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High-Yield Debt Covenants and Their Real Effects

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Abstract:
High-yield debt, including leveraged loans, is characterized by incurrence financial covenants, or "cov-lite" provisions. Unlike, traditional, maintenance covenants, incurrence covenants preserve equity control rights but trigger pre-specified restrictions on the borrower's actions once the covenant threshold is crossed. We show that restricted actions impose significant constraints on investments: Similar to the effects of the shift of control rights to creditors in traditional loans, the drop in investment under incurrence covenants is large and sudden. This evidence suggests a new shock amplification mechanism through contractual restrictions that are at play for a highly levered corporate sector long before default or bankruptcy.

JEL Classifications: G31, G33, G21, G32
Keywords: high-yield debt, corporate debt, covenants, incurrence covenants, cov-lite, amplification mechanisms, contracts, contingent contracting

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I. INTRODUCTION

The rise in high-yield corporate leverage following the Great Financial Crisis (GFC) has been a source of increasing concern in the United States and Europe. For example, according to S&P's Global Market Intelligence, the U.S. leveraged (that is, high-yield) loan market more than doubled in size in the decade following the GFC, growing to nearly $1.2 trillion in outstanding debt by 2019, up from $400 billion in 2006 (an 8.8 percent rate of annual growth).[1] According to Bank of America, the numbers are very similar in the high-yield bond market and dwarf the annual GDP growth rate for the same period of about 3.5 percent. Not surprisingly, the associated rise in leverage has become a frequent topic of discussion for central bankers and other policymakers, and these concerns have been voiced in other developed markets.[2]

Taking a step back, the problem with high corporate leverage is the effects of financial insolvency: A negative demand shock can leave a firm with an oversized debt burden with consequences that can be amplified though multiple channels, thus intensifying the initial impact. For example, the widespread economic shutdown related to the 2020 pandemic has raised alarms about potential amplification of economic distress due to higher bankruptcy costs related to potential concentration of bankruptcies (e.g., Greenwood, Iverson, and Thesmar 2020; Group of Thirty 2020; and Ellias, Iverson, and Roe 2021). In the aftermath of the GFC, Giroud and Mueller (2017), Kalemli-Özcan, Laeven, and Moreno (2020), and Chodorow-Reich and Falato (2020)

[1] On net-of-cash basis, total leverage of firms borrowing in the leveraged-loan market at issuance increased from 4.4x EBITDA in 2006 to 5.2x in 2019 for large corporate loans, and from 4.4x to 5.3x in the middle market.

[2] See, for example, "Warren Presses Regulators on Risks in Leveraged Lending Market," November 15, 2018, https://www.warren.senate.gov/oversight/letters/warren-presses-regulators-on-risks-in-leveraged-lending-market; and "Warren Raises Concerns that Leveraged Lending Market Could Escalate Risks to Financial System as Coronavirus Outbreak Continues to Rattle Markets," March 20, 2020, https://www.warren.senate.gov/oversight/letters/warren-raises-concerns-that-leveraged-lending-market-could-escalate-risks-to-financial-system-as-coronavirus-outbreak-continues-to-rattle-markets. Also see OECD (2020).

study the role of corporate leverage in propagating the collapse of the financial system. In particular, Chodorow-Reich and Falato (2020) document that during the 2008–09 economic downturn, about one-quarter of syndicated loans had a binding financial covenant. They further show that the transfer of control rights to creditors was a critical channel for the spread of lenders' distress to the nonfinancial sector.

While our work relates to financial covenants, high-yield debt (loans and bonds included) has a financial covenant structure that is different from the one discussed in the existing literature. In particular, high-yield debt is characterized by *incurrence* covenants, which do not shift control rights to creditors, but instead restrict some actions of the borrower if the covenant threshold is crossed.[3] Such covenants earned high-yield loans the moniker "cov-lite." Their share of the leveraged-loan market increased from just over 10 percent in 2007 to more than 80 percent in 2020 (Figure 1).[4] In contrast, traditional loans have *maintenance* covenants, which require the borrower's continuous compliance with the covenant threshold every quarter under the threat of transferring control rights to lenders.[5] Despite the prevalence of incurrence covenants in the high-yield space, where consequences of debt are most tangible, there is little empirical evidence on their use and the real consequences of their use. (A notable exception is Becher, Griffin, and Nini (2021), which focuses on M&As.)

[3] In this paper, we refer to the crossing of an incurrence covenant threshold interchangeably as a "latent violation" of an incurrence covenant or an incurrence covenant "trigger." Similarly, we use maintenance covenant "violation" and maintenance covenant "trigger" interchangeably.

[4] See Goodison and Wagner (2019) for more details on similarities between cov-lite loans and high-yield bonds that include financial covenants.

