Anticipating binding constraints:
an analysis of financial covenants

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Abstract

This paper studies the extent to which financial covenants are an important consideration for firm decisions outside of violation events. Applying textual analysis to earnings call transcripts, I construct a novel measure of covenant concerns by distinguishing between discussions of covenants that relate to the future as opposed to the past or present. The measure captures instances when covenants are both more likely to be violated and expected to have significant consequences. Covenant concerns are greater when firm earnings decline, particularly for financially constrained firms and those borrowing from institutional investors. These concerns are also associated with reductions in investment and financing activity, which are economically large relative to the effects of actual violations.

1   Introduction

Financial covenants are a common feature of debt contracts of large non-financial firms in the United States. These covenants impose restrictions on borrowers' financial ratios and actions, such as requiring that debt not exceed a multiple of earnings or limiting capital expenditures and acquisitions. Covenants serve an important role in mitigating agency conflicts between borrowers and lenders, enabling access to financing that would otherwise not be available. However, managers often express concerns about their costs, arguing that covenants impose significant constraints on their firm's financial and operational flexibility. The tension between the benefits and costs of covenants raises important questions about how they affect firm outcomes in practice.

This paper examines whether concerns about covenants explain significant changes in firm investment and financing decisions, thereby shaping corporate strategy in important ways. I focus on discussions outside of covenant violation events,[1] since these are situations in which lenders have not intervened and managers maintain control over their decisions. To shed light on this question, I construct a measure of covenant concerns that captures instances when covenants are both more likely to be violated and expected to have significant consequences for the borrower. In particular, I apply natural language processing techniques to firms' earnings call transcripts to identify forward-looking discussions related to covenants. The measure is significantly correlated with firm characteristics associated with a higher probability and severity of covenant violations, validating its ability to capture meaningful covenant concerns.

Having constructed the measure, I examine how covenant concerns vary with firm and lender characteristics. On the firm side, I find that covenant concerns rise substantially when earnings deteriorate, but vary little when earnings rise. These concerns are more likely expressed by firms that are financially constrained, as proxied by having higher leverage, lower cash holdings, net worth, and Altman z-score. Turning to lender characteristics, firms with a greater reliance on institutional loans and larger lending syndicates express more concerns about covenants. This finding is notable, as it implies that the increasing involvement of institutional investors in the syndicated loan market has not led to more borrower-friendly covenants (Berlin, Nini, and Yu, 2020). The results are robust to controlling for firm fixed effects and observed borrower risk, indicating that they are not driven by differences in borrower characteristics.

To disentangle the role of covenant concerns from other drivers of firm investment and financing decisions, I employ two complementary empirical strategies. First, I use a matched difference-in-differences approach, which compares firms that express heightened concerns about covenants to

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[1]There is a rich literature that studies the effects of covenant violations, including Chava and Roberts (2008); Roberts and Sufi (2009); Nini, Smith, and Sufi (2012); Falato and Liang (2016); Chava, Nanda, and Xiao (2017); Ferreira, Ferreira, and Mariano (2018); Becher, Griffin, and Nini (2021). A covenant violation is a failure to comply with the limits specified in the covenants, which could lead to restrictions on various actions such as debt issuance, capital expenditures, and dividend payments. In some cases, lenders also have the right to accelerate debt repayment or terminate the loan contract.

a control group of firms with similar investment opportunities. This approach allows for a more precise identification of the effect of covenant concerns, as it controls for potential confounding factors. Second, I estimate panel regressions that exploit within-firm variation in covenant concerns over time, while controlling for a rich set of firm-level characteristics and fixed effects. The results from both empirical approaches show that firms expressing concerns about covenants significantly reduce their investment and financing activities, even in the absence of actual covenant violations. I examine the relative importance of two key channels driving covenant concerns: expected earnings deterioration and the anticipation of costly violation outcomes. While both channels play a role, the results suggest that the latter is more economically significant. Specifically, while the correlation between covenant concerns and changes in earnings expectations is small in magnitude, I find that these concerns are associated with a significant increase in the probability of loan amendments at the time of violation.

Related literature. This paper contributes to several strands of literature. The first relates to studies on the implications of covenant violations. The literature provides ample evidence that covenant violations have economically meaningful effects on a wide range of firm outcomes, including but not limited to investments, net debt issuance, equity payouts, CEO turnover, employment, and acquisitions (Chava and Roberts, 2008; Roberts and Sufi, 2009; Nini et al., 2012; Falato and Liang, 2016; Chava et al., 2017; Ferreira et al., 2018; Chava, Wang, and Zou, 2019; Becher et al., 2021). Several studies also emphasize the importance of lenders in affecting the outcome of violations (Demiroglu and James, 2010; Murfin, 2012; Bradley and Roberts, 2015; Acharya, Almeida, Ippolito, and Orive, 2021; Chodorow-Reich and Falato, 2021). The contribution of this paper is to document evidence that firms cut investments and financing activities not only at violation but also when they are concerned about potential future violations.

Broadly, this paper relates to a recent literature that investigates the borrowing constraints of large US non-financial corporations. Lian and Ma (2021) document that around eighty percent of large rated US non-financial firms have earnings-based covenants written in their debt contracts. Drechsel (2023) and Greenwald (2019) study the macroeconomic implications of financial covenants. Related to this paper, Adler (2024) quantifies the impact of financial covenants on corporate investment in a structural model with banks and long-term debt. He finds that covenants finds that financial covenants increases aggregate investment on average, but there is a substantial cost arising indirectly from firms' desire to avoid a covenant violation and directly from actual covenant violations. This paper provides empirical evidence that shows that the indirect costs of debt covenants are relevant in the data.

This paper also speaks to the positive accounting literature studying the debt covenant hypothesis, which posits that firms close to violation have a stronger incentive to manage their earnings to avoid possible covenant violations (Watts and Zimmerman, 1986). Bordeman and Demerjian (2022) extend earlier work by Dichev and Skinner (2002) and document evidence of bunching around

covenant thresholds, providing support for the debt covenant hypothesis. However, they do not find evidence of bunching around debt-to-earnings covenants, which is the most common type of covenant. Franz, HassabElnaby, and Lobo (2013) examine current ratio covenants and document that firms in close proximity to the thresholds are significantly more likely to use both accrual and real earnings management to increase reported earnings. Cohen, Katz, Mutlu, and Sadka (2018) use an exogenous change in SFA 160 accounting standards, which relaxed equity-based covenants by allowing minority interests to be counted as equity. They find that firms increase their leverage after the rule change, suggesting that these covenants constrain firm financing policies even when no violations occur. This paper contributes to this literature by examining the impact of covenants in general, including covenants defined as a function of earnings. It also discusses the effects on covenants on firm investment, whereas the previous papers focus on the effects on earnings and leverage.

Third, this paper contributes to a literature that measures financial constraints using textual data. Hoberg and Maksimovic (2014) employs an algorithm to identify financially constrained firms from the universe of SEC 10-K filings, and find that constrained firms cut their investments and issuance policies to a larger extent following unexpected negative shocks compared to unconstrained firms. They find that covenant violations are a significant driver of debt-driven constraints. Buehlmaier and Whited (2018) estimates a text-based classifier on their measure and find that more constrained firms earn higher stock returns. Bodnaruk, Loughran, and McDonald (2015) find that more frequent use of constrained words predict higher probability of dividend omissions and underfunded pensions and lower probability of dividend increases and equity recycling. Previous research studies financial constraints in general and does not look at the effects of future binding constraints. This paper focuses on the role of financial covenants and highlights the importance of concerns about future binding constraints on firm decisions.

The paper proceeds as follows. Section 2 provides a conceptual framework for understanding how covenants affect investment and financing policies outside of violations. Section 3 details how the measure of concerns is constructed and discusses the results of the validation exercises. Section 4 examines the firm and lender determinants of covenant concerns. Section 5 looks at the real implications of covenant concerns on firm investment and financing activity. Section 6 examines the economic channels driving the relationship between covenant concerns and firm responses. Finally, Section 7 concludes.

2 Conceptual framework

This section outlines out the conceptual framework for the subsequent empirical analysis. In particular, it focuses on the following questions: How do debt covenants affect firm investment and financing policies outside of violation events? What are the key determinants of the effects of

expected future violations on firm policies?

I begin by describing a stylized three-period investment model, which incorporates the minimal ingredients for expected violations to matter for firm investment and financing policies. In the model, operating cash flow $\pi(z, k)$ depends on capital stock k, which is chosen in the previous period, and productivity z, which is realized after capital stock is chosen. Operating cash flow is assumed to take the functional form $\pi(z, k) = zk^\alpha$. Productivity z is random in period 1 but deterministic in period 2. In particular, productivity in period 1 is z_H with probability p and z_L with probability $(1 - p)$, where $z_H > z_L$. For simplicity, I assume productivity in period 2 is the same as period 1's productivity.

Firms also have access to a one-period risk-free debt b in both periods 0 and 1, and faces an exogenous borrowing limit C. Firms enjoys an interest tax shield on its borrowing so that the interest rate on debt r_τ is lower than the firm's discount rate of future dividends r. This assumption implies that, absent additional external cost of financing, the firm will set its borrowing equal to its borrowing limit. However, as will be shown below, the expectation of a violation penalty induces firms to preserve some borrowing capacity.

When a covenant violation occurs, lenders impose two penalties on the violating firm. The first penalty forces firms to reduce their debt to b_v at a cost of $\frac{1}{2}q(b_1 - b_v)^2$. This transaction cost could arise in a richer model when firms repurchase debt at a par value above market (Titman and Tsyplakov (2007)). Alternatively, it could also be seen as a proxy for the costs associated with issuing equity to pay down debt. The second penalty forces the firm to reduce its capital to be at most k_v. When reducing its capital, the firm faces a liquidation cost of $s(k_{t-1} - k_v)$. This cost could be viewed as arising from the partial irreversibility of capital or a proxy for transfers that the manager can pocket during liquidation due to investment complexity (Garleanu and Zwiebel (2009)). These two forms of direct creditor intervention are consistent with the typical outcomes of covenant violation that has been documented in the literature (Roberts and Sufi, 2009; Nini et al., 2012).

The firm's problem can be written as follows:

$$\max_{k_1, k_2, b_1, b_2} d_0 + \frac{1}{1+r}\mathbb{E}_0[d_1] + \frac{1}{(1+r)^2}\mathbb{E}_1[d_2]$$

subject to

$$d_0 = x_0 + \frac{b_1}{1+r_\tau} - k_1$$

$$d_1 = z_1 k_1^\alpha + (1-\delta)k_1 + \frac{b_2}{1+r_\tau} - b_1 - k_2 - 1(Viol) \times \left(s(k_1 - k_v) + \frac{1}{2}q(b_1 - b_v)^2\right)$$

$$d_2 = z_2 k_2^\alpha + (1-\delta)k_2 - b_2$$

where $1(Viol) = 1$ when the firm is in violation of its covenants, and zero otherwise.

The relevant case to consider is when the firm is in compliance of its covenants in period 0 and when period 1 productivity is high $z_1 = z_H$, but in violation when period 1 productivity is low $z_1 = z_L$. This case applies when average productivity $\overline{z} = pz_H + (1-p)z_L$ is sufficiently high so that $k_b < k_1$. That is, the covenant restriction on capital and debt is binding when the covenant is violated. The following proposition summarizes the effects of expected covenant violations on firms; investment and financing in the model:

Proposition 1. *An expected covenant violation in period 1 in the low productivity state lowers optimal investment and debt financing in period 0. Optimal investment and debt financing policies are given by*

$$
k_1 = \left(\frac{\alpha \overline{z}}{r + \delta + (1-p)s} \right)^{\frac{1}{1-\alpha}}
$$
$$
b_1 = b_v + \frac{1}{(1-p)q} \frac{r - r_\tau}{1 + r_\tau}
$$

where $\overline{z} = pz_H + (1-p)z_L$. Optimal investment is decreasing in the probability of a low productivity state, $1-p$ and in the liquidation cost s. Optimal debt financing is also decreasing in $1-p$, the transaction cost q, and increasing in the borrowing limit at violation b_v.

Proof. See Appendix F.1.

The stylized model show that firms' investment and financing decisions take into account future restrictions on investment and debt financing imposed by creditors when firms violate their covenants. These future restrictions affect the firm's current investment and financing decisions because the size of the penalties depend on the firm's previous capital and debt choices, which reflect the severity of agency frictions and external financing costs facing the firm. Importantly, the effect of these restrictions on firm decisions depends on how likely firms expect a violation to occur as well as the severity of the violation penalties. These testable implications are further examined in subsequent empirical analysis.

The forward-looking nature of corporate investment and financing decisions also features in rich dynamic corporate finance models. Gamba and Triantis (2008) show how the value of financial flexibility is shaped by external financing costs, reversibility of capital, growth opportunities, and taxes. Their model explains why firms simultaneously hold cash and debt. Notably, they find that the value of financial flexibility is larger when productivity is low and also when firms have less flexible capital, as proxied by higher liquidation cost of capital. Flexible capital allows firms to easily liquidate capital to deal with debt obligations, hence offsetting external financing restrictions. These

findings are consistent with the result from the stylized model, which show that the liquidation cost of capital is important for explaining why expected violations affect current investments.

DeAngelo, DeAngelo, and Whited (2011) also examines the interaction of firms' investment and capital structure in a dynamic investment model. Firms find it valuable to preserve debt capacity to respond to future shocks to investment opportunities without having to resort to costly equity issuance. Strebulaev and Whited (2012) builds on this insight and finds that debt capacity is increasing in the probability of needing external equity financing and cost of equity financing. These results are also consistent with the idea from the stylized model, which shows that transaction costs associated with paying down debt at violation explains why firms choose to have less debt outside of violation states.

3 Data and measurement

3.1 Data and sample selection

The primary data is the earnings call transcripts transcribed and published by FactSet from 2002Q1 to 2020Q1. The sample consists of 418 thousand calls of 12,781 unique firms with matched CUSIP identifiers. Earnings calls are typically held once per quarter and serve as a medium for firms to discuss their most recent earnings results and disclose material information to market participants. The typical earnings calls consists of a management discussion section in which senior managers (CEOs and CFOs) discuss the company's most recent financial results and a question and answer section in which management fields questions from market participants.

I merge this data with information on covenant violations reported in SEC 10-K and 10-Q filings as well as firm-quarter level income and balance sheet information from Compustat. Information on covenant violations comes from Becher et al. (2021), who extend the covenant violation data set in Nini et al. (2012).[2] In particular, the algorithm searches for the joint occurrence of the word "covenant" and the following five phrases in the surrounding seven lines from the initial hit: "waiv", "viol", "in default", "modif", and "not in compliance". I use a similar algorithm to extend the dataset of covenant violations to 2020.

Subsequent analyses focus on a sample of firm-quarter observations of firms incorporated in the United States, excluding utilities (SIC 4900-4999) and financials (SIC 6000-6999), from quarters 2002Q1 to 2020Q1 constructed from the intersection of three datasets: (1) earnings call transcript from Factset, (2) income and balance sheet information from Compustat, and (3) covenant violations data from SEC 10-K and 10-Q filings. I winsorize all continuous variables at the 1 and 99 percent levels. The merged sample consists of 128,251 firm-quarter observations from 4,616 permanent Compustat firm identifiers (gvkey).

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[2]I thank Thomas Griffin for generously sharing the dataset of covenant violations.

I also use covenant and lender information from LPC DealScan. LPC DealScan database records information on private syndicated debt contracts, where syndicated means a group of lenders jointly lending to a single borrower (Berlin et al., 2020). The sample with covenant and lender information from Dealscan consists of 57,172 firm-quarter observations.

3.2   Measuring concern about future covenant violations

The variable of interest is a measure of when firms anticipate future covenant violations. To provide some intuition for the measurement exercise, consider the following four sentences extracted from earnings calls that relates to covenants.

> "During the first quarter we exceeded accumulative limit of \$61 million for the add back of these cutover-related costs for covenant purposes."
>
> "Our financial covenants are conservative."
>
> "We will proactively work with our bank groups to seek a waiver."
>
> "It now appears that we are at risk of violating our interest coverage covenant."

The first sentence describes events in the past, as illustrated by the past tense form of the root verb "exceeded". To disentangle concern about future violations from discussions of realized violations, it is important to exclude these discussions as they likely describe past covenant violations. The second sentence describes events in the present, as illustrated by the present tense form of the root verb "are". These discussions may not represent concern about future violations if they are simply reporting of existing terms of financial contracts. The last two sentences are examples of discussions about events that may occur in the future, which are the focus of subsequent analyses. The forward-looking nature of the third sentence is captured by the use of the auxiliary modal verb "will".[3] The forward-looking component of the fourth sentence is less obvious as the sentence does not contain a modal verb. However, the use of the phrase "at risk" provides a strong indicator that the discussion is related to the future.

The construction of forward-looking measure of covenant mentions proceeds as follows. First, I extract all sub-sentences[4] in earnings calls with variants of the word "covenant", and assign an indicator $1\{"covenant''\} = 1$ for these subsentences and 0 for other sentences. For each subsentence containing mentions of covenants, I construct an indicator $1\{forward\}$ to denote whether the sentence is forward-looking. If the subsentence is in past tense, then the indicator assignment is $1\{forward\} = 0$. If the subsentence is in present tense, then I examine whether a forward-looking

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[3]Modal verbs are verbs that are used with other verbs to express ideas such as possibility, necessity, and permission (Merriam-Webster).

[4]As spoken sentences are complex with multiple statements joined by conjunctions, I focus on subsentences by further splitting each sentence based on indicators such as "but", "so" and punctuations such as ",", ";". See Cieslak and Vissing-Jorgensen (2020) for a similar treatment of sentences in FOMC minutes and transcripts. Appendix C.1 provides further details of steps taken to preprocess the text.

keyword is present in the text. If forward-looking keyword is present, then the indicator assignment is $1\{forward\} = 1$, otherwise it is 0. If the subsentence is in the future tense, the indicator assignment is $1\{forward\} = 1$. For subsentences with ambiguous tenses, I assign $1\{forward\} = 1$ if it contains a forward-looking keyword.

Finally, I aggregate these subsentence into a call-level indicator of forward-looking covenant mentions that takes a value of one if the call contains any subsentence with covenant mentions and is labeled as forward-looking. Formally, define $\mathcal{S}_{it}$ to be the set of all subsentences in call of firm i related to fiscal quarter t. The forward-looking covenant mention $CovConcern_{it}$ is given by

$$CovConcerns_{it} = \max_{s \in \mathcal{S}} \Big(1\{\text{``covenant''}\} \times 1\{forward\} \Big)$$

3.2.1 Detecting tenses

The procedure for identifying the tense of a subsentence relies on well-developed infrastructure in the natural language processing literature. Specifically, I deploy spaCy's dependency parsing algorithm to process the grammatical structure of a sentence (Honnibal and Johnson, 2015). In dependency parsing, the grammatical structure of a sentence is expressed a directed graph with words as vertices and the relationships between any two words as arcs. To construct the directed graph for a given sentence, the dependency parsing algorithm relies on an "oracle", which is a classifier trained by supervised machine learning to predict the appropriate action to take given a particular configuration of the parse (Jurafsky and Martin, 2000).

For the purpose of identifying the tense of the sentence, a key output of the dependency parse is the root node of a sentence. A sentence is in the past tense if the root node is a past tense verb, or if not a past tense verb, has an auxiliary verb that is in the past tense. Consider again the example sentence provided at the beginning of the section, "During the first quarter we *exceeded* accumulative limit...for covenant purposes." For this sentence, the former case applies as the root verb "exceeded" is in the past tense, hence the sentence as a whole is past tense. The latter case is applicable for verbs that are in the past continuous tense, such as "was exceeding", or past perfect continuous tense, such as "had been exceeding".

A sentence is in the present tense if the root node is a present tense verb and if any auxiliary verb is not in the past tense or modal form. The example sentence, "Our financial covenants *are* conservative." satisfies the definition as the root verb "are" is in the present tense and the sentence does not contain an auxiliary verb. On the other hand, the example sentence "We *will* proactively work with our bank groups to seek a waiver." does not satisfy the criteria as the auxiliary verb "will" is modal, which signals that the sentence is in the future tense.

Identifying future tenses in English is less direct as the future is usually expressed using the present tense (Huddleston and Pullum, 2002). Rather, a primary way to indicate the future is to use modal verbs such as "will", "shall", or "might". I categorize a sentence as a future tense sentence

if the root node is a present tense verb and if any auxiliary verb is modal. However, as the fourth example sentence in the beginning of the section illustrates, this strategy leaves out a large number of sentences that describes the future but does not explicitly contain modal auxiliary verbs. For that purpose, I turn to detecting for the usage of forward-looking keywords in the sentence.

