated and unconsolidated samples of new debt issues. Merging data of new debt issues with Compustat leaves us with an unconsolidated (transaction-level) sample of 30,742 debt issues for 4,213 firms. We measure the debt maturity of a debt issue (*DEBT_MAT*) as the natural logarithm of the maturity of the new loan or bond issue. Following Brockman et al. (2010), we further construct a consolidated (firm-level) sample to deal with firms with multiple debt issues within a fiscal year. We define the debt maturity of those firms as (i) the natural logarithm of the issue-size-weighted maturity (*WAVG_MAT*) or (ii) the natural logarithm of the equal-weighted maturity (*AVG_MAT*). Our consolidated sample consists of 15,687 firm-year observations.

Table 5 presents the regression results for both the unconsolidated and consolidated samples.[9] In Columns (1) and (2), we find that the coefficient on debt maturity (*DEBT_MAT*) is significantly positive and that this result continues to hold after we control for the size of the debt issue (*DEBT_SIZE*). These results indicate that firms that issue debt with longer (shorter) maturity are more (less) likely to experience future stock price crashes, which is also in line with our hypothesis. Columns (3) to (6) present the results for the consolidated sample. In Columns (4) and (6), we further control for the total amount of firms' multiple debt issues within a fiscal year (*SUM_SIZE*). The results show that the coefficients on two measures of debt maturity, *WAVG_MAT* and *AVG_MAT*, are positive and significant at 10% in Columns (3) and (4), and positive and significant at 5% in Columns (5) and (6). Overall, the evidence from the subsample of new debt issues is consistent with our baseline regression results using balance sheet data and provides additional support for our main hypothesis.

[Insert Table 5 about here]

[9] In this table, we focus on one measure of crash risk, *NCSKEW*. The results for *DUVOL* are qualitatively similar but are not reported to preserve space.

4.3. Test of Hypothesis H2

We next examine how the negative relation between short-term debt and future stock price crash risk varies with the strength of firms' corporate governance mechanisms. We employ four proxies to measure the effectiveness of corporate governance, including the adjusted net governance score (*GOV*), the governance index (*GINDEX*), the proportion of total institutional ownership (*INST*), and the proportion of long-term institutional investors (*LTINST*). The governance score data is from the MSCI ESG database, formerly known as the Kinder, Lyndenberg, and Domini Research and Analytics Inc. (KLD) database. We calculate the adjusted net governance score (*GOV*) by standardizing the raw governance strength and concerns scores by the number of items of strengths and concerns in the year respectively, and then taking the net difference between the adjusted strengths and concerns. The strength indicators in the corporate governance category include: limited compensation, ownership strength, reporting quality strength, political accountability strength, and public policy strength. The concern indicators include: high compensation, ownership concern, accounting concern, reporting quality, political accountability concern, and public policy concern. Our second measure of corporate governance is the governance index (*GINDEX*) developed by Gompers et al. (2003). Using data from RiskMetrics' Governance Database, this index is calculated on the basis of the number of antitakeover provisions at the firm level. Gompers et al. (2003) contend that less antitakeover provisions are related to better shareholder rights. Next, we measure the monitoring power of institution ownership using data from Thomson 13F in two ways. First, we calculate the proportion of total institutional ownership (*INST*) as the percentage of shares held by institutional owners. Moreover, based on institutional investors' trading behavior, Bushee (1998, 2001) separates them into three groups, namely dedicated, quasi-indexer, and transient investors. Transient investors usually have short-term horizons and fewer incentives to understand and monitor invested firms.

Thus, we compute our second proxy for the role of institutional investors (*LTINST*) as the percentage of common shares owned by dedicated and quasi-indexer institutions.

We partition the full sample based on the annual median values of the governance measures and report the results in Table 6. In Panel A, we define weak (strong) governance firms as those whose net governance scores (*GOV*) are above (below) the median. The results show that the coefficient on short-term debt is negative for both groups of firms, but statistically and economically more significant for those with weaker governance (Columns (1) and (3)). This finding holds for both measures of crash risk, namely *NCSKEW* and *DUVOL*. In Panel B, we split the sample into strong and weak governance firms based on shareholder rights (*GINDEX*). Firms with above-median (below-median) *GINDEX* are those with weak (strong) governance mechanisms. The results again indicate that the coefficient on short-term debt remains significantly negative for weak governance firms (Columns (1) and (3)), but insignificant for those with strong governance. In Panels C and D, we divide the sample into firms with strong (weak) external institutional monitoring, defined as those with above-median (below-median) *INST* and *LTINST*, respectively. We find that the effect of short-term debt on crash risk is negative for both subsamples, but only significant when (long-term) institutional shareholdings are lower.

Overall, these results support *Hypothesis H2* that corporate governance mechanisms tend to moderate the negative effect of short-term debt on future stock price crash risk, consistent with short-term debt serving as an effective monitoring tool to reduce managers' bad news hoarding behavior when the monitoring from shareholders and institutional investors is insufficient. This evidence is also in line with prior studies on stock price crash risk. For example, Kim et al. (2011b) find that effective external monitoring can attenuate the impact of tax avoidance on crash risk, while Callen and Fang (2015b) show that firms headquartered in countries with higher levels of religiosity have lower crash risk, and this mitigating effect becomes insignificant for firms with strong governance mechanisms. Taken together, our results indicate that short-term debt may substitute and compensate for weak corporate governance in mitigating managerial bad news hoarding behavior.

[Insert Table 6 about here]

4.4. Test of Hypothesis H3

We next study how the degree of asymmetric information affects the relation between short-term debt and future stock price crash risk. Following prior literature (e.g., Custodio et al., 2013), we measure information asymmetry using analyst coverage (*COVER*), analyst forecasts' dispersion (*DISPER*), and R&D expenditure (*RD*). We obtain analyst earnings' forecast data, issued over the 90 days leading up to the earnings announcement in fiscal year *t*, from the I/B/E/S Database. Analyst coverage (*COVER*) is defined as the number of analysts following the firm. The dispersion of analyst forecasts (*DISPER*) is the standard deviation of analyst forecasts divided by the consensus analyst forecasts. R&D expenditure (*RD*) is defined as the ratio of research and development expenditure to total assets. Higher forecasts' dispersion, lower analyst coverage, and more R&D expenditure are associated with higher levels of information asymmetry (e.g., Healy and Palepu, 2001; Custodio et al., 2013).

In Table 7, we split the sample into firms with high and low levels of asymmetric information based on these three measures. The results in Panel A show that the coefficient on short-term debt is significantly negative at the 1% level for the subsample of firms with high analyst coverage. However, for firms with low analyst coverage, the coefficient is insignificant or only marginally significant. Similarly in Panel B, the coefficient on short-term debt is significantly negative for firms with greater dispersions in analysts' forecasts, but insignificantly negative for those with lower dispersions. Panel C reveals that the coefficient on short-term debt is economically and statistically more significant for R&D-intensive firms.

