Crash Risk and Debt Maturity: Evidence from Australia

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Abstract

Purpose - The purpose of this paper is to examine the association between debt maturity structure and stock price crash risk in Australia.

Design/methodology/approach - We employ panel data estimation with industry and year fixed effects. The paper uses a sample of 1,548 publicly listed Australian firms (8,661 firm-year observations) covering the 2000–2015 period.

Findings - Stock price crash risk is positively and significantly associated with the long-term debt maturity structure of firms. In addition, this positive association is more pronounced for firms with a more opaque information environment.

Originality/value – This is the first study to examine stock price crash risk in Australia. The findings are value relevant as it uncovers how debt maturity structure affects shareholders' wealth protection.

1. Introduction

Debt financing is one of the most important means by which firms can raise capital (Alcock et al. 2012). Indeed, the structure of debt financing can potentially affect the ability of firms to continue as going concerns and whether the objectives of shareholder welfare maximization are to be met (Alcock et al. 2012). Research examines both the determinants and consequences of debt maturity structures (Alcock et al. 2012; Barclay and Smith 1995; Gomariz and Ballesta 2014; Gopalan et al. 2014; Harford et al. 2014; Rajan and Winton 1995). Dang et al. (2018) examine the relation between debt structure and stock price crash risk in the U.S. context. However, studies indicate that firm-level debt maturity choices to a large extent depend on a country's institutional setting (e.g., Awartani et al. 2016), which may lead to differential implications for agency costs and monitoring costs. Australia is unique in this regard. There are at least five unique institutional aspects in Australia that make it different from the US. These include- a much greater percentage of direct investment; a less sophisticated investor base; a higher level of long-term debt; a dominance of bank loans relative to public offerings; a less liquid debt market; and an imputations tax system. These institutional differences motivate us to examine whether the association between debt-maturity structure and stock price crash risk in Australia is different than the US.

Stock price crash risk refers to a rapid decline in a firm's equity price (Callen and Fang 2013; Chen et al. 2001; Habib et al. 2018). The occurrence of such an event raises questions as to how firms' capital structure (in particular, their debt contracting terms), together with their information environment, affect their propensity to be subject to future stock price crash risk. This is important given that the underlying causes of stock price crash risk are considered to primarily relate to managerial incentives to suppress the public availability of bad or poorer quality news concerning the firm. The suppression of negative news may relate to management's reputational concerns, linkages between firm performance and compensation types and levels, the desire to sustain the agency-related accumulation of non-pecuniary benefits by management and poor operational decision making associated with, for instance, over- or under-investment. The release of accumulated bad news may then lead to a rapid decline in a firm's stock price.

In this study, we argue that firms with a higher proportion of long-term debt in their capital structure are likely to face a greater risk of a sudden collapse in their stock prices. Given that long-term debt covenants are renewed less frequently than short-term debt covenants, lenders are less likely to scrutinize and assess the performance of firms on a relatively more frequent basis. The terms and conditions of debt covenants in this situation are less likely to be used as a tool to align the interests of debt-holders with those of firm management - that is, the assurance of operational efficiency, transparency, and effective governance and control. Long term debt-holders face increased credit risk because of the infrequent revision of debt contracts, which affords management the opportunity to engage in various types of self-serving behavior that may lead them to suppress or accumulate bad news. Long-term debt providers may only act if a breach of debt covenants occurs, while short-term debt providers may radically change the terms of debt contracts or may even cancel a contract if firm performance measures, including the timely release of all material news, has not been adhered to (Alcock et al. 2012). Thus, the nature of debt contracts, particularly the maturity terms of those contracts, may serve as an important mechanism that suppresses managerial incentives to hide or accumulate bad news for a sustained period, thereby influencing the stock price crash risk.

Based on a sample of 8,661 firm-year observations of publicly listed Australian firms covering the 2000–2015 period, the regression results show that firms with a larger proportion of long-term debt in their capital structure have significantly higher stock price crash risk. This result is consistent with agency theory tenets in that long-term debt providers play a weaker monitoring role for the firms to which they lend, thereby allowing firm management to engage in opportunistic behavior that includes the suppression or accumulation of negative news. The ongoing accumulation of bad news may reach a point where a large amount is released approximately at the same time or over a relatively short period (e.g. a year), giving rise to higher stock price crash risk. The results also show that the positive association between long-term debt and crash risk is significantly more pronounced for firms with more information asymmetry as reflected by real earnings management and idiosyncratic volatility. Further, we find that firms with more long-maturity debt exhibit less accounting conservatism, which provides managerial opportunities to hoard bad news.

This study contributes to the literature in several important ways. First, it extends the emerging literature on stock price crash risk. Most crash risk studies focus on U.S. firms (e.g., Callen and Fang 2013; Chen et al. 2001; Kim et al. 2014; Kim et al. 2011a,b; Kim and Zhang 2016) with a few exceptions that examine stock price crash risk in China (Sun et al. 2017; Xu et al. 2013; Zhang et al. 2016). To this end, this is the first to investigate the stock price crash risk in Australia. From this perspective, our study responds to the call for more research to better understand the effect of country-specific idiosyncratic features that determine stock price crash risk (Habib et al. 2018). As indicated earlier, the institutional features of Australia make a study of stock price crash risk an important and interesting focal area.

One key difference is that Australian share ownership differs significantly from that in the U.S. An Australian Share Ownership Study (2014)[1] showed that 33% of the adult Australian population directly invests in the Australian share market, which differs significantly from that in the U.S. (14%). Direct investment is likely to diffuse management oversight and this would result in higher stock-price crash risk. Furthermore, 31% of Australian investors trade through a self-service broker, and a majority of these are less sophisticated in terms of trading in capital markets. In contrast, the U.S. stock market is dominated more by sophisticated institutional investors (Sharma 2004). This may have a negative impact on stock-price crash risk in Australia relative to the United States. The increased percentage of direct investment by less sophisticated investors is likely to result in relatively less management oversight, and management would consider it easier to hide bad news from less sophisticated stockholders. Another factor differentiating Australia from the US is that Australia has a greater level of long-term borrowing (Alcock et al. 2012). This has implications for monitoring incentives and capacity and, hence, the likelihood of stock price crash risk. Finally, the reliance of Australian firms on obtaining debt from banks rather than via public offerings means that those borrowings may be reviewed frequently, and a higher level of monitoring is likely to reduce potential agency-related costs (Alcock et al. 2012). However, the recent Royal Commission into Misconduct in the Banking and Superannuation and Financial Services Industry (2019) has raised many questions regarding agency-related issues between Australian banks and their customers. It is unclear if there has been higher levels of monitoring by banks and a reduction in stock price crash risk from the additional bank debt in Australia. A final factor that may influence the effect of debt maturity on stock price crash risk is that Australian

[1] http://www.asx.com.au/documents/resources/australian-share-ownership-study-2014.pdf

firms may be less reliant on debt for raising capital given the availability of franking credits under the Australian imputation taxation system (Alcock et al. 2012; Fan et al. 2012). This means that the incentive to use debt is generally less in Australia relative to the US. This then pushes management monitoring back to stockholders and given they are dispersed and relatively unsophisticated we would expect higher stock price crash risk.

Second, this study also contributes to the debt maturity structure literature. Prior studies suggest that, shorter debt maturity improves investment efficiency (Gomariz and Ballesta 2014) and the timely disclosure of information (Rajan and Winton 1995). Our study extends this line of literature by showing that long-term debt fails to suppress managerial bad news hoarding, which in turn increases future stock crash risk.

Our study differs from Dang et al. (2018) with respect to institutional settings and moderation effect of information environment. In particular, while Dang et al. (2018) covers US publicly listed firms, we focus on Australian public firms. Given that Australian firms are subject to significantly different institutional environment, a study from Australian context is interesting and important. In addition, albeit prior studies emphasize that bad news hoarding through opaque information environment (e.g., accrual management, real earnings management, and accounting conservatism) drives future stock price crash risk (Francis et al. 2016; Hutton et al. 2009; Kim and Zhang 2016), Dang et al. (2018) overlook this important dimension. In the study, we explicitly take the information environment into account and show that the relationship between long term debt and future stick price crash risk is more pronounced in the presence of more real earnings management and idiosyncratic volatility. We also show that long-term debt is associated with less accounting conservatism, which further provides support for the informational opacity argument of future crash risk.

The remainder of this paper proceeds as follows. Section 2 develops our hypothesis. Section 3 discusses the research design, including the sample and statistical techniques. Section 4 explains the empirical results. Section 5 concludes the paper.

2. Background and hypotheses development

2.1. Debt maturity

Although Miller and Modigliani (1961) proposes that in a frictionless capital market, firms should be indifferent between the choices of debt versus equity, subsequent capital structure research argues that a higher proportion of debt reduces agency costs (Jensen and Meckling 1976) and further that the debt maturity structure choice, play an important role in reducing agency conflicts (Barclay and Smith 1995; Guedes and Opler 1996; Stohs and Mauer 1996). Short-maturity debt reduces agency costs by subjecting managers to more frequent monitoring by lenders as short-term debt comes up for frequent renewal (Stulz 2001). Prior studies suggest that more informationally opaque firms endanger more severe moral hazard problems for lenders, requiring them to use short-term maturity debt to control informational problems (Berger and Udell 1998; Ortiz-Molina and Penas 2008). Studies also show that a firm's debt maturity structure affects its credit quality (Gopalan et al. 2014), accounting conservatism (Khurana and Wang 2015), and investment decisions (Aivazian et al. 2005).