3.2.2 Detecting forward-looking keywords

To construct a dictionary of forward-looking keywords, I rely on example keywords provided by firms in their safe harbor disclosures for signaling that a statement is forward-looking. Consider the following safe harbor disclaimer in the 2020-Q1 10-Q filings of Apple Inc., where example keywords are words or phrases that appear in quotation marks:

> This section and other parts of this Quarterly Report on Form 10-Q contain forward-looking statements, within the meaning of the Private Securities Litigation Reform Act of 1995, that involve risks and uncertainties. Forward-looking statements provide current expectations of future events based on certain assumptions and include any statement that does not directly relate to any historical or current fact. Forward-looking statements can also be identified by words such as "future," "anticipates," "believes," "estimates," "expects," "intends," "plans," "predicts," "will," "would," "could," "can," "may," and similar terms.

Firms tend to be careful about forward-looking statements to avoid liability in situations where the statements do not subsequently materialize. The Private Securities Litigation Reform Act of 1995 provides a safe-harbor clause that affords protection in such instances, so long as statements made are not misleading and are accompanied by meaningful cautionary statements. (Horwich, 2009) Statements made in the present tense that are accompanied by appropriate linguistic cues can be considered forward looking: "[t]he use of linguistic cues like "we expect" or "we believe," when combined with an explanatory description of the company's intention to thereby designate a statement as forward-looking, generally should be sufficient to put the reader on notice that the company is making a forward-looking statement." (*Slayton vs American Express Co*, as cited in Rosen and Carey (2016))

Building on this insight, I apply an algorithm that extracts safe-harbor disclosures from all SEC 10-K and 10-Q filings from 2002Q1 to 2021Q4. From the universe of 10-K and 10-Q filings, I identify 57 thousand filings with safe-harbor disclosures that provide examples of forward-looking keywords. The algorithm then identifies portions of the disclosures that provide examples of forward-looking words. After hand-removing false positives, typos, and ambiguous keywords, the text search procedure yields 119 unique forward-looking keywords or phrases.

Table 1 lists the root words of the 30 most commonly occurring forward-looking words in safe-harbor statements. The set of forward-looking keywords is intuitive. It includes words such as

Table 1: Most common forward-looking words or phrases extracted from safe-harbor disclosures in 10-K and 10-Q filings.

Word/Phrase	Count	Word/Phrase	Count	Word/Phrase	Count
expect	84545	could	30922	contempl	3161
believ	75291	potenti	19267	will like result	2444
estim	73095	predict	18485	hope	1945
intend	71885	would	17951	possibl	1803
anticip	71480	seek	16125	forese	1665
plan	62660	might	6426	guidanc	1637
will	46940	goal	6151	aim	1513
project	43365	futur	4808	probabl	1246
may	42233	like	4647	opportun	1233
should	41302	outlook	4502	pursu	812

Notes. "Count" is number of disclosures a given phrase is used as an example. Appendix C.3 provides the full list of forward-looking keywords.

"expect", "believ", "anticip", which convey a sense of anticipation about future events, as well as hedging terms such as "probabl", "hope", and "might", which convey a sense of uncertainty that comes with forecasting the future. A closely related word list is the Loughran and McDonald (2011) dictionary of uncertainty keywords. I find that the word list constructed from safe-harbor disclosures include informative terms not contained in the 2018 release of the Loughran-McDonald dictionary, such as "expect", "foresee", and "intend".

3.3 Validation

Having described how the measure is constructed, this section evaluates whether the measure contains economically significant information about future covenant violations. The first analysis examines an event study of covenant discussions around reported covenant violations. The second analysis compares the information content of covenant concerns relative to the information in other proxies of future covenant violations.

Figure 1 examines variation in covenant mentions and covenant concerns around reported violations. The dashed red line (right axis) shows the share of calls in each quarter with any discussions of covenants, whereas the solid blue line (left axis) plots the share of covenant discussions in each quarter that are forward-looking. To provide a clean analysis of covenant discussions pre- versus post-violation, I restrict the sample to violation events with no prior violations reported in the past three quarters.

The rise in covenant mentions and covenant concerns around violation events indicate that these discussions are not simply boilerplate disclosures, but informative of actual and expected

Figure 1: Covenant mentions around violations reported in SEC filings.
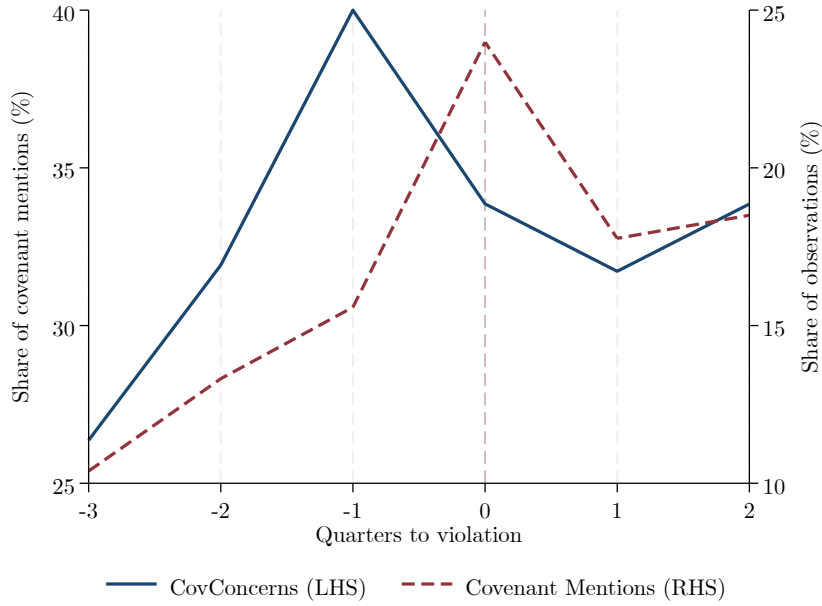
Notes. Sample restricted to events with no violations in the preceding 3 quarters ($N = 1,167$). Left axis shows share of covenant mentions that is forward looking, right axis shows share of observations with any covenant mentions.

future violations. In particular, covenant mentions in general peak in the quarter that covenants are violated, rising from 10 percent three quarters prior to violation to 24 percent in the quarter of violation. Second, the figure also shows that forward-looking covenant mentions, as a share of total covenant mentions, peaks in the quarter prior to violation, rather than at violation. This finding supports the idea that the measure captures information that relates to the future as opposed to the past or present.

The next validation exercise investigate whether covenant concerns are informative about future violations, over and above information contained in other predictors of future violations. In particular, I estimate the regression specification

$$Viol_{i,t+1 \to h} = \beta CovConcerns_{it} + \Gamma X_{it} + \alpha_i + \delta_t + \epsilon_{it+h} \tag{1}$$

where $Viol_{i,t+1 \to h}$ is an indicator for whether firm i violates its debt covenant in any quarter between $t + 1$ and $t + h$, $CovConcern_{it}$ is the measure of covenant concerns in quarter t, X_{it} are other predictors of future violations, and α_i and δ_t are firm and time fixed effects. To ensure that the results are not driven by persistent violations, the sample is restricted to observations with no reported violations in quarters $t - 4$ to t.

The regression compares covenant concerns against two key predictors of future violations: operating earnings and covenant slack. Operating earnings (EBITDA) is an important predictor about

	Violation occurs within...			
	1 quarter	2 quarters	3 quarters	4 quarters
Covenant concerns (t)	2.86***	4.84***	6.03***	7.07***
	(3.29)	(5.11)	(4.88)	(5.06)
Earnings (t)	-0.20***	-0.35***	-0.45***	-0.45***
	(-5.64)	(-5.78)	(-6.83)	(-6.25)
Sq. earnings (t)	-0.25	-0.63*	-0.13	-0.34
	(-0.96)	(-1.87)	(-0.28)	(-0.67)
Covenant slack (t)	-0.37	-0.54	-0.86	-1.15
	(-1.42)	(-1.18)	(-1.40)	(-1.56)
Sq. covenant slack (t)	0.14	0.12	-0.08	-0.26
	(0.64)	(0.35)	(-0.18)	(-0.51)
Average violation prob.	1.79	3.46	5.01	6.44
Firm & Time FE	✓	✓	✓	✓
R^2	0.11	0.20	0.25	0.29
N	44030	44030	44030	44030

Table 2: Sample consist of observations with covenant information in Dealscan, and excludes observations with violations reported in the current and past four quarters. Standard errors double-clustered by firm and quarter. * p<0.10, ** p<0.05, *** p<0.01.

future covenant violations because most financial covenants are defined to be a function of EBITDA (Lian and Ma, 2021). Prior work also finds that covenant slack, defined as the difference between the covenant threshold and the firms actual financial ratio, is an important empirical proxy for future violations (?Demerjian and Owens, 2016). I include second order terms to allow for a non-linear relationship between violation status and these variables.

Table 2 show that covenant concerns predict a significant increase in the probability of a reported violation in the next four quarters. In Column 1, the probability of violation increases by 2.86 percent ($s.e. = 0.87$) in the quarter after covenant concerns are mentioned. This estimate is economically significant relative to the average violation probability of 1.8 percent. Columns 2 to 4 show that covenant concerns continue to predict an increase in the probability of violation four quarters after concerns are mentioned.[5]

Importantly, the estimates show that covenant concerns is informative about future violations, over and above information already contained in operating earnings, covenant slack, and their squared values. In unreported analysis, I also check that this result is robust to other non-linear proxies of operating earnings and covenant slack, such as quartile indicators of these variables.

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[5]While this is in part driven by the persistent nature of violations in the data ($Corr(Viol_{it}, Viol_{it-1}) = 0.35$), in unreported analysis I also find that covenant concerns remains a significant predictor of new violations four quarters after mention.

Covenant concerns is a useful proxy of expected future violations, relative to existing measures, because it not only captures differences in the probability of future violations, but also in the severity of the violation. Operating earnings and covenant slack are informative measures of distance to violation, but are not directly informative about the consequences of violations. As Figure 1 shows, only about a fourth of violations are discussed by firms in their earnings calls. In Appendix Table A.2, I report that covenant violations that are discussed are more likely to result in an amendment favorable to lenders, suggesting that covenant discussions capture violations that are of greater consequence to firm outcomes. In other words, the measure of covenant concerns is plausibly a more relevant proxy of consequential violations on firm outcomes.

Discussion of covenant violations. Besides financial covenants, borrowers may also be subjected to other types of covenants, such as affirmative covenants and negative covenants (Nini et al., 2012).[6] To investigate whether there are differences in the types of violations discussed in earnings calls, I collect information on violations from a random sample of 360 violation events with matched SEC filings and earnings call transcripts. Appendix Table A.3 reports the share of violations that are related to financial covenants and the share of violations that are relates only to non-financial covenants. The analysis shows that the majority of violations are associated with financial covenants, more so violations that are discussed in earnings calls. In particular, 82.5 percent of violations pertain to a financial covenant in the unconditional sample, and 92.6 percent of violations discussed in earnings calls relate to financial covenants.

An important caveat of the analysis is that a violation of financial covenants does not necessarily imply a breach of contract, which must be reported in SEC filings. In particular, incurrence-based covenants do not shift control rights when financial thresholds are crossed but activates certain restrictions on borrower actions (Brauning, Ivashina, and Ozdagli, 2022). Additionally, monitoring of maintenance covenants for springing covenants are only activated when the usage of credit lines exceed a pre-specified threshold (Berlin et al., 2020). Hence, covenant concerns may capture situations where firms have crossed the financial thresholds specified in covenants but are not in technical violation of their debt covenants.

4   Determinants of covenant concerns

Having described and validated the economic content of the measure, this section explores the firm and lender determinants of why firms become concerned about covenants. On the firm side, I examine how covenant concerns covary with changes in earnings and the degree to which firms are financially constrained. On the lender side, I examine whether relying on institutional funding and the size of the lending syndicate explains differences in concerns about violating debt covenants.

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[6]An example of an affirmative covenant is one that requires timely submission of financial information. An example of a negative covenants is one that restrict payment of dividends or capital expenditures.

Figure 2: Binned scatter plot of covenant concerns and change in earnings.
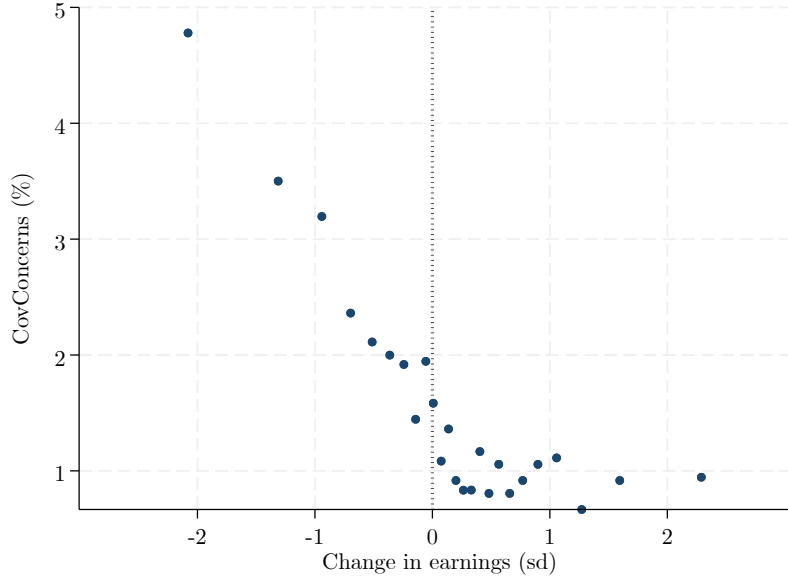
Notes. Change in earnings is the year-over-year difference in earnings, normalized by firm-level standard deviation of difference in earnings.

4.1 Covenant concerns and firm characteristics

I begin by examining the relationship between covenant concerns and changes in earnings, defined as the difference in earnings from four quarters prior and normalized by firm-specific standard deviation in earnings. Figure 2 shows a distinct non-linearity in the relationship, with covenant concerns rising when earnings fall but varying little when earnings rise.[7] Since financial covenants are commonly defined as a function of earnings, a fall in earnings increases the probability that a violation occurs (Nini et al., 2012). Holding fixed investment opportunities, covenant violations also become costlier when cash flow falls since firms increasingly rely on external financing to fund their investments and debt obligations.

Figure 3 shows that covenant concerns is also higher when leverage is high or when cash holdings, net worth, and the Altman z-score are low. Since covenants are defined based on measures of financial constraints such as leverage and net worth, a decline in these measures increases the likelihood of a covenant violation. Moreover, these measures are also proxies for greater default risk, making lenders more likely to impose severe penalties when covenants are violated. Given the higher probability and cost of covenant violation, firms are more concerned about the risk of

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[7]Appendix Table A.4 formalizes the findings in a regression specification. In particular, I find that the estimates are robust to controlling for violation status, firm and time fixed effects. In unreported analysis, I find the estimates qualitatively similar after dropping observations in violation in the current and past quarter.

Figure 3: Covenant concerns and financial constraints.

Notes. High (low) leverage, net worth, cash, and Altman-z are defined relative to the median value within two-digit SIC industry and time at the beginning of the quarter. Change in earnings is the year-over-year difference in earnings, normalized by firm-level standard deviation of difference in earnings.
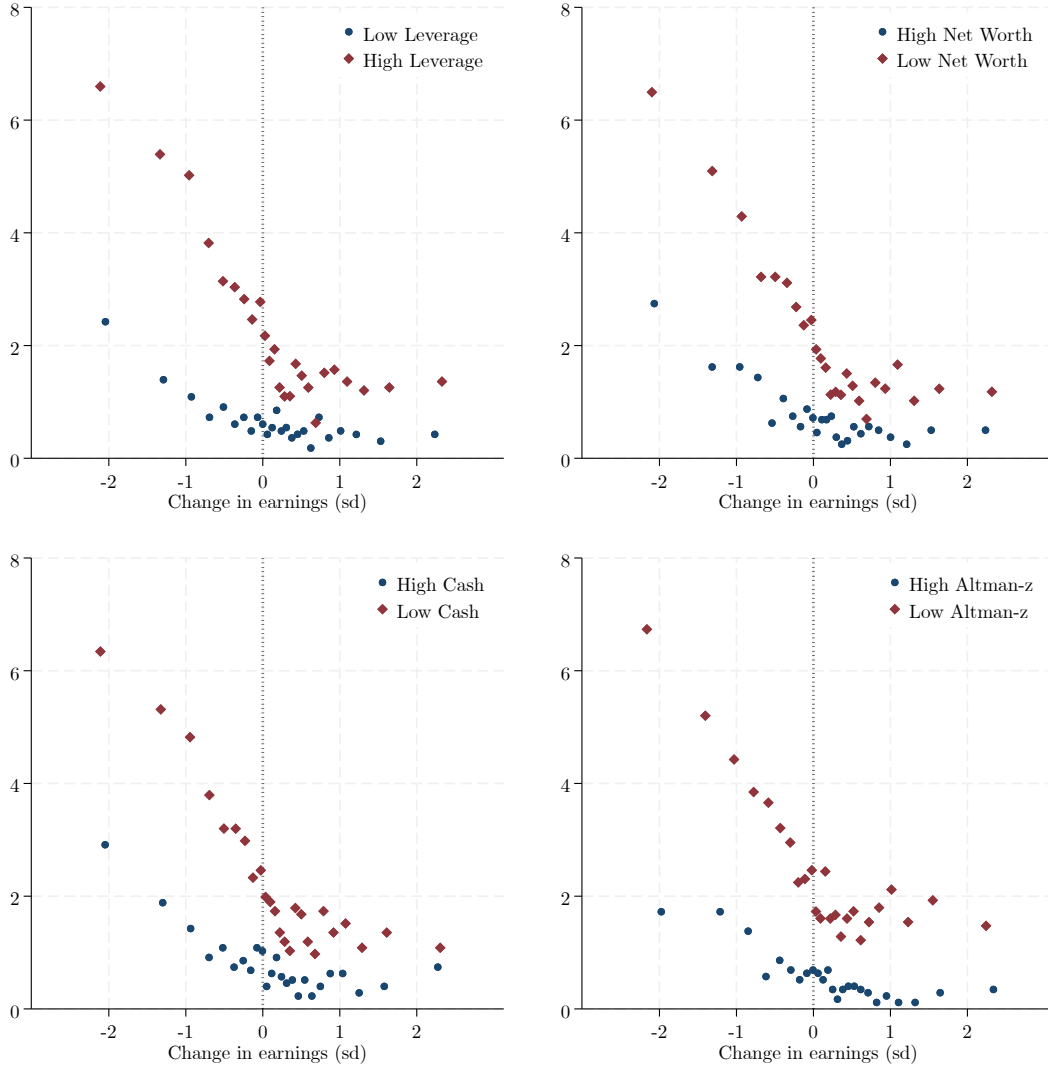
breaching their covenants when they are financially constrained. Appendix Table A.4 presents a formal regression analysis of these results.

Table 3 examines additional descriptive statistics of covenant concerns and violations in the cross-section of firms. Notably, the frequency of covenant concerns increases monotonically with the size of the firm, as measured by book assets, whereas no such pattern is observed for covenant violations.[8] This finding is consistent with prior research indicating that smaller firms tend to rely more on asset-based lending than cash-flow based lending, which is where covenants are more commonly used (Lian and Ma, 2021). Since covenants primarily apply to cash-flow based lending, smaller firms are less likely to be concerned about violating their covenants.

I also find that firms with high yield credit ratings are more likely to be concerned about covenants and more likely to violate them compared to investment grade firms or unrated firms. This finding is consistent with the idea that creditors are more likely to intervene in riskier firms that violate covenants, since these are situations in which creditors potentially face large losses to their claims (Garleanu and Zwiebel, 2009). These firms in turn are more likely concerned about violating their covenants, given the greater probability of severe violation penalties.

4.2 Covenant concerns and loan characteristics

Next, I examine whether loan characteristics explain variation in borrower concerns about debt covenants. I focus on two features that are plausibly relevant for covenant violation outcomes: the presence of institutional lenders and the number of participants in the loan syndicate. Loans with institutional lenders tend to be more dispersedly held, which makes it the process of renegotiations more challenging (Demiroglu and James, 2015). Similarly, larger loan syndicates also potentially face more difficult renegotiations due to greater creditor coordination frictions. The creditor coordination friction channel would predict that borrowers with institutional lenders and more participants in their lending syndicate are more likely to be concerned about covenant violations.