Overall, these findings are highly consistent with *Hypothesis H3* that the role of short-term debt in mitigating managers' information withholding and mitigating future stock price crash risk is more pronounced when there is less corporate transparency. Taken together with the results in Section 4.3, they also suggest that the negative relation between short-term debt and crash risk is more likely to be driven by lenders' monitoring rather than *ex ante* better corporate governance and information environment of the borrowers.

5. Conclusion

This study examines the impact of debt maturity on future stock price crash risk. We provide original evidence of a negative relationship between the use of short-term debt and the likelihood of subsequent stock price crashes. The results are robust to a battery of robustness checks, including tests addressing endogeneity concerns and those using alternative measures of debt maturity and crash risk, as well as the incremental approach focusing on new debt issues. Our findings are consistent with the monitoring role of short-term debt serving as an effective tool to curb managerial bad news hoarding behavior, which in turn reduces stock price crash risk. We also investigate whether the influence of short-term debt on crash risk is conditional on corporate governance mechanisms and information asymmetry. Our findings indicate that the mitigating effect of short-term debt on future crash risk is more pronounced when firms have lower governance ratings, lower shareholder rights, and less (long-term) institutional ownership. We also find that the negative relation between short-maturity debt and crash risk is more conspicuous for firms having higher asymmetric information. These results highlight the importance of short-term debt for firms with weaker governance and higher information asymmetry. In other words, short-term debt may act as a substitute for corporate governance in reducing managerial bad news hoarding.

Overall, our study complements a growing body of research on stock price crash risk as well as debt maturity structure. In the literature on crash risk, our study is the first to provide evidence that a corporate finance factor such as debt maturity has a significant influence above and beyond many other determinants identified by prior studies. In the debt maturity literature, we provide evidence that firms can benefit from short-term debt due to its mitigating effect on future stock price crash risk, which supports the notion that "short-term debt maturity can be an extremely powerful tool to monitor management" (Stulz, 2001 pp. 172). Together, these add to a greater understanding of how debt financing and lenders could contribute to corporate governance and reduce agency costs. Our study shows that debt maturity structure enables creditors to constrain managers' misconduct, which in turn is mutually beneficial to shareholders' wealth through the reduction of stock price crash risk.

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Table 1. Descriptive statistics and correlations matrix

The table reports the descriptive statistics and correlation matrix for the variables used in our study. Panel A reports the descriptive statistics and Panel B reports the Pearson correlation matrix. Variable definitions are provided in the Appendix. All variables are winsorized at 1% and 99%. In Panel B, *p*-values of the test that the correlation coefficients are significant are shown in parentheses.

Panel A. Descriptive statistics

Variable	N	Mean	Std. dev.	5%	25%	Median	75%	95%
$NCSKEW_t$	50088	-0.091	0.742	-1.279	-0.505	-0.104	0.292	1.186
$DUVOL_t$	50088	-0.060	0.370	-0.662	-0.304	-0.066	0.174	0.578
$ST3_{t-1}$	50088	0.516	0.348	0.007	0.205	0.478	0.878	1.000
$DTURN_{t-1}$	50088	0.027	0.778	-1.046	-0.198	0.001	0.213	1.227
$SIGMA_{t-1}$	50088	0.055	0.029	0.022	0.035	0.049	0.069	0.112
RET_{t-1}	50088	-0.192	0.223	-0.613	-0.236	-0.117	-0.058	-0.023
$SIZE_{t-1}$	50088	6.346	2.047	3.131	4.824	6.265	7.761	9.939
MB_{t-1}	50088	2.666	2.922	0.594	1.175	1.865	3.035	7.142
LEV_{t-1}	50088	0.176	0.127	0.006	0.075	0.159	0.250	0.413
ROA_{t-1}	50088	0.013	0.097	-0.138	0.003	0.028	0.054	0.107
$NCSKEW_{t-1}$	50088	-0.094	0.728	-1.245	-0.504	-0.109	0.279	1.155
$ACCM_{t-1}$	50088	0.040	0.046	0.002	0.011	0.026	0.052	0.128
$TERMSTR_{t-1}$	50088	1.749	1.011	0.130	0.900	1.680	2.690	3.020
GOV_{t-1}	10655	-0.029	0.078	-0.100	-0.100	0.000	0.000	0.125
$GINDEX_{t-1}$	11491	9.490	2.973	5.000	7.000	9.000	12.000	14.000
$INST_{t-1}$	40343	0.448	0.299	0.014	0.178	0.437	0.699	0.932
$LTINST_{t-1}$	40549	0.337	0.235	0.010	0.130	0.317	0.518	0.745
$COVER_{t-1}$	50088	3.006	5.215	0.000	0.000	1.000	4.000	14.000
$DISPER_{t-1}$	21133	0.049	0.290	-0.177	0.008	0.024	0.067	0.344
RD_{t-1}	29542	0.039	0.063	0.000	0.003	0.017	0.049	0.147