Country-specific effects are also known to account for a significant part of firms' debt maturity choices given that a country's legal, tax and institutional factors can influence those choices (Fan et al. 2012). Fan et al. (2012) show that the preferences of suppliers of capital in a particular country can influence debt maturity choices. Alcock et al. (2012) find that Australian firms use short-term (bank) debt as a signal of their commitment to transparency and good governance to the market. The reason for this is that greater reliance on bank debt can lead to increased refinancing risk if banks find that firms are in breach of debt covenants. The bulk of the literature that has examined the economic consequences of debt maturity structure has focused on the U.S. market (Alcock et al. 2012). In this study, we employ sample from Australia to examine the relationship between debt maturity structure and future stock price crash risk.

2.2. Stock price crash risk

Stock price crash risk is influenced by a suite of internal and external mechanisms. Internal mechanisms include a number of managerial incentives and characteristics that include the compensation of management and the board of directors, tax planning and strategies, accounting conservatism and CEO overconfidence (Chen et al. 2001; Habib et al. 2018; Kothari et al. 2009; Kim et al. 2011a,b; Kim and Zhang 2016). External mechanisms can be broadly grouped into financial reporting, regulatory and capital market factors, and institutional factors, and these may include the extent of institutional ownership, audit service provision and stock liquidity (An and Zhang 2013; Callen and Fang 2015a,b; DeFond et al. 2014, Habib and Hasan 2015; Chang et al. 2017)[2]. Dang et al. (2018) examined the relation between debt maturity structure and stock price crash risk in the U.S. They asserted that short maturity debt assists in monitoring management and may then suppress the accumulation of bad news. This paper is closely aligned with Dang et al. (2018) but extends their work by first assessing if relations between these attributes hold in the Australian context, where debt structure and capital market features differ significantly from those in the U.S. market, and by further examining whether opaque information environment can assist in explaining the observed relations.

2.3 Association between debt maturity and stock price crash risk

Debtholders are likely to perceive firm's choice of debt maturity as a signal of their commitment to information transparency and to mitigating agency-related costs. The choice of long-term debt may exacerbate agency conflicts between shareholders and managers because

[2] See Habib et al. (2018) for a detailed review of stock price crash risk.

managers have the opportunity to participate in obscure arrangements that may allow them to potentially engage in rent extraction to the detriment of shareholders. Agency conflicts may also arise between debtholders and managers, where managers are able to make decisions that transfer the risk to debtholders while obtaining the potential rewards of their decisions (Jensen and Meckling 1976). The choice of short-maturity debt by firm management can signal to other stakeholders that firm management encourages the review and scrutiny of debt agreements on a more frequent basis, a factor that is likely to reduce agency-related issues such as rent extraction, market frictions, and information asymmetry (Alcock et al. 2012; Barclay and Smith 1995). In the Australian context, the reliance on bank debt issuance means that any funding will be associated with increased monitoring. High-quality firms may use short-term debt to signal their quality to the market (Alcock et al. 2012). Debt providers such as banks have the incentive to monitor firms' financial statements and compliance with debt covenants to protect their investment in the firm. Banks can enforce control through more frequent ongoing reviews of compliance with debt covenants and through rejection of or agreement to an increase in the costs associated with refinancing. Firms in this situation are also under pressure to signal their quality through the timely provision of credible information to the market.

Firm's reliance on short-term debt as a financing source limits the agency-related self-serving behavior of firm management due to the increased market scrutiny, transparency and regulatory pressure associated with such arrangements (Rajan and Winton, 1995; Fung and Goodwin 2013). Managerial hoarding of bad news and stock price crash are less likely in such a situation. Providers of long-term debt are also likely to monitor borrowers' compliance with debt covenants but are more likely to do so infrequently; hence, the effect of managerial discretion is more likely to play a role in accumulating bad news. The release of accumulated bad news relating to a firm may result in a sudden and severe decline in its stock price and have an immediate effect on shareholder wealth creation (Callen and Fang 2015a; Chen et al. 2001; Kim et al. 2014).

We thus expect firms that have a proportionately greater level of long-term debt in their capital structure to be subject to less monitoring that provides opportunities to hoard bad news, leading to greater future stock price crash risk. Therefore, the hypothesis is:

H1: All else being equal, stock price crash risk is positively associated with proportionately more long-term debt relative to short-term debt in capital structure.

3. Empirical methodology

3.1 The Sample

We collect financial statement data from the Compustat Global file and corporate governance data from the Securities Industry Research Centre of Asia-Pacific (SIRCA). Our sample period spans from 2000 to 2015.[3] Our initial sample is 28,003 firm-year observations. We then exclude observations from financial and utility industries (4,848 firm years) and observations with missing crash risk variables (dependent variable) (4,367 firm years). We then drop 10,127 firm-year observations with missing independent and control variables. Our primary sample consists of 8,661 firm-year observations (1,548 unique firms). All of the continuous variables are winsorized at the 1st and 99th percentiles to mitigate the undesirable influence of outliers.

The firm-year observations come from a wide variety of industries. Panel B shows that the materials (29.55%) and industrial (17.38%) sectors command the largest industry representation in our sample.

[TABLE 1 ABOUT HERE]

3.2 Independent variable: Debt maturity structure

[3] Since we use financial information available at year *t* to predict crash risk incidents in year *t+1*, our financial information (crash) data period covers from 2000 to 2014 (2001 to 2015).

Following the debt maturity literature (e.g., Alcock et al. 2012; Awartani et al. 2016; Barclay and Smith 1995), we define debt maturity as the ratio of a firm's long-term debt (debt due after 1 year) to total debt, where total debt is the sum of long-term debt and debt in current liabilities. In the robustness test, we also consider long-term liabilities to total liabilities as alternative measures of debt maturity (Awartani et al. 2016). We also consider long-term debt to total liabilities as another measure of debt maturity.

3.3 Dependent variable: Stock price crash risk

Following prior studies (Chen et al. 2001; Dang et al. 2018; Kim et al. 2014), we use two measures of firm-specific stock price crash risk. Both measures are based on firm-specific weekly returns estimated as the residuals from the market model. This empirical estimation ensures that stock price crash risk captures firm-specific factors rather than broad market movements. In particular, we estimate the following expanded market model regression:

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

where $r_{,j,\tau}$ is the return of firm j in week τ and $r_{m,\tau}$ is the return on the ASX All Ordinary Index (i.e., market return) in week τ. The lead and lag terms for the market index return are included to allow for non-synchronous trading (Dimson 1979). The firm-specific weekly return for firm j in week τ ($W_{j,\tau}$) is calculated as the natural logarithm of one plus the residual return from Eq. (1) above. In estimating equation (1), we require at least 26 weeks of return data to alleviate the thin trading concern (Kim et al. 2014).

The first measure of crash risk is the negative conditional skewness of firm-specific weekly returns over the fiscal year (*NCSKEW*). *NCSKEW* is calculated by taking the negative of the third moment of firm-specific weekly returns for each year and normalizing it by the standard deviation of the firm-specific weekly returns raised to the third power. Specifically, for each firm j in year τ, *NCSKEW* is calculated as

$$NCSKEW = -\left[n(n-1)^{3/2}\sum w^{3}{}_{j,\tau}\right] / \left[(n-1)(n-2)(\sum w^{2}{}_{j,\tau})^{3/2}\right] \ldots\ldots\ldots\ldots\ldots\ldots \text{(2)}$$

The second measure of crash risk is the down-to-up volatility measure (*DUVOL*) of the crash likelihood. For each firm *j* over a fiscal year period *τ*, firm-specific weekly returns are separated into two groups: “down” weeks, when the returns are below the annual mean, and “up” weeks, when the returns are above the annual mean. The standard deviation of firm-specific weekly returns is calculated separately for each of these two groups. *DUVOL* is the natural logarithm of the ratio of the standard deviation in the “down” weeks to the standard deviation in the “up” weeks:

$$DUVOL_{j,\tau} = \log\left\{(n_u - 1)\sum_{Down} w^{2}{}_{j,\tau} / (n_d - 1)\sum_{Up} w^{2}{}_{j,\tau}\right\} \ldots\ldots\ldots\ldots\ldots\ldots \text{(3)}$$

A higher value of *DUVOL* indicates greater crash risk. As suggested in Chen et al. (2001), *DUVOL* does not involve third moments, and hence is less likely to be overly influenced by extreme weekly returns.

3.4 Empirical model

To examine the association between debt maturity and firm-specific future stock price crash risk, we estimate the following model:

$$CRASH\ RISK_t = \beta_0 + \beta_1 DMS_{t-1} + \beta_2 CRASH\ RISK_{t-1} + \beta_3 SIZE_{t-1} + \beta_4 MTB_{t-1} + \beta_5 LEV_{t-1} + \beta_6 ROA_{t-1} + \beta_7 |DAC|_{t-1} + \beta_8 RET_{t-1} + \beta_9 SIGMA_{t-1} + \beta_{10} DTURNOVER_{t-1} + \beta_m IND\ DUMMIES + \beta_n YEAR\ DUMMIES + \varepsilon_t \ldots\ldots\ldots\ldots \text{(4)}$$

where the dependent variable, *CRASH RISK*, is proxied by NCSKEW or DUVOL and our primary independent variable is DMS, as discussed in Section 3.2. We use a 1-year lag between the dependent and independent variables to examine whether DMS in year *t-1* can predict crash risk in year *t*.