I draw on two measures of institutional loans in the literature. The first measure, from Demiroglu and James (2015), is an indicator for whether the syndicated loans contains institutional loans, which are defined as Term B loans or non-Term B loans held at origination by one or more institutional lender. Term B loans are commonly held by institutional lenders given their longer duration, which reduces investment risk for asset managers (Nadauld and Weisbach, 2012). The second, from Berlin et al. (2020), adopts an alternative definition of institutional loans, which are defined as Term B, C, or D loans in loan syndicate. Finally, the size of the lending syndicate is measured by the log number of lenders in the firm's loan syndicate.

Figure 4 shows how the correlation between covenant concerns and earnings growth varies with

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[8]The relationship is not mechanically due to larger firms having better earnings call coverage than smaller firms. Specifically Appendix Table A.5 shows that the relationship between covenant concerns and size is robust to controlling for analyst coverage, call length, and number of quarters observed.

Table 3: Cross-sectional summary statistics for covenant concerns and violations.

	Any Concern	Any Violation	Difference
All firms	0.21	0.26	-0.04
A. By industry			
Energy	0.39	0.32	0.07
Chemicals	0.36	0.24	0.11
Manufacturing	0.34	0.34	-0.00
Telecom	0.33	0.29	0.04
Durables	0.31	0.40	-0.09
Retail	0.26	0.25	0.01
Non-Durables	0.23	0.29	-0.06
Business-Equipment	0.11	0.22	-0.10
Health	0.08	0.17	-0.09
B. By book asset quintile			
1 (small)	0.02	0.06	-0.05
2	0.07	0.23	-0.16
3	0.11	0.25	-0.14
4	0.27	0.30	-0.03
5 (large)	0.35	0.26	0.08
C. By S&P credit rating			
Investment Grade	0.14	0.11	0.03
High Yield	0.44	0.36	0.09
No rating	0.19	0.25	-0.06

Notes. "Any Concern" shows share of firms (as fraction of one) with at least one mention of covenant concerns across all observed quarters in the sample, "Any Violation" shows share of firms (as fraction of one) with at least one violation, "Difference" shows the difference between the two shares. Industry refers to the Fama-French 12 industry classification, excluding firms that are classified as utilities, financials, and others. Book asset quintiles are constructed by sorting firms into five quintile bins each quarter based on their book asset value at the start of the quarter.

Figure 4: Cross-sectional variation in covenant concerns and change in earnings.
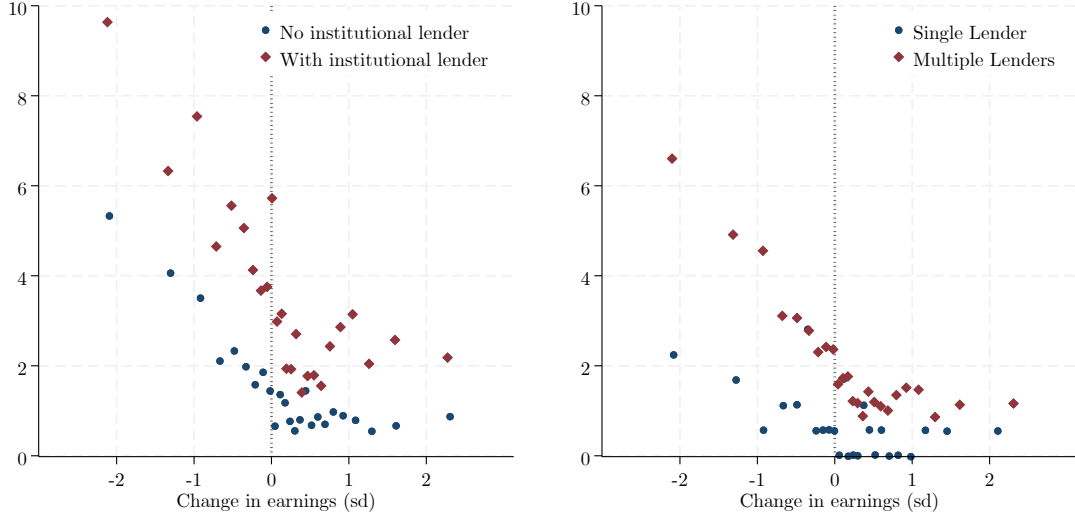
Notes. Binscatters of covenant concerns and change in earnings, controlling for borrower size (log book asset) and loan size (syndicated loan amount to lagged asset). Institution loans are defined as Term B loans or non-Term B loans held by one or more institutional lender. Institutional lenders, defined in Demiroglu and James (2015), are lenders classified as CDOs, Hedge Funds, Private Equity, and Mutual Funds in DealScan. Syndicated Loan-to-Asset is the value of the syndicated loan in dollars, normalized by lagged value of asset. Change in earnings is the year-over-year difference in earnings, normalized by firm-level standard deviation of difference in earnings.

institutional lender involvement and the size of the lending syndicate. The first panel shows that covenant concerns tend to be higher on average when the borrower's lending syndicate includes an institutional lender. The figure is similar using both proxies of institutional loans previously defined. The right figure shows that covenant concerns are greater when there are multiple lenders involved in the lending syndicate.

Since institutional lending is primarily a feature of the leveraged loan market (Becker and Ivashina, 2016), it is important to further control for differences in borrower risk. In particular, greater concerns about covenants by firms with non-bank institutional funding are partially driven by leveraged firms, which face greater borrower risk. To further control for heterogeneity in borrower characteristics, I estimate the following panel regression:

$$CovConcerns_{it} = \beta LoanCharacteristics_{it-1} + \Gamma X_{it} + \alpha_i + \delta_t + \epsilon_{it}$$

The variable of interest is $LoanCharacteristics_{it-1}$, which is one of the three proxies for non-bank institutional participation in the firm's lending syndication. The vector X_{it} controls for time-varying observable proxies for borrower characteristics. Specifically, I control for differences in investment opportunities, as proxied by sales growth, Tobin's Q, and cash flow growth. To further control for differences in borrower risk, I control for leverage, size and the firm's S&P credit rating, with

unrated firms as the base category.

Columns 1-3 report the estimates for the OLS specification, which includes borrower and time fixed effects, α_i and δ_t. Since borrower fixed effects are included, the coefficient β should be interpreted as how covenant concerns vary when exposure to non-bank institutional lenders in the loan syndication change relative to the firm's average contract. The time fixed effects δ_t absorbs unobserved aggregate risk that explains the relationship between covenant concerns and exposure to non-bank institutional lenders.

The estimates suggest that non-bank institutional borrowing are significant associated with higher concerns about covenants, even after controlling for observed proxies of borrower risk. Specifically, I find that covenant concerns are higher when firms have an institutional loan in their loan portfolio. In contrast, the presence of traditional bank loans is not associated with differences in covenant concerns. Private loans, defined as Term A loans funded by specialized investment banks, are also associated with higher covenant concerns. This finding is consistent with the results from Demiroglu and James (2015), who find that borrowers with institutional and private loans are less likely to restructure out of court, indicating greater renegotiation frictions. Finally, I also find that covenant concerns rises with the log number of participants in the lending syndicate, consistent with the idea that greater coordination costs raises the probability of a more unfavorable outcome of violation.

These results provide evidence against the "weak covenant hypothesis", which is the notion that institutional lender participation in the syndicated loan market leads to more borrower-friendly lending contracts. Rather, the results show that firms that borrow from non-bank lenders are in fact more likely to express concerns about their covenants in their earnings calls with investors. Since institutional loans are associated with a larger number of lenders, the higher coordination costs increases the complexity of the renegotiation process and plausibly leads to a more unfavorable violation outcome for the firm.

5   Implications of covenant concerns for firm investment and financing

This section delves into the relationship between covenant concerns and real outcomes. Using a matched difference-in-difference design, I examine whether covenant concerns are associated with significant changes in firm investment and financing activity relative to firms with similar investment opportunities at the time of covenant concerns. I also examine whether the information content in covenant concerns is robust to controlling for other proxies of covenant violation risk, such as earnings, covenant slack, as well as measures of default, negative sentiment, and risk.

Table 4: Covenant concerns and loan characteristics.

	(1) CovConcerns	(2) CovConcerns	(3) CovConcerns
L.Traditional Bank Loan	-0.48		
	(-0.55)		
L.Institutional Loan	0.52**		
	(2.51)		
L.Private Loan	0.38**		
	(2.25)		
L.Term A Loan		0.84	
		(1.48)	
L.Term B-D Loans		0.46**	
		(2.29)	
L.log(Participants)			0.59***
			(3.18)
Leverage	0.08***	0.08***	0.08***
	(7.01)	(7.04)	(6.95)
log(Asset)	0.74***	0.78***	0.59***
	(3.33)	(3.49)	(2.89)
Sales Growth	-0.91***	-0.91***	-0.90***
	(-8.29)	(-8.31)	(-8.27)
Cash Flow	-0.05***	-0.05***	-0.05***
	(-2.79)	(-2.79)	(-2.81)
Tobin's Q	-0.47***	-0.47***	-0.46***
	(-4.31)	(-4.32)	(-4.16)
Firm FE	✓	✓	✓
Time FE	✓	✓	✓
Rating control	✓	✓	✓
R-squared	0.12	0.12	0.12
No. observations	71921	71921	71921

Notes. This table reports the panel regression estimates of covenant concerns on loan characteristics. Traditional bank loans are Term A loans funded by commercial banks. Institutional loans are Term B loans or non-Term B loans funded by institutional lenders. Private loans are Term A loans funded by investment banks. The omitted group are uncategorized bank loan types. Lender types are identified based on information in Dealscan. Log(Participants) is the log number of participants in the firm's lending syndicate. Standard errors clustered by year-quarter. t-statistics are reported in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

5.1 Matched difference-in-difference

To better understand the relationship between firm responses to covenant concerns and changes in investment opportunities, I construct a comparison set of events that have similar trends in key measures of investment opportunities leading up to the event but with no mentions of covenant concerns. To do so, I match each firm-quarter observation where covenant concerns are mentioned with up to four firm-quarter observations where no covenant concerns are mentioned, based on their similarities along key measures of investment opportunities as defined by the Mahalanobis distance metric.[9]

The three key measures of investment opportunities are Tobin's Q, operating cash flows, and sales growth. Tobin's Q and operating cash flows are included because they are standard proxies of Q in standard investment regressions. Sales growth is included to capture information about investment opportunities from changes in firm performance. Matching is done using both the contemporaneous and one-quarter lagged values of these variables. As before, the comparison group is restricted to observations where no covenant concerns are mentioned in any of the four quarters prior to the event and no violations occur in any of the four quarters prior to or including the event.

Table 5 provides a summary of the distribution of covariates for observations with and without mentions of covenant concerns, as well as the results of the matching analysis. Panel A presents covariates related to investment opportunities, which are used in the matching analysis. The results show that firms with covenant concerns have lower Tobin's Q and sales growth but higher operating cash flows compared to the full sample of observations with no mentions of covenant concerns. The matching procedure addresses this covariate imbalance, with the matched group of unconcerned observations being closer to the concerned observations along these three measures. In addition, Appendix Figure A.1 demonstrates parallel pre-trends in the matched variables, including the quarters not used in the matching process.

Panel B highlights differences in the distribution of other covariates not used in the matching analysis. Specifically, firms with covenant concerns exhibit higher leverage, lower tangible net worth, lower cash holdings, and lower Altman z-scores compared to the comparison group. Since financial covenants are defined based on not only the firms' earnings but also measures of financial constraints, these differences imply that firms concerned about covenants are closer to violating their covenants than their comparison group. Section 6.2 shows that these firms are also more likely to face creditor intervention conditional on violation, hence more concerned about violating their covenants. Thus, the matched event study design can be viewed as a comparison of the responses of firms with similar investment opportunities but differing in the extent to which covenants are a binding borrowing constraint.

To quantify the difference in firm outcomes when there are covenant concerns, I estimate the

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[9]The matching is done with replacement, and in undocumented analysis, I find results are found to be robust to selecting different numbers of matches.

Table 5: Summary statistics for matched event study sample.

	CovConcerns Mentions		Matched Non-mentions		All Non-mentions	
	Mean	SD	Mean	SD	Mean	SD
A. Matched variables						
Tobin Q (t)	1.16	0.82	1.18	0.77	1.96	1.56
Cash Flow (t, %)	1.99	5.34	2.18	3.94	1.27	7.25
Sales Growth (t, %)	5.10	102.09	6.19	97.65	38.3	91.46
Tobin Q (t-1)	1.25	0.94	1.25	0.87	1.96	1.56
Cash Flow (t-1, %)	2.22	5.06	2.42	4.03	1.28	7.29
Sales Growth (t-1, %)	18.03	94.92	20.65	90.29	38.81	90.41
B. Non-matched variables						
Log(Assets) (t-1)	7.11	1.44	7.07	1.66	6.54	1.87
Leverage(t-1,%)	40.58	29.16	24.50	21.17	22.56	28.13
Tangible Net Worth (t-1, %)	6.66	40.97	25.76	33.53	28.81	48.66
Cash Holdings (t-1, %)	8.71	13.35	15.51	18.32	23.93	24.91
Altman-z (t-1)	1.36	2.59	2.50	3.44	4.12	6.39
N	1355		5420		121048	

Notes. "CovConcerns Mentions" describe statistics of concerned firms in the quarter concerns are mentioned. "Matched Non-mentions" describe statistics of comparison firms with matched Tobin's Q, cash flow, and sales growth in the quarter prior to and when concerns are mentioned. "All Non-mentions" are statistics for all unconcerned firms in the sample. Sample restricted to concerns where no violations occur in quarters up to and including mention, and no covenant concerns expressed prior to mention.

following difference-in-differences specification

$$Y_{it} = \sum_{\tau=-4,\tau\neq-1}^{4} \beta_\tau 1\{h_{it}^{concerned} = \tau\} + \sum_{\tau=-4,\tau\neq-1}^{4} \delta_\tau 1\{h_{it}^{All} = \tau\} + \alpha_g + \alpha_{g\times concerned} + \epsilon_{it} \qquad (2)$$

where $1\{h_{it}^{concerned} = \tau\}$ are lead-lag indicators of quarter τ relative to the event for concerned firms, $1\{h_{it}^{All} = \tau\}$ are lead-lag indicators of quarter τ relative to the event for all firms in the sample. The group fixed effects α_g allow for differences in responses across groups of concerned firms and their matched counterparts in the baseline quarter $h = -1$, and the group-concerned fixed effects $\alpha_{g\times concerned}$ allow for group-specific time-invariant differences between concerned firms and their matched counterparts in quarter $h = -1$. Standard errors are two-way clustered by firm and time.

The top left panel in Figure 5 displays the average change in capital stock (PPE) for firms with and without covenant concerns. Both groups experience a similar trends in the four quarters prior to mention. However, after concerns are mentioned, firms with covenant concerns exhibit a larger decline in capital stock compared to their matched comparison group. This finding suggests that factors beyond poor investment opportunities, as proxied by Tobin's Q, operating cash flow, and sales growth, contribute to the decline in capital following covenant concerns. The top right panel in Figure 5 shows that this difference in response grows to 0.67 percentage points (s.e.=0.20) four quarters after concerns are mentioned. This corresponds to an 36.8 percent decline relative to the average change in capital of 1.82 percentage points in the unconditional sample.

The lower two panels in Figure 5 further demonstrate a larger post-event decline in total debt growth and equity payout for firms with covenant concerns compared to their comparison group. Four quarters after mention, the difference in total debt growth is 4.9 log percentage points (s.e.=2.4), which is more than the average unconditional long-term debt growth of 3.2 log percentage points. Similarly, four quarters after mention, the difference in equity payout is 14.0 log percentage points (s.e.=6.8), equivalent to a 9.8 percent decline relative to the average unconditional equity payout of 132.2 log percentage points. Taken together, these findings suggest that the post-event decline in firm investment and financing activities cannot be fully explained by differences in investment opportunities trends leading up to mention of covenant concerns.

5.1.1 Covenant concerns and ex-post violations

Figure 6 sheds light on the underlying drivers of the different responses between firms that mention covenant concerns and firms that do not. The figure shows that firms that mention covenant concerns are more likely to violate their covenants in the quarters after concerns are mentioned. Four quarters after mention, 10.4 percent of concerned firms experience at least one violation, while only 3.7 percent of the comparison group do so. The right panel shows that concerned firms are also more likely to face a loan amendment that increases their interest rates or reduces the loan

Figure 5: Investment and financing responses around covenant concerns, relative to matched comparison group.
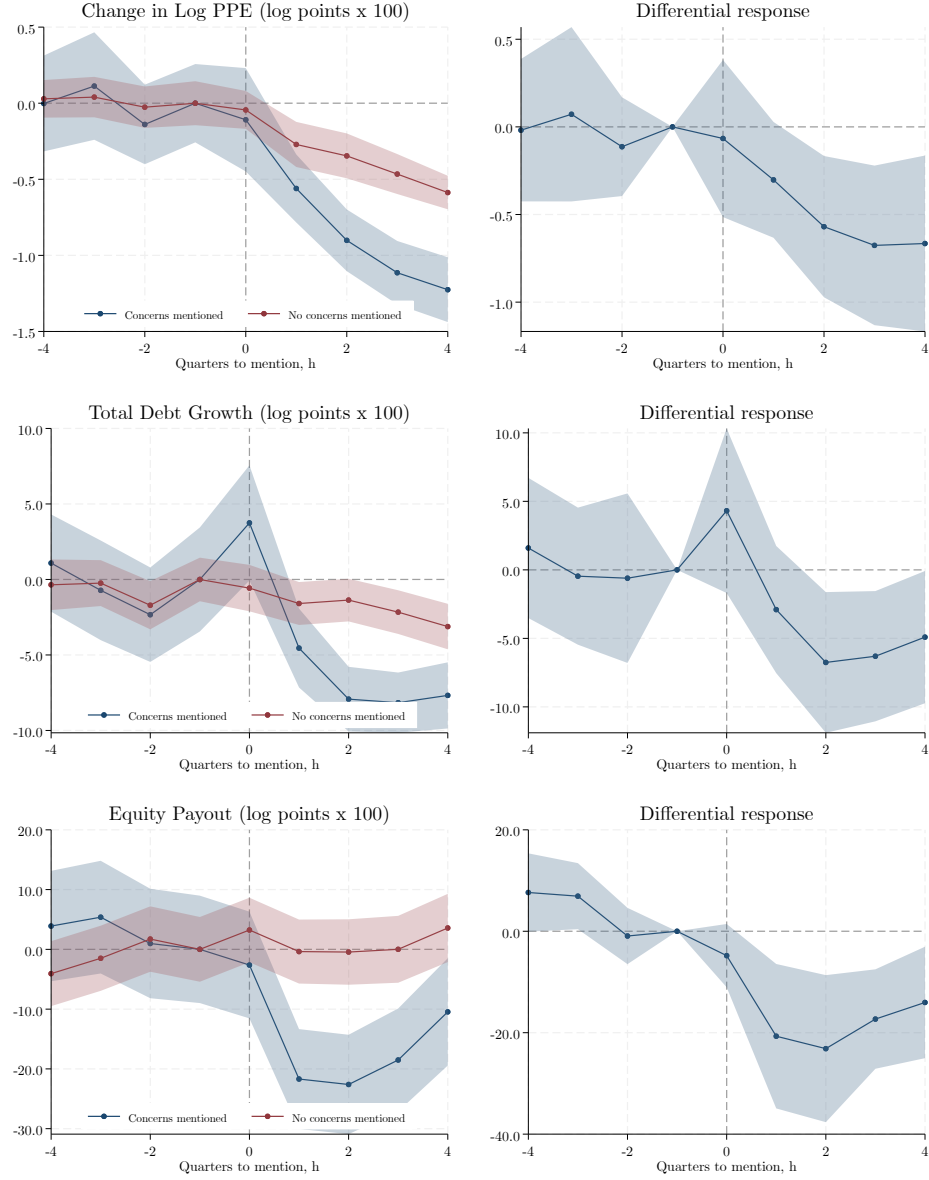
Notes. Left panel shows raw means, normalized to 0 in period -1. Blue line is average response when covenant concerns are mentioned. Red line is average response of matched events where concerns are not mentioned. Right panel shows differential response given by β_τ from OLS specification (2). Shaded area denotes 95 percent confidence interval.

Figure 6: Probability of violation and costly loan amendments around covenant concerns.