[5] As an example, suppose that two otherwise identical companies, A and B, have a $100 loan containing an indebtedness covenant that prohibits the net debt/EBITDA ratio from exceeding 5x. Company A has a maintenance covenant, and it will be verified every quarter. Company B has an incurrence covenant that ties verification of indebtedness to the firm's engagement in restricted actions, such as distributions to equity holders, capital expenditures, or acquisitions. A significant drop in EBITDA would put Company A in technical default (the mechanism in Chodorow-Reich and Falato 2020), leading to a shift in control rights to creditors. Company B will remain in compliance as long as it does not incur "restricted actions" specified in its loan agreement.

In this paper, we show that, in the leveraged-loan market, restricted actions triggered under the incurrence covenants have sizable real effects long before any defaults or bankruptcy. Overall, our evidence supports the importance of the corporate balance sheet channel for the transmission of shocks, but our insight is different from that of the existing literature.[6] Not only are we able to isolate a specific and novel mechanism relevant for understanding the consequences of high corporate leverage, but we also look at the current debt environment, which, unlike in the 2008–09 period, is dominated by high-yield loan issuance that has contractual features more characteristic of high-yield bonds.

Central to the mechanism is that incurrence covenant triggers activate a set of contractual constraints on a firm's actions. As we will show, these triggers have a strong effect on a firm's investment policy. While not all restricted actions directly limit investment, they tend to be costly for equity holders, and as a result, they indirectly influence the firm's capital expenditures. For example, consider a borrower that exceeds a cap on leverage (net debt/EBITDA), which is, by far, the most prominent type of financial covenant in the leveraged-loan space. To lift the restrictions and get into the "green zone," the borrower has to lower its net debt/EBITDA. To do so, the borrower might engage in some cost-cutting to boost EBITDA. Another evident channel is to reduce net debt, which can be achieved by selling some assets or constraining capital expenditures that require financing.

Our empirical identification of these effects exploits novel, hand-collected, loan-level data on covenant information in conjunction with a regression discontinuity design as in Chava and

[6] To be clear, the findings in this paper and those in the existing literature are not competing effects, but instead are different blocks that are central to understanding amplification effects of negative demand shocks in an economy with a highly levered corporate sector.

Roberts (2008).[7] Our key empirical results are as follows. First, the investment rate drops about 1.83 percentage points when incurrence covenant restrictions are triggered, as compared with 0.94 percentage point when a maintenance covenant is violated. Second, after either violating a maintenance covenant or triggering incurrence covenant restrictions, firms significantly deleverage. In our sample, we find that the debt-to-assets ratio decreases by about 1.58 percentage points when a firm violates a maintenance covenant. However, we also find that triggering incurrence covenant restrictions leads to a reduction in the debt-to-assets ratio of about 2.66 percentage points. Third, both latent incurrence covenant violations and maintenance covenant violations lead to a significant decline in equity returns (about 6 percentage points), consistent with the role that covenants play in preserving creditors' debt value. Moreover, these effects are as sudden for incurrence covenant triggers as they are for maintenance covenant violations, indicating that the propagation of shocks in an economy with a highly levered corporate sector occurs quickly.

The regression discontinuity approach enables us to isolate real effects stemming from triggering incurrence covenants. The cross-firm analysis, however, may be subject to sample selection concerns. Specifically, the economic consequences of maintenance covenant violations give us a reference point for what might be considered an economically significant effect, but direct comparison of incurrence versus maintenance covenants might be hard to interpret beyond that. In separate tests, we focus on loans with both incurrence and maintenance covenants. In this context, unobservable characteristics associated with firms that tend to have incurrence covenants in contrast to those of firms that tend to have maintenance covenants are unlikely to be the central explanation. For loans with two types of covenants, we show that maintenance covenants are set

[7] Chava and Roberts (2008) show that capital expenditures drop significantly following a covenant violation in a typical loan agreement and attribute this pattern to the shift in control rights. We will show that our results are not subsumed by the findings in previous studies.

at laxer levels. Thus, a firm needs to be in worse condition to violate a maintenance covenant (as compared with triggering incurrence covenant restrictions). Therefore, when a firm reaches a maintenance covenant threshold, its level of investment is already curtailed.[8] That said, the central point of our paper is that contractual constraints underlying incurrence covenants lead to significant economic consequences despite the absence of a shift in control rights and long before bankruptcy. In this respect, we also show that our results hold when we exclude loans with incurrence covenants that directly restrict investments after a covenant threshold is passed.