We follow prior crash risk studies (Chen et al. 2001; Dang et al. 2018; Kim et al. 2014) and control for several factors that have been shown to affect future stock price crash risk. In particular, we control for 1-year lagged *CRASH RISK* to account for the potential serial correlation. We also control for firm size (SIZE), growth (MTB), leverage (LEV), profitability (ROA), abnormal accruals (|DAC|), a proxy for earnings management estimated from the modified Jones model (Kothari et al. 2005), stock return (RET), stock volatility (SIGMA) and change in trading volume (DTURNOVER). We also include dummies to control for industry and year effects. All of the variables are defined in the Appendix.

4. Results

4.1 Descriptive statistics

Panel A, Table 2 provides descriptive statistics for the variables used in the regression analyses. The mean values of *NCSKEW* and *DUVOL*, the crash risk measures, are 0.036 and -0.114, respectively. The mean *NCSKEW* and *DUVOL* are close to the estimates from U.S. studies (Kim et al. 2011b; Kim et al. 2014). The sample firms have an average long-term debt (debt due after 1 year) to total debt proportion of 53.6%. The average firm may also be considered as a moderately small firm (*SIZE* = 4.290) with low leverage (*LEV* = 0.098), moderate future growth opportunities (*MTB* = 2.716), negative profitability (*ROA* = -0.211) and some degree of risk (*SIGMA* = 0.117). The average absolute value of abnormal accruals (|*DAC*|) is 0.099, and the average change in monthly trading volume (as a percentage of shares outstanding) is 0.000.

Panel B shows the mean crash risk (*NCSKEW* and *DUVOL*) and debt maturity structure (*DMS*) over the years. Both crash risk measures exhibit considerable variation across years, with 2007 having the highest crash risk and 2005 having the lowest crash risk. Debt maturity over the years shows a gradual decline, with 2000 having the highest *DMS* (0.634) and 2013 having the lowest *DMS* (0.481). This indicates less (more) use of long-term (short-term) debt over the years. It also supports the findings of Alcock et al. (2012) that Australian firms issue more short-term debt to signal their quality.

[TABLE 2 ABOUT HERE]

4.2 Correlations

Table 3 presents the correlations between the key variables of the study. First, long-term debt (*DMS*) is positively and significantly correlated with *NCSKEW* (ρ=0.02; p<0.05) and *DUVOL* (ρ=0.05; p<0.01), suggesting that firms with long-term debt tend to face more future crash risk. This provides preliminary univariate support for our Hypothesis (H1). Second, the correlation between crash risk measures (*NCSKEW* and *DUVOL*) is highly positive and significant (ρ=0.91; p<0.01), indicating that both measures capture similar underlying extreme movements in stock price. Third, *NCSKEW* and *DUVOL* are also positively and significantly correlated with firm size (0.03), leverage (0.02) and sigma (0.02), indicating that future crash risk tends to be higher for large, leveraged, and risky firms.

[TABLE 3 ABOUT HERE]

4.3 Baseline regression results

Table 4 presents the main regression analysis of the effects of the debt maturity structure on stock price crash risk. We estimate the regression models using ordinary least squares (OLS) regressions with standard errors adjusted for heteroskedasticity and within-firm clustering. We hypothesized that stock price crash risk will be higher for firms with a long- term debt maturity structure (H1). We find support for our hypothesis.[4]

In columns (1) and (2), we use two measures of stock price crash risk, *NCSKEW* and *DUVOL*, and regress them on long-term debt (DMS_{t-1}), and we control for firm-specific characteristics and industry and year effects. The results reported in Columns (1) and (2) show that long-term debt is significantly and positively associated with one-year-ahead stock price crash risk. The coefficient for *NCSKEW* is 0.081 (t-statistic = 2.08; $p < 0.05$). The

[4] Findings from our analysis remains qualitatively similar even after controlling for time trend in the regressions (untabulated).

corresponding coefficient for *DUVOL* is also 0.081 (t-statistic = 2.55; $p < 0.05$).[5] This finding supports our conjecture that long-term debt does not serve as a good monitoring mechanism, creating scope for managers to hoard bad news, thus leading to higher stock price crash risk.

The results reported in Table 4 are also economically meaningful. For example, in terms of economic significance, the reported coefficients in Columns (1) and (2) suggest that a one-standard-deviation increase in DMS_{t-1} is associated with a 3.16% (=0.39*0.081) increase in future stock price crash risk. The corresponding economic significance as reported by Dang et al. (2018) is 1.71% (=0.356*0.048) and 0.82% (=0.356*0.023) for *NCSKEW* and *DUVOL* measures of crash risk, respectively. Our reported coefficients in Columns (1) and (2) also suggest that an increase in DMS_{t-1} from the 25th to the 75th percentile increases future crash risk by 7.11% (= 0.081 x 0.878, where 0.081 is the coefficient estimate in Column (1) and (2), and 0.878 is the interquartile range of DMS_{t-1}). The corresponding economic significance as reported by Dang et al. (2018) is 3.5% (= 0.048 x 0.721, where 0.048 is the coefficient estimate and 0.721 is the interquartile range of DMS_{t-1}) and 1.7% (=0.023*0.721) for *NCSKEW* and *DUVOL* measures of crash risk, respectively. Thus, the economic significance of DMS_{t-1} in our study is more than double of that reported by Dang et al. (2018), providing support to our earlier discussion that since bank debt accounts for high proportion of debt in Australia, debt maturity is likely to have more dominating effect on crash risk.

The sign and significance of the control variables are generally consistent with prior research (Dang et al. 2018; Kim et al. 2014). For example, crash risk is higher for large and risky firms. Moreover, future crash risk is positively associated with lagged crash risk. Overall, the results reported in Table 4 lend support to our conjecture that stock price crash risk is

[5] To mitigate the concern that our results might be biased because of the multicollinearity problem, we checked the variance inflation factor (VIF) values. We find that multicollinearity is not a problem, as the highest VIF is 1.69 for *DMS*, followed by 1.65 for *LEV*. The rest of the VIFs pertinent to the variables are below 1.52.

positively associated with proportionately more long-term debt relative to short-term debt in firms' capital structure.[6]

[TABLE 4 ABOUT HERE]

4.4 Robustness checks

4.4.1 Firm fixed effect regression

One may argue that firm fixed effects estimates are critical to control for unobserved time-invariant firm heterogeneity. Therefore, we re-estimated the regression using the firm fixed effect regression and presented the results in Table 5 (Panel A). Our firm fixed effect regression results are also qualitatively very similar to the OLS results in terms of sign, significance and magnitude. In particular, the coefficient for DMS_{t-1} is 0.091 (t-stat = 1.96; $p < 0.05$) for the $NCSKEW_t$ measure of crash risk, while the corresponding coefficient is 0.079 (t-stat 2.06; $p < 0.05$) for the $DUVOL_t$ measure of crash risk. This result confirms that our results are not driven by firm-level unobserved heterogeneity and debt maturity has a profound effect on future stock price crash risk.

4.4.2 Additional controls

In our main regression analysis, we do not control for corporate governance attributes. Because corporate governance mechanisms curb bad news hoarding and thus mitigate crash risk (Andreou et al. 2016), one may argue that our documented findings are biased because of the omission of corporate governance. To allay this concern, we perform additional tests after including corporate governance attributes in the regressions: (i) the natural log of board size (*BSIZE*), (ii) the percentage of independent directors on the board (*%IND_DIR*), and (iii) CEO duality (*CEO_DUAL*). The requirement for these additional data from SIRCA reduces the

[6] Inference from our analysis remains qualitatively similar if we control for real earnings management (Roychowdhury, 2006) in place of discretionary accrual (|DAC |). For example, coefficient for $NCSKEW_t$ is 0.095 ($p<0.05$) and for $DUVOL_t$ is 0.084 ($p<0.05$) (results are untabulated but available upon request).

sample size to 5,996 firm-years. The results tabulated in Column (1) and (2) of Panel B (Table 5) provide a qualitatively similar conclusion, and the sign, significance and magnitude of the main variables of interest remain the same. The coefficients for DMS_{t-1} are 0.092 and 0.094 (both significant at $p < 0.05$) for the $NCSKEW_t$ and $DUVOL_t$ measures of crash risk, respectively.

In addition, to alleviate the concern that our documented relation between debt maturity structure and stock price crash risk may be driven by omitted operating leverage, we include operating leverage (*OPER_LEV*) as an addition control in Column (3) and (4). We defined operating leverage as the sum of cost of goods sold plus selling, general and administrative expenses, divided by total assets (Novy-Marx 2011). The coefficients for DMS_{t-1} remain positive and significant ($p<0.05$), even after controlling for operating leverage. Finally, in Column (5) and (6), we control for both corporate governance variables and operating leverage and find qualitatively similar results. Thus, we find that our documented relation between debt maturity structure and stock price crash risk is not driven by the omitted corporate governance and operating leverage variables.