Cumulative Violation (pct)
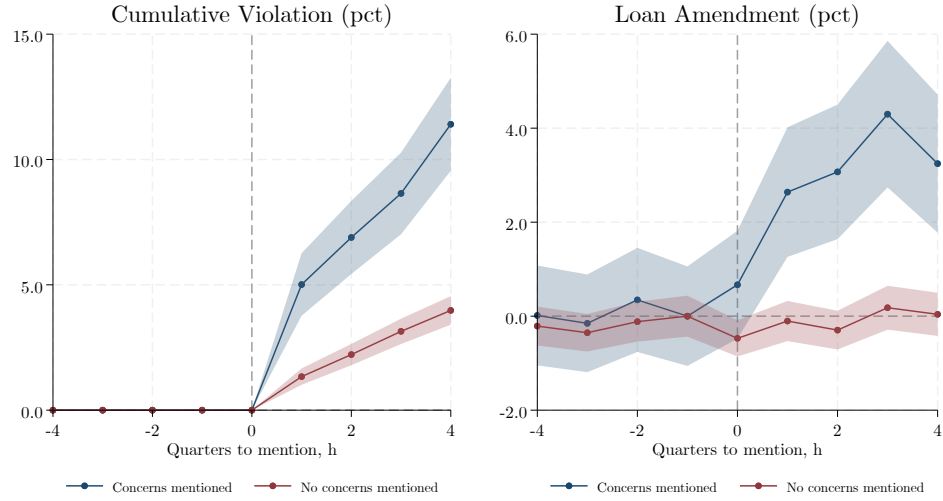
Loan Amendment (pct)

Notes. Cumulative violation is the probability of any violation in the current and previous quarters following mention. Loan amendment is an indicator for whether the firm reports an increase in interest rates or a reduction in loan amounts in their SEC filings. Shaded area denotes 95 percent confidence interval.

Figure 7: Investment response around covenant concerns, conditional on no post-event violations.
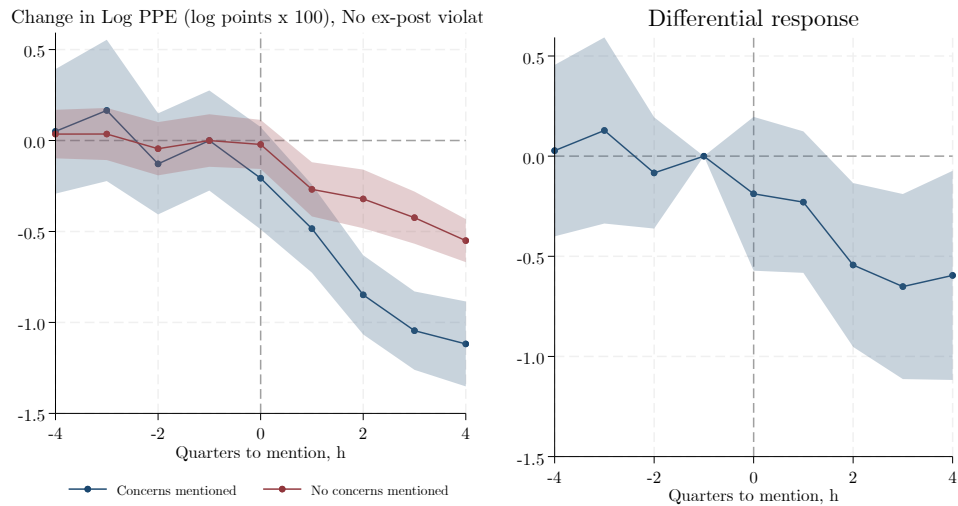
Change in Log PPE (log points x 100), No ex-post violat

Differential response

Notes. Red line is average response of control firms matched by Tobin's Q, cash flow, and sales growth in periods 0 and -1. Shaded area denotes 95 percent confidence interval.

amount. This result implies that concerned firms face a more severe penalty when they violate their covenants.

A question that arises is whether subsequent covenant violations explain the differences in firm outcomes. Figure 7 indicates that this is not the case. The figure illustrates the average change in capital stock among firms that mention covenants but do not subsequently violate them in the four quarters after mention. The figure shows that the change in capital stock is quantitatively similar to the unconditional sample, which indicates that the results are not driven by subsequent covenant violations. This is not surprising given that only around 10 percent of firms violate covenants four quarters after mentioning concerns (Figure 6). Similar patterns are observed for long-term debt growth and equity payouts, as shown in Appendix Figure A.2.

5.2 Panel regression analysis

Next, I use a panel regression framework to assess whether the relationship between covenant concerns and firm policies is robust to other controls. Building on Nini et al. (2012), I investigate four-quarter changes in post-event firm outcomes using the regression equation:

$$Y_{it+4} - Y_{it-1} = \beta_0 + \beta_1 CovConcerns_{it} + \Gamma X_{it} + \alpha_i + \delta_t + \epsilon_{it} \tag{3}$$

The dependent variable is the change in firm outcome from the beginning of quarter t to the end of quarter $t+4$. $CovConcerns_{it}$ is an indicator for whether covenant concerns are mentioned in quarter t, and X_{it} are a set of time-varying controls. The baseline controls include Tobin's Q, operating cash flow, and sales growth in quarter t to proxy for investment opportunities. To isolate the effect of covenant concerns outside of the states in which covenant violations occur, I limit the sample to observations with no violations reported in quarter t or any of the four quarters preceding quarter t.

To test whether covenant concerns provide additional information about firm outcomes over and above other predictors of future covenant violations, I control for covenant slack and operating earnings, as well as their squared values. I also control for additional measures of borrower risk, including Altman z-score, an indicator for credit rating downgrade, and text-based measures of call sentiment and risk.

It is important to control for covenant slack, which is defined as the standardized difference between a firm's financial covenant threshold and its actual financial ratio, since it is a key measure of borrowing capacity. Prior work finds lower covenant slack is associated with lower debt growth (Lian and Ma, 2021) and lower investments and debt issuance among firms that switch from net worth based covenants to earnings-based covenants (Adler, 2024). However, in the data the correlation between covenant slack and covenant concerns is low (correlation of -0.1). An important difference is that covenant slack measures distance to violation but does not directly differentiates between

Table 6: Covenant concerns and changes in investment activity.

	Δ Log(PPE)					Δ Capital Expenditures				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CovConcerns	-1.90***	-1.32***	-1.94***	-1.99***	-2.06***	-8.87**	-11.82**	-13.64***	-13.33***	-11.59***
	(-5.01)	(-3.03)	(-4.89)	(-5.02)	(-5.15)	(-2.05)	(-2.33)	(-3.29)	(-3.22)	(-2.83)
Tobin's Q	1.79***	2.48***	1.88***	1.45***	1.97***	4.18***	9.85***	4.83***	4.58***	4.63***
	(8.86)	(7.23)	(8.78)	(5.66)	(9.48)	(5.96)	(5.66)	(6.26)	(5.50)	(6.23)
Cash Flow	0.07***	0.04**	0.02	0.07***	0.08***	-0.02	0.12	0.17	0.14	0.07
	(2.89)	(2.04)	(0.92)	(2.78)	(3.29)	(-0.18)	(0.56)	(1.09)	(0.98)	(0.48)
Sales Growth	1.80***	1.72***	1.64***	1.80***	1.80***	-1.39*	-2.59**	-0.95	-1.06	-2.24**
	(15.65)	(14.12)	(13.23)	(14.68)	(14.31)	(-1.75)	(-2.34)	(-1.08)	(-1.23)	(-2.57)
Covenant Slack		1.62**					-3.12			
		(2.46)					(-0.75)			
Sq. Covenant Slack		-0.43					2.05			
		(-0.79)					(0.70)			
Earnings			0.22***					-0.11		
			(3.62)					(-0.32)		
Sq. Earnings			0.00					-0.00		
			(0.18)					(-0.64)		
Altman z-score				0.24***					0.07	
				(3.55)					(0.42)	
Rating Downgrade				-0.43					-21.07***	
				(-1.35)					(-4.97)	
LM Sentiment					-0.03					1.49***
					(-1.35)					(11.10)
HHLT Risk					0.29*					1.81
					(1.82)					(1.36)
Firm & Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.55	0.64	0.56	0.56	0.56	0.10	0.13	0.098	0.098	0.10
N	63780	33431	53945	53945	53945	98851	46313	82870	82870	82870

Notes. Dependent variables are changes from quarter t to quarter $t+4$. Sample restricted to observations with no violations reported in the current and past four quarters. Due to data constraints, regressions on covenant slack and its squared only cover firms with covenant information reported in DealScan. Standard errors double-clustered by firm and quarter. t-statistics are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 7: Covenant concerns and changes in financing activity.

	Δ Log(Total Debt)					Δ Log(LT Debt)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CovConcerns	-11.20***	-10.48***	-10.78***	-11.30***	-11.49***	-17.94***	-18.51***	-19.44***	-20.00***	-20.05***
	(-4.67)	(-3.48)	(-4.06)	(-4.17)	(-4.28)	(-4.03)	(-3.15)	(-3.72)	(-3.77)	(-3.80)
Tobin's Q	5.57***	10.22***	5.22***	-0.37	5.98***	6.42***	11.64***	6.39***	0.05	7.13***
	(6.59)	(5.44)	(5.20)	(-0.33)	(6.16)	(6.99)	(4.88)	(6.23)	(0.05)	(7.16)
Cash Flow	-1.43***	-2.42***	-2.13***	-1.77***	-1.67***	-0.78***	-1.11***	-1.27***	-1.01***	-0.90***
	(-8.93)	(-6.70)	(-10.77)	(-9.65)	(-9.10)	(-6.49)	(-5.21)	(-8.81)	(-6.90)	(-6.19)
Sales Growth	1.58**	1.77**	0.20	1.71**	1.52*	2.21***	2.54**	1.00	2.44**	2.16**
	(2.10)	(2.04)	(0.23)	(2.06)	(1.80)	(2.70)	(2.39)	(1.04)	(2.63)	(2.30)
Covenant Slack		40.52***					32.80***			
		(8.34)					(6.49)			
Sq. Covenant Slack		25.14***					22.19***			
		(5.94)					(5.26)			
Earnings			1.74***					1.56***		
			(5.53)					(4.55)		
Sq. Earnings			0.02**					0.02**		
			(2.10)					(2.36)		
Altman z-score				2.91***					3.25***	
				(9.22)					(9.64)	
Rating Downgrade				11.61***					18.97***	
				(3.50)					(4.93)	
LM Sentiment					-0.10					-0.03
					(-0.70)					(-0.20)
HHLT Risk					0.22					0.38
					(0.17)					(0.27)
Firm & Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.12	0.15	0.12	0.12	0.12	0.11	0.13	0.11	0.11	0.10
N	99219	46512	82880	82880	82880	99216	46473	82852	82852	82852

Notes. Dependent variables are changes from quarter t to quarter $t+4$. Sample restricted to observations with no violations reported in the current and past four quarters. Due to data constraints, regressions on covenant slack and its squared only cover firms with covenant information reported in DealScan. Standard errors double-clustered by firm and quarter. t-statistics are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 8: Covenant concerns and changes in financing activity (continued).

	Δ Log(Equity Payout)					Δ Log(Cash)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CovConcerns	-8.28**	-9.88*	-10.20**	-9.85**	-8.53**	5.13**	2.24	3.34	3.09	3.80
	(-2.26)	(-1.99)	(-2.64)	(-2.56)	(-2.22)	(2.24)	(0.72)	(1.25)	(1.15)	(1.41)
Tobin's Q	1.13*	1.19	1.19	-0.60	1.20	3.84***	-2.10*	3.63***	5.00***	3.89***
	(1.72)	(0.64)	(1.58)	(-0.76)	(1.60)	(8.32)	(-1.95)	(6.87)	(8.33)	(7.51)
Cash Flow	0.34***	0.60*	0.37**	0.36**	0.33**	2.26***	4.50***	2.94***	2.67***	2.63***
	(2.79)	(1.90)	(2.36)	(2.43)	(2.24)	(15.70)	(22.73)	(21.55)	(17.76)	(17.36)
Sales Growth	10.27***	12.06***	10.65***	10.82***	9.67***	0.92*	0.84	1.06*	0.90	0.59
	(11.89)	(10.10)	(10.80)	(11.08)	(9.91)	(1.74)	(1.12)	(1.82)	(1.54)	(0.99)
Covenant Slack		3.21					0.87			
		(0.85)					(0.32)			
Sq. Covenant Slack		-1.29					-4.33			
		(-0.47)					(-1.58)			
Earnings			0.17					-0.29		
			(0.80)					(-1.38)		
Sq. Earnings			0.01**					0.04***		
			(2.17)					(3.93)		
Altman z-score				0.85***					-0.49***	
				(4.47)					(-4.10)	
Rating Downgrade				-30.64***					9.19**	
				(-2.78)					(2.36)	
LM Sentiment					1.27***					0.42***
					(8.52)					(4.83)
HHLT Risk					-1.69					0.58
					(-1.56)					(0.71)
Firm & Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.069	0.090	0.071	0.071	0.072	0.13	0.13	0.14	0.14	0.14
N	95300	44671	79327	79327	79327	99002	46662	82634	82634	82634

Notes. Dependent variables are changes from quarter t to quarter $t+4$. Sample restricted to observations with no violations reported in the current and past four quarters. Due to data constraints, regressions on covenant slack and its squared only cover firms with covenant information reported in DealScan. Standard errors double-clustered by firm and quarter. t-statistics are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

consequential and inconsequential violations. Another difference is that covenant slack is defined based on past cash flow realizations, where covenant concerns reflect concerns by firm managers that plausibly reflect forward-looking information about the firm's performance and lending conditions.

Operating earnings is also an important measure of a firm's borrowing capacity as financial covenants are often based on earnings. Changes in operating earnings have been shown to predict changes in firm investment and financing activity, independent of investment opportunities (Lian and Ma, 2021). Altman z-score and credit rating downgrade indicators proxy for default risk. Additionally, text-based measures of call sentiment (LM Sentiment) and risk (HHLT Risk) capture the first and second moments of firm performance contained in earnings calls. These measures are constructed using keywords from Loughran and McDonald (2011) and Hassan, Hollander, van Lent, and Tahoun (2019) and are obtained from the website https://www.firmlevelrisk.com.

The findings in Table 6 indicate that covenant concerns predict a significant decline in firm investments. Specifically, the baseline specification (Column 1) shows that capital stock fall by 1.9 percentage points (s.e.=0.38) over four quarters following mentions of covenant concerns. This result is robust to controlling for covenant slack and operating earnings as well as their squared terms (Columns 2 and 3). Moreover, controlling for borrower risk, including the Altman z-score and credit rating downgrade, as well as the firm's overall sentiment or general risk level, does not affect the magnitude of the estimates (Columns 4 and 5). Columns 6 through 10 show that covenant concerns also predict a significant decline in capital expenditures in the four quarters after covenant concerns are mentioned, and these estimates are also robust to the inclusion of additional controls.

Tables 7 and 8 provides evidence of the sensitivity of financing policies to covenant concerns. Specifically, the results indicate that covenant concerns are associated with significant reductions in both debt and equity financing activities. In Column 1 of Table 7, covenant concerns are associated with a 11.2 percentage point (s.e.=2.4) decline in total debt. In Column 1 of Table 8, we see that covenant concerns are associated with a 8.28 log percentage point (s.e.=3.7) decline in log equity payouts. These results are also robust to controlling for covenant slack, operating earnings, changes in default risk, as well as firm-level sentiment and risk. Finally, Columns 6-10 examine the relationship between covenant concerns and changes in cash holdings. In the baseline specification (Column 6), covenant concerns predict an increase in cash holdings by 5.1 percentage point (s.e.=2.29). However, this is no longer significant once additional controls are included.

Appendix Table A.11 compares the marginal effects of covenant concerns relative to those of actual covenant violations, leverage, earnings, and covenant slack. Specifically, I re-estimate equation 3, but substitute each of the variables mentioned for *CovConcerns*. The estimated coefficients show that the response of investment and financing activity to covenant concerns is sizable relative to the effects of actual violations, even conditioning on violations that are discussed in earnings calls, which Section 3.3 shows to be more consequential relative to the average covenant violation. A test of equality of coefficients cannot reject the null hypothesis that the coefficients of covenant

concerns and covenant violations mentioned in earnings calls are equal.

6 Economics channels

This section sheds further light into the underlying drivers for why firms express concerns about covenants. One reason is that firms experience an expected decline in profitability, which increases the probability of a covenant violation. Another reason is that firms expect higher costs of violation.

6.1 Covenant concerns and expected profitability

To investigate the role of expected profitability, I examine whether covenant concerns are associated with changes in expected sales and earnings using analyst forecasts data from I/B/E/S. Specifically, I estimate the following regression specification

$$F_{it}\Big[\Delta Sales_{i,1,4}\Big] - F_{it-}\Big[\Delta Sales_{i,1,4}\Big] = \beta_0 + \beta_1 CovConcerns_{it} + \Gamma X_{it} \qquad (4)$$
$$+ \alpha_i + \delta_t + \epsilon_t$$

where $\Delta Sales_{i,1,4}$ the forecast of sales growth for the next four fiscal quarters, t index the month of the call, and $t-$ index the month prior to the call.[10] Controls X_{it} include measures of investment opportunities, Tobin's Q, cash flow, and realized sales growth. I also control for expected sales growth in the month prior to the call as well as the difference in sales growth for the current fiscal quarter relative to expectation. To rule out changes due to reported violations, the sample is restricted to firm-quarters where no violations are reported in the current and past four quarters.

Table 9 presents the coefficient estimates from equation (4). The top panel shows that covenant concerns are associated with a downward revision in expected sales growth over the next four quarters. Specifically, in the baseline specification (Column 1), covenant concerns are linked to a 0.43 percent decline ($s.e. = 0.12$) in expected sales growth. This decline is equivalent to a 5.0 percent decrease relative to the average expected sales growth of 8.66 percent based on forecasts in the month before the earnings call. The bottom panel shows that covenant concerns are similarly associated with a downward revision in expected earnings growth over the next four quarters. The results indicate that covenant concerns are related to a 0.25 basis point decline ($s.e. = 0.09$) in expected earnings over past sales, which is equivalent to a 2 percent decline relative to the average expected earnings over past sales. I find that these estimates remain robust in Columns 2 through 5, where additional controls such as covenant slack, operating earnings, Altman z-score, credit rating downgrade, and the call's sentiment and risk are included. The overall findings suggest that, while

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[10]For instance, consider a call of a firm related to fiscal quarter 2010Q1 held on April 15, 2010. $F_{it}[\Delta Sales_{i,1,4}]$ is the forecast of sales growth over fiscal quarters 2010Q2 to 2011Q1 as of April 30, 2010, whereas $F_{it-}[\Delta Sales_{i,1,4}]$ is the forecast of sales growth over fiscal quarters 2010Q2 to 2011Q1 as of March 31, 2010. Appendix E provides additional details on the sample construction.

Table 9: Covenant concerns and changes in expected sales and earnings growth.

| | Change in Expected Sales Growth (pct) | | | | |
	(1)	(2)	(3)	(4)	(5)
CovConcerns (t)	-0.47***	-0.42***	-0.47***	-0.47***	-0.37**
	(-3.01)	(-2.85)	(-2.99)	(-3.02)	(-2.64)
Sales Surprise (t)	1.38***	1.36***	1.38***	1.38***	1.27***
	(32.58)	(29.91)	(32.59)	(32.58)	(32.34)
Expected Sales Growth $(t-)$	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***
	(-7.93)	(-6.48)	(-7.93)	(-7.94)	(-8.06)
Firm FE	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓
R^2	0.31	0.35	0.31	0.31	0.33
N	40004	20968	40004	40004	40004

| | Change in Expected Earnings Growth (bps) | | | | |
	(1)	(2)	(3)	(4)	(5)
CovConcerns (t)	-0.31**	-0.26***	-0.30**	-0.31**	-0.23*
	(-2.55)	(-2.75)	(-2.43)	(-2.56)	(-1.89)
Earnings Surprise (t)	0.50***	0.41***	0.48***	0.50***	0.43***
	(20.93)	(14.65)	(20.49)	(20.96)	(19.66)
Expected Earnings Growth $(t-)$	-0.02***	-0.03***	-0.03***	-0.02***	-0.02***
	(-8.21)	(-6.86)	(-9.21)	(-8.21)	(-8.17)
Firm FE	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓
R^2	0.26	0.27	0.27	0.26	0.28
N	43797	24369	43797	43797	43797

Notes. This table examines whether covenant concerns are associated with changes in expected sales and earnings growth over the next four quarters. The columns report specifications with similar controls as in Tables 6 and 7. Due to data constraints, regressions on covenant slack and its squared (Column 2) only cover firms with covenant information reported in DealScan. Sample excludes observations where violation reported in the current and past four quarters. Standard errors double-clustered by firm and quarter. t-statistics are reported in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

covenant concerns are associated with a deterioration in expected profitability, the magnitude of the correlations is small.