One potential concern could be that our results are driven by changes in firms' investment demand rather than covenant triggers, because much of our sample period is during the COVID-19 crisis. We focus intentionally on this period because of the importance of cov-lite loans and the high number of binding covenants. However, the pandemic was a major shock that led to a drop in demand and therefore a shift in investment opportunities and potentially a debt overhang problem (Myers 1977) while at the same time leading to poor financial performance and increasing the likelihood of covenant triggers. While our regression discontinuity design as well as our rich set of controls (including loan-type-specific time fixed effects) mitigate such concerns, we provide additional evidence (for example, within-industry estimation) that our findings are not driven by this particular macroeconomic shock.

Our work contributes to several strands of the literature. We add to the research that outlines and measures the mechanisms for propagation of negative shocks through the economy, specifically those mechanisms that operate through debt on firms' balance sheets. This includes the effects of debt overhang articulated in the seminal paper by Myers (1977) and its recent

[8] Another possibility is that maintenance covenants are frequently waived (e.g., Chodorow-Reich and Falato 2020), thereby alleviating the effect of their violation. The two possibilities are not mutually exclusive.

applications (e.g., Giroud and Mueller 2017). It also includes the zombie lending literature (e.g., Caballero, Hoshi, and Kashyap 2008; or more recently, Acharya et al. 2019) as well as the literature on costly bankruptcy referenced earlier.

In contrast to this literature, we specifically focus on the mechanisms at play for companies with high levels of leverage and point out that these firms can become constrained without an imminent threat of default or bankruptcy. Although bankruptcy as an amplification mechanism has attracted attention in the context of the COVID-19 shock, for a firm to file for bankruptcy protection there has to be a *trigger*. But most companies were far removed from such triggers in 2020. Because leveraged loans have no pre-payment penalty, they are typically refinanced as credit conditions ease, and an average loan maturity is five years. As a result, there were few pressing maturities when the negative COVID-19 shock hit.[9] While this (and several other factors) can significantly reduce defaults and, therefore, bankruptcy filings, we show that latent violations of incurrence covenants have strong effects on real activity even absent default or bankruptcy.

Our paper relates most closely to the work that examines constraints tied to the debt covenant structure, including Chava and Roberts (2008), Roberts and Sufi (2009), Nini, Smith, and Sufi (2012), Falato and Liang (2016), Greenwald (2019), and Chodorow-Reich and Falato (2020). These papers, however, focus on traditional (investment-grade-like) bank debt and emphasize the contingent shift in control rights (for example, violations of maintenance provisions) at the core of the economic mechanism. In contrast, high leverage is, almost by definition, tied to nonbank high-yield markets, where the central governance mechanism is contractual (that is, it operates through restricted actions specified in the loan agreement as opposed to through the shift in control rights).

[9] For example, according to S&P's Global Market Intelligence, in 2019, 37 percent of all new issuance in the leveraged-loan market was refinancing. This is an even larger share of past loans given that loan volume was growing at 8.8 percent annually in the years leading up to 2019.

Therefore, the binding nature of these provisions is unclear and often dismissed as ineffective, which is reflected in the term "cov-lite."

Related to this point, our work informs the theoretical literature on contingent contracting including Williamson (1985), Grossman and Hart (1986), Hart and Moore (1990), Aghion and Tirole (1994), and Klein, Crawford, and Alchian (2009). The premise behind this literature is that contractual terms can stretch only so far, and ultimately, contingent control rights reallocation is the optimal form of contracting. Our empirical results provide insight into the extent to which simple restrictions on borrowers' actions can realign the incentives among borrowers and creditors when financial conditions deteriorate.

The rest of the paper is divided in three sections. The next section (Section II) introduces the data used in the analysis. Section III presents the analysis, and Section IV concludes.

II. DATA

The covenant data for our study are largely hand collected. Many studies of loan covenants use Thompson Reuter's DealScan data, which provide information about newly originated loans in the syndicated corporate loan market. However, first, financial-covenants coverage in DealScan declines over time. Second, previous studies, including Chava and Roberts (2008), look at the corporate syndicated loan market as a whole and do not differentiate between safer loans and high-leverage loans.[10] Incurrence covenants are primarily a leveraged-loan market phenomenon, which ties back to the wide institutional creditor base for these loans (e.g., Becker and Ivashina 2016). While the growth of the leveraged-loan market has accelerated since the Great Financial Crisis

[10] We follow the industry practice and treat a loan package as an individual loan; that is, a set of credit facilities covered by the same credit agreement constitutes a loan.

(GFC), the DealScan coverage of financial covenants in this segment has precipitously dropped, which we illustrate in Table I.

[TABLE I]

In the upper panel of Table I (rows [a] through [d]), we show statistics for the 1994–2005 period, which is the sample period covered in Chava and Roberts (2008). Rows (e) though (h) correspond to 2017 through 2019, the period covered in our sample. Column (1) shows all loans in DealScan that can be mapped to Compustat. The first takeaway is that DealScan includes financial covenant information for about 42 percent of the loans in the 1994–2005 period, but for only 26 percent of the loans originated more recently.