Panel B. Pearson correlation matrix

		A	B	C	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
$NCSKEW_t$	A	1.000																			
$DUVOL_t$	B	0.961	1.000																		
		0.000																			
$ST3_{t-1}$	C	-0.050	-0.054	1.000																	
		0.000	0.000																		
$DTURN_{t-1}$	E	0.034	0.030	-0.020	1.000																
		0.000	0.000	0.000																	
$SIGMA_{t-1}$	F	-0.085	-0.091	0.258	0.146	1.000															
		0.000	0.000	0.000	0.000																
RET_{t-1}	G	0.082	0.088	-0.231	-0.148	-0.955	1.000														
		0.000	0.000	0.000	0.000	0.000															
$SIZE_{t-1}$	H	0.131	0.134	-0.386	0.007	-0.502	0.424	1.000													
		0.000	0.000	0.000	0.130	0.000	0.000														
MB_{t-1}	I	0.054	0.052	0.016	0.083	0.048	-0.070	0.001	1.000												
		0.000	0.000	0.001	0.000	0.000	0.000	0.735													
LEV_{t-1}	J	-0.005	0.000	-0.355	0.006	-0.024	0.019	0.238	0.058	1.000											
		0.241	0.872	0.000	0.189	0.000	0.000	0.000	0.241												
ROA_{t-1}	K	0.090	0.097	-0.122	0.053	-0.383	0.376	0.250	-0.103	-0.054	1.000										
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000											
$NCSKEW_{t-1}$	L	0.045	0.046	-0.048	0.043	-0.059	0.089	0.141	-0.010	0.015	0.027	1.000									
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.001	0.000										
$ACCM_{t-1}$	M	-0.013	-0.014	0.153	0.049	0.246	-0.219	-0.223	0.101	-0.040	-0.138	-0.025	1.000								
		0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
$TERMSTR_{t-1}$	N	-0.019	-0.020	0.013	-0.055	-0.073	0.067	0.023	-0.043	0.000	-0.024	-0.003	-0.044	1.000							
		0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.978	0.000	0.503	0.000								
GOV_{t-1}	O	0.006	0.003	0.063	0.005	0.080	-0.064	-0.240	-0.023	-0.051	-0.023	-0.014	0.028	0.009	1.000						
		0.532	0.765	0.000	0.577	0.000	0.000	0.000	0.018	0.000	0.019	0.137	0.005	0.332							
$GINDEX_{t-1}$	P	0.009	0.009	-0.095	0.019	-0.185	0.153	0.155	-0.024	0.047	0.041	0.002	-0.061	0.005	-0.009	1.000					
		0.360	0.338	0.000	0.038	0.000	0.000	0.000	0.010	0.000	0.000	0.818	0.000	0.572	0.504						
$INST_{t-1}$	Q	0.146	0.148	-0.288	0.046	-0.286	0.257	0.458	0.083	0.088	0.142	0.165	-0.108	0.030	-0.181	0.107	1.000				
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
$LTINST_{t-1}$	R	0.125	0.126	-0.285	0.021	-0.357	0.312	0.442	0.064	0.066	0.166	0.146	-0.134	-0.012	-0.178	0.149	0.892	1.000			
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000				
$COVER_{t-1}$	S	0.082	0.087	-0.205	0.015	-0.225	0.186	0.500	0.085	0.044	0.130	0.095	-0.101	0.040	-0.143	0.031	0.366	0.366	1.000		
		0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000			
$DISPER_{t-1}$	T	0.013	0.012	-0.012	0.017	-0.028	0.037	0.021	-0.045	0.004	0.073	0.004	-0.003	0.008	-0.010	-0.006	-0.030	-0.021	0.013	1.000	
		0.052	0.081	0.071	0.013	0.000	0.000	0.003	0.000	0.548	0.000	0.536	0.689	0.229	0.384	0.594	0.000	0.002	0.063		
RD_{t-1}	U	-0.012	-0.018	0.195	0.002	0.300	-0.289	-0.223	0.295	-0.194	-0.547	-0.001	0.124	-0.007	-0.002	-0.142	-0.032	-0.059	-0.017	-0.052	1.000
		0.042	0.002	0.000	0.790	0.000	0.000	0.000	0.000	0.000	0.000	0.878	0.000	0.215	0.900	0.000	0.000	0.000	0.004	0.000	

Table 2. The impact of short-term debt on stock price crash risk

This table presents the regression results for Model (3), in which we regress stock price crash risk on short-term debt and the control variables. Variable definitions are provided in the Appendix. All variables except year and industry dummies are winsorized at the 1% and 99%. *t*-statistics are reported in parentheses and are based on (cluster-robust) standard errors that are corrected for heteroskedasticity and clustered at the firm level. ***, **, and * indicate significance of the coefficients at the 1%, 5%, and 10% levels, respectively (two-sided).

	Predicted Sign	(1) $NCSKEW_t$	(2) $NCSKEW_t$	(3) $NCSKEW_t$	(4) $DUVOL_t$	(5) $DUVOL_t$	(6) $DUVOL_t$
$ST3_{t-1}$	-	-0.021*	-0.039***	-0.044***	-0.013**	-0.022***	-0.024***
		(-1.90)	(-3.50)	(-3.97)	(-2.30)	(-4.10)	(-4.43)
$DTURN_{t-1}$	+	0.024***	0.025***	0.026***	0.010***	0.011***	0.012***
		(5.52)	(5.79)	(6.01)	(4.91)	(5.27)	(5.43)
$SIGMA_{t-1}$	+	2.148***	2.294***	1.938***	0.839***	0.895***	0.724***
		(4.89)	(5.03)	(4.16)	(3.83)	(3.96)	(3.13)
RET_{t-1}	+	0.317***	0.343***	0.317***	0.137***	0.150***	0.137***
		(6.16)	(6.59)	(6.00)	(5.31)	(5.77)	(5.21)
$SIZE_{t-1}$	+	0.045***	0.038***	0.038***	0.022***	0.017***	0.017***
		(19.72)	(15.97)	(15.74)	(19.27)	(15.00)	(14.57)
MB_{t-1}	+	0.015***	0.014***	0.013***	0.008***	0.007***	0.007***
		(12.04)	(10.88)	(10.37)	(11.73)	(10.59)	(10.39)
LEV_{t-1}	-	-0.221***	-0.295***	-0.265***	-0.095***	-0.138***	-0.126***
		(-7.51)	(-9.91)	(-8.50)	(-6.50)	(-9.31)	(-8.14)
ROA_{t-1}	+/-	0.449***	0.435***	0.442***	0.245***	0.236***	0.238***
		(11.20)	(10.94)	(11.05)	(12.55)	(12.28)	(12.20)
$NCSKEW_{t-1}$	+	0.023***	0.019***	0.017***	0.012***	0.010***	0.009***
		(4.49)	(3.76)	(3.28)	(4.99)	(4.16)	(3.78)
$ACCM_{t-1}$	+	0.262***	0.161**	0.116	0.140***	0.085**	0.065*
		(3.37)	(2.08)	(1.48)	(3.68)	(2.23)	(1.70)
Intercept		-0.439***	-0.562***	-0.606***	-0.222***	-0.282***	-0.305***
		(-16.10)	(-17.09)	(-8.88)	(-16.41)	(-17.55)	(-9.33)
Year FE		No	Yes	Yes	No	Yes	Yes
Industry FE		No	No	Yes	No	No	Yes
N		50,088	50,088	50,088	50,088	50,088	50,088
Adjusted R^2		0.028	0.038	0.040	0.029	0.041	0.042

Table 3. Regression analysis to address endogeneity

This table presents three tests to address endogeneity concerns in the baseline regression of future stock price crash risk on short-term debt maturity. Panel A presents the results from the fixed-effects (FE) regressions (Columns (1) and (2)) and the first-differences (FD) regressions (Columns (3) and (4)). Panel B presents the first and second-stage results from the instrumental variable (IV)/two-stage least squares (2SLS) regressions with the term structure of interest rates (*TERMSTR*) used as the instrument variable for short-term debt (*ST3*). *TERMSTR* is the difference between the yield on 10-year Government bonds and the yield on 6-month Treasury bills. Panel C reports the System Generalized Method of Moments (SYSGMM) regression results. *AR1* and *AR2* are the tests for first- and second-order autocorrelation in the residuals, under the null of no autocorrelation. *Sargan* is the test for overidentification of the instruments, under the null of non-overidentification. Variable definitions are provided in the Appendix. All variables except year and industry dummies are winsorized at the 1% and 99%. *t*-statistics are reported in parentheses and are based on (cluster-robust) standard errors that are corrected for heteroskedasticity and clustered at the firm level. ***, **, and * indicate significance of the coefficients at the 1%, 5%, and 10% levels, respectively (two-sided).