6.2   Covenant concerns and costly violations

Next, I examine whether covenant concerns are associated with more severe consequences of violations, proxied by changes in loan terms reported in SEC filings. Building on previous work by Roberts and Sufi (2009), I collect the text of the management, discussion, and analysis (MDA) section of SEC filings and parse for mentions of an increase in the loan interest rate or a reduction in the credit facility. Appendix D.4 provides additional details of the data collection procedure.

As validation of the text-based measures, Table A.10 in the appendix reports the correlation between each text-based indicator of loan amendment and actual changes in loan rates and amounts reported in DealScan. The table shows that mentions of amendments increasing loan interest rates are significantly associated with increases in loan interest rates in DealScan, and mentions of amendments reducing credit facility are associated with significant decreases in the the loan amounts in DealScan. These results show that the measure of loan amendments parsed from SEC filings are informative about actual changes in loan terms.

To examine whether mentions of covenant concerns explain differences in the probability of a costly loan amendment, I estimate the following regression specification

$$Amendment_{it} = \beta_0 + \beta_1 CovConcerns_{it-1} + \Gamma X_{it-1} + \alpha_i + \delta_t + \epsilon_{it} \tag{5}$$

where $Amendment_{it}$ is an indicator for whether firm i reports a costly loan amendment in quarter of violation t or any of next four quarters. The coefficient of interest is β_1, which is the difference in probability of a costly violation when the violation predicted by covenant concerns. The hypothesis that covenant concerns are associated with more costly covenant violations predicts that $\beta_1 > 0$. The vector of controls X_{it-1} account for differences in the firm's investment opportunities at the time concerns are mentioned, and includes Tobin's Q, sales growth, and operating cash flow in the quarter prior to violation.

Table 10 reports the coefficient estimates for β_1. Column 1 shows that covenant violations preceded by covenant concerns are more likely to result in loan amendments that increase interest rates or decrease the loan amount. The magnitude of the correlation is sizable, with the probability of a loan rate increase being equivalent to 80 percent of the unconditional average and the probability of a reduction in loan amount of 6.7 percent being equivalent to 67 percent of the unconditional average. Notably, I find that covenant slack does not significantly predict future loan amendments once controlling for covenant concerns. Taken together, these results provide evidence that covenant concerns coincide with a higher probability of more severe penalties conditional on violation.

To conclude, this section provides evidence that covenant concerns are associated with a down-

Table 10: Covenant concerns and loan amendments at violation.

	1{Increase Loan Rate}			1{Reduce Credit Facility}		
	(1)	(2)	(3)	(4)	(5)	(6)
CovConcerns (t-1)	3.58***	3.12**	3.48***	6.03***	6.17***	5.99***
	(2.90)	(2.60)	(2.83)	(4.03)	(3.82)	(4.03)
Covenant Slack (t-1)		1.06			1.38	
		(0.90)			(0.71)	
Sq. Covenant Slack (t-1)		1.10			2.94**	
		(1.32)			(2.11)	
Earnings (t-1)			-0.26***			-0.11
			(-2.95)			(-0.69)
Sq. Earnings (t-1)			-0.01			-0.00
			(-1.21)			(-1.03)
Unconditional avg.	4.44	4.44	4.44	8.53	8.53	8.53
% Δ relative to avg.	80.61	70.23	78.42	70.71	72.41	70.24
Firm & Time FE	✓	✓	✓	✓	✓	✓
R-squared	0.38	0.37	0.38	0.39	0.38	0.39
Nobs	17262	15750	17262	17262	15750	17262

Notes. This table examines whether covenant concerns predict a costly loan amendment in the quarter of violation or any of the following four quarters. 1{Increase Loan Rate} indicates a reported amendment that increases the loan interest rates. 1{Reduce Credit Facility} indicates a reported amendment that reduces the credit facility. The sample is restricted to violation events reported in DealScan or SEC filings. t-statistics reported in parentheses are double-clustered by firm and time. * p<0.10, ** p<0.05, *** p<0.01.

ward revision in expected profitability and also more costly loan amendments in the quarters of and after violation. Nonetheless, I find that second channel is likely to be more economically significant. Specifically, the correlation between covenant concerns and expected profitability is small. On the other hand, covenant concerns explain a significant rise in the probability of an amendment at violation that increases the loan interest rate or reduces the loan amount.

7 Conclusion

This paper examines the extent to which covenants are an important consideration for firm decisions when they are not presently in violation. To do so, it develops a measure of covenant concerns that captures not only when covenant violations are expected to occur, but also when these violations are expected to be costly. The measure predicts future covenant violation even after controlling for information in covenant slack and earnings.

I document that covenant concerns are higher when earnings deteriorate and also when firms are financially constrained. Notably, I also find that the reliance on institutional loans and the size of the lending syndicate also significantly predicts an increase in covenant concerns. This finding provides evidence against the weak covenant hypothesis, which suggest that non-bank institutions participation in the syndicate loan market promotes borrower-friendly loan terms.

Using the constructed measure, I find that covenant concerns are associated with a substantial reduction in investment, debt, and equity financing. The reduction in investment and financing activities is larger than a comparison group of firms with similar investment opportunities but no mention of covenant concerns. Furthermore, estimates from panel regression analysis suggest that the information captured by covenant concerns is not explained by other controls, such as covenant slack, earnings, changes in default risk, as well as firm-level sentiment and risk.

In summary, this paper provides empirical evidence that covenants are a relevant concern in firm decision making outside of violations, to the extent that these concerns lead to more conservative investment and financing policies. Broadly, these findings highlights the role of financing constraints in firm decisions, even when constraints are not presently binding.

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Internet Appendix to "Anticipating binding constraints: an analysis of financial covenants"

A Additional figures and tables

Table A.1: Summary statistics of full sample and conditional on forward-looking covenant concerns.

	All			CovConcerns=1		
	Nobs	Mean	Std. dev.	Nobs	Mean	Std. dev.
CovMention(pct)	128251	7.15	25.77	2230	100.00	0.00
CovConcerns(pct)	128251	1.74	13.07	2230	100.00	0.00
Capital Expenditure (bps)	126658	121.75	146.63	2197	120.50	150.64
Change in Log(Asset) (log pp)	126481	1.82	15.03	2220	-0.79	15.29
Total Debt Growth (log pp)	126647	3.18	57.37	2212	4.12	51.89
Equity Payout Growth (log pp)	124053	132.15	175.26	2195	92.16	138.65
Tobin's Q	122183	1.88	1.52	2073	1.04	0.72
Cash Flow (pct)	127741	1.51	6.69	2219	1.98	4.83
Sales Growth (pct)	125900	35.59	92.83	2179	-11.78	105.55
Log(Asset)	127344	6.63	1.85	2229	6.94	1.45
Leverage(pct)	126063	23.09	21.47	2156	41.75	21.09
Tangible Net Worth (pct)	127992	25.46	48.66	2223	3.77	40.86
Cash Holdings (pct)	128156	21.37	23.49	2229	7.54	10.74
Altman z-score	112875	3.67	5.96	1839	0.87	2.00
Earnings(pct)	124509	1.42	8.00	2170	1.67	4.80
Has Rating (pct)	128251	26.84	44.31	2230	38.30	48.62
High Yield Rating (pct)	34885	61.74	48.60	875	89.14	31.13
LM Sentiment	112930	8.37	5.22	1993	5.31	5.61
HHLT Risk	112930	0.58	0.51	1993	0.64	0.50
Violation(pct)	128251	2.98	17.01	2230	13.23	33.89
Violation, DealScan (pct)	57172	34.71	47.61	1442	66.50	47.21
Covenant Slack (sd)	57172	0.02	0.35	1442	-0.21	0.40

Table A.2: Covenant mentions and the consequences of covenant violations.

	(1) Capital Expenditure	(2) Long-term Debt Growth	(3) Equity Payout	(4) 1{Increase Loan Rate}	(5) 1{Reduce Loan Amount}	(6) 1{Rating Downgrade}
CovMention	-12.94*	-12.39***	-0.17**	4.71**	8.94***	5.93***
	(-1.81)	(-3.89)	(-2.37)	(2.44)	(2.88)	(4.69)
Covenant slack	32.63**	4.63	0.75***	-4.57***	-2.86	-2.90**
	(2.60)	(0.29)	(4.77)	(-2.70)	(-1.21)	(-2.29)
Sq. covenant slack	21.94**	5.84	0.52***	-0.10	1.28	-0.46
	(2.61)	(0.41)	(4.68)	(-0.07)	(0.66)	(-0.34)
Earnings	1.89	0.57	0.05***	0.13	-0.17	0.05
	(1.59)	(1.06)	(3.07)	(0.71)	(-0.97)	(0.47)
Sq. earnings	17.50***	-2.90	0.16**	2.28**	-1.73	-0.67
	(3.50)	(-0.94)	(2.32)	(2.37)	(-1.48)	(-1.19)
Industry & Time FE	✓	✓	✓	✓	✓	✓
R^2	0.39	0.050	0.30	0.14	0.15	0.14
N	1893	1930	1909	1509	1509	1940

Notes. This table examines cross-sectional variation in the consequences of covenant violations. 1{Increase Loan Rate} is an indicator for a loan amendment that increases interest rates in the SEC filing in the quarter of violation. 1{Reduce Loan Amount} is an indicator for a loan amendment that decreases borrowing amount in the quarter of violation. CovMention is an indicator for whether covenants are discussed in the quarter of violation. Sample restricted to firm-quarter observations in which violation is reported in SEC filings. Standard errors are two-way clustered by industry and year-quarter. t-statistics are reported in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A.3: Types of violations reported in SEC filings.

	Percent of violation
A. Unconditional sample	
Number of violations	360
Financial covenant	82.5
Non-financial covenant only	10.6
Dividend restriction	7.9
Capx restriction	15.8
Reporting requirement	50
Others	26.3
Unclear	6.9
B. Conditional on covenant mention	
Share of violations	26.4
Financial covenant	92.6
Non-financial covenant only	5.3
Dividend restriction	20
Capx restriction	0
Reporting requirement	80
Others	0
Unclear	2.1

Notes. This table examines the types of violations reported by firms in their SEC filings. The sample is constructed using 360 randomly sampled violation events with matched SEC filings and earnings call transcripts. All values are in percentage points, except for number of violations. Values for "Dividend restrictions", "Capx restrictions", "Reporting requirement", and "Others" are reported as a share of all non-financial covenant violations. "Conditional on covenant mentions" refers to violation events with associated discussions of covenants in earnings call transcripts. "Unclear" refers to cases where the types of violations cannot be inferred from SEC filings.

Table A.4: Covenant concerns and changes in earnings.

	(1) CovConcerns	(2) CovConcerns	(3) CovConcerns	(4) CovConcerns	(5) CovConcerns
Δ EBITDA	-0.07 (-0.81)	-0.04 (-0.61)	-0.00 (-0.02)	0.03 (0.27)	-0.04 (-0.40)
1{Δ EBITDA<0}=1 × Δ EBITDA	-1.12*** (-4.34)	-0.41 (-1.64)	-0.56* (-1.84)	-0.68*** (-2.83)	-0.56** (-2.07)
1{Δ EBITDA<0}=1 × Leverage=1 × Δ EBITDA		-1.19*** (-3.74)			
1{Δ EBITDA<0}=1 × NetWorth=1 × Δ EBITDA			-1.09** (-2.62)		
1{Δ EBITDA<0}=1 × Cash=1 × Δ EBITDA				-0.75* (-1.78)	
1{Δ EBITDA<0}=1 × Altmanz=1 × Δ EBITDA					-1.48*** (-2.79)
Violation controls	✓	✓	✓	✓	✓
Firm & Time FE	✓	✓	✓	✓	✓
R^2	0.029	0.035	0.033	0.034	0.037
N	89626	88675	86343	89562	59549

Notes. This table examines the statistical significance of the correlation between covenant concerns and earnings. Leverage (net worth, cash, and Altmanz) is an indicator that takes a value of one if it is above (below) the median value within two-digit SIC industry and time at the beginning of the quarter. $\Delta Earnings$ is the year-over-year difference in earnings, normalized by firm-level standard deviation of earnings. $1\{\Delta Earnings < 0\}$ is an indicator for negative change in earnings. Column 2 violation controls include violation and its interactions with $1\{\Delta Earnings < 0\}$. Column 4 violation controls include violation and its interactions with and $1\{\Delta Earnings < 0\}$ and indicators of financial constraints. Standard errors double clustered by two-digit SIC industry and time. t-statistics are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.5: Covenant mentions and call coverage

	(1) Any Concern	(2) Any Violation
log(Asset)	3.25***	-1.31
	(6.07)	(-1.54)
Analyst coverage	-1.93***	-1.53***
	(-7.85)	(-11.09)
Num. quarters observed	0.53***	0.50***
	(9.46)	(10.50)
Call length	12.55***	2.08
	(3.43)	(1.05)
Industry FE	✓	✓
R^2	0.2	0.1
N	4381	4381

Notes. This table examines the relationship between covenant mentions and call coverage. Any concern is an indicator that equals one if a firm mentions covenant concerns in any quarter in the sample. Any violation is an indicator that equals one if a firm violations covenants in any quarter in the sample. Industry classification based on 2-digit SIC classification code. Standard errors clustered by industry. t-statistics are reported in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A.6: Covenant mentions, violations, and covenant tightness.

	(1) Any Concern	(2) Any Violation
Covenant tightness	-21.95***	-12.15**
	(-5.12)	(-2.37)
Num. covenants	3.37**	4.30**
	(2.43)	(2.59)
Industry FE	✓	✓
R^2	0.07	0.06
N	1980	1980

Notes. This table examines the relationship between covenant mentions and violations with covenant tightness. Any concern is an indicator that equals one if a firm mentions covenant concerns in any quarter in the sample. Any violation is an indicator that equals one if a firm violations covenants in any quarter in the sample. Covenant tightness is the smallest difference between financial covenant threshold and the corresponding financial ratio at loan origination. Num. covenants is the average number of financial covenants reported in DealScan. Industry classification based on 2-digit SIC classification code. Standard errors clustered by industry. t-stat in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A.7: Robustness – covenant concerns and changes in investment activities.

	Δ Log(PPE)				Δ Capital Expenditures			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CovConcerns x CovSent > 0	-1.23*				-3.47			
	(-1.82)				(-0.58)			
CovConcerns x CovSent ≤ 0	-2.14***				-10.90***			
	(-5.14)				(-2.92)			
CovConcerns (Intensive)		-2.39***				-6.94		
		(-4.54)				(-1.64)		
CovConcerns (MDA)			-1.79***				-9.03**	
			(-4.34)				(-2.45)	
CovConcerns (QA)			-1.52**				-6.62	
			(-2.13)				(-1.03)	
CovConcerns x Recession				-1.16*				-1.16*
				(-1.83)				(-1.83)
CovConcerns x (1-Recession)				-2.24***				-2.24***
				(-5.18)				(-5.18)
Difference	.9		-.28	1.08	7.43		-2.42	1.08
	(1.15)		(-.33)	(1.42)	(1.06)		(-.32)	(1.42)
Firm & Time FE	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.55	0.55	0.55	0.55	0.10	0.10	0.10	0.55
N	63780	63780	63780	63780	98851	98851	98851	63780

Notes. This table examines robustness of the relationship between covenant concerns and changes in investment activity from the beginning of quarter t to the end of quarter $t + 4$. Sample is restricted to firm-quarter observations with no violations reported in the current and past four quarters. Due to data constraints, regressions on covenant slack and its squared only cover firms with covenant information reported in DealScan. Standard errors double-clustered by firm and quarter. t-statistics are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

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Table A.8: Robustness – covenant concerns and changes in financing activities.

	Δ Log(Total Debt)				Δ Log(LT Debt)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CovConcerns x CovSent > 0	-11.31**				-14.54**			
	(-2.06)				(-2.34)			
CovConcerns x CovSent ≤ 0	-11.16***				-19.20***			
	(-3.28)				(-5.00)			
CovConcerns (Intensive)		-12.76***				-22.70***		
		(-3.33)				(-5.25)		
CovConcerns (MDA)			-10.24***				-15.71***	
			(-3.04)				(-4.13)	
CovConcerns (QA)			-13.66**				-28.09***	
			(-2.33)				(-4.24)	
CovConcerns x Recession				-13.56***				-24.88***
				(-2.64)				(-4.28)
CovConcerns x (1-Recession)				-10.10***				-14.70***
				(-2.85)				(-3.68)
Difference	-.16		3.42	-3.46	4.65		12.38	-10.19
	(-.03)		(.49)	(-.56)	(.64)		(1.59)	(-1.46)
Firm & Time FE	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11
N	99219	99219	99219	99219	99216	99216	99216	99216

Notes. This table examines robustness of the relationship between covenant concerns and changes in financing activity from the beginning of quarter t to the end of quarter $t+4$. Sample is restricted to firm-quarter observations with no violations reported in the current and past four quarters. Due to data constraints, regressions on covenant slack and its squared only cover firms with covenant information reported in DealScan. Standard errors double-clustered by firm and quarter. t-statistics are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.9: Robustness – covenant concerns and changes in financing activities (cont'd).

	Δ Log(Equity Payout)				Δ Log(Cash)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CovConcerns x CovSent > 0	-1.58				3.43			
	(-0.24)				(0.88)			
CovConcerns x CovSent $\leq$ 0	-10.76***				5.75**			
	(-2.66)				(2.37)			
CovConcerns (Intensive)		-5.35				5.12*		
		(-1.18)				(1.87)		
CovConcerns (MDA)			-7.03*				4.43*	
			(-1.76)				(1.85)	
CovConcerns (QA)			-12.02*				9.97**	
			(-1.71)				(2.39)	
CovConcerns x Recession				-14.42**				3.29
				(-2.34)				(0.90)
CovConcerns x (1-Recession)				-5.45				5.98**
				(-1.30)				(2.38)
Difference	9.18		4.99	-8.98	-2.32		-5.54	-2.69
	(1.21)		(.6)	(-1.22)	(-.52)		(-1.13)	(-.61)
Firm & Time FE	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.07	0.07	0.07	0.07	0.13	0.13	0.13	0.13
N	95300	95300	95300	95300	99002	99002	99002	99002

Notes. This table examines robustness of the relationship between covenant concerns and changes in financing activity from the beginning of quarter t to the end of quarter $t + 4$. Sample is restricted to firm-quarter observations with no violations reported in the current and past four quarters. Due to data constraints, regressions on covenant slack and its squared only cover firms with covenant information reported in DealScan. Standard errors double-clustered by firm and quarter. t-statistics are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.10: Loan amendments in SEC filings and changes in loan terms in DealScan.

	Δ Loan Rate (log pp)		Δ Deal Amount (log pp)	
	(1)	(2)	(3)	(4)
1{Increase Loan Rate}	2.58***	2.34***		2.36*
	(4.40)	(3.97)		(1.88)
1{Reduce Credit Facility}		1.36***	-2.21**	-2.42***
		(3.23)	(-2.50)	(-2.72)
Firm & Time FE	✓	✓	✓	✓
R^2	0.16	0.16	0.13	0.13
N	64601	64601	64857	64857

Notes. This table examines the economic content of the text-based measure of loan amendments parsed from SEC filings. Δ Loan Rate is the log difference in loan interest spread over LIBOR from quarter t to quarter $t + 4$, whereas Δ Deal Amount is the log difference in deal amount from quarter t to quarter $t + 4$. Both variables are expressed in units of log percentage points, and are computed using loan information from DealScan. The variables 1{Increase Loan Rate} and 1{Reduce Credit Facility} are text-based indicators for whether a loan amendment that increases the loan spread or decrease the credit facility are reported in SEC filings in quarter t to quarter $t + 4$. t-statistics reported in parentheses are based on non-clustered standard errors. * p<0.10, ** p<0.05, *** p<0.01.