4.4.3 Change analysis

Although the preceding analyses control for a set of firm characteristics that might account for the relation between debt maturity and future crash risk, endogeneity is always a concern in studies such as this. One possible way to mitigate the potential endogeneity concern is to conduct a “change” analysis. We argue that if a firm’s long-term debt drives the future crash risk, then the firm’s increased use of long-term debt should result in increased future stock price crash. Therefore, we modify the “level” specification in equation (4) to a “change” specification, wherein we regress changes in stock price crash ($\Delta NCSKEW_t$ and $\Delta DUVOL_t$) on changes in the debt maturity (ΔDMS_{t-1}) along with changes in other economic determinants (Panel C, Table 5). We continue to find a positive and significant association between changes in debt maturity and changes in future crash risk over time (e.g., coefficient = 0.096, $p < 0.05$ for *ΔNCSKEW*$_t$ and coefficient = 0.114, $p < 0.01$ for *ΔDUVOL*$_t$). Overall, we document that more long-term debt is associated with more future stock price crash risk over time.

4.4.4 Two-step system generalized method of moments (GMM)

We use the two-step system GMM approach adopted by Blundell and Bond (1998) to address endogeneity concern. In the two-step system GMM, the first lag difference of firm characteristics are used as instruments for the equations in levels, and the second lag of firm characteristics are used as instruments in the difference equation.

Results in Table 5 (Panel D) suggest that the relationship between debt maturity structure and stock price crash risk remains robust after accounting for the endogenous relationship between debt maturity structure and crash risk. For example, the estimated coefficients (and *p* value) are 0.543 ($p<0.05$) for $NCSKEW_t$ and 0.445 ($p<0.05$) for the $DUVOL_t$ measures of crash risk. The bottom part of Panel D also reports the desirable statistically significant AR(1) and statistically insignificant AR(2). Moreover, statistically insignificant Hansen test of over-identifying restrictions tests indicate that the instruments are valid in the two-step system GMM estimation.

[TABLE 5 ABOUT HERE]

4.4.5 Other robustness checks

In our main analysis, we define debt maturity as the ratio of a firm's long-term debt (debt due after 1 year) to total debt, where total debt is the sum of long-term debt and debt in current liabilities (Alcock et al. 2012; Awartani et al. 2016; Barclay and Smith 1995). In the robustness tests, we define debt maturity (*DMS2*) as the ratio of long-term liabilities to total liabilities (Awartani et al. 2016). We also define debt maturity (*DMS3*) as the ratio of long-term debt to total liabilities. The results tabulated in Table 6 corroborate our main findings that long-term debt is positively related to future stock price crash risk. In Columns (1) and (2), the coefficients for *DMS2* are 0.107 ($p < 0.05$) and 0.108 ($p < 0.01$) for the *NCSKEW* and *DUVOL* measures of crash risk, respectively. Furthermore, in Columns (3) and (4), the coefficients for *DMS3* are 0.252 ($p < 0.01$) and 0.251 ($p < 0.01$) for the *NCSKEW* and *DUVOL* measures of crash risk, respectively. Thus, our documented results are not driven by any specific definition of debt maturity structure.

The yearly mean stock price crash risk reported in Table 2 (Panel B) shows that crash risk was relatively higher in 2007, the beginning of the global financial crisis. We test the sensitivity of our empirical findings after excluding observations pertaining to the year 2007 from our sample. Untabulated results show that our inference from this analysis remains unaffected, as the sign, significance and magnitude of the main variable of interest (*DMS*) remain qualitatively the same.

[TABLE 6 ABOUT HERE]

4.5 Extensions and additional analyses

Prior studies emphasize that opaque information environment enables the managers to hoard bad news for extended period. The sudden release of that accumulated bad news in the market leads to a rapid decline and eventual crash in stock prices. In this section, we employ different facets of information quality to explore how these moderate the relationship between long-term debt and stock price crash risk.

4.5.1 Moderating role of real earnings management

In developing hypothesis, we argue that long-term debt serves as a less effective monitoring mechanism, which affords management the opportunity to engage in various types of self-serving behavior that may lead them to suppress or accumulate bad news. We thus expect that the positive association between long-term debt and stock price crash risk is more pronounced for firms that are subject to more real earnings management (REM).[7]

To test this conjecture, in Table 7, we partition the sample based on the real earnings management (REM). In particular, firm-year observations with above-median REM (below-median REM) are defined as poor (high) financial reporting quality. In Table 7, the coefficient for *DMS* is positive and significant ($p < 0.01$) for the poor financial reporting sub-sample (i.e., *REM>* sample median) and it is statistically insignificant for the high financial reporting counterparts (i.e., *REM* < sample median). Importantly, the coefficient for *DMS* is also much higher for the poor financial reporting subsample. An *F*-test suggests that the difference in the coefficients for *DMS* between the sub-sample is significant at the 1% (10%) level for *NCSKEW* (*DUVOL*), implying that the relationship between long-term debt and future crash risk is relatively more pronounced for firms with poor financial reporting quality.[8]

[TABLE 7 ABOUT HERE]

4.5.2 Moderating role of idiosyncratic volatility

In this section, we examine whether the relation between long-term debt and future stock price crash risk is conditional on the idiosyncratic volatility of the firm. We consider the idiosyncratic volatility of firms as proxy for information asymmetry (Rajgopal and Venkatachalam 2011). We obtain idiosyncratic volatility from market model and split the sample into two groups based on whether idiosyncratic volatility of a particular firm is higher (lower) than the median in a given year. Table 8 reports the results from the analysis. Our results show that the role of long-term debt (*DMS*) on future crash risk is positive and significant ($p < 0.05$) only for the

[7] We employ REM as a moderating variable as past studies report a decline in discretionary accruals, while there has been a rise in real earnings management after the passage of SOX 2002 (e.g., Cohen et al. 2008; Hutton et al. 2009). For instance, Hutton et al. (2009) find that discretionary accruals predictive power for stock crash price risk is reduced after SOX.

[8] As a further analysis, we use discretionary accrual (|DAC|) to split the sample into high vs low financial reporting quality sub-sample. Our results show consistent evidence that relation between *DMS* and future crash risk is significant and relatively more pronounced for poor quality sub-sample. However, *F*-test suggests that the difference in the coefficients for *DMS* between the sub-sample are statistically insignificant.

subsample of firms with higher than median value of idiosyncratic volatility. However, the coefficient is insignificant for the other group with less than median value of idiosyncratic volatility. These results indicate that lower information asymmetry in the form of lower idiosyncratic volatility reduces opportunities for managerial bad news hoarding and therefore suppresses the ability of long-term debt to increase future stock price crash risk.

[TABLE 8 ABOUT HERE]

4.5.3 The role of accounting conservatism

Our central argument in this study is that long-term debt structures are subject to less monitoring which allow managers to hide bad news for opportunistic purposes. This in turn leads to increased stock price crash risk. Our analysis so far provides support for this argument. In this section, we examine whether long-term debt is indeed associated with accounting conservatism, a possible underlying mechanism that limits managers' incentive and ability to hide bad news, which in turn, reduces stock price crash risk (Kim and Zhang 2016). In our setting, we argue that since long-maturity debt reduces monitoring efficiency, firms with long-term debt are associated with less accounting conservatism. We use both accrual-based conservatism (Ahmed and Duellman 2007; Givoly and Hayn 2000) and accounting conservatism based on the Basu (1997) model as modified by Khurana and Wang (2015) and Ahmed and Henry (2012).

The accrual-based measure of conservatism (*CON_ACC*) is calculated as net income before extraordinary items plus depreciation less operating cash flows scaled by average total assets, and averaged over a 3-year period centered on year t, multiplied by negative one (Ahmed and Duellman 2007). We estimate the following OLS model to test whether long-term debt is associated with less accounting conservatism:

$$CON\_ACC_t = \beta_0 + \beta_1 DMS_t + \beta_2 SIZE_t + \beta_3 \Delta SALES_t + \beta_4 LEV_t + \beta_5 CFO/TA_t + \beta_6 R\&D_t + \beta_7 LITIGATION_t + \beta_m IND\ DUMMIES + \beta_n YEAR\ DUMMIES + \varepsilon_t \text{…………}(5)$$

where *ΔSALES* is the annual growth in sales, *CFO/TA* is the operating cash flow scaled by total assets, *R&D* is research and development expenses scaled by total assets, *LITIGATION* is a dummy variable that takes a value of 1 if firms are classified as a technology firm, and other variables are defined earlier. A negative coefficient for *DMS* will indicate less accounting conservatism associated with long-term debt.

Following prior studies (Ahmed and Duellman 2007; Ahmed and Henry 2012; Khurana and Wang 2015), we use the following OLS regression to test the asymmetric timeliness with respect to bad news versus good news associated with long-term debt:

$$NI_t = \beta_0 + \beta_1 DMS_t + \beta_2 RET_t + \beta_3 NEG_t + \beta_4 RET_t{*}NEG_t + \beta_5\, DMS_t{*}NEG_t + \beta_6 DMS_t{*}\, RET_t + \beta_7 DMS_t{*}RET_t{*}NEG_t + \beta_8 SIZE_t + \beta_9 \Delta SALES_t + \beta_{10} LEV_t + \beta_{11} CFO/TA_t + \beta_{12} R\&D_t + \beta_{13} LITIGATION_t + \beta_m IND\ DUMMIES + \beta_n YEAR\ DUMMIES + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

where *NI* is the net income before extraordinary items scaled by market value of equity at the end of the year, *RET* is the cumulative return over the year, *NEG* is a dummy variable that takes a value of 1 id *RET* is negative, 0 otherwise, and other variables are as defined earlier. A negative coefficient for β_7 would indicate that long-term debt is associated with less conservatism.