Panel A. Fixed-effects and first-differences regressions

	(1) FE $NCSKEW_t$	(2) FE $DUVOL_t$	(3) FD $NCSKEW_t$	(4) FD $DUVOL_t$
$ST3_{t-1}$	-0.028*	-0.018**	-0.032*	-0.020**
	(-1.85)	(-2.41)	(-1.77)	(-2.24)
$DTURN_{t-1}$	0.025***	0.011***	0.024***	0.010***
	(5.56)	(4.87)	(5.56)	(4.28)
$SIGMA_{t-1}$	0.609	0.304	-0.416	0.528
	(1.03)	(1.05)	(-0.62)	(1.59)
RET_{t-1}	0.180***	0.094***	0.090	0.126***
	(2.71)	(2.87)	(1.23)	(3.45)
$SIZE_{t-1}$	0.128***	0.064***	0.344***	0.168***
	(14.63)	(14.92)	(16.81)	(16.54)
MB_{t-1}	0.022***	0.011***	0.030***	0.016***
	(11.84)	(12.12)	(12.11)	(12.46)
LEV_{t-1}	-0.435***	-0.212***	-0.766***	-0.372***
	(-8.09)	(-8.02)	(-9.20)	(-8.84)
ROA_{t-1}	0.586***	0.311***	0.504***	0.280***
	(10.25)	(11.01)	(7.59)	(8.44)
$NCSKEW_{t-1}$	-0.110***	-0.052***	-0.508***	-0.244***
	(-20.35)	(-19.67)	(-117.34)	(-107.91)
$ACCM_{t-1}$	-0.002	0.012	-0.164*	-0.068
	(-0.02)	(0.26)	(-1.77)	(-1.44)
Intercept	-1.011***	-0.538***	-0.040	-0.012
	(-9.46)	(-8.19)	(-0.99)	(-0.55)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	50,088	50,088	39,187	39,187
Adjusted R^2	0.038	0.040	0.271	0.252

Panel B. Instrumental Variable/Two-stage least squares regressions				
	(1)		(2)	
	First stage	Second stage	First stage	Second stage
Dependent variable	$ST3_{t-1}$	$NCSKEW_{t}$	$ST3_{t-1}$	$DUVOL_{t}$
$ST3_{t-1}$		-1.305***		-0.710***
		(-3.33)		(-3.54)
$DTURN_{t-1}$	-0.014***	0.006	-0.014***	0.001
	(-8.18)	(0.81)	(-8.18)	(0.19)
$SIGMA_{t-1}$	1.344***	3.443***	1.344***	1.562***
	(5.49)	(4.65)	(5.49)	(4.09)
RET_{t-1}	0.006	0.294***	0.006	0.125***
	(0.21)	(4.70)	(0.21)	(3.91)
$SIZE_{t-1}$	-0.040***	-0.006	-0.040***	-0.006
	(-21.39)	(-0.38)	(-21.39)	(-0.78)
MB_{t-1}	0.002***	0.017***	0.002***	0.009***
	(2.76)	(9.57)	(2.76)	(9.38)
LEV_{t-1}	-0.760***	-1.154***	-0.760***	-0.607***
	(-33.40)	(-3.84)	(-33.40)	(-3.94)
ROA_{t-1}	-0.076***	0.358***	-0.076***	0.192***
	(-3.68)	(6.09)	(-3.68)	(6.44)
$NCSKEW_{t-1}$	-0.001	0.019***	-0.001	0.011***
	(-0.50)	(3.37)	(-0.50)	(3.79)
$ACCM_{t-1}$	0.364***	0.669***	0.364***	0.367***
	(9.77)	(4.01)	(9.77)	(4.31)
Intercept	0.826***	0.602*	0.826***	0.346**
	(21.62)	(1.77)	(21.62)	(1.99)
Instrumental variable				
$TERMSTR_{t-1}$	0.009***		0.009***	
	(6.57)		(6.57)	
Industry FE	Yes	Yes	Yes	Yes
Observations	50,088	50,088	50,088	50,088
Adjusted R^2	0.25		0.25	

Panel C. Dynamic SYSGMM approach

	(1)	(2)
	$NCSKEW_t$	$DUVOL_t$
$ST3_{t-1}$	-0.044*	-0.030**
	(-1.71)	(-2.41)
$DTURN_{t-1}$	0.008*	0.003
	(1.79)	(1.26)
$SIGMA_{t-1}$	-3.620***	-1.600***
	(-6.74)	(-6.07)
RET_{t-1}	-0.366***	-0.151***
	(-5.89)	(-5.00)
$SIZE_{t-1}$	0.028***	0.013***
	(10.29)	(9.48)
MB_{t-1}	0.019***	0.010***
	(12.86)	(13.15)
LEV_{t-1}	-0.289***	-0.145***
	(-7.64)	(-7.76)
ROA_{t-1}	0.634***	0.336***
	(13.84)	(14.91)
$NCSKEW_{t-1}$	-0.001	-0.001
	(-0.16)	(-0.20)
$ACCM_{t-1}$	0.071	0.042
	(0.81)	(0.96)
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	50,444	50,444
AR1 p-value	0.000	0.000
AR2 p-value	0.837	0.604
Sargan *p*-value	0.128	0.280
Sargan	63.72(52)	57.46(52)
Wald test	0.000	0.000

Table 4. Alternative measures of short-term debt and stock price crash risk

This table presents the results using alternative measures of short-term debt and stock price crash risk. In Panel A, we measure short-term debt as the ratio of debt in current liabilities to total debt (*ST1*), the ratio of debt in current liabilities plus debt maturing in two years to total debt (*ST2*), and the ratio of debt in current liabilities minus long-term debt due in one year to total debt (*STNP1*). In Panel B, we measure crash risk as an indicator variable (*CRASH*) that takes the value of one if the firm experiences one or more price crash weeks in a fiscal year, and zero otherwise. Variable definitions are provided in the Appendix. All variables except year and industry dummies are winsorized at the 1% and 99%. *t*-statistics are reported in parentheses and are based on (cluster-robust) standard errors that are corrected for heteroskedasticity and clustered at the firm level. ***, **, and * indicate significance of the coefficients at the 1%, 5%, and 10% levels, respectively (two-sided).