Figure A.1: Measures of investment opportunities around covenant concerns, relative to the matched comparison group.
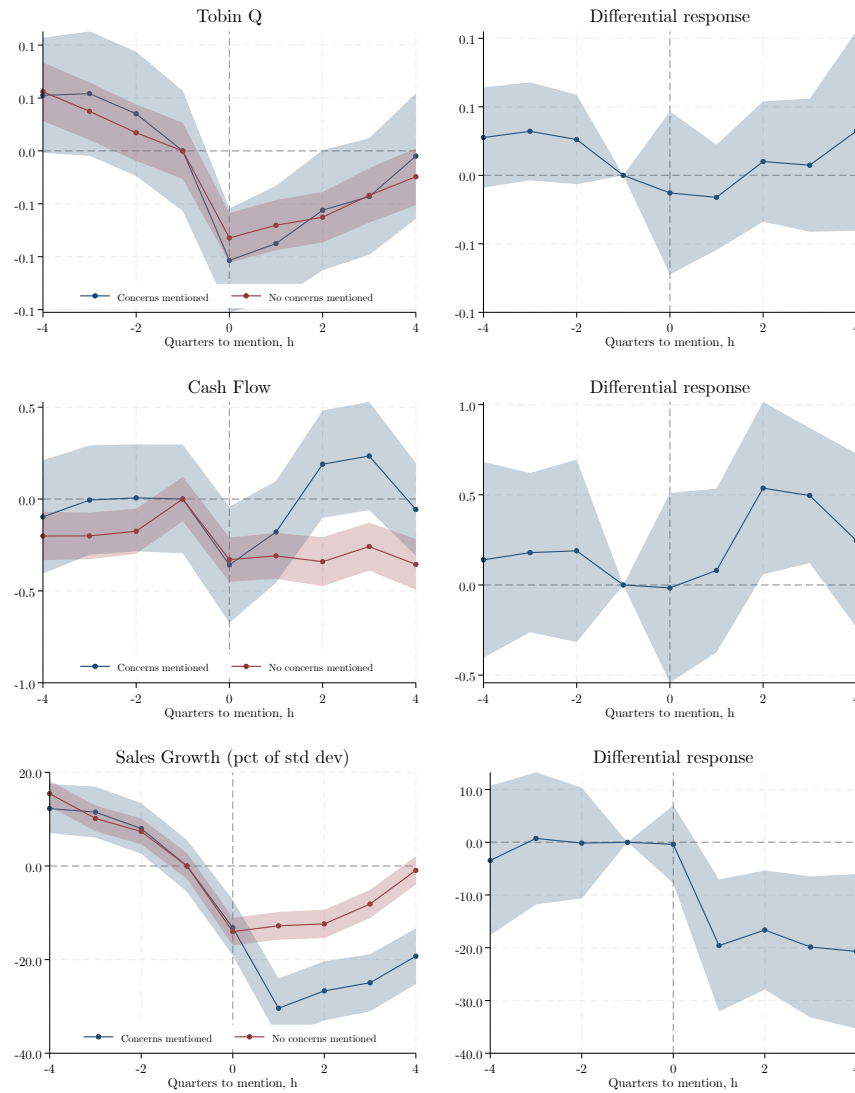
Notes. This table examines how measures of investment opportunities change around covenant concerns, relative to the matched comparison group. Left panel shows raw means, normalized to 0 in period -1. Blue line is average response when covenant concerns are mentioned. Red line is average response of matched events where concerns are not mentioned. Right panel shows differential response given by β_τ from OLS specification (2). Shaded area denotes 95 percent confidence interval, which are based on non-clustered standard errors.

Figure A.2: Financing responses around covenant concerns, , conditional on post-event violations.
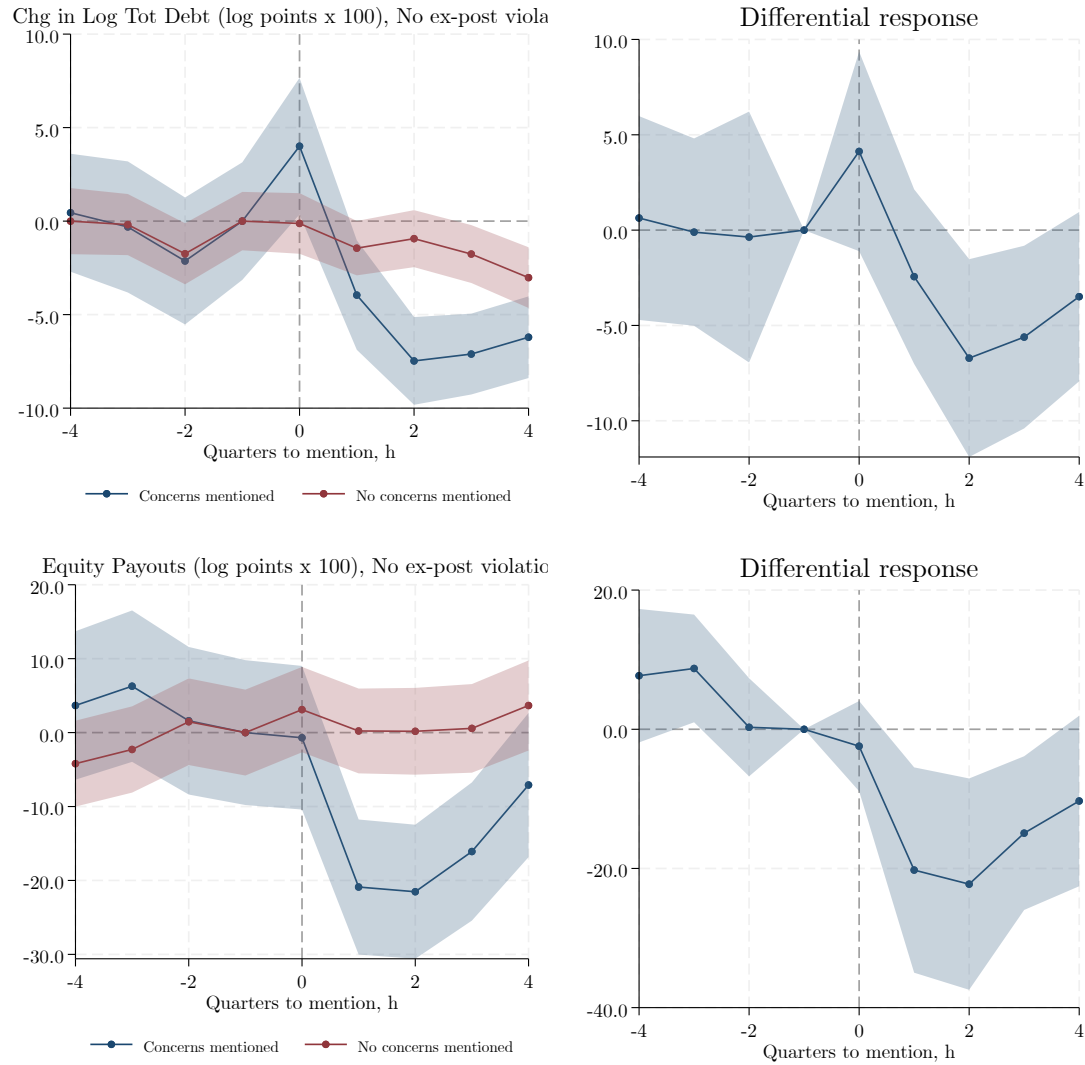
Chg in Log Tot Debt (log points x 100), No ex-post viola

Differential response

Equity Payouts (log points x 100), No ex-post violatio

Differential response

Notes. Red line is average response of control firms matched by Tobin's Q, cash flow, and sales growth in periods 0 and -1. Red vertical line in the right panels are the average quarter of first violation for firms that mention covenant concerns (2.1 quarters after mention). Shaded area denotes 95 percent confidence interval, which are based on non-clustered standard errors.

Table A.11: Economic magnitude of covenant concerns.

	(1) Δ CapEx	(2) Δ Log(Asset)	(3) Δ NDI	(4) Δ EquityPay
CovFuture	-20.82***	-5.07***	-44.23***	-15.72***
	(-5.41)	(-5.02)	(-3.49)	(-5.03)
Violation	-7.13**	-4.38***	-28.17*	-11.78***
	(-2.60)	(-4.88)	(-1.89)	(-3.78)
Violation(Mentioned)	-13.25**	-10.07***	-68.36***	-23.18***
	(-2.29)	(-5.95)	(-2.74)	(-4.47)
Leverage	-6.64***	-0.98***	-39.48***	-13.36***
	(-8.93)	(-3.86)	(-17.42)	(-14.52)
Earnings	6.16***	3.82***	15.64***	8.70***
	(8.83)	(15.09)	(6.78)	(10.76)
Covenant Slack	14.96***	3.21***	73.07***	34.43***
	(5.04)	(3.56)	(7.10)	(8.11)

Notes. This table compares the marginal effect of covenant concerns on firm outcomes to the marginal effect of covenant violations and other variables of interest. Each element in the table represents the marginal effect of the variable (row) on the firm outcome (column). The marginal effect is the estimated coefficient from regression specification 3, but with the respective variable (row) substituted for *CovConcerns*. The covariates include Tobin's Q, sales growth, cash flow, and the lagged dependent variable. The specification also includes firm and time fixed effects. In the table, leverage and earnings are standardized by subtracting the firms average and dividing by the firms standard deviation. Standard errors double-clustered by firm and quarter. t-statistics are reported in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

B Data

B.1 Financial covenants

I obtain data on debt covenants from Thomson Reuters LPC DealScan database. The database records information on private syndicated debt contracts at the point of origination, where syndicated means a group of lenders jointly lending to a single borrower (Berlin et al. (2020)). These contracts, known as deals in the database, typically bundles different types of tranches, such as revolvers or lines of credits and term loans. Coverage in DealScan is available from 1981 onwards, with more than individual 101 thousand deals involving US-based borrowers. Chava and Roberts (2008) find that DealScan covers 50-75 percent of all commercial loans issued in the United States.

Information on financial covenants comes from the variable "all_covenants_financial", which provides a textual description of the types of financial covenants as well as their respective thresholds. The covenant information provided is common across tranches within a deal package. I use this text-based variable, instead of the information provided in the individual covenant variables provided by Dealscan as I found many missing entries in the individual covenant variables even though information is provided in "all_covenants_financial". I apply a simple text search algorithm to extract information on the type of covenants and the threshold that applies.

Next, I construct a firm-quarter panel of covenant thresholds from DealScan. To this end, I define a covenant threshold as active from the date the tranche becomes active ("tranche_active_date"). A covenant threshold no longer is relevant when the tranche matures or if the tranche is amended, i.e. a new "tranche_active_date" is recorded before the previous "tranche_maturity_date". I obtain the Compustat GVKEY ID of each borrower from the Roberts Dealscan-Compustat linking database (Chava and Roberts (2008)). This allows me to know which covenant threshold applies in a given firm and year-quarter. If a firm has multiple covenant thresholds that apply in a given quarter, I keep the tightest threshold.

Table B.1: Prevalence of financial covenants in Dealscan.

Covenant Type	No. Obs	p25	p50	p75	Mean
Max. Debt to EBITDA	118788	2.5	3	3.9	3.34
Min. Interest Coverage	94024	2.5	3	3.5	2.98
Min. Fixed Charge Coverage	73679	1.15	1.3	1.6	1.5
Min. Tangible Net Worth	37438	45	275	1500	4367
Max. Leverage ratio	36738	0.5	0.6	0.65	0.8
Min. Net Worth	31247	87	257	800	3373
Max. Senior Debt to EBITDA	23527	2	2.5	3.1	2.81
Min. Current Ratio	22148	1	1	1.2	1.37
Min. Debt Service Coverage	17691	1.2	1.3	1.75	1.56
Max. Debt to Tangible Net Worth	17320	1	1.5	2.25	2.3
Max. Debt to Equity	5407	1	1.5	2.23	3.74
Min. Cash Interest Coverage	3267	1.5	2.25	3	2.43
Max. Loan to Value ratio	1673	0.5	0.65	0.75	6.11

Notes. "No. Obs" is the number of firm-quarter observations in which a covenant type applies. "p25", "p50", "p75", "Mean" are, respectively, the 25th, 50th, 75th percentiles, and average covenant threshold. See text for constructing firm-quarter panel of covenant thresholds from Dealscan information. Sample consists of borrowers with Compustat GVKEY ID available in the Roberts Dealscan-Compustat linking database (Chava and Roberts (2008)) and financial covenant information in the variable "all$_c$ovenants$_f$inancial"$inDealscanfrom2002Q1to2020Q1$.
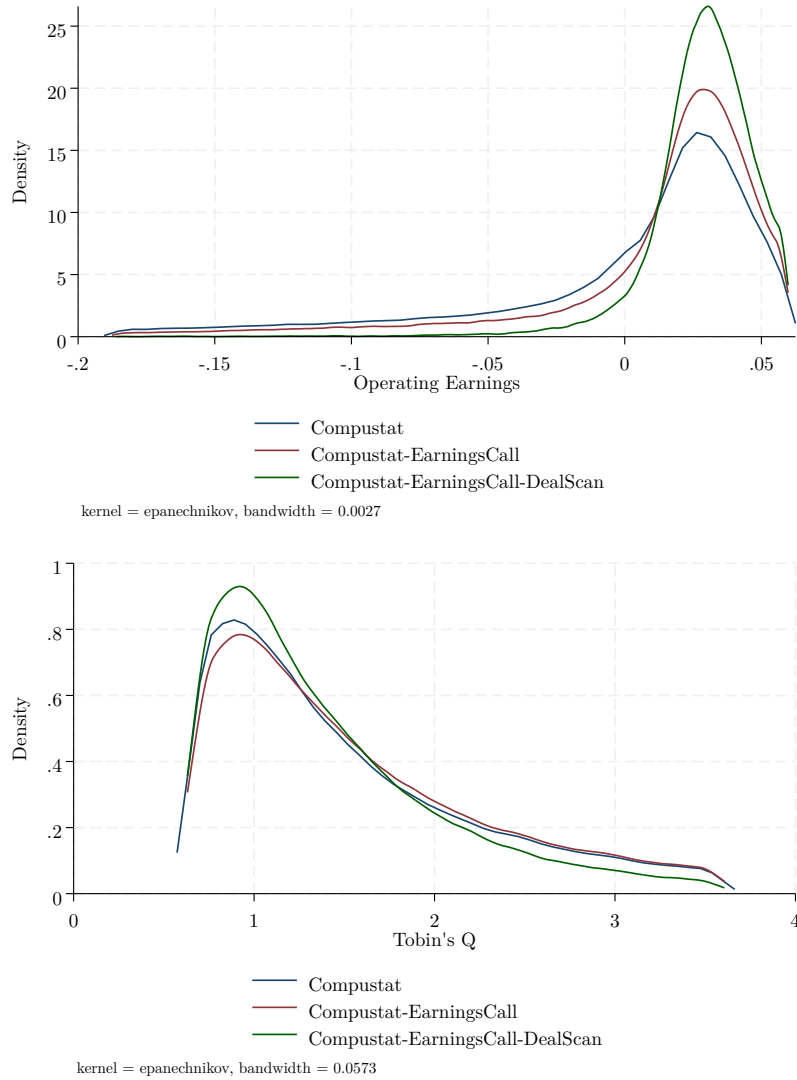
Table B.1 shows the prevalence of different types of financial covenants in DealScan. As documented in prior literature, most financial covenants are related to operating earnings or EBITDA (earnings before interest, taxes, depreciation, and amortization) (Drechsel (2018); Lian and Ma (2021); Adler (2024)). These covenants are restrictions on total debt at the firm level, not just for a particular loan contract. The remaining set of financial covenants, such as the minimum net worth and maximum leverage ratio covenants, are based on book values of the firms assets and liabilities. I obtain accounting variables from Compustat to compute financial ratios corresponding to each of the financial covenants, using the definitions of financial ratios provided in Demerjian and Owens (2016).

Figure B.1: Distribution of assets and leverage by sample.
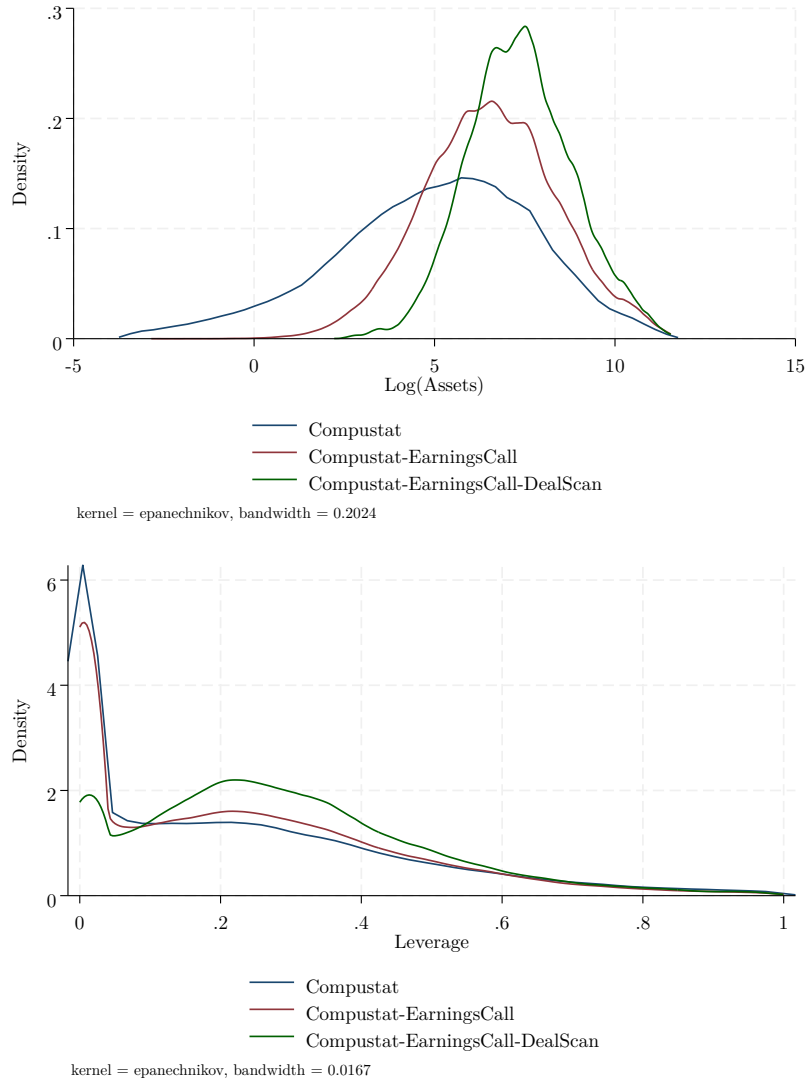
kernel = epanechnikov, bandwidth = 0.2024

kernel = epanechnikov, bandwidth = 0.0167

Notes. Compustat refers to firm-quarter observations in Compustat with matched SEC filings, excluding utilities (SIC 4900-4999) and financials (SIC 6000-6999), from 2002Q1 to 2020Q1. Compustat-EarningsCall refers to firm-quarter observations in the Compustat sample with earnings call transcripts. Compustat-EarningsCall-DealScan refers to firm-quarter observations in Compustat-EarningsCall sample with financial covenant information in DealScan.

Figure B.2: Distribution of earnings and Tobin's Q by sample.