To zoom in on leveraged loans, we rely on the Standard & Poor's Leveraged Commentary & Data (LCD) database, a leading source of data and analytics in the leveraged-loan market. The leveraged loan sample is reported in column (2). Like DealScan, LCD reports information on each individual loan. In particular, LCD indicates whether a facility of a loan is covenant light, or cov-lite.[11] We call a loan cov-lite if any of the term-loan facilities is identified as such in LCD data. Statistics for cov-lite loans are reported in column (3). Although 64 percent of leveraged loans have financial covenants reported in DealScan during the 1994–2005 period, only 22 percent have this information reported in the 2017–19 sample. Consistent with the rise of the cov-lite phenomenon after the GFC, column (4) shows that less than 1 percent of the leveraged loans were cov-lite before 2006, whereas this number is 62 percent for the loans in our 2017–19 sample. While it is difficult to conclude that there was a bias in DealScan financial covenant reporting for cov-lite loans in the early period of the syndicated loan market, we can see that during the 2017–19

[11] S&P's LCD pioneered the systematic coverage of cov-lite loan originations and was tracking them even before the GFC, which enables us to look at the composition of the sample for the 1994–2005 period.

period, only 11 percent (=52/483) of cov-lite loans have financial covenant information in DealScan compared with 41 percent (=124/301) for cov-strong loans. This potential bias in the availability of covenant information in DealScan toward cov-strong loans suggests that the cov-lite market may appear much smaller when using DealScan data versus using the numbers in LCD as reported in Figure 1. This observation about the need for better financial covenants data is consistent with the evidence in Berlin, Nini, and Yu (2020).

To overcome this major data limitation, we hand-collect detailed maintenance and incurrence covenant information from individual leveraged loan agreements filed with the Security and Exchange Commission (SEC). Part of the challenge of the data-collection exercise is that the format of the loan contracts is not standardized, rendering an automated data extraction infeasible. Given the intensity of the manual data collection, we focus on the most recent period in which cov-lite loans play a significant role in the leveraged-loan market (thus ruling out the GFC, when most loan contracts had maintenance covenants). Our sample includes, but is not limited to, the 2020 COVID-19 breakout, for which it is particularly important to understand the propagation mechanism of the economic shock. This shock initiated a strong exogenous drop in income, leading to an increase in the leverage ratio and a drop in the interest coverage ratio, thereby triggering widespread covenant violations (Appendix, Figure A.1).

Our data-collection process can be summarized as follows. First, we consider all leveraged loans originated from 2017 through 2019 as recorded in the LCD data set. (Presumably, these loans were outstanding at the onset of the COVID-19 shock.) Second, we focus on loans taken out by firms that we can match to Compustat, as, ultimately, we need financial information for our analysis to estimate the effect of restriction-triggering events on firms' decisions, such as investment and financing. Third, for this sample of loans, we then read each individual credit

agreement and record the thresholds for the leverage ratio and interest-coverage ratio that pertain, as specified in the Financial Covenant section, Restricted Action section, or other parts of the contract. (Appendix A shows an example of how covenant information is collected from the loan agreements.) Finally, we complement these hand-collected leveraged-loan data with DealScan loans that have information on these leverage and interest-coverage covenants.

We focus on covenants restricting the leverage ratio or the interest-coverage ratio due to their dominance in the leveraged-loan market.[12] As illustrated in Figure 2, Panel A, while leveraged-loan contracts featured different types of covenants a decade ago, more recently, the leverage ratio is the single most important type of maintenance covenant, with about 76 percent of loans with maintenance covenants having caps on the leverage ratio in 2018. About 11 percent of leveraged loans feature interest-coverage covenants. Other covenant types are less important. Moreover, Figure 2, Panel B, shows that the number of different covenants in a given loan contract has decreased over the past decade, and now most loans have at most only two types of financial covenants.

[FIGURE 2]

Table II shows the summary statistics on data collection. Overall, the sample includes 278 loans, 222 of which we had to hand-collect and code the covenant information. For the majority of the hand-collected covenants, either the loan or the covenant information is missing in DealScan. For the subset of hand-collected loans that also have covenant information in DealScan, Appendix Table A.I benchmarks the hand-collected covenant threshold information with the information provided by DealScan. These numbers are very close to each other, confirming the accuracy of our data collection methodology.

[12] The leverage ratio and interest-coverage ratio are also common types of covenants in the broader corporate loan market (e.g., Chava and Roberts 2008, Greenwald 2019).