Panel A. Alternative measures of short-term debt

	(1)	(2)	(3)	(4)	(5)	(6)
	$NCSKEW_t$	$DUVOL_t$	$NCSKEW_t$	$DUVOL_t$	$NCSKEW_t$	$DUVOL_t$
$ST1_{t-1}$	-0.030**	-0.015**				
	(-2.44)	(-2.44)				
$ST2_{t-1}$			-0.054***	-0.027***		
			(-4.69)	(-4.83)		
$STNP1_{t-1}$					-0.036***	-0.017***
					(-2.71)	(-2.59)
$DTURN_{t-1}$	0.026***	0.012***	0.026***	0.012***	0.026***	0.012***
	(6.08)	(5.51)	(6.00)	(5.42)	(6.11)	(5.52)
$SIGMA_{t-1}$	1.896***	0.701***	1.923***	0.715***	1.891***	0.692***
	(4.07)	(3.03)	(4.13)	(3.09)	(4.05)	(2.98)
RET_{t-1}	0.313***	0.135***	0.313***	0.135***	0.317***	0.136***
	(5.92)	(5.13)	(5.92)	(5.13)	(5.99)	(5.16)
$SIZE_{t-1}$	0.040***	0.018***	0.038***	0.018***	0.040***	0.018***
	(16.50)	(15.39)	(15.88)	(14.75)	(16.67)	(15.56)
MB_{t-1}	0.013***	0.007***	0.013***	0.007***	0.013***	0.007***
	(10.39)	(10.39)	(10.45)	(10.46)	(10.50)	(10.52)
LEV_{t-1}	-0.252***	-0.117***	-0.274***	-0.129***	-0.242***	-0.112***
	(-8.00)	(-7.51)	(-8.74)	(-8.28)	(-7.92)	(-7.39)
ROA_{t-1}	0.442***	0.238***	0.439***	0.237***	0.446***	0.240***
	(11.04)	(12.19)	(10.97)	(12.12)	(11.13)	(12.30)
$NCSKEW_{t-1}$	0.017***	0.009***	0.017***	0.009***	0.017***	0.009***
	(3.31)	(3.81)	(3.29)	(3.79)	(3.33)	(3.83)
$ACCM_{t-1}$	0.116	0.065*	0.123	0.068*	0.115	0.065*
	(1.48)	(1.68)	(1.57)	(1.77)	(1.47)	(1.69)
Intercept	-0.627***	-0.317***	-0.604***	-0.305***	-0.624***	-0.315***
	(-9.16)	(-9.70)	(-8.87)	(-9.36)	(-9.11)	(-9.59)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	50,088	50,088	50,088	50,088	49,731	49,731
Adjusted R^2	0.039	0.042	0.040	0.043	0.040	0.042

Panel B. Alternative measure of crash risk – Logistic regression results

	(1)	(2)	(3)	(4)
	$CRASH_t$	$CRASH_t$	$CRASH_t$	$CRASH_t$
$ST1_{t-1}$	-0.108**			
	(-2.32)			
$ST2_{t-1}$		-0.148***		
		(-3.37)		
$ST3_{t-1}$			-0.113***	
			(-2.68)	
$STNP1_{t-1}$				-0.077
				(-1.55)
$DTURN_{t-1}$	0.068***	0.068***	0.068***	0.069***
	(4.16)	(4.11)	(4.12)	(4.19)
$SIGMA_{t-1}$	3.947**	4.005**	4.053**	3.876*
	(1.98)	(2.01)	(2.04)	(1.94)
RET_{t-1}	0.976***	0.977***	0.990***	0.993***
	(3.90)	(3.91)	(3.96)	(3.95)
$SIZE_{t-1}$	-0.006	-0.010	-0.009	-0.005
	(-0.68)	(-1.01)	(-0.96)	(-0.54)
MB_{t-1}	0.021***	0.021***	0.020***	0.020***
	(5.08)	(5.11)	(5.03)	(4.95)
LEV_{t-1}	-0.355***	-0.400***	-0.367***	-0.298***
	(-3.03)	(-3.41)	(-3.14)	(-2.63)
ROA_{t-1}	1.011***	1.010***	1.017***	1.011***
	(6.09)	(6.07)	(6.12)	(6.08)
$NCSKEW_{t-1}$	0.053***	0.052***	0.052***	0.053***
	(2.87)	(2.84)	(2.84)	(2.86)
$ACCM_{t-1}$	0.241	0.249	0.228	0.222
	(0.85)	(0.87)	(0.80)	(0.78)
Intercept	-2.157***	-2.105***	-2.117***	-2.159***
	(-8.46)	(-8.29)	(-8.35)	(-8.49)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	50,088	50,088	50,088	49,731
Pseudo R^2	0.022	0.022	0.022	0.022

Table 5. Relation between debt maturity and crash risk: Evidence from new debt issues

This table presents results regarding the effect of debt maturity on stock price crash risk using data on new debt issues. The dependent variable is the negative conditional skewness $NCSKEW_t$. Columns (1) and (2) report results for an unconsolidated (transaction-level) sample of new debt issues. *DEBT_MAT* is the natural logarithm of the maturity of a new loan or bond issue. *DEBT_SIZE* is the natural logarithm of the amount of a new loan or bond issue. Columns (3) to (6) report results for a consolidated sample (firm-level). *WAVG_MAT* is the natural logarithm of the issue-size-weighted debt maturity. *AVG_MAT* is the natural logarithm of the equal-weighted debt maturity. *SUM_SIZE* is the natural logarithm of the total amount of new loans or bond issues. Variable definitions are provided in the Appendix. All variables except year and industry dummies are winsorized at the 1% and 99%. *t*-statistics are reported in parentheses and are based on (cluster-robust) standard errors that are corrected for heteroskedasticity and clustered at the firm level. ***, **, and * indicate significance of the coefficients at the 1%, 5%, and 10% levels, respectively (two-sided).

	Unconsolidated sample (transaction level)		Consolidated sample (firm-year level)			
	(1)	(2)	(3)	(4)	(5)	(6)
$DEBT\_MAT_{t-1}$	0.013**	0.017**				
	(2.18)	(2.51)				
$DEBT\_SIZE_{t-1}$		0.002				
		(1.13)				
$WAVG\_MAT_{t-1}$			0.014*	0.017*		
			(1.81)	(1.91)		
AVG_MAT_{t-1}					0.017**	0.020**
					(2.16)	(2.27)
SUM_SIZE_{t-1}				0.002		0.002
				(0.74)		(0.71)
$DTURN_{t-1}$	0.027***	0.027***	0.021***	0.021***	0.022***	0.021***
	(2.86)	(2.88)	(2.67)	(2.68)	(2.72)	(2.66)
$SIGMA_{t-1}$	2.037*	2.016*	2.830***	2.828***	2.824***	2.851***
	(1.92)	(1.90)	(3.19)	(3.19)	(3.18)	(3.22)
RET_{t-1}	0.413***	0.408***	0.481***	0.479***	0.480***	0.481***
	(3.27)	(3.24)	(4.35)	(4.33)	(4.34)	(4.35)
$SIZE_{t-1}$	0.021***	0.020***	0.027***	0.026***	0.026***	0.025***
	(4.05)	(3.92)	(6.46)	(5.95)	(6.19)	(5.67)
MB_{t-1}	-0.121*	-0.123**	-0.118**	-0.121**	-0.126**	-0.125**
	(-1.93)	(-1.96)	(-2.20)	(-2.25)	(-2.32)	(-2.31)
LEV_{t-1}	0.010***	0.010***	0.012***	0.012***	0.012***	0.012***
	(3.84)	(3.87)	(5.15)	(5.18)	(5.14)	(5.17)
ROA_{t-1}	0.553***	0.548***	0.596***	0.593***	0.596***	0.594***
	(4.92)	(4.87)	(6.04)	(5.99)	(6.03)	(6.01)
$NCSKEW_{t-1}$	0.016	0.016	0.017*	0.017*	0.017*	0.017*
	(1.48)	(1.48)	(1.81)	(1.81)	(1.83)	(1.79)
$ACCM_{t-1}$	0.112	0.110	0.218*	0.215	0.220*	0.215
	(0.72)	(0.71)	(1.65)	(1.62)	(1.66)	(1.63)
Intercept	-0.384**	0.017**	-0.559***	-0.602***	-0.471***	-0.497***
	(-2.19)	(2.51)	(-4.52)	(-4.35)	(-4.42)	(-4.44)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	30,742	30,742	15,687	15,687	15,687	15,687
Adjusted R^2	0.031	0.031	0.031	0.031	0.031	0.031