Figure B.3: Distribution of cash and covenant slack by sample.
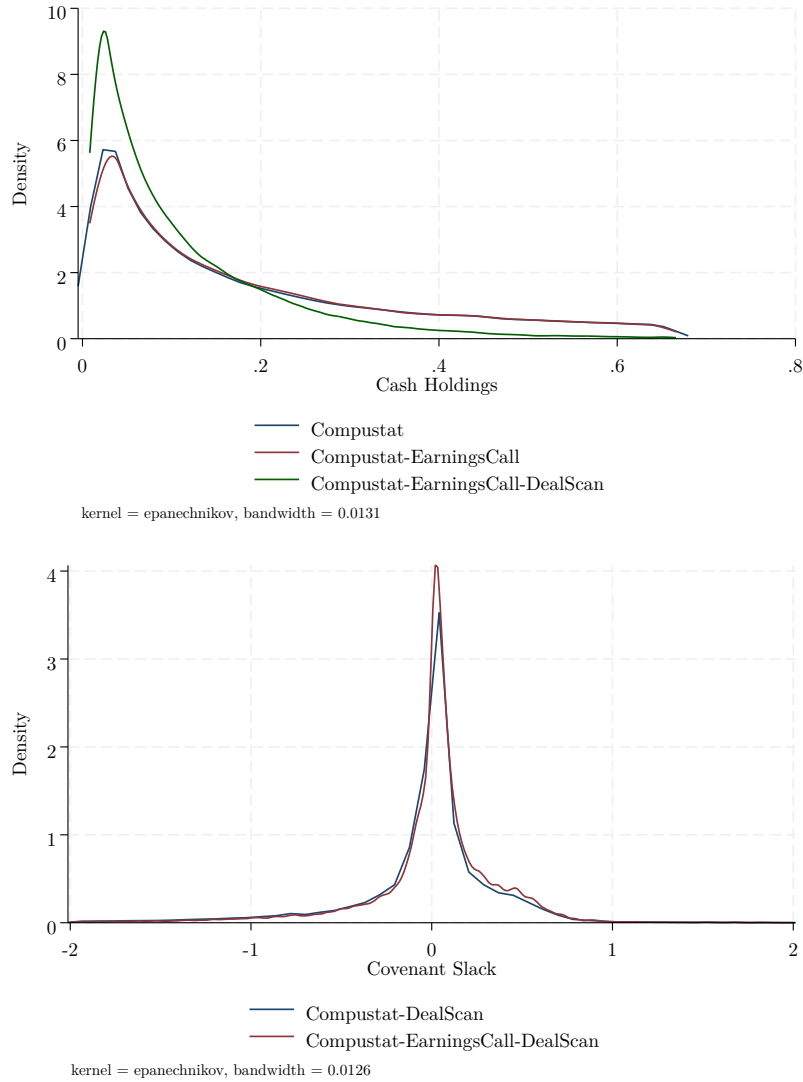
kernel = epanechnikov, bandwidth = 0.0131

kernel = epanechnikov, bandwidth = 0.0126

Notes. Compustat refers to firm-quarter observations in Compustat with matched SEC filings, excluding utilities (SIC 4900-4999) and financials (SIC 6000-6999), from 2002Q1 to 2020Q1. Compustat-EarningsCall refers to firm-quarter observations in the Compustat sample with earnings call transcripts. Compustat-EarningsCall-DealScan refers to firm-quarter observations in Compustat-EarningsCall sample with financial covenant information in DealScan

B.2 Variable definitions

Variable	Compustat formula and notes	Source
Altman-z	3.3*(oibdpq/atq) + saleq/atq + 1.4*req/atq + 1.2*((actq-lctq)/atq) + 0.6*mcap/ltq	Compustat
Capital expenditure	capxq / l1.atq where capxq = capxy - l1.capxy if fqtr!=1 and capxq = capxy if fqtr==1	Compustat
Cash holdings	cheq / atq	Compustat
Covenant slack	Difference between accounting ratio and threshold in covenants, normalized by standard deviation of accounting ratio. If multiple covenants present, take whichever is tighter (more negative).	Compustat, Dealscan
CovFuture	Text-based measure of covenant concerns. See text for definition.	
Current ratio	actq/lctq	Compustat
Depreciation	dpq / l1.atq	Compustat
Earnings (EBITDA)	oibdpq / l1.atq	Compustat
Earnings growth	(oibdpq - l4.oibdpq) / oibdpq_sd where oibdpq_sd is the firm specific standard deviation of (oibdpq - l4.oibdpq)	Compustat
Equity Payouts	log(1+prstkcq+dvq) where prstkcq = prstkcy - l1.prstkcy if fqtr!=1 and prstkcq = prstkcy if fqtr==1, similar treatment for dvq	Compustat
HHLT Risk	Text-based measure of risk constructed using keywords from Hassan et al. (2019). Firm-quarter level data obtained from the website https://www.firmlevelrisk.com.	
Interest expense	xintq / l1.atq	Compustat
Leverage	(dlttq + dlcq) / atq	Compustat
Long-term debt growth	log(1+dlttq) - log(1+l1.dlttq)	Compustat
Total debt growth	log(dlttq + dlcq) - log(1+l1.dlttq+l1.dlcq)	Compustat

Variable	Compustat formula and notes	Source
Net debt issuance	(dltisq-dltrq) / l1.atq where dltisq = dltisy - l1.dltisy if fqtr!=1 and dltisq = dltisy if fqtr==1, similar treatment for dltrq	
LM Sentiment	Text-based measure of sentiment constructed using keywords from Loughran and McDonald (2011). Firm-quarter level data obtained from the website https://www.firmlevelrisk.com.	
Max. Debt-to-EBITDA	(dlttq + dlcq) / ann_oibdpq where ann_oibdpq = oibdpq + l1.oibdpq + l2.oibdpq + l3.oibdpq	Compustat
Min. interest coverage	ann_oibdpq / ann_xintq where ann_xintq = xintq + l1.xintq + l2.xintq + l3.xintq and intpnq = intpny - l.intpny if fqtr!=1 and intpnq=intpny if fqtr==1	Compustat
Net worth	(atq - ltq) / atq	Compustat
Operating cash flow	(oancfq + xintq) / l1.atq where oancfq = oancfy - l1.oancfy if fqtr!=1 and oancfq = oancfy if fqtr==1	Compustat
PPE	ppentq / atq	Compustat
Rating	S&P credit rating obtained from Capital IQ. Ratings between AAA and BBB- are labeled as investment grade, the remainder are labeled as high yield. Missing data is labeled as no ratings.	Capital IQ
Sales growth	(saleq - l4.saleq) / saleq_sd where saleq_sd is the firm specific standard deviation of (saleq - l4.saleq)	Compustat
Size / Log(assets)	log(atq)	Compustat
Tangible net worth	(atq - ltq - intanq) / atq	Compustat
Tobin's Q	(dlttq + dlcq + mcap) / atq where mcap = prc * shrout / 1000	Compustat, CRSP
Violation	Covenant violation reported in SEC filings. See text for definition.	
Violation, DealScan	Covenant violations computed using covenant slack imputed from DealScan. Violation is an indicator for whether covenant slack falls below zero.	Compustat, DealScan
Traditional Bank Loan; Institutional Loan; Private Loan	Term A loans that are funded by commercial banks only; Term B loans or non-Term B loans funded by institutional investors; Term A loans funded by investment banks only (Demiroglu and James (2015))	DealScan
Lead Portfolio	The log share of syndicated loans which a lead lender arrangers in the past three quarters.	DealScan
Ind. Institutional Share	The share of firms in a given industry with an institutional loan in their lending syndicate.	DealScan

C Textual analysis of earning call transcripts

C.1 Preprocessing

I begin by extracting discussions of firm participants in earnings call transcripts. I include both prepared remarks in the management discussion and analysis section as well as unprepared remarks by management in the question and answer section. I exclude the first 15 sentences in each call to remove the boilerplate statements made before beginning discussions of operating and financial results. As the measurement strategy relies on identifying forward-looking keywords typically found in these boilerplate discussions, their removal is necessary to ensure that the measure constructed reflects economically meaningful content.

As spoken sentences are often complex with multiple statements joined by conjunctions, I use SpaCy's sentence tokenizer algorithm to split the text of each call into subsentences by detecting for the presence of the following indicators:

> ",", ".", "!", "?", ";", "or", "after", "because", "but", "so", "when", "where", "while", "although", "however", "though", "whereas" "so that", "despite"

Next, I apply a simple cleaning algorithm to each sentence.

- Remove any words that occur in brackets or squared brackets.

- Remove months ("January", "February", etc), irrelevant mentions of covenants ("covenant skills" and "customer covenant").

- Remove capitalization, punctuation, and numbers.

Finally, I stem words to their roots using the Porter stemming algorithm (Porter, 1980). For instance, words such as "earnings" are stemmed to "earn" and "risks" are stemmed to "risk". The purpose is to reduce the number of variations in words that convey the same meaning.

C.2 Tense detection

I use SpaCy's dependency parser to learn the grammatical structure of each subsentence. The relevant output of the dependency parser is each words part-of-speech tag and the dependency relation with the head node. A part-of-speech (POS) tag identifies the grammatical category (e.g. noun, verb, adverb) of each word. The part-of-speech tags follow the Universal Dependency scheme (source: https://universaldependencies.org/u/pos/), which is commonly used in natural language processing applications. The dependency relation identifies the root word of a subsentence and

auxiliary words, where the root word is the word in which all other words directly or indirectly depend and auxiliary words are functional words associated with verbal predicates that express tense, mood, aspect, or voice. (Universal Dependencies, n.d.)

A subsentence is labeled past tense if the following criteria is satisfied:

- The root word has POS tag: VBD (verb, past tense) or VBN (verb, past participle), or;

- Any child of the root word that is an auxiliary word (AUX or AUXPASS) has POS tag: VBD or VBN.

A subsentence is labeled as present tense if the following criteria is satisfied:

- The root word has POS tag: VB (verb, base form), VBG (verb, gerund or present participle), VBP (verb, non-3rd person singular present), VBZ (verb, 3rd person singular present), and;

- Any child of the root word that is an auxiliary word (AUX or AUXPASS) does not have POS tag: VBD, VBN, or MD (modal).

A subsentence is labeled as future tense if the following criteria is satisfied:

- The root word has POS tag: VB (verb, base form), VBG (verb, gerund or present participle), VBP (verb, non-3rd person singular present), VBZ (verb, 3rd person singular present), and;

- Any child of the root word that is an auxiliary word (AUX or AUXPASS) has POS tag: MD.

C.3 Forward-looking keywords

Table C.1: Forward-looking keywords or key phrases obtained from safe-harbor disclosures of SEC 10-K and 10-Q filings (1 of 4)

Word/Phrase (Stemmed)	Count	Variants
expect	84545	expect, expects, expected, expectations, expectation, expecting
believ	75291	believe, believes, believer
estim	73095	estimate, estimates, estimated
intend	71885	intend, intends, intended
anticip	71480	anticipate, anticipates, anticipated, anticipating
plan	62660	plan, plans, planned, planning
will	46940	will
project	43365	project, projects, projection, projected, projections, projecting
may	42233	may
should	41302	should
could	30922	could
potenti	19267	potential, potentially
predict	18485	predict, predicts, predictions, predicted, predicting, predictable
would	17951	would
seek	16125	seek, seeks, seeking
might	6426	might
goal	6151	goal, goals
futur	4808	future
like	4647	likely
outlook	4502	outlook
contempl	3161	contemplate, contemplates, contemplated
will like result	2444	will likely result
hope	1945	hope, hopes, hopeful, hopefully
possibl	1803	possible, possibly, possibility
forese	1665	foresee, foresees, foreseeable
guidanc	1637	guidance
aim	1513	aim, aims, aimed, aiming

Notes. Keywords and key phrases are stemmed to their roots using the NLTK Porter Stemmer algorithm. "Count" is the number of safe-harbor disclosures in which the keyword or key phrase is given as an example of words that indicate a statement as forward-looking. "Variants" is the variant of the stemmed word that appears in the safe harbor disclosure.

Table C.2: Forward-looking keywords or key phrases obtained from safe-harbor disclosures of SEC 10-K and 10-Q filings (2 of 4)

Word/Phrase (Stemmed)	Count	Variants
probabl	1246	probably, probable, probability
opportun	1233	opportunity, opportunities
pursu	812	pursue, pursues, pursuing
consid	713	consider, considers
can have	649	can have
shall	623	shall
appear	570	appear, appears
indic	570	indicate, indicates, indicator, indicative, indication
schedul	558	scheduled, schedule
propos	551	propose, proposed, proposes
see	501	see, sees
suggest	399	suggest, suggests
think	371	think, thinks
prospect	363	prospects, prospective, prospect
is like	358	is likely
trend	323	trend, trends
pro forma	290	pro forma
feel	260	feel, feels
confid	234	confident, confidence
preliminari	227	preliminary
endeavor	214	endeavor, endeavors
look forward	177	looking forward, look forward, looks forward
depend	150	depend, depends
view	107	view, views
prioriti	98	priorities, priority
drive	97	drive, driving
tent	95	tentative
look ahead	94	looking ahead
upsid	90	upside
belief	89	belief, beliefs
could be	87	could be
envis	85	envision, envisions
risk	81	risk

Notes. Keywords and key phrases are stemmed to their roots using the NLTK Porter Stemmer algorithm. "Count" is the number of safe-harbor disclosures in which the keyword or key phrase is given as an example of words that indicate a statement as forward-looking. "Variants" is the variant of the stemmed word that appears in the safe harbor disclosure.

Table C.3: Forward-looking keywords or key phrases obtained from safe-harbor disclosures of SEC 10-K and 10-Q filings (3 of 4)

Word/Phrase (Stemmed)	Count	Variants
pipelin	76	pipeline
is like to	75	is likely to
explor	74	explore, exploring
pend	68	pending
seek to	55	seek to, seeks to
are like	54	are likely
do not expect	51	do not expect
will like	51	will likely
may not	51	may not
do not anticip	51	do not anticipate
may be	48	may be
presum	48	presume
look forward to	43	look forward to
on pace	37	on pace
will like be	36	will likely be
may impact	34	may impact
improv	33	improve
expect to	31	expects to, expect to
move toward	24	moving toward
would be	23	would be
like will result	21	likely will result
express confid	15	expressed confidence
may continu	15	may continue
remain confid	15	remain confident
may result	14	may result
forse	13	forsees
shortterm	13	shortterm
can be	12	can be
uncertainti	11	uncertainty, uncertainties
call for	11	calls for
with a view to	11	with a view to
schedul to	10	scheduled to

Notes. Keywords and key phrases are stemmed to their roots using the NLTK Porter Stemmer algorithm. "Count" is the number of safe-harbor disclosures in which the keyword or key phrase is given as an example of words that indicate a statement as forward-looking. "Variants" is the variant of the stemmed word that appears in the safe harbor disclosure.

Table C.4: Forward-looking keywords or key phrases obtained from safe-harbor disclosures of SEC 10-K and 10-Q filings (4 of 4)

Word/Phrase (Stemmed)	Count	Variants
go to	9	going to
work toward	8	work toward, working toward
go forward	7	going forward
unknown	6	unknown
unanticip	6	unanticipated
appear to	6	appear to
abl to remain	6	able to remain
estim will	6	estimate will
likelihood	6	likelihood
like to	6	likely to
on target	6	on target
up to	5	up to
could depend	5	could depends
well posit to	5	well positioned to
tailwind	5	tailwind
headwind	5	headwind
longterm	4	longterm
may depend	3	may depend
short term	3	short term
not expect	3	not expected
may affect	3	may affect
hypothes	3	hypothesize
uncertain	2	uncertain
could potenti	1	could potentially
ought	1	ought
may becom	1	may become
full year guidanc	1	full year guidance

Notes. Keywords and key phrases are stemmed to their roots using the NLTK Porter Stemmer algorithm. "Count" is the number of safe-harbor disclosures in which the keyword or key phrase is given as an example of words that indicate a statement as forward-looking. "Variants" is the variant of the stemmed word that appears in the safe harbor disclosure.

C.4   Sentence examples

Table C.5: Sentence excerpts with mentions of forward-looking covenant concerns (1 of 7)

Quarters to violation	Text excerpt
-4	1) "We **believe** that we are currently compliance with all material covenants of our mortgages and revolving credit facility." (Alerislife Inc, Mar 1, 2006) 2) "This coupled with the reduce level of capital spending that I mentioned in the use of free cash flow repay debt **should** results and coverage under covenants actually **improving** beginning in the first quarter of 2009." (Hercules Offshore Inc, Oct 29, 2008) 3) "...as you can **see** we had significant cushion in both of these covenants and looking ahead..." (United Rentals Inc, Oct 29, 2008) 4) "...it **would** not impact compliance with our debt covenants as it **would** be a non-cash expense." (Amn Healthcare Services Inc, Feb 26, 2009) 5) "In addition we **expect** that the Company **will** remain in compliance with the financial covenants..." (Key Energy Services Inc, Feb 26, 2009) 6) "We believe that the reduction in debt – reduction in indebtedness combined with the improvement in debt-to-total capitalization and debt-to-EBITDA covenant better position American Dental Partners refinance our revolving credit facility in term loan..." (American Dental Partners Inc, Jul 28, 2009) 7) "Youll note that we have continued to **improve** on our covenant ratios." (Pharmerica Corp, Feb 5, 2010) 8) "...we **will** proactively reach out to our lenders to discuss our performance relative to our covenants and we **will** determine the appropriate course of action." (Federal Signal Corp, Nov 3, 2010) 9) "...we dont **see** significant pressure on that covenant as we model out the **future**." (Tivity Health Inc, Oct 24, 2011) 10) "We **intend** to initially allocate the free cash flow to leverage reduction and we **expect** covenant leverage of approximately 4.5 times by year end 2016 and that assumes no net proceeds from the incentive auction." (Nexstar Media Group, May 3, 2016)

Notes. Quarters to violation refer to the fiscal quarter relative to violation event. Bold words are keywords that identifies a subsentence as forward looking. The text is selected among Compustat firms with maximum Debt-to-EBITDA or minimum interest coverage financial covenants in LPC DealScan, excluding firms in financial and utilities industries.

Table C.6: Sentence excerpts with mentions of forward-looking covenant concerns (2 of 7).

Quarters to violation	Text excerpt
-3	1) "We **believe** that we are totally in compliance with all material covenants of our mortgages and revolving credit facility." (Alerislife Inc, May 10, 2006)
	2) "...the less obvious **potential** remedies weve already commenced discussions with our agent bank on our options for gaining additional flexibility under the covenants during this cyclical downturn." (Hercules Offshore Inc, Feb 10, 2009)
	3) "...we **believe** our lenders **will** work with us to negotiate some relief on covenants if market conditions persist." (Pioneer Energy Services Corp, May 7, 2009)
	4) "...at some point in the **future** we **might** chip those covenants and speculate thats what the banks response **would** be..." (Bronco Drilling Co, May 8, 2009)
	5) "Therefore we do not **believe** that we have covenant issues related to the consolidation of receivables." (Cabelas Inc, July 30, 2009)
	6) "As such we remain very comfortable that we **will** stay in compliance with our covenants even if 2010 proves to be another year of declining EBITDA leaving us with ample excess to liquidity **should** we need it." (Starwood Hotels & Resort world, Jul 23, 2009)
	7) "We are **reviewing** our options for replacing this credit facility primarily due to certain covenant limitations." (Englobal Corp, Nov 9, 2009)
	8) "But we dont have a concern about an issue with that covenant and the payment rate is in line with our **expectations**." (Conns Inc, Mar 27, 2014)
	9) "...we **plan** to use cash to pay down debt as we move back under the bank covenant constraint of 3-to-1 debt to EBITDA ratio." (Essendant Inc, Apr 21, 2016)
	10) "We **intend** to initially allocate free cash flow to leverage reduction and **expect** covenant leverage of approximately 4.5 times by year end 2016 and that assumes no net proceeds from the spectrum auction." (Nexstar Media Group, Aug 9, 2016)

Notes. Quarters to violation refer to the fiscal quarter relative to violation event. Bold words are keywords that identifies a subsentence as forward looking. The text is selected among Compustat firms with maximum Debt-to-EBITDA or minimum interest coverage financial covenants in LPC DealScan, excluding firms in financial and utilities industries.

Table C.7: Sentence excerpts with mentions of forward-looking covenant concerns (3 of 7).

Quarters to violation	Text excerpt
-2	1) "...there is a reasonable **likelihood** we **will** not be in compliance with covenant and revolving credit agreement as we exit the fourth quarter." (Brunswick Corp, Oct 23, 2008) 2) "...we **believe** that our liquidity position is strong and we currently have sufficient **headwind** on our three financial covenants." (Newpark Resources, Feb 20, 2009) 3) "...we are currently **pursuing** other changes to the financial covenants underlying the credit facility to provide us with ongoing financial flexibility in response of the current economic environment." (Flow International Corp, Mar 12, 2009) 4) "...we determine that we **will** need more cushion under these covenants and have better visibility as to what we **would** need..." (Hercules Offshore Inc, Apr 28, 2009) 5) "...we **believe** that we **will** continue to maintain compliance with such financial covenants." (Calumet Specialty Products, Nov 4, 2009) 6) "We are taking actions to maintain compliance including entering discussions with the lenders in our ABL and ABS facilities regarding **potential** amendment of the covenants and are **reviewing** options to reduce the outstanding balance of debt on our balance sheet including the ability to sell and lease back owned real estate..." (Conns Inc, Nov 25, 2009) 7) "We do not **believe** that we **will** violate any covenants under the line of credit..." (ITT Educational Services Inc, Jan 24, 2013) 8) "...we **anticipate** our covenants **will** be [tight] on a go forward basis." (Amedisys Inc, Mar 12, 2014) 9) "....if we need to make any minor **short-term** adjustments to key covenants as we work through this trading period." (American Vanguard Corp, May 1, 2014) 10) "So I **think** the concern about covenants today in the downturn is **considerably** less than any concerns we **would** have then." (Asbury Automotive Group Inc, Feb 4, 2016)

Notes. Quarters to violation refer to the fiscal quarter relative to violation event. Bold words are keywords that identifies a subsentence as forward looking. The text is selected among Compustat firms with maximum Debt-to-EBITDA or minimum interest coverage financial covenants in LPC DealScan, excluding firms in financial and utilities industries.