Table III shows detailed information on the collected covenants at the covenant level. Overall, our data set contains information on 169 maintenance covenants, 144 (85 percent) of which restrict the borrower's leverage (net total debt/EBITDA) ratio, with an average threshold of 4.39x. Similarly, our sample includes 119 maintenance covenants that require the borrower to maintain an interest coverage ratio (EBITDA/interest expense) above 2.63x, on average.

As indicated in Table III, our sample also covers a large sample of incurrence covenants, of which 194 are tied to restrictions on payments, 172 to restrictions on indebtedness, and 122 to restrictions on investments (capital expenditures and acquisitions). The vast majority of incurrence covenants in our sample (about 93 percent) restrict certain actions if the leverage ratio exceeds a threshold. On average, this threshold is 3.61x. Thus, we find that incurrence covenants generally incorporate tighter thresholds compared with maintenance covenants. Table A.II in the Appendix confirms this argument by focusing on firms subject to both maintenance and incurrence covenants. When such a firm triggers an incurrence covenant, it takes, on average, another 3.9 quarters before it also violates the maintenance covenant for the same loan, if it ever does so.

[TABLES II & III]

While the types of financial covenants with restricted-actions triggers are somewhat standard, the restricted actions are more customized. For example, among incurrence covenants with leverage thresholds, the most common type of restriction (184 covenants) involves payments to equity holders if the leverage ratio is too high. This type of restriction is followed by restrictions on indebtedness (151 covenants) and restrictions on investments (119 covenants). (Appendix B provides some examples of these restrictions.) Appendix Table A.III focuses on these statistics at the loan level rather than the covenant level and shows that among loans with incurrence covenants, restrictions on payments to shareholders are the most common, but many loans restrict

more than one type of action. About 71 percent of contracts with restricted payments (101 out of 142) include a restriction on indebtedness, and about 62 percent (88 out of 142) include restrictions on investment. Overall, these numbers map well with the conceptual framework of covenants in Tirole (2006), which points out that the restricted actions are intended to realign incentives of shareholders with those of their creditors as financial performance deteriorates.[13]

[TABLE IV]

Table IV shows the statistics for loans in our sample that have either a maintenance covenant violation or a triggered restriction (from exceeding the incurrence covenant threshold).[14] In the case where a loan has multiple maintenance or incurrence covenants, we look at the tightest financial covenant. Since incurrence covenants are typically tighter than maintenance covenants, a loan can have active restrictions without having a maintenance covenant violation. As Table IV shows, throughout our sample period, which extends through 2020:Q4, we observe that about 64 percent of loans, 152 (=51+33+68 in row 2) out of 237 (=68+71+98 in row 1), have a covenant violation at some point; the violations most frequently involve the maximum permitted leverage ratio. Focusing on loans with incurrence covenants, about 75 percent (=51/68) have a latent violation of an incurrence covenant. On the other hand, focusing on loans with only maintenance covenants, 46 percent (=33/71) have a violation. This difference is consistent with the information in Table III, which shows that restricted actions coded in incurrence covenants—a purely

[13] See Tirole (2006), Section 2.3.3, "Writing of Debt Agreement Covenants." To reiterate, for our empirical methodology, what is relevant is that the trigger is an activated restriction specified in the financial covenant. Although there is variation with restricted actions in incurrence covenants—and arguably infinite possibilities for the course of creditor actions with maintenance covenants studied by Chava and Roberts (2008)—this does not invalidate our approach.

[14] We drop borrowers for which we do not have financial information in Compustat. Moreover, to estimate changes in investment before and after a violation, we drop loans that have a violation of a maintenance covenant during the first quarter of origination. The latter choice has no qualitative effect on our results.

contractual creditor governance mechanism—have a more tightly set trigger as compared with a shift in control rights (maintenance covenants).

Table IV also reports the number of firms and firm-quarters, the ultimate unit of observation in most of our analysis. Most firms are bound by covenants from only one contract. In the few cases where we observe more than one loan outstanding per firm, we consider the tightest covenant among all of the firm's outstanding loans. Overall, we observe 196 firms (=50+59+87 in row 3) with a total of 2,191 firm-quarters (=584+638+969 in row 5) in which they are constrained by the triggering of restrictions or a violation of a covenant at some point during our sample period. About 39 percent of firm-quarter observations (316+133+413 in row 6 out of 2,191) show a restrictions trigger or a violation of a covenant threshold. This share is larger than the 15 percent reported in Chava and Roberts (2008). The difference is driven by the COVID-19 shock (which led to substantial income loss and related violations of covenants), by our focus on the leveraged-loan market, and by the fact that our analysis also includes incurrence covenants, which are generally tighter than maintenance covenants.