Table 6. Differential impacts of short-term debt on stock price crash risk: Governance monitoring mechanisms

This table presents the results regarding the impact of short-term debt on future stock price crash risk conditional on the effectiveness of corporate governance mechanisms. In Panel A, we partition our sample based on the (annual) median value of the lagged standardized corporate governance scores (*GOV*). In Panel B, we split our sample using the (annual) median value of the lagged shareholder rights index (*GINDEX*). In Panel C, we partition the sample based on the (annual) median value of the fraction of institutional ownership (*INST*). In Panel D, we split the sample using the (annual) median value of the fraction of long-term institutional ownership (*LTINST*). Variable definitions are provided in the Appendix. All variables except year and industry dummies are winsorized at the 1% and 99%. *t*-statistics are reported in parentheses and are based on (cluster-robust) standard errors that are corrected for heteroskedasticity and clustered at the firm level. ***, **, and * indicate significance of the coefficients at the 1%, 5%, and 10% levels, respectively (two-sided).

Panel A. Net governance score

	(1)	(2)	(3)	(4)
Dependent variable	$NCSKEW_t$	$NCSKEW_t$	$DUVOL_t$	$DUVOL_t$
Partition	Weak governance (GOV ≤ median)	Strong governance (GOV > median)	Weak governance (GOV ≤ median)	Strong governance (GOV > median)
$ST3_{t-1}$	-0.058**	-0.011	-0.027**	-0.007
	(-2.26)	(-0.16)	(-2.21)	(-0.20)
$DTURN_{t-1}$	0.009	-0.019	0.001	-0.012
	(0.84)	(-0.71)	(0.29)	(-0.94)
$SIGMA_{t-1}$	3.130**	4.639	1.730***	1.935
	(2.40)	(1.58)	(2.73)	(1.30)
RET_{t-1}	0.428***	0.722**	0.241***	0.315*
	(2.64)	(2.00)	(3.01)	(1.68)
$SIZE_{t-1}$	0.005	0.003	0.004	0.003
	(0.70)	(0.18)	(1.02)	(0.46)
MB_{t-1}	0.011***	0.003	0.006***	0.003
	(4.00)	(0.37)	(4.60)	(0.88)
LEV_{t-1}	-0.193***	-0.023	-0.089***	-0.018
	(-2.76)	(-0.12)	(-2.59)	(-0.19)
ROA_{t-1}	0.470***	0.608**	0.261***	0.337***
	(4.52)	(2.38)	(5.33)	(2.78)
$NCSKEW_{t-1}$	0.005	-0.031	0.004	-0.010
	(0.46)	(-1.08)	(0.78)	(-0.73)
$ACCM_{t-1}$	0.238	1.120*	0.120	0.508
	(1.05)	(1.71)	(1.11)	(1.48)
Intercept	-0.035	0.086	-0.073	-0.043
	(-0.22)	(0.27)	(-1.05)	(-0.25)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	9,201	1,454	9,201	1,454
Adjusted R^2	0.018	0.025	0.021	0.028

Panel B. Shareholder rights				
	(1)	(2)	(3)	(4)
Dependent variable	$NCSKEW_t$	$NCSKEW_t$	$DUVOL_t$	$DUVOL_t$
Partition	Weak governance (GINDEX ⩾ median)	Strong governance (GINDEX < median)	Weak governance (GINDEX ⩾ median)	Strong governance (GINDEX < median)
$ST3_{t-1}$	-0.064*	-0.026	-0.037**	-0.012
	(-1.92)	(-0.80)	(-2.22)	(-0.75)
$DTURN_{t-1}$	-0.016	0.011	-0.012	0.005
	(-0.87)	(0.76)	(-1.32)	(0.69)
$SIGMA_{t-1}$	6.016***	3.355**	2.921***	1.921**
	(3.83)	(2.16)	(3.48)	(2.37)
RET_{t-1}	0.786***	0.502**	0.381***	0.293***
	(3.46)	(2.48)	(2.98)	(2.70)
$SIZE_{t-1}$	0.016**	0.022**	0.009**	0.012***
	(2.02)	(2.57)	(2.22)	(2.66)
MB_{t-1}	0.004	0.007*	0.003	0.004*
	(1.02)	(1.80)	(1.58)	(1.89)
LEV_{t-1}	-0.161	-0.286***	-0.099*	-0.139***
	(-1.49)	(-2.72)	(-1.83)	(-2.63)
ROA_{t-1}	0.853***	0.530***	0.439***	0.273***
	(3.65)	(3.41)	(3.90)	(3.41)
$NCSKEW_{t-1}$	0.006	0.016	0.004	0.011
	(0.46)	(1.00)	(0.66)	(1.40)
$ACCM_{t-1}$	0.283	0.175	0.160	0.136
	(0.99)	(0.62)	(1.10)	(0.98)
Intercept	-0.130	-0.514*	-0.117	-0.287*
	(-0.46)	(-1.77)	(-1.01)	(-1.95)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	6,618	4,873	6,618	4,873
Adjusted R^2	0.019	0.023	0.023	0.026