Table 9 reports results from the above analysis. In Column (1), coefficient for *DMS* is negative and significant (coefficient = -0.047; $p<0.05$), which suggest that long-term debt is associated with less accounting conservatism. In Column (2), coefficient for *DMS*RET*NEG* is negative and significant ($p<0.05$) implying that firms with more long-maturity debt exhibit less accounting conservatism. These results thus provide corroborating evidence that long-term debt provides managerial opportunities to hoard bad news.

[TABLE 9 ABOUT HERE]

5. Conclusion

This paper examines the association between stock price crash risk and debt maturity structure using a sample of Australian firms. The regression results show that stock price crash risk increases with debt maturity. The issuance of proportionately more long-term debt is associated with increased stock price crash because of the comparatively reduced effectiveness of lenders in monitoring management. A reduced incidence or effectiveness of monitoring allows managers to engage in opportunistic bad news hoarding, the sudden release of which can lead to a rapid decline in a firm's stock price. The results are robust to an alternative measures of debt maturity structure, the implementation of a firm fixed effect model, change analysis and two-step system GMM.

In additional analyses, we show that relationship between long-term debt and stock price crash risk is more pronounced for firms with more real earnings management and higher level of idiosyncratic volatility. We also find that long term debt leads to less accounting conservatism, which we argue to prompt more future crash risk. Overall, our finding is consistent with the conjecture that firms with long term debt are associated with poor information quality, which allow managers to withhold bad news and, the sudden release of which can lead to future stock price crash.

The findings extend the literature on stock price crash risk and debt maturity structure to the Australian context, as this is the first to study the determinants of stock price crash risk in this context. Moreover, it also extends the literature on the agency-related consequences of debt structure by confirming the view that short-term debt mitigates potential agency-related conflicts and costs. While the institutional differences between Australia and the US such as a much greater percentage of direct investment; a less sophisticated investor base; a higher level of long-term debt; a dominance of bank loans relative to public offerings; a less liquid debt market; and an imputations tax system provide the setting for our research, by definition, these factors are institutional and are not readily controllable in a single country study. Therefore, we encourage future research to exploit cross country settings to better understand the extent to which these institutional differences explain future stock price crash risk.

Appendix

Variable	Definition
NCSKEW	Negative conditional skewness of firm-specific weekly returns over the fiscal year. NCSKEW is calculated by taking the negative of the third moment of firm-specific weekly returns for each year and normalizing it by the standard deviation of firm-specific weekly returns raised to the third power [See text for the detailed formula].
DUVOL	Down-to-up volatility measure of the crash likelihood. For each firm j over a fiscal-year period t, firm-specific weekly returns are separated into two groups: ''down'' weeks when the returns are below the annual mean, and ''up'' weeks when the returns are above the annual mean. Standard deviation of firm-specific weekly returns is calculated separately for each of these two groups, and *DUVOL* is the natural logarithm of the ratio of the standard deviation in the ''down'' weeks to the standard deviation in the ''up'' weeks [See text for the detailed formula].
DMS	The ratio of a firm's long-term debt (debt due after 1 year) to total debt, where total debt is the sum of long-term debt and debt in current liabilities. In our robustness tests, we also consider long-term liabilities to total liabilities as alternative measures of debt maturity.
SIZE	Natural log of total assets.
MTB	The market value of equity scaled by the book value of equity.
LEV	Total long-term debt scaled by market value of total assets.
ROA	Return on assets, measured as income before extraordinary items divided by total assets.
|DAC|	Absolute discretionary accruals calculated using the performance-adjusted Modified Jones model (Kothari et al. 2005). We require at least 10 observations in an industry (GICS codes) in a particular year to calculate discretionary accrual.
RET	The firm-specific mean weekly returns over the fiscal year.
SIGMA	Standard deviation of firm-specific weekly returns over the fiscal year.
DTURNOVER	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.

References:

Ahmed, A. S. and Duellman, S. (2007), "Accounting conservatism and board of director characteristics: An empirical analysis", *Journal of Accounting and Economics,* Vol. 43 No. (2-3), pp. 411-437.

Ahmed, K. and Henry, D. (2012), "Accounting conservatism and voluntary corporate governance mechanisms by Australian firms", *Accounting & Finance,* Vol. 52 No. 3, pp. 631-662.

Aivazian, V. A., Ge, Y. and Qiu, J. (2005), "Debt maturity structure and firm investment", *Financial Management,* Vol. 34 No. 4, pp. 107-119.

Alcock, J., Finn, F. and Tan K. J. K. (2012), "The determinants of debt maturity in Australian firms", *Accounting & Finance,* Vol. 52 No. 2, pp. 313-341.

An, H. and Zhang, T. (2013), "Stock price synchronicity, crash risk, and institutional investors", *Journal of Corporate Finance,* Vol. 21, pp. 1-15.

Andreou, P. C., Antoniou, C., Horton, J. and Louca, C. (2016), "Corporate Governance and Firm-specific Stock Price Crashes", *European Financial Management,* Vol. 22 No. 5, pp. 916-956.

Awartani, B., Belkhir, M., Boubaker, S. and Maghyereh, A. (2016), "Corporate debt maturity in the MENA region: Does institutional quality matter?", *International Review of Financial Analysis,* Vol. 46, pp. 309-325.

Barclay, M. J. and Smith, C. W. (1995), "The maturity structure of corporate debt", *The Journal of Finance,* Vol. 50 No. 2, pp. 609-631.

Basu, S. (1997), "The conservatism principle and the asymmetric timeliness of earnings", *Journal of Accounting and Economics,* Vol. 24 No. 1, pp. 3-37.

Berger, A. N. and Udell, G. F. (1998), "The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle", *Journal of Banking & Finance*, Vol. 22 No. (6-8), pp. 613-673.

Blundell, R. and Bond, S. (1998), "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics,* Vol. 87 No. 1, pp. 115-143.

Callen, J. L. and Fang, X. (2013), "Institutional investor stability and crash risk: Monitoring versus short-termism?", *Journal of Banking & Finance,* Vol. 37 No. 8, pp. 3047-3063.

Callen, J. L. and Fang, X. (2015a), "Short interest and stock price crash risk", *Journal of Banking & Finance,* Vol. 60, pp. 181–194.

Callen, J. L. and Fang, X. (2015b), "Religion and stock price crash risk", *Journal of Financial and Quantitative Analysis*, Vol. 50 No. 1-2, pp. 169-195.

Chang, X., Chen, Y. and Zolotoy, L. (2017), "Stock liquidity and stock price crash risk", *Journal of Financial and Quantitative Analysis,* Vol. 52 No. 4, pp. 1605-1637.

Chen, J., Hong, H. and Stein, J. C. (2001), "Forecasting crashes, trading volume, past returns, and conditional skewness in stock prices", *Journal of Financial Economics,* Vol. 61 No. 3, pp. 345-381.

Cohen, D. A., Dey, A. and Lys, T. Z. (2008), "Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley periods", *The Accounting Review*, Vol. 83 No. 3, pp. 757-787.

Dang, V. H., Lee, E., Liu, Y. and Zeng, C. (2018), "Corporate debt maturity and stock price crash risk", *European Financial Management,* Vol. 24 No. 3, pp. 451-484.

DeFond, M. L., Hung, M., Li, S. and Li, Y. (2014), "Does mandatory IFRS adoption affect crash risk?", *Accounting Review,* Vol. 90 No.1 , pp. 265-299.

Dimson, E. (1979), "Risk measurement when shares are subject to infrequent trading", *Journal of Financial Economics,* Vol. 7 No.2, pp. 197-226.

Fan, J. P., Titman, S. and Twite, G. (2012), "An international comparison of capital structure and debt maturity choices", *Journal of Financial and Quantitative Analysis,* Vol. 47 No.1, pp. 23-56.

Francis, B., Hasan, I. and Li, L. (2016), "Abnormal real operations, real earnings management, and subsequent crashes in stock prices", *Review of Quantitative Finance and Accounting,* Vol. 46 No. 2, pp. 217-260.

Fung, S. Y. and Goodwin, J. (2013), "Short-term debt maturity, monitoring and accruals-based earnings management", *Journal of Contemporary Accounting & Economics,* Vol. 9 No.1, pp. 67-82.

Givoly, D. and Hayn, C. (2000), “The changing time-series properties of earnings, cash flows and accruals: Has financial reporting become more conservative?”, *Journal of Accounting and Economics,* Vol. 29 No. 3, pp. 287-320.

Gomariz, M. F. C. and Ballesta, J. P. S. (2014), “Financial reporting quality, debt maturity and investment efficiency”, *Journal of Banking & Finance,* Vol. 40, pp. 494-506.

Gopalan, R., Song, F. and Yerramilli, V. (2014), “Debt maturity structure and credit quality”, *Journal of Financial and Quantitative Analysis*, Vol. 49 No.4, pp. 817-842.

Guedes, J. and Opler, T. (1996), “The determinants of the maturity of corporate debt issues”, *Journal of Finance*, Vol. 51 No. 5, pp. 1809-1833.

Habib, A. and Hasan, M. M. (2015), “Auditor-provided tax services and stock price crash risk”, *Accounting and Business Research*, Vol. 46 No. 1, pp. 51-82.