III. Results

A. Identification Strategy

To identify the real consequences of using incurrence covenants, we build on the empirical approach in Chava and Roberts (2008). With maintenance covenants, the control rights shift to the creditors if a firm crosses a predetermined threshold for financial ratios. In contrast, with incurrence covenants, if a firm exceeds financial ratio thresholds, the loan contract precludes the firm from pursuing a set of actions. These restrictions are intended to protect creditors' value. Similar to the existing literature, we focus on firms' investment as a measure of real effects. So, as in Chava and Roberts (2008), the binding state is a binary variable that captures whether the

firm has crossed a financial-ratio threshold (thus making restricted actions binding), and the outcome variable (investment rate) is continuous.

Specifically, similar to Chava and Roberts (2008), we use a regression discontinuity design to address the concern that investment opportunities and the distance between the financial ratios and the covenant threshold may be jointly determined. Suppose the covenant constrains the maximum leverage ratio. In the case of maintenance covenants, the instant that the firm's leverage ratio violates this threshold, regardless of the amount, control rights shift to the lender. As discussed in Chava and Roberts (2008), the lender can then take various actions that may affect the firm's investment. For example, the lender can reduce the funds available to the firm, change the terms of the loan (the maturity or interest rate), or directly interfere with the investment policy of the firm. In the case of incurrence covenants, the instant that the firm's financial ratio exceeds the allowed threshold, regardless of the amount, the firm is prevented from taking certain actions (for example, making payments to equity holders, going further into indebtedness, or substituting assets by undertaking certain investments), although the terms of the loan do not change. The firm can have the restrictions lifted by improving its financial ratio and complying with the incurrence threshold.[15]

Formally, our binary treatment variable, $Bind_{it}$, is defined as

$$Bind_{it} = \begin{cases} 1 \; if \; z_{it} - z_{it}^{0} > 0 \\ 0 \; otherwise, \end{cases}$$

[15] In practical terms, to have the constraint lifted, the goal is to lower net debt/EBITDA, the most common type of incurrence covenant. There might be some cost-cutting and/or equity cure to boost EBITDA. Another way to achieve this goal is to reduce net debt and constrain investment that requires financing.

where i and t index firm and year-quarter observations, z_{it} is the observed financial ratio (the leverage ratio), and z_{it}^{0} is the corresponding threshold specified by the covenant. For the leverage ratio, covenants become binding if the leverage ratio is above the threshold specified in the loan agreement. For interest coverage covenants, the inequality sign is reversed, as contracts specify a *minimum* interest-coverage ratio. Following Chava and Roberts (2008), we also include in our regressions smooth functions (polynomials) of the distance to the covenant threshold. Therefore, under this discontinuity design, the distance to the covenant threshold does not affect our understanding of how the transfer of, or limitations on, control rights affects investment after a covenant is violated or restrictions are triggered. This approach isolates the discontinuous effect of the violation or triggering at the covenant threshold.

B. Investment Response and Equity Value

We start by replicating the core specifications in Chava and Roberts (2008), who focus on violations of maintenance covenants, given their sample. This exercise is valuable because our focus is on a different, non-overlapping time window, and we zoom in on the leveraged-loan segment of the loan market. We also use a different data source. So, we want to illustrate that our main results are not driven by the differences in the data. The replication result is reported in Figure 3, Panel A.[16] On the horizontal axis, zero is the quarter of the first covenant violation for a given loan, and the vertical axis depicts capital expenditures (as a fraction of capital stock at the beginning of the quarter) in the two-year window before and after this violation event. In line with the magnitudes in Chava and Roberts (2008), the average investment rate before the covenant

[16] This corresponds to Figure 1 in Chava and Roberts (2008). Their figure looks at the current ratio and net worth ratio covenants separately, although the conclusion is the same across the two metrics. As explained earlier, the prevalence of financial covenants has changed over time, which is why we focus on a different metric.

violation is close to 6 percent, but it drops significantly to values below 4 percent following the quarters of the initial violation.

[FIGURE 3]

In Panel B of Figure 3, we show average investment rates around the first triggering of restrictions under the incurrence covenant. The figure highlights the key point of this paper: As with a maintenance covenant violation, once an incurrence covenant becomes binding, it leads to a substantial reduction in investment. In the following empirical analysis, we tightly identify and quantify the impact of maintenance covenant violations versus incurrence covenant constraints by accounting for potential confounding factors that may be present in the raw data.

Chava and Roberts' (2008) methodology helps us measure real effects of contractual constraints stemming from incurrence covenants for a given firm. As mentioned earlier, the cross-sectional analysis—specifically, the comparison of incurrence versus maintenance covenants—however, is subject to sample selection concerns. That is, the choice between contracts that feature maintenance covenants and those that feature incurrence covenants could be endogenous to firm characteristics. We mitigate this selection concern by including a large set of fixed effects and controls, and by looking at contracts that feature both types of covenants, as we will discuss in more detail below. But we start by examining, in Table V, a range of financial ratios (at loan origination) for firms that have maintenance versus incurrence covenants.