Table C.8: Sentence excerpts with mentions of forward-looking covenant concerns (4 of 7).

Quarters to violation	Text excerpt
-1	1) "We **believe** that we are currently in compliance with all material covenants of our mortgages and revolving credit facility." (Alerislife Inc, Nov 9, 2006)
	2) "We **will** be working with our lenders to obtain a modification of covenants for **future** periods." (Ruby Tuesday Inc, Jan 9, 2008)
	3) "...we **would** ask for a waiver from our long-standing bank group regarding compliance with these financial covenants for a specific period of time." (Steel Dynamics Inc, Apr 23, 2009)
	4) "...we **feel** we **will** remain in compliance with our debt covenants for the remainder of 2009." (Arc Document Solutions Inc, May 7, 2009)
	5) "...we **might** stand against the two financial covenants contained in our credit agreement." (Hercules Offshore Inc, Jul 23, 2009)
	6) "We do **anticipate** continued pressure on our leverage covenant in 2010 due to lower margins and throughput in our Midstream Business." (Eagle Rock Energy Partnrs LP, Nov 5, 2009)
	7) "...we **believe** we have sufficient cushion in our covenants to satisfy our debt covenant test." (Education Management Corp, Nov 1, 2012)
	8) "This **guidance would suggest** that we **will** be running close to our leverage covenant of 4.0 at the end of the year." (Ranger Oil Corporation, Feb 26, 2015)
	9) "...we **believe** that in addition to our **anticipated** cash flow from operations and having worked out some loosening of our key covenants for a few quarters." (American Vanguard Corp, Jul 31, 2014)
	10) "Our current internal financial forecast **indicates** that we **will** not remain in compliance with this interest coverage covenant as early as the end of the first quarter of our fiscal 2017..." (Tidewater Inc, May 26, 2016)

Notes. Quarters to violation refer to the fiscal quarter relative to violation event. Bold words are keywords that identifies a subsentence as forward looking. The text is selected among Compustat firms with maximum Debt-to-EBITDA or minimum interest coverage financial covenants in LPC DealScan, excluding firms in financial and utilities industries.

Table C.9: Sentence excerpts with mentions of forward-looking covenant concerns (5 of 7).

Quarters to violation	Text excerpt
0	1) "The banks **agreed** to exclude the majority of the one-time cost attributable to the strike in Cedar Rapids and relaxed previously established thresholds for this covenant ratio. " (Penford Corp, Dec 16, 2004) 2) "...this forbearance agreement **is designed** to provide time for our management team along with the banks to evaluate the structure in terms of this facility and to address our ability to satisfy certain financial covenants." (Ultralife Corp, Aug 2, 2007) 3) "...we **did not** meet two of the financial ratio covenants required by \$75million unsecured revolving credit facility." (Tandy Brands Accessories Inc, Nov 13, 2007) 4) "...**removed** all the maintenance covenants that caused so..." (Axiall Corp, Feb 18, 2010) 5) "...we **were** not incompliance with the consolidated leverage covenant in our credit agreement." (Kids Brands Inc, Aug 14, 2012) 6) "Net interest coverage **was** 2.85 times compared to a covenants requirement of 1.85." (West Corp, Jan 31, 2013) 7) "...we **obtained** covenant release from our vendor group during the third quarter to ensure that we had adequate borrowing capacity in light of covenants based on 12 month trailing EBITDA." (American Vanguard Corp, Oct 30, 2014) 8) "Crestwood also **amended** certain terms of our revolving credit facility such as increasing the total leverage ratio covenant from 5.0 times to 5.5 times and adding a senior secure level ratio of 3.75 times." (Crestwood Equity partners LP, Nov 3, 2015) 9) "...our credit agreement **has been** simplified to only have one leverage covenant." (Nexstar Media Group, Aug 8, 2017) 10) "...we **amended** our revolving credit facility to obtain a waiver of financial leverage covenants for four quarters through the first quarter of 2021." (Hyatt Hotels Corp, May 7, 2020)

Notes. Quarters to violation refer to the fiscal quarter relative to violation event. Bold words are keywords that identifies a subsentence as forward looking. The text is selected among Compustat firms with maximum Debt-to-EBITDA or minimum interest coverage financial covenants in LPC DealScan, excluding firms in financial and utilities industries.

Table C.10: Sentence excerpts with mentions of forward-looking covenant concerns (6 of 7).

Quarters to violation	Text excerpt
1	1) "We **extended** the majority of our facilities to six years revised some of the covenants and reduced the recorded annual principal payments from 16 million to 2 million." (Pantry Inc, Jan 26, 2006)
	2) "...we **had** conversations with many of our banks regarding our need for an amendment of the covenant package in our credit facility." (Avis Budget Group Inc, Nov 7, 2008)
	3) "...the Company significantly **exceeded** its debt covenant requirements which resulted in are moving down two pricing levels on our interest cost to 200 basis points over LIBOR." (Craft Brew Alliance Inc, Mar 31, 2010)
	4) "...we **worked** closely with our bank syndicate to revise our credit agreement to provide additional flexibility in our loan covenants." (1-800-flowers.com, Aug 19, 2010)
	5) "The company **paid** down nearly \$17 million in debt during the quarter and achieve a net leverage ratio of 3.35 times which is significantly below our leverage covenant of 3.50." (Lodgenet Interactive Corp, Feb 25, 2011)
	6) "...**increased** the companys flexibility with respect to certain financial covenants." (Alliance Healthcare Services Inc, Nov 9, 2011)
	87) "We **extended** the 4.5 times beverage covenant through the end of 2013..." (Ranger Oil Corporation, Nov 1, 2012)
	8) "...we **received** unanimous support from our lenders to address our debt covenants for the quarterly reporting periods in 2013." (Cleveland Cliffs Inc, Apr 25, 2013)
	9) "Our debt covenants **were** reinstated at the fourth quarter and we are in full compliance." (Pilgrims Pride Corp, Feb 15, 2013)
	10) "...we **finished** the year with a net debt-to-EBITDA ratio of 2.9 times based on our bank covenant definition." (Acco Brands Corp, Feb 11, 2015)

Notes. Quarters to violation refer to the fiscal quarter relative to violation event. Bold words are keywords that identifies a subsentence as forward looking. The text is selected among Compustat firms with maximum Debt-to-EBITDA or minimum interest coverage financial covenants in LPC DealScan, excluding firms in financial and utilities industries.

Table C.11: Sentence excerpts with mentions of forward-looking covenant concerns (7 of 7).

Quarters to violation	Text excerpt
2	1) "...**relaxed** the number of the restrictive covenants including those relating to debt incurrence..." (Guitar Center Inc, Jan 29, 2004) 2) "We **did** meet our covenants under the agreement for the quarter." (PRGX Global Inc, Jul 28, 2005) 3) "...we **maintained** our debt covenant compliance throughout the year and ended 2009 with a total debt covenant ratio of 3.1 times which was well below the required level under our credit agreement of 3.75 times." (Barnes Group Inc, Feb 18, 2010) 4) "We **had limited** scope for investment due to our obligations to meet our debt covenants." (Brocade Communications Sys, Sep 15, 2010) 5) "...we **reduced** our debt and the effect of this was to eliminate all of our maintenance covenants that were part of the term loan." (Dana Inc, Feb 23, 2011) 6) "We also **made** various modifications to financial covenants under the facilities that provide PAA and PNG with increased flexibility." (Plains All American Pipeline, Nov 3, 2011) 7) "...this amendment **provided** Alliance with greater flexibility under our financial maintenance covenants." (Alliance Healthcare Services, Mar 15, 2012) 8) "We **ended** the quarter with significant cushion in our credit statistics with our leverage ratio as defined in our Credit Agreement at 3.1 times consolidated EBITDA compared to our covenant maximum of 6 times." (NPC Restaurant Holdings LLC, Mar 10, 2014) 9) "...we successfully **removed** the limiting restricted cash covenant allowing us to redeploy the additional capital into the business." (AV Homes Inc, Feb 24, 2017) 10) "...**eliminated** almost all financial covenants and generally provides the company with more financial flexibility." (Seaworld Entertainment Inc, Nov 5, 2018)

Notes. Quarters to violation refer to the fiscal quarter relative to violation event. Bold words are keywords that identifies a subsentence as forward looking. The text is selected among Compustat firms with maximum Debt-to-EBITDA or minimum interest coverage financial covenants in LPC DealScan, excluding firms in financial and utilities industries.

D   Textual analysis of SEC filings

D.1   Overview

I identify instances of covenant violations and loan amendments using each firms 10-K and 10-Q SEC filings. As discussed in Beneish and Press (1993) and Sufi (2009), firms are required by SEC regulation to report covenant violations that are unresolved in the most recent SEC filings. This makes SEC filings the ideal setting to extract information about covenant violations. However, firms are not required to disclose information on loan amendments, hence any information extracted from SEC filings are those made by firms on a voluntary basis.

The procedure for identifying covenant violations builds on the text-search algorithm in Nini et al. (2012). Building on the initial algorithm, Adler (2024) extends the database on covenant violations to 2015, whereas Becher et al. (2021) extends the database on covenant violations to 2017. I modify the algorithm to extend the database further to 2020. While the adapted algorithm I propose is able to reduce false positive identifications, it does not fully eliminate all false positive identifications. Since Becher et al. (2021) removes false positive identifications through detailed reading of text snippets around covenant violations, I use their measure as the default measure but supplement missing information with those from the measure I constructed.

The procedure for identifying loan amendments similarly rely on a text-search algorithm. In previous research, Roberts and Sufi (2009) identifies loan amendments from SEC filings through a detailed reading of 500 randomly selected transcripts. More recently, ? extends the database of loan amendments reported in SEC filings to firms with covenant information in the LPC DealScan database.

D.2   Data collection and pre-processing

The text of SEC filings is obtained directly from the SEC EDGAR website, which contains all filings for the universe of publicly listed firms in the United States. The raw text files directly downloaded from the website are not XML formatted, so it is often difficult to identify separate sections in the text without extensive cleaning. To this end, I employ the proprietary API from SEC-API to extract relevant text from SEC filings directly from the SEC EDGAR website.

I only use the Management, Discussion, and Analysis (MDA) section of each firms SEC filings. These are Item 7 in 10-K filings and Item 1 Part 2 in 10-Q filings. This approach is consistent with past research, in particular Kaplan and Zingales (1997) and Hoberg and Maksimovic (2014), that uses this portion of the filings to identify when firms are financially constrained. In undocumented analysis, I find that parsing for covenant violations and loan amendments using the entire SEC filings yields significantly more false positives. This is because SEC filings often contain attached exhibits of loan agreements that discuss conditions of covenant violations and amendments, which do not reflect actual violations or amendment events.

The pre-processing of the text is standard. They include:

- Remove formatting, such as line break symbols "\n", and character symbols, such as "&#1" or "rsquo".

- Remove capitalization, punctuation, and extra spacing. I retain full stops, which is used to split the text into sentences. I also retain numerical characters, since this is subsequently used to identify dates.

- Remove irrelevant text, such as page number, "table of contents", and section headers.

Once the text is cleaned, it is then split into sentences. Since grammatical information is not used to identify covenant violations and loan amendments, I do not split the sentences further into subsentences. Additionally, I do not stem the text since this yields a larger number of false positive identifications when parsing various types of loan amendments.

D.3   Identifying covenant violations

The procedure for identifying covenant violations builds on the text-search algorithm proposed in Nini et al. (2012), but with several modifications. The purpose is to reduce the number of false positive identifications while minimizing the time required for a detailed reading of the text excerpts.

I begin by searching for sentences that contains the word "covenant". I then separately search for sentences that contains the following violation keywords (stars denote wildcards):

waiv*, viol*, in default, modif*, not in compliance, forbear*, out of compliance, did not comply, unable to comply, failed to comply, did not meet, unable to meet, failed to meet, did not satisfy, unable to satisfy, failed to satisfy

To remove likely false positive identifications, I search for sentences that contains the following:

- Negation of violation terms, e.g. "not in violation". I remove these sentences by searching for the presence of negating terms that occur 10 characters before any violation term. The negating keywords are: "no", "not", "don*", "won*", "none", "wouldn*", "without", "didn*".

- Hypothetical statements, which are sentences that include the presence of forward-looking keywords. The keywords are similar to those used in the construction of the measure of covenant concerns. I do not filter for the tense of the sentence since this step is computationally costly.

- References to old dates, which implies that the violation or amendment did not occur in the fiscal quarter of filing. I remove dates that are 6 months prior to the filing date. Year only references are assumed as occurring on July 1 of the given year. If there are multiple

date references in a given sentence, I consider the sentence as referring to an old violation or amendment if more than half of the dates are more than 6 months prior to the filing date.

Finally, I consider the sentence as referring to a covenant violation if a sentence containing a violation keyword occurs in the same sentence as those with the word "covenant" or any of the latter's subsequent three sentences.

D.4 Identifying loan amendments

To identify keywords that are relevant to identifying loan amendments, I search for sentences that jointly contains keywords that imply amendments (stars denote wildcards):

> amend*, modif*, renegotiate, forbearance, waiv*, in default, viol*, not in compliance

as well as keywords that refer to loan agreements:

> covenant, line of credit, lines of credit, credit line, credit facility, loan facility, revolving facility, credit agreement, loan agreement, financing agreement, revolving credit, revolver, term loan

As before, I remove false positive identifications by searching for sentences that contain hypothetical statements or references to old dates. Next, I extract these sentences as well as the three subsequent sentences.

To identify loan amendments that are costly to firms, I search for amendments that imply any of the following changes: an increase in the interest rate, a reduction in the borrowing amount, an adjustment of the loan maturity, and a requirement of additional collateral.

These changes are identified by searching for the joint occurrence of "directional" keywords and "loan term" keywords. Specifically, I require that "directional" keywords occurring 30 characters before "loan term" keywords, or "loan term" keywords occurring 30 characters before "directional" keywords but separated by a past tense term, e.g. "was", "were". I also require that no punctuations occur between the "directional" keyword and "loan term" keywords.

The directional keywords are:

- "increase" keywords: *increase, raise, upward*

- "decrease" keywords: *decrease, reduce, lower, downward*

- "adjust" keywords: *adjust, change, update, decrease, lower, reduce, shorten*

- "require" keywords: *require, pledge, add, provide, deposit*

The loan term keywords are:

- "interest rate" keywords: *interest rate, rate, yield, spread, margin, borrowing cost, pricing grid, commitment fee, rate increment, libor increment*

- "credit availability" keywords: *amount, size, commitment, capacity, limit, sublimit, committed, line of credit, lines of credit, lines of credit, credit line, revolving credit, revolver, loan facility, credit facility, revolving facility, borrowing base, maximum available, credit availability, available credit*

- "maturity" keywords: *matur**

- "collateral" keywords: *collateral**

Finally, I consider a sentence as referring to a costly loan amendment if a sentence referring costly changes occur in the same sentence as the sentence referring to loan amendments, or any of the latter's subsequent three sentences.

E Constructing forecasts of sales and earnings growth

Changes in expected sales and earnings growth are computed using data on analyst forecasts of sales and earnings per share from I/B/E/S. To construct the dataset, I start by computing the consensus forecast for each firm's fiscal quarter at the end of every month leading up to the announcement date of the fiscal quarter's results. The consensus forecast is computed as the median forecast at the end of each month among analysts who have issued a forecast for the next five fiscal quarters (I/B/E/S FPI codes $= 6, 7, 8, 9, N$). To ensure the most recent forecast is used for each fiscal quarter, I take each analyst's most up-to-date forecast.

To calculate the change in forecast for a given fiscal quarter, I subtract the consensus forecast for that fiscal quarter at the end of the month from the consensus forecast of the same fiscal quarter in the previous month. Next, to measure changes in expected sales and earnings growth, I sum the change in forecast of sales and earnings per share for the next four fiscal quarters, respectively, and normalize these sums by dividing them by realized sales per share in the past four quarters. Forecasts of earnings per share is also normalized by realized sales per share to ensure that observations where realized earnings are negative are not dropped.

The sample is limited to firm-quarters with at least one forecast of sales or earnings per share for each of the next four quarters in the month before and during the earnings call. The resulting panel comprises 46,194 firm-quarter observations with valid forecasts of earnings and sales growth, which are winsorized at the 5 percent level. Table E.1 show that firms with valid forecasts tend to be larger, have higher cash flows, and less likely to violate their covenants than firms that have missing forecasts.

Table E.1: Summary statistics conditional on availability of analyst forecasts.

	Has All Forecast			Missing Forecast		
	Nobs	Mean	SD	Nobs	Mean	SD
Chg in F(SalesGrowth) (%)	45643	-0.37	2.82	10648	-0.80	3.82
Chg in F(EarnGrowth) (bps)	45643	-0.43	1.76	15177	-1.07	2.90
F(SalesGrowth) (%)	45643	8.66	8.06	10643	12.99	10.76
F(EarnGrowth) (bps)	45643	13.02	14.32	15175	13.24	18.43
CovFuture (%)	45643	1.32	11.44	92457	1.93	13.77
Violation(%)	45643	1.63	12.66	92457	3.73	18.96
Tobin's Q	45446	1.85	1.32	85468	1.90	1.62
Cash Flow (%)	45599	3.15	3.74	91816	0.39	8.11
Annualized Sales Growth (%)	43928	7.78	14.69	75718	9.62	24.69
Log(Asset)	45122	7.44	1.51	91976	6.09	1.84
Leverage(%)	45588	24.10	22.46	92085	24.24	31.73
Tang Net Worth (%)	45639	23.42	33.44	92111	28.43	56.48
Cash Holdings (%)	45643	16.14	16.60	92318	25.54	26.55
Altman z-score	42704	3.74	4.50	78257	3.79	6.89
Has Rating (%)	45643	34.29	47.47	92457	21.09	40.79
High Yield Rating (%)	15802	52.63	49.93	19822	69.41	46.07

Notes. This table reports the summary statistics for the sample of firms from Compustat, excluding financials and utilities, with covenant violations data from SEC filings, and earnings call transcripts in FactSet. "Has All Forecast" refers to observations with analyst forecasts of sales and earnings per share for the next four quarters. "Missing Forecast" refers to observations with at least one missing forecast. See Appendix B.2 for variable definitions.

F Conceptual framework

F.1 Proof of Proposition 1

The firm's value maximization problem is given by:

$$\max_{k_1, k_2^H, b_1, b_2^H} d_0 + \frac{p}{1+r}\left(d_1^H + \frac{d_2^H}{1+r}\right) + \frac{1-p}{1+r}\left(d_1^L + \frac{d_2^L}{1+r}\right)$$

where

$$d_0 = x_0 + \frac{b_1}{1+r_\tau} - k_1$$

$$d_1^H = z^H k_1^\alpha + (1-\delta)k_1 + \frac{b_2^H}{1+r_\tau} - b_1 - k_2^H$$

$$d_2^H = z^H k_2^{H\alpha} - b_2^H + (1-\delta)k_2^H$$

$$d_1^L = z^L k_1^\alpha + (1-\delta)k_1 + \frac{b_v}{1+r_\tau} - b_1 - k_b - s(k_1 - k_b) - \frac{1}{2}q(b_1 - b_v)^2$$

$$d_2^L = z^L k_b^\alpha + (1-\delta)k_b - b_v$$

where d_0 and $\{d_t^H, d_t^L\}$ for $t = 1, 2$ are equity issuance or payouts in each state and period. The remaining exogenous parameters are x_0, which is the firm's initial endowment, and δ, which is the depreciation rate of capital.

The firm's optimality conditions are given by

$$r + \delta = \bar{z}\alpha k_1^{\alpha-1} - (1-p)s$$

$$r + \delta = z^H \alpha k_2^{H\alpha-1}$$

$$\frac{1}{1+r_\tau} = \frac{1}{1+r} + \frac{1-p}{1+r}q(b_1 - b_v)$$

Since the effective interest rate on debt r_τ is lower than the discount rate on dividend r due to the interest tax shield, the firm sets its borrowing b_2^H equal to its maximum borrowing capacity C. Rearranging the first and third optimality conditions yields the expressions provided in the Proposition.