Habib, A., Hasan, M. M. and Jiang, H. (2018), “Stock price crash risk: review of the empirical literature”, *Accounting & Finance*, Vol. 58, pp. 211-251.

Harford, J., Klasa, S. and Maxwell, W. F. (2014), “Refinancing risk and cash holdings”, *The Journal of Finance,* Vol. 69 No.3, pp. 975-1012.

Hutton, A. P., Marcus, A. J. and Tehranian, H. (2009), “Opaque financial reports, R2, and crash risk”, *Journal of Financial Economics*, Vol. 94 No. 1, pp. 67-86.

Jensen, M. C. and Meckling, W. H. (1976), “Theory of the firm: Managerial behavior, agency costs and ownership structure”, *Journal of Financial Economics,* Vol. 3 No.4, pp. 305-360.

Khurana, I. K. and Wang, C. (2015), “Debt maturity structure and accounting conservatism”, *Journal of Business Finance & Accounting,* Vol. 42 No. 1-2, pp. 167-203.

Kim, J. B. and Zhang, L. (2016), “Accounting conservatism and stock price crash risk: Firm-level evidence”, *Contemporary Accounting Research,* vol. 33 No.1, pp. 412-441.

Kim, J. B., Li, Y. and Zhang, L. (2011a), “CFO versus CEO: Equity incentives and crashes”, *Journal of Financial Economics,* Vol. 101 No. 3, pp. 713-730.

Kim, J. B., Li, Y. and Zhang, L. (2011b), “Corporate tax avoidance and stock price crash risk: Firm-level analysis”, *Journal of Financial Economics,* Vol. 100 No. 3, pp. 639-662.

Kim, Y., Li, H. and Li, S. (2014), “Corporate social responsibility and stock price crash risk”, *Journal of Banking & Finance,* Vol. 43, pp. 1-13.

Kothari, S. P., Leone, A. and Wasley, C. (2005), “Performance matched discretionary accrual measure”, *Journal of Accounting and Economics,* Vol. 39 No. 1, pp. 163-197.

Kothari, S. P., Shu, S. and Wysocki, P. D. (2009), “Do managers withhold bad news?”, *Journal of Accounting Research,* Vol. 47 No. 1, pp. 241-276.

Miller, M. H. and Modigliani, F. (1961), “Dividend policy, growth, and the valuation of shares”, *Journal of Business,* Vol. 34 No. 4, pp. 411-433.

Novy-Marx, R. (2011), “Operating leverage”, *Review of Finance,* Vol. 15 No. 1, pp. 103-134.

Ortiz-Molina, H. and Penas, M. F. (2008), “Lending to small businesses: The role of loan maturity in addressing information problems”, *Small Business Economics*, Vol. 30 No. 4, pp. 361-383.

Rajan, R. and Winton, A. (1995), “Covenants and collateral as incentives to monitor”, *The Journal of Finance,* Vol. 50 No. 4, pp. 1113-1146.

Rajgopal, S. and Venkatachalam, M. (2011), “Financial reporting quality and idiosyncratic return volatility”, *Journal of Accounting and Economics*, Vol. 51 No. (1-2), pp. 1-20.

Roychowdhury, S. (2006), “Earnings management through real activities manipulation”, *Journal of Accounting and Economics,* Vol. 42 No. 3, pp. 335-370.

Sharma, V. D. (2004), “Board of director characteristics, institutional ownership, and fraud: Evidence from Australia”, *Auditing: A Journal of Practice & Theory,* Vol. 23 No. 2, pp. 105-117.

Stohs, M. H. and Mauer, D. C. (1996), “The determinants of corporate debt maturity structure”, *Journal of Business*, pp. 279-312.

Stulz, R. (2001), “Does financial structure matter for economic growth? A corporate finance perspective. In Financial structure and economic growth: A cross-country comparison of banks, markets, and development”, *Cambridge, MA: MIT press,* pp. 143-188.

Sun, J., Yuan, R., Cao, F. and Wang, B. (2017), “Principal–principal agency problems and stock price crash risk: Evidence from the split-share structure reform in China”, *Corporate Governance: An International Review,* Vol. 25 No. 3, pp. 186-199.

Xu, N., Jiang, X., Chan, K. C. and Yi, Z. (2013), "Analyst coverage, optimism, and stock price crash risk: Evidence from China", *Pacific-Basin Finance Journal*, Vol. 25, pp. 217-239.
Zhang, M., Xie, L. and Xu, H. (2016), "Corporate philanthropy and stock price crash risk: Evidence from China", *Journal of Business Ethics*, Vol. 139 No. 3, pp. 595-617.

Table 1
Sample selection and distribution of the sample.

Panel A: Sample selection

Description	Observations
Financial statement data available in Compustat Global (2000-2015)	28,003
Less: Financial and utility firms (4,265 + 583 firm years)	4,848
Less: Firm-years with missing dependent (crash risk) variable	4,367
Less: Firm-years with missing data for independent and control variables	10,127
Number of firm-years used in Hypothesis (H1)	8,661
Number of firms	1,548

Panel B: Industry distribution

Sector	Observations	Percent
Energy	876	10.11%
Materials	2559	29.55%
Industrials	1505	17.38%
Consumer Discretionary	1359	15.69%
Consumer Staples	509	5.88%
Health Care	815	9.41%
Information Technology	766	8.84%
Telecommunication Services	202	2.33%
Real Estate	70	0.81%
Total	8,661	100.00%

Table 2
Panel A: Descriptive statistics.
This table reports descriptive statistics of the variables used in the regression models. All continuous variables are winsorized at the 1% and 99% levels and definitions are provided in Appendix.

Variables	N	mean	Std. Dev.	p25	p50	p75
Crash risk variables						
$NCSKEW_t$	8,661	0.036	1.017	-0.501	-0.019	0.482
$DUVOL_t$	8,661	-0.114	0.862	-0.667	-0.159	0.353
Debt Maturity variable						
DMS_{t-1}	8,661	0.536	0.390	0.042	0.633	0.920
Control and conditional variables						
$NCSKEW_{t-1}$	8,661	0.041	0.973	-0.484	-0.024	0.458
$DUVOL_{t-1}$	8,661	-0.121	0.835	-0.661	-0.170	0.337
$SIZE_{t-1}$	8,661	4.290	2.182	2.726	4.087	5.739
MTB_{t-1}	8,661	2.716	5.437	0.694	1.388	2.811
LEV_{t-1}	8,661	0.098	0.129	0.001	0.039	0.157
ROA_{t-1}	8,661	-0.211	0.838	-0.185	0.004	0.064
$\|DAC\|_{t-1}$	8,661	0.099	0.137	0.021	0.051	0.115
RET_{t-1}	8,661	0.037	0.524	-0.005	0.003	0.011
$SIGMA_{t-1}$	8,661	0.117	0.161	0.048	0.077	0.121
$DTURNOVER_{t-1}$	8,661	0.000	0.038	-0.010	0.000	0.010
$\%IND\_DIR_{t-1}$	5,996	0.628	0.231	0.500	0.667	0.800
$ANALYST_{t-1}$	8,661	2.986	5.312	0.000	0.000	3.000

Panel B: Yearly mean crash risk and DMS

Year	Frequency	$NCSKEW_t$	$DUVOL_t$	DMS_{t-1}
2001	249	-0.042	-0.222	0.634
2002	270	0.061	-0.085	0.617
2003	429	-0.104	-0.245	0.568
2004	552	-0.109	-0.226	0.549
2005	550	0.035	-0.102	0.558
2006	577	-0.186	-0.342	0.588
2007	624	-0.098	-0.242	0.568
2008	642	0.300	0.129	0.574
2009	676	-0.143	-0.330	0.558
2010	723	-0.009	-0.148	0.515
2011	672	0.178	0.037	0.510
2012	656	0.173	0.010	0.492
2013	668	0.126	-0.057	0.489
2014	675	0.139	0.002	0.481
2015	698	0.088	-0.033	0.483

Table 3
Correlation matrix
This table reports Pearson correlation coefficients of selected variables used in the regression models. *, **, *** denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. Refer to Appendix for variable definition.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
$NCSKEW_t$ (1)	1												
$DUVOL_t$ (2)	0.91***	1											
$NCSKEW_{t-1}$ (3)	0.07***	0.05***	1										
$DUVOL_{t-1}$ (4)	0.06***	0.09***	0.92***	1									
DMS_{t-1} (5)	0.02**	0.05***	0.01	0.04***	1								
$SIZE_{t-1}$ (6)	0.03***	0.10***	0.03***	0.09***	0.40***	1							
MTB_{t-1} (7)	-0.01	0.02	-0.06***	-0.06***	-0.01	-0.10***	1						
LEV_{t-1} (8)	0.02**	0.04***	0.10***	0.12***	0.59***	0.35***	-0.15***	1					
ROA_{t-1} (9)	0.00	0.03***	-0.04***	-0.02	0.17***	0.43***	-0.03***	0.09***	1				
$\|DAC\|_{t-1}$ (10)	0.01	-0.01	-0.03**	-0.04***	-0.15***	-0.23***	0.09***	-0.11***	-0.14***	1			
RET_{t-1} (11)	-0.05***	0.07***	-0.08***	0.08***	0.01	0.04***	0.06***	0.02**	0.00	0.01	1		
$SIGMA_{t-1}$ (12)	0.02**	0.09***	0.10***	0.15***	-0.12***	-0.18***	0.17***	-0.07***	-0.16***	0.09***	0.35***	1	
$DTURNOVER_{t-1}$ (13)	0.00	0.01	0.00	-0.01	0.02	0.02*	0.07***	-0.01	0.00	0.01	0.05***	0.03***	1

Table 4
Regression analysis on the association between debt maturity structure and stock price crash risk.
This table reports the results from the OLS regression of the association between long-term debt and future stock price crash risk. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. *, **, *** denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. Refer to Appendix for variable definition.