[TABLE V]

There are some differences between firms that have a loan with a maintenance covenant and those that have a loan with an incurrence covenant, although an overwhelming majority of the characteristics are quite similar. For example, while on average, firms with only maintenance covenants appear to have a larger asset size compared with firms that have only incurrence

covenants, this difference seems to be driven by extreme observations, as the median asset size across groups are quite similar. Cash flow also seems to be higher (although not significantly) for firms with only maintenance covenants, on average, but the medians again are very similar. Other variables, such as return on assets and investment rates are roughly comparable across firms with different types of covenants. Consistent with the observations in Tables III and V, incurrence covenants tend to be set at a range that is tighter to current financial metrics compared with maintenance covenants. Although ex ante it might not be fully clear that this would be the case, this finding is consistent with the observation that a shift in control rights is a more dangerous action for the borrower, and as such it requires a substantially larger deterioration in financial performance.[17]

To account for such firm heterogeneity, we next employ a regression discontinuity approach following Chava and Roberts (2008) that allows us to isolate the effect of a covenant violation on investment (or other firm responses) by controlling for potential confounding factors. Because we are also interested in the differential impact of maintenance covenant violations and incurrence covenant triggers, we estimate separate response coefficients for the two covenant types.

Our key empirical model for the remainder of this section is given by:

$$Investment_{i,t} =$$

$$\alpha + \beta_0\, Incurrence\ Bind_{i,t-1} + \beta_1\, Maintenance\ Bind_{i,t-1} + \gamma\, X_{i,t-1} + \epsilon_{i,t},$$

where $Investment_{i,t}$ is capital expenditures as a percentage of beginning-of-the-quarter capital stock, $Incurrence\ Bind_{i,t-1}$ is a dummy variable that equals 1 if an incurrence covenant

[17] For example, it could expose a borrower with temporary financial problems to a negative balance sheet shock at the lender level (Roberts and Sahlman 2011). Alternatively, losing control rights could deprive the borrower of much of the optionality by limiting its liquid assets and forcing it to divest in a short period of time, a set of actions that CEOs often describe as creditors "breathing down their neck" (Ivashina, Dionne, and Boyar 2017).

restriction is binding (latent violation) in the previous quarter and 0 otherwise, and $Maintenance\ Bind_{i,t-1}$ is an analogous dummy variable for a maintenance covenant violation. As discussed earlier, firms can be subject to both types of covenants simultaneously. Our key parameters of interest are β_0 and β_1, which measure the impact of a covenant violation on investment for each of the two classes of covenants.

The vector $X_{i,t-1}$ includes a set of control variables and fixed effects, in particular the baseline controls used in Chava and Roberts (2008). These variables include cash flow, log total assets, and macro q, as defined in the notes for Table V, as well as polynomials in the distance to technical default (based on the leverage ratio and interest-coverage ratio) of order two to isolate the discontinuity effect of a covenant violation. In addition to isolating the treatment effect of a covenant violation, this approach helps us mitigate concerns that the distance to the covenant threshold contains information about future investment opportunities not captured by other control variables. The vector $X_{i,t-1}$ also includes firm fixed effects and quarter fixed effects. Thus, identification of our key parameters of interest comes from changes in investment for the same firm depending on a covenant violation after netting out common time trends. Given the reported heterogeneity across firms with incurrence and maintenance covenants, we also interact all control variables and time fixed effects with the covenant type dummy variable in our tightest specification.

Our inference is based on standard errors that are two-way clustered at the firm and quarter levels, thereby allowing for arbitrary correlation of errors within a firm and across time. Moreover, we trim the top and bottom 1 percent of all financial ratios entering the regression and discard influential observations that, if removed from the regressions, change the estimated coefficients of

interest (β_0 and β_1) by more than three standard deviations (Bernanke and Kuttner 2005). These choices help us estimate robust effects, but they do not qualitatively affect our conclusions.

[TABLE VI]

Table VI reports coefficient estimates for our key variables of interest. Column (1) reports pooled effects for all (latent) covenant violations, without differentiating between incurrence and maintenance covenants. We estimate a highly significant, negative coefficient, indicating that investment contracts by 1.59 percentage points after a covenant violation. Column (2) shows that investment contracts by 1.92 percentage points after the triggering of incurrence covenant restrictions, and column (3) shows that the effect is practically the same for those firms without maintenance covenants, alleviating concerns that firms' self-selection into covenant types can affect our estimates. Column (4) shows that investment contracts by 0.95 percentage point after a maintenance covenant violation, and column (5) shows that the effect is similar for those firms without incurrence covenants, again mitigating concerns that firms' self-selection into covenant types affects our estimates.