Panel C. Institutional ownership				
	(1)	(2)	(3)	(4)
Dependent variable	$NCSKEW_t$	$NCSKEW_t$	$DUVOL_t$	$DUVOL_t$
Partition	Weak governance (INST < median)	Strong governance (INST ⩾ median)	Weak governance (INST < median)	Strong governance (INST ⩾ median)
$ST3_{t-1}$	-0.031*	-0.013	-0.021**	-0.006
	(-1.80)	(-0.74)	(-2.49)	(-0.70)
$DTURN_{t-1}$	0.034***	0.006	0.015***	0.002
	(5.30)	(0.83)	(4.78)	(0.54)
$SIGMA_{t-1}$	-0.197	5.059***	-0.363	2.325***
	(-0.28)	(6.09)	(-1.03)	(5.45)
RET_{t-1}	0.063	0.656***	0.008	0.308***
	(0.79)	(6.13)	(0.21)	(5.38)
$SIZE_{t-1}$	0.028***	0.026***	0.011***	0.013***
	(7.70)	(5.99)	(6.55)	(6.13)
MB_{t-1}	0.013***	0.011***	0.007***	0.006***
	(7.01)	(5.11)	(6.78)	(5.36)
LEV_{t-1}	-0.205***	-0.193***	-0.096***	-0.098***
	(-4.27)	(-3.69)	(-3.98)	(-3.78)
ROA_{t-1}	0.402***	0.570***	0.212***	0.306***
	(7.15)	(6.44)	(7.91)	(7.13)
$NCSKEW_{t-1}$	0.005	0.009	0.003	0.005
	(0.64)	(1.18)	(0.89)	(1.24)
$ACCM_{t-1}$	0.038	0.324**	0.019	0.201***
	(0.34)	(2.23)	(0.34)	(2.81)
Intercept	-0.588***	-0.562***	-0.287***	-0.293***
	(-5.81)	(-5.31)	(-5.72)	(-6.23)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	20,165	20,178	20,165	20,178
Adjusted R^2	0.037	0.026	0.041	0.028

Panel D. Long-term institutional ownership				
	(1)	(2)	(3)	(4)
Dependent variable	$NCSKEW_t$	$NCSKEW_t$	$DUVOL_t$	$DUVOL_t$
Partition	Weak governance (LTINST < median)	Strong governance (LTINST≥median)	Weak governance (LTINST < median)	Strong governance (LTINST≥median)
$ST3_{t-1}$	-0.040**	-0.013	-0.026***	-0.004
	(-2.31)	(-0.73)	(-3.09)	(-0.44)
$DTURN_{t-1}$	0.033***	0.007	0.015***	0.002
	(5.39)	(0.86)	(4.86)	(0.59)
$SIGMA_{t-1}$	0.367	5.555***	-0.122	2.565***
	(0.52)	(6.29)	(-0.35)	(5.74)
RET_{t-1}	0.114	0.720***	0.030	0.335***
	(1.46)	(6.08)	(0.78)	(5.45)
$SIZE_{t-1}$	0.032***	0.030***	0.014***	0.015***
	(8.72)	(7.09)	(7.62)	(7.30)
MB_{t-1}	0.013***	0.012***	0.006***	0.006***
	(6.83)	(5.40)	(6.61)	(5.62)
LEV_{t-1}	-0.243***	-0.163***	-0.118***	-0.076***
	(-5.21)	(-3.02)	(-5.07)	(-2.84)
ROA_{t-1}	0.410***	0.647***	0.215***	0.349***
	(7.61)	(6.85)	(8.33)	(7.57)
$NCSKEW_{t-1}$	0.011	0.009	0.007*	0.004
	(1.43)	(1.20)	(1.84)	(1.15)
$ACCM_{t-1}$	0.095	0.264*	0.058	0.164**
	(0.85)	(1.76)	(1.06)	(2.24)
Intercept	-0.642***	-0.574***	-0.308***	-0.303***
	(-6.30)	(-5.87)	(-6.12)	(-6.70)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	20267	20282	20267	20282
Adjusted R^2	0.037	0.027	0.040	0.030

Table 7. Differential impacts of short-term debt on stock price crash risk: The role of information asymmetry

This table presents the results regarding the impact of short-term debt on future stock price crash risk conditional on the degrees of information asymmetry (*IA*). In Panel A, we partition our sample based on the (annual) median value of analyst coverage (*COVER*). In Panel B, we split our sample based on the (annual) median value of the dispersion of analysts' forecasts (*DISPER*). In Panel C, we partition our sample based on the (annual) median value of the R&D ratio. All regressions include year and industry dummies. Variable definitions are provided in the Appendix. All variables except year and industry dummies are winsorized at the 1% and 99%. *t*-statistics are reported in parentheses and are based on (cluster-robust) standard errors that are corrected for heteroskedasticity and clustered at the firm level. ***, **, and * indicate significance of the coefficients at the 1%, 5%, and 10% levels, respectively (two-sided).

Panel A. Analyst coverage

Dependent variable	(1) $NCSKEW_t$	(2) $NCSKEW_t$	(3) $DUVOL_t$	(4) $DUVOL_t$
Partition	High IA	Low IA	High IA	Low IA
	(COVER≤median)	(COVER>median)	(COVER≤median)	(COVER>median)
$ST3_{t-1}$	-0.041***	-0.025	-0.024***	-0.014*
	(-2.73)	(-1.60)	(-3.29)	(-1.75)
$DTURN_{t-1}$	0.023***	0.024***	0.011***	0.011***
	(3.71)	(3.89)	(3.40)	(3.41)
$SIGMA_{t-1}$	0.616	3.273***	0.102	1.388***
	(1.01)	(4.19)	(0.34)	(3.50)
RET_{t-1}	0.143**	0.518***	0.055*	0.238***
	(2.17)	(5.05)	(1.69)	(4.57)
$SIZE_{t-1}$	0.045***	0.016***	0.019***	0.008***
	(13.36)	(4.41)	(11.70)	(4.49)
MB_{t-1}	0.015***	0.010***	0.007***	0.005***
	(8.96)	(5.11)	(8.71)	(5.34)
LEV_{t-1}	-0.297***	-0.158***	-0.141***	-0.074***
	(-7.26)	(-3.38)	(-7.03)	(-3.13)
ROA_{t-1}	0.436***	0.464***	0.228***	0.261***
	(9.02)	(6.31)	(9.74)	(7.27)
$NCSKEW_{t-1}$	0.013*	0.013*	0.008**	0.007*
	(1.92)	(1.75)	(2.50)	(1.85)
$ACCM_{t-1}$	0.107	0.172	0.049	0.115*
	(1.09)	(1.34)	(1.01)	(1.82)
Intercept	-0.647***	-0.385***	-0.317***	-0.209***
	(-7.61)	(-5.66)	(-7.74)	(-5.92)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	27,603	22,485	27,603	22,485
Adjusted R^2	0.045	0.022	0.047	0.025