	(1)	(2)
Dep. Var. =	$NCSKEW_t$	$DUVOL_t$
DMS_{t-1}	**0.081****	**0.081****
	[2.08]	**[2.55]**
$NCSKEW_{t-1}$	0.055***	
	[3.81]	
$DUVOL_{t-1}$		0.057***
		[4.23]
$SIZE_{t-1}$	0.016**	0.034***
	[2.04]	[5.67]
MTB_{t-1}	-0.002	0.002
	[-0.81]	[0.79]
LEV_{t-1}	-0.022	-0.085
	[-0.18]	[-0.83]
ROA_{t-1}	-0.013	-0.003
	[-0.78]	[-0.20]
$\|DAC\|_{t-1}$	0.139	0.087
	[1.62]	[1.21]
RET_{t-1}	-0.125***	0.038
	[-3.01]	[1.40]
$SIGMA_{t-1}$	0.332***	0.489***
	[2.83]	[5.08]
$DTURNOVER_{t-1}$	-0.146	-0.144
	[-0.59]	[-0.68]
Constant	-0.154	-0.481***
	[-0.72]	[-2.62]
Industry effects	Yes	Yes
Year effects	Yes	Yes
Observations	8,661	8,661
Adj. R-squared	0.03	0.05

Table 5 Sensitivity analysis

Panel A: Firm fixed effect

This table reports the results from the firm fixed effect regression estimation of the association between long-term debt and future stock price crash risk. Robust t-statistics are in brackets. *, **, *** denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. Refer to Appendix for variable definition.

	(1)	(2)
Dep. Var. =	$NCSKEW_t$	$DUVOL_t$
DMS_{t-1}	**0.091****	**0.079****
	[1.96]	**[2.06]**
$NCSKEW_{t-1}$	-0.093***	
	[-6.47]	
$DUVOL_{t-1}$		-0.093***
		[-6.97]
$SIZE_{t-1}$	0.097***	0.125***
	[4.48]	[6.95]
MTB_{t-1}	0.002	0.005**
	[0.63]	[2.42]
LEV_{t-1}	-0.394**	-0.426***
	[-2.35]	[-3.01]
ROA_{t-1}	-0.028	-0.026
	[-1.27]	[-1.48]
$\|DAC\|_{t-1}$	0.085	0.058
	[0.89]	[0.73]
RET_{t-1}	-0.126***	0.054
	[-4.11]	[1.48]
$SIGMA_{t-1}$	0.064	0.236**
	[0.50]	[2.30]
$DTURNOVER_{t-1}$	-0.055	-0.070
	[-0.21]	[-0.32]
Constant	-0.428***	-0.797***
	[-3.96]	[-8.78]
Firm fixed effects	Yes	Yes
Year effects	Yes	Yes
Observations	8,661	8,661
Adj. R-squared	0.09	0.11

Panel B: Control for corporate governance

This table reports the results from the OLS regression of the association between long-term debt and future stock price crash risk after including corporate governance variables. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. *, **, *** denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. In the table, BSIZE indicates natural log of board size, %IND_DIR indicates proportion of independent directors in the board, and CEO_DUAL takes a value of 1 if same person serves the role of CEO and chairman, 0 otherwise. Refer to Appendix for other variable definition.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var. =	$NCSKEW_t$	$DUVOL_t$	$NCSKEW_t$	$DUVOL_t$	$NCSKEW_t$	$DUVOL_t$
DMS_{t-1}	**0.092****	**0.094****	**0.079****	**0.074****	**0.098****	**0.089****
	[2.00]	**[2.47]**	**[1.97]**	**[2.25]**	**[2.09]**	**[2.30]**
$NCSKEW_{t-1}$	0.052***		0.053***		0.051***	
	[2.99]		[3.41]		[2.77]	
$DUVOL_{t-1}$		0.045***		0.055***		0.046***
		[2.87]		[3.86]		[2.77]
$SIZE_{t-1}$	0.032***	0.052***	0.015*	0.033***	0.031***	0.050***
	[2.85]	[5.72]	[1.94]	[5.27]	[2.60]	[5.19]
MTB_{t-1}	0.003	0.006**	-0.001	0.002	0.005	0.007***
	[1.11]	[2.41]	[-0.37]	[1.04]	[1.51]	[2.62]
LEV_{t-1}	-0.158	-0.202	-0.012	-0.047	-0.175	-0.183
	[-1.06]	[-1.63]	[-0.09]	[-0.42]	[-1.10]	[-1.40]
ROA_{t-1}	-0.032	-0.018	-0.008	0.004	-0.026	-0.009
	[-1.31]	[-0.95]	[-0.46]	[0.27]	[-0.97]	[-0.42]
$\|DAC\|_{t-1}$	0.165	0.081	0.146*	0.097	0.144	0.077
	[1.46]	[0.85]	[1.67]	[1.32]	[1.25]	[0.78]
RET_{t-1}	-0.172***	0.094**	-0.117***	0.032	-0.162***	0.088**
	[-2.66]	[2.48]	[-2.91]	[1.18]	[-2.64]	[2.46]
$SIGMA_{t-1}$	0.392**	0.633***	0.337***	0.503***	0.397**	0.629***
	[2.44]	[5.52]	[2.78]	[5.48]	[2.47]	[5.48]
$DTURNOVER_{t-1}$	0.074	0.014	-0.192	-0.209	0.002	-0.075
	[0.24]	[0.05]	[-0.76]	[-0.97]	[0.01]	[-0.28]
$BSIZE_{t-1}$	-0.022	-0.022			-0.016	-0.013
	[-0.49]	[-0.57]			[-0.32]	[-0.31]
$\%IND\_DIR_{t-1}$	-0.037	-0.031			-0.019	-0.023
	[-0.58]	[-0.57]			[-0.27]	[-0.39]
CEO_DUAL_{t-1}	0.022	0.041			0.025	0.052
	[0.46]	[1.05]			[0.51]	[1.24]
$OPER\_LEV_{t-1}$			0.018	0.019	0.021	0.027
			[1.05]	[1.39]	[0.94]	[1.54]
Constant	-0.273	-0.577***	-0.302	-0.588***	-0.464**	-0.720***
	[-1.41]	[-3.76]	[-1.33]	[-3.01]	[-2.28]	[-4.41]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,996	5,996	7,961	7,961	5,561	5,561
Adj. R-squared	0.03	0.07	0.03	0.05	0.03	0.07

Panel C: Change analysis

This table reports the results from the OLS regression of the association between change in long-term debt and change in future stock price crash risk. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. *, **, *** Denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. Refer to Appendix for variable definition.

	(1)	(2)
Dep. Var. =	$\Delta NCSKEW_t$	$\Delta DUVOL_t$
ΔDMS_{t-1}	**0.096**	**0.114***
	[1.99]	**[2.64]**
$\Delta NCSKEW_{t-1}$	-0.474***	
	[-44.63]	
$\Delta DUVOL_{t-1}$		-0.489***
		[-44.81]
$\Delta SIZE_{t-1}$	0.163***	0.176***
	[4.77]	[5.81]
ΔMTB_{t-1}	0.004	0.005**
	[1.44]	[2.44]
ΔLEV_{t-1}	-0.478***	-0.597***
	[-2.73]	[-3.73]
ΔROA_{t-1}	-0.007	-0.004
	[-0.32]	[-0.19]
$\Delta\|DAC\|_{t-1}$	-0.063	-0.043
	[-0.63]	[-0.51]
ΔRET_{t-1}	-0.073**	-0.024
	[-2.54]	[-0.98]
$\Delta SIGMA_{t-1}$	-0.013	0.133
	[-0.12]	[1.34]
$\Delta DTURNOVER_{t-1}$	-0.225	-0.288
	[-0.90]	[-1.34]
Constant	0.071	0.061
	[0.65]	[0.68]
Industry effects	Yes	Yes
Year effects	Yes	Yes
Observations	6,639	6,639
Adj. R-squared	0.24	0.25

Panel D: Two-step system GMM

This table reports the results from the two-step GMM of the association between debt maturity and future stock price crash risk. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. *, **, *** Denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. Refer to Appendix for variable definition.

	(1)	(2)
Dep. Var. =	$NCSKEW_t$	$DUVOL_t$
DMS_{t-1}	**0.543****	**0.445****
	[2.12]	**[2.10]**
$NCSKEW_{t-1}$	0.258	
	[1.20]	
$DUVOL_{t-1}$		0.292
		[1.57]
$SIZE_{t-1}$	-0.003	0.013
	[-0.22]	[1.13]
MTB_{t-1}	-0.003	0.001
	[-0.80]	[0.47]
LEV_{t-1}	-0.834*	-0.725*
	[-1.71]	[-1.85]
ROA_{t-1}	-0.010	0.005
	[-0.48]	[0.31]
$\|DAC\|_{t-1}$	0.178*	0.147*
	[1.68]	[1.65]
RET_{t-1}	-0.068	0.037
	[-1.10]	[1.60]
$SIGMA_{t-1}$	0.164	0.335
	[0.63]	[1.60]
$DTURNOVER_{t-1}$	-0.276	-0.180
	[-1.00]	[-0.79]
Constant	0.257	-0.568
	[0.19]	[-0.48]
Industry effects	Yes	Yes
Year effects	Yes	Yes
Observations	8,661	8,661
Post-estimation test statistics		
AR (1)	-3.33***	-3.93***
p-value	[0.00]	[0.00]
AR (2)	1.09	1.51
p-value	[0.28]	[0.10]
Overidentification test		
Hansen J statistic	55.56	59.59
P-value	[0.18]	[0.11]

Table 6
Other robustness checks: Alternative measure of debt maturity structure
This table reports the results from the OLS regression of the association between long-term debt and future stock price crash risk using alternative measure of long term debt. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. *, **, *** Denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. DMS2 denotes long-term liabilities to total liabilities and DMS3 denotes long-term debt to total liabilities. Refer to Appendix for other variable definition.

	(1)	(2)	(3)	(4)
Dep. Var. =	$NCSKEW_t$	$DUVOL_t$	$NCSKEW_t$	$DUVOL_t$
$DMS2_{t-1}$	**0.107****	**0.108*****		
	[2.40]	**[2.89]**		
$DMS3_{t-1}$			**0.252*****	**0.251*****
			[3.33]	**[3.99]**
$NCSKEW_{t-1}$	0.054***		0.054***	
	[4.44]		[4.38]	
$DUVOL_{t-1}$		0.058***		0.059***
		[5.26]		[5.25]
$SIZE_{t-1}$	0.019***	0.033***	0.019***	0.033***
	[2.97]	[6.49]	[3.12]	[6.78]
MTB_{t-1}	-0.002	0.001	-0.002	0.001
	[-1.02]	[0.76]	[-1.17]	[0.62]
LEV_{t-1}	-0.037	-0.079	-0.299*	-0.335**
	[-0.30]	[-0.78]	[-1.79]	[-2.44]
ROA_{t-1}	-0.022*	-0.011	-0.021*	-0.010
	[-1.85]	[-1.15]	[-1.70]	[-1.00]
$\|DAC\|_{t-1}$	0.093	0.050	0.101*	0.056
	[1.53]	[0.97]	[1.67]	[1.10]
RET_{t-1}	-0.145***	0.055*	-0.145***	0.055*
	[-3.12]	[1.89]	[-3.09]	[1.90]
$SIGMA_{t-1}$	0.446***	0.465***	0.453***	0.473***
	[4.62]	[6.05]	[4.69]	[6.16]
$DTURNOVER_{t-1}$	0.008	-0.011	0.018	-0.004
	[0.05]	[-0.07]	[0.11]	[-0.03]
Constant	-0.173	-0.469***	-0.163	-0.461**
	[-0.83]	[-2.64]	[-0.78]	[-2.57]
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	14,779	14,779	14,663	14,663
Adj. R-squared	0.03	0.05	0.03	0.05

Table 7
Association between debt maturity structure and stock price crash risk: The role of real earnings management

This table reports the results from the OLS regression of the association between long-term debt and future stock price crash risk conditional on real earnings management of the firm. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. *, **, *** denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. Refer to Appendix for variable definition.

Dep. Var. =	(1) REM>Median $NCSKEW_t$	(2) REM<Median $NCSKEW_t$	(3) REM>Median $DUVOL_t$	(4) REM<Median $DUVOL_t$
DMS_{t-1}	**0.207*** **	**0.026**	**0.152*** **	**0.035**
	[3.21]	**[0.51]**	**[2.86]**	**[0.81]**
$NCSKEW_{t-1}$	0.097***	0.000		
	[4.19]	[0.01]		
$DUVOL_{t-1}$			0.094***	0.021
			[4.21]	[1.15]
$SIZE_{t-1}$	0.010	0.019*	0.023**	0.033***
	[0.85]	[1.71]	[2.53]	[3.58]
MTB_{t-1}	-0.002	0.000	0.000	0.004
	[-0.52]	[0.02]	[0.02]	[1.49]
LEV_{t-1}	-0.216	0.117	-0.144	0.065
	[-1.06]	[0.65]	[-0.84]	[0.43]
ROA_{t-1}	-0.008	-0.011	0.015	-0.013
	[-0.36]	[-0.39]	[0.90]	[-0.54]
$\|DAC\|_{t-1}$	0.127	0.173	0.075	0.123
	[0.98]	[1.29]	[0.67]	[1.11]
RET_{t-1}	-0.147***	-0.321***	0.044***	0.349***
	[-3.94]	[-3.27]	[2.85]	[4.06]
$SIGMA_{t-1}$	0.322*	0.481***	0.583***	0.111
	[1.83]	[3.18]	[4.64]	[0.85]
$DTURNOVER_{t-1}$	-0.644	0.229	-0.667*	0.126
	[-1.58]	[0.65]	[-1.84]	[0.44]
Constant	-0.115	-0.401	-0.354	-0.640***
	[-0.42]	[-1.44]	[-1.40]	[-2.75]
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	3,625	3,771	3,625	3,771
Adj. R-squared	0.04	0.02	0.06	0.05
Difference in coefficients on DMS_{t-1} between high vs low REM sub-sample: χ^2 (*p*-value)	5.09*** (0.02)		3.08* (0.08)	

Table 8
Association between debt maturity structure and stock price crash risk: The role of idiosyncratic volatility

This table reports the results from the OLS regression of the association between long-term debt and future stock price crash risk conditional on idiosyncratic volatility of the firm. We measure idiosyncratic volatility based on market model. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. *, **, *** denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. Refer to Appendix for variable definition.

Dep. Var. =	(1) IVOL>Median $NCSKEW_t$	(2) IVOL<Median $DUVOL_t$	(3) IVOL>Median $NCSKEW_t$	(4) IVOL<Median $DUVOL_t$
DMS_{t-1}	**0.123****	**-0.003**	**0.113****	**-0.005**
	[2.33]	**[-0.05]**	**[2.54]**	**[-0.10]**
$NCSKEW_{t-1}$	0.060***	0.060***		
	[2.72]	[2.80]		
$DUVOL_{t-1}$			0.050**	0.074***
			[2.40]	[3.82]
$SIZE_{t-1}$	-0.007	0.024**	0.016	0.029***
	[-0.48]	[2.09]	[1.56]	[3.13]
MTB_{t-1}	-0.005*	0.005	-0.001	0.005
	[-1.89]	[1.08]	[-0.28]	[1.33]
LEV_{t-1}	0.159	0.004	0.093	-0.018
	[0.98]	[0.02]	[0.69]	[-0.12]
ROA_{t-1}	-0.002	-0.034	0.003	-0.009
	[-0.10]	[-0.34]	[0.22]	[-0.12]
$\|DAC\|_{t-1}$	0.050	0.258	0.033	0.152
	[0.50]	[1.64]	[0.38]	[1.19]
RET_{t-1}	-0.129***	2.582	0.032	3.981**
	[-3.14]	[1.32]	[1.31]	[2.38]
$SIGMA_{t-1}$	0.445***	-2.977***	0.531***	-3.218***
	[3.88]	[-3.01]	[5.12]	[-4.07]
$DTURNOVER_{t-1}$	-0.384	0.807	-0.485*	0.788*
	[-1.34]	[1.40]	[-1.92]	[1.72]
Constant	0.397	-0.202	0.014	-0.407**
	[1.26]	[-1.00]	[0.08]	[-2.44]
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	3,803	4,858	3,803	4,858
Adj. R-squared	0.06	0.02	0.10	0.04
Difference in coefficients on DMS_{t-1} between high vs low REM sub-sample: χ^2 (*p*-value)	2.78* (0.09)		3.56* (0.06)	

Table 9
Association between debt maturity structure and accounting conservatism
This table reports the results from the OLS regression of the association between long-term debt and accounting conservatism. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. *, **, *** denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively. Refer to Appendix for variable definition.

	(1)	(2)
Dep. Var. =	CON_ACC	NI
DMS	**-0.047*** **	0.371***
	[-5.30]	[8.56]
RET		-0.083***
		[-3.66]
NEG		-0.197**
		[-2.31]
RET*NEG		31.430***
		[4.37]
DMS*NEG		0.235**
		[2.20]
DMS*RET		0.088***
		[3.15]
DMS*RET*NEG		**-22.571** **
		[-2.32]
SIZE	-0.020***	0.079***
	[-8.92]	[8.50]
ΔSALES	0.000	0.001
	[1.35]	[0.91]
LEV	0.135***	0.373***
	[5.60]	[5.49]
CFO/TA	-0.078***	-1.834***
	[-3.44]	[-8.59]
R&D	0.107	-0.044
	[1.53]	[-0.16]
LITIGATION	-0.003	-0.027
	[-0.21]	[-0.43]
Constant	0.093***	-0.691**
	[4.31]	[-2.51]
Industry effects	Yes	Yes
Year effects	Yes	Yes
Observations	8,634	8,626
Adj. R-squared	0.16	0.17