Panel B. Dispersion of analyst forecasts				
Dependent variable	(1) $NCSKEW_t$	(2) $NCSKEW_t$	(3) $DUVOL_t$	(4) $DUVOL_t$
Partition	High IA	Low IA	High IA	Low IA
	(DISPER≥median)	(DISPER<median)	(DISPER≥median)	(DISPER<median)
$ST3_{t-1}$	-0.067***	-0.025	-0.039***	-0.015
	(-2.85)	(-1.07)	(-3.26)	(-1.25)
$DTURN_{t-1}$	0.016**	0.024**	0.007	0.011**
	(2.02)	(2.37)	(1.61)	(2.25)
$SIGMA_{t-1}$	1.668	3.518***	0.157	1.682***
	(1.37)	(2.98)	(0.25)	(2.88)
RET_{t-1}	0.195	0.643***	0.025	0.313***
	(1.19)	(4.14)	(0.30)	(4.09)
$SIZE_{t-1}$	0.001	0.009	-0.000	0.005
	(0.12)	(1.60)	(-0.08)	(1.57)
MB_{t-1}	0.006*	0.011***	0.003*	0.006***
	(1.78)	(4.26)	(1.83)	(4.42)
LEV_{t-1}	-0.140**	-0.184***	-0.057*	-0.090***
	(-2.08)	(-2.69)	(-1.67)	(-2.68)
ROA_{t-1}	0.540***	0.337***	0.296***	0.193***
	(3.90)	(3.33)	(4.41)	(3.95)
$NCSKEW_{t-1}$	-0.000	0.001	0.002	0.001
	(-0.04)	(0.11)	(0.32)	(0.14)
$ACCM_{t-1}$	0.485***	0.072	0.274***	0.045
	(2.70)	(0.35)	(3.08)	(0.43)
Intercept	-0.239**	-0.205*	-0.113**	-0.135**
	(-2.43)	(-1.79)	(-2.14)	(-2.29)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	10,574	10,559	10,574	10,559
Adjusted R^2	0.018	0.022	0.020	0.025

Panel C. R&D Intensity				
Dependent variable	(1) $NCSKEW_t$	(2) $NCSKEW_t$	(3) $DUVOL_t$	(4) $DUVOL_t$
Partition	High IA	Low IA	High IA	Low IA
	(RD ⩾ median)	(RD < median)	(RD ⩾ median)	(RD < median)
$ST3_{t-1}$	-0.045**	-0.023	-0.022**	-0.015
	(-2.18)	(-1.11)	(-2.19)	(-1.43)
$DTURN_{t-1}$	0.027***	0.021**	0.011***	0.010**
	(3.86)	(2.56)	(3.29)	(2.52)
$SIGMA_{t-1}$	3.856***	1.510*	1.716***	0.349
	(4.51)	(1.69)	(4.07)	(0.78)
RET_{t-1}	0.483***	0.204*	0.226***	0.064
	(5.35)	(1.92)	(5.09)	(1.19)
$SIZE_{t-1}$	0.045***	0.042***	0.021***	0.018***
	(10.36)	(8.95)	(10.09)	(7.77)
MB_{t-1}	0.010***	0.021***	0.005***	0.009***
	(5.01)	(7.62)	(5.50)	(6.73)
LEV_{t-1}	-0.347***	-0.202***	-0.155***	-0.102***
	(-5.13)	(-3.45)	(-4.75)	(-3.45)
ROA_{t-1}	0.338***	0.748***	0.188***	0.379***
	(6.31)	(6.77)	(7.25)	(6.73)
$NCSKEW_{t-1}$	-0.005	0.025***	-0.001	0.014***
	(-0.51)	(2.76)	(-0.17)	(3.29)
$ACCM_{t-1}$	-0.122	0.047	-0.017	0.037
	(-0.85)	(0.31)	(-0.25)	(0.49)
Intercept	-0.693***	-0.794***	-0.326***	-0.399***
	(-6.85)	(-5.97)	(-6.90)	(-5.01)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	14,781	14,761	14,781	14,761
Adjusted R^2	0.044	0.039	0.048	0.039

Appendix. Variable definitions

Crash risk variables

NCSKEW is the negative skewness of firm-specific weekly returns over the fiscal year.

DUVOL is the log of the ratio of the standard deviations of down-week to up-week firm-specific weekly returns.

For both crash risk variables, the firm-specific weekly return (*W*) is equal to ln(1 + residual), where the residual is from the following expanded market model regression:

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

Debt maturity variables

ST3 is the ratio of debt in current liabilities (dlc) plus debt maturing in two or three years (dd2+dd3) to total debt (the sum of debt in current liabilities plus long-term debt, i.e., dlc+dltt).

ST1 is the ratio of debt in current liabilities (dlc) to total debt (dlc+dltt).

ST2 is the ratio of debt in current liabilities (dlc) plus debt maturing in two years (dd2) to total debt (dlc+dltt).

STNP1 is the ratio of debt in current liabilities (dlc) minus long-term debt due in one year (dd1) to total debt (dlc+dltt).

DEBT_MAT is the natural logarithm of new private loan or public bond maturity, in days. Data source: Mergent Fixed Income Securities Database (FISD) and the Loan Pricing Corporation's Dealscan database.

WAVG_MAT is the natural logarithm of the issue-size-weighted debt maturity.

AVG_MAT is the natural logarithm of the equal-weighted debt maturity.

Control variables

DTURN is the average monthly share turnover over the current fiscal year minus the average monthly share turnover over the previous fiscal year, where monthly share turnover is calculated as the monthly trading volume divided by the total number of shares outstanding during the month.

SIGMA is the standard deviation of firm-specific weekly returns over the fiscal year.

RET is the mean of firm-specific weekly returns over the fiscal year, times 100.

MB is the market value of equity divided by the book value of equity (market-to-book).

SIZE is the natural logarithm of total assets.

LEV is long-term debt divided by total assets.

ROA is income before extraordinary items divided by total assets.

ACCM is the absolute value of discretionary accruals, where discretionary accruals are estimated from the modified Jones model.

TERMSTR is the difference between the yield on 10-year Government bonds and the yield on 6-month Treasury bills. Source: Federal Reserves.

DEBT_SIZE is the natural logarithm of the total amount of new private loans or the par value of new public bonds. Data sources: Mergent Fixed Income Securities Database (FISD) and the Loan Pricing Corporation's Dealscan.

SUM_SIZE is the natural logarithm of the total amount of new loans or bond issues in year *t*.

Conditioning variables

GINDEX is the number of anti-takeover provisions based on Gompers et al. (2003). Anti-takeover provisions are obtained from RiskMetrics' Governance Database.

GOV is the adjusted net governance score calculated by standardizing the raw governance strengths and concerns scores by the number of items of governance strengths and concerns in the year, and then taking the net difference between adjusted strengths and concerns. Governance score data is based on the governance category based on the MSCI ESG ratings data

INST is the percentage of shares held by institutional owners, obtained from the Thomson 13F database.

LTINST is the percentage of shares held by dedicated and quasi-indexer institutional investors.

COVER is the number of analysts covering from I/B/E/S.

DISPER is the standard deviation of analyst forecasts divided by consensus analyst forecast within 90 days before the earnings announcement in fiscal year t.

RD is the ratio of research and development expenditures (xrd) to total assets (at).