In column (6), we include the violation of both maintenance and incurrence covenants. While we find negative and highly significant effects for violations of both types of covenants, our estimates confirm that the effect for incurrence covenants (–1.84) is significantly larger than the effect for maintenance covenants (–0.74).[18] A test of coefficient equality rejects the null that the effects are equal with a *p*-value of 0.03. Column (7) shows the robustness of these core results to the inclusion of additional interaction terms, where we interact all control variables and time fixed effects with dummy variables for each covenant type. The coefficient estimates and differential

[18] Note that the sample for this specification includes loans with incurrence violations. However, the estimated effect of maintenance covenant violations is similar to that of the sample where we use only loans with maintenance covenant violations. Maintenance covenant violations are always preceded by latent violations.

effects between violations of incurrence and maintenance covenants remain quantitatively similar and strongly significant.

Finally, column (8) shows that our results remain practically the same for those firms with both types of covenants. Thus, we confirm again that our results are unlikely to be driven by firms' self-selection into covenant types. It is important to highlight that in the column (8) sample, for a given loan, incurrence covenants always have tighter constraints compared with maintenance covenants. As a result, the coefficient on Incurrence Bind in column (8) is identified from observations in which the incurrence covenant threshold has been crossed but the maintenance covenant threshold had not yet been crossed. This means that in column (8), the coefficient on maintenance covenants can be interpreted as incremental. In Appendix Table A.II, we show that, on average, a loan in the column (8) sample spends about 3.9 quarters in violation of an incurrence covenant before also violating the maintenance covenant (if it ever does) and about 2.8 quarters before moving from a binding incurrence covenant to no binding constraint (if it ever does). These seem like reasonable horizons for real effects to take place and for us to be confident we are detecting effects that can be attributed to the triggering of incurrence covenants.

One potential concern with our analysis could be that much of our sample is from the period of the COVID-19 crisis, a major shock that led to a drop in demand. As discussed in the data section, while we focus intentionally on this period, we provide additional evidence that our findings are not driven by this particular macro shock. In fact, our identification strategy controls for quarter*covenant-type fixed effects and focuses on the discontinuous effect at the covenant threshold. Moreover, Appendix Figure A.1 shows that our sample includes a substantial share of covenant violations before 2020:Q1, and violations during the COVID-19 period are spread over several quarters. In addition, in Appendix Table A.IV, we directly control for industry-specific

time fixed effects, for example, those related to differential exposure to demand shocks (services, travel, etc.), in addition to our baseline set of controls and fixed effects. Our results remain robust to the inclusion of these additional controls, showing that the covenant violations are not driven by firms in certain industries that were hit hardest by the pandemic. This pattern highlights the broader implications of our findings.

[TABLE VII]

In Table VII, columns (1) and (2), we show that the adverse investment effect from a latent incurrence violation is not a mechanical effect driven by direct restrictions on investments. (Recall that a large number of incurrence covenants directly restrict capital expenditures or acquisitions.) Instead, we find very similar results if we focus on loans with incurrence covenants that do *not* have any restrictions on investments, but instead constrain equity distributions or indebtedness. Hence, the contractional government mechanism operates through incentives structures that indirectly restrict spending and creditor value preservations, similar to what would be achieved by a shift in control rights.

In Table VII, we also refine our baseline results by considering that maintenance covenants may not apply to all credit facilities in a given loan package. For about 18 percent of the loans in our sample with a maintenance covenant, the covenant applies not to all facilities but only to the revolving credit facility (and potentially other facilities). Such maintenance covenants may be "springing covenants," meaning that they are activated only under certain conditions, such as when the share of utilized credit (relative to the volume of the credit line) is above a certain threshold. This opens the possibility that firms use their credit lines strategically to avoid binding maintenance covenants, which would reduce the measured effect of maintenance covenant violations. In Table VII, columns (3) and (4), we therefore drop those firm-quarters in which the

firm has an outstanding loan contract with a maintenance covenant that does not apply to all facilities and re-estimate the main specifications of Table VI (columns 6 and 7). The results remain qualitatively robust, but we obtain a somewhat larger effect of a maintenance covenant violation on investment.

As another refinement of our analysis, we consider loan amendments. Especially during the COVID-19 period, loans may have been amended as borrower performance deteriorated. In particular, maintenance covenants could have been waived. If we record such cases as covenant violations in our data set , they would be incorrect, because the waivers actually would have voided the covenants. These amendments, if not accounted for in the empirical analysis, would downward bias our estimated effect of a maintenance covenant violation on investment. LCD data record loan-level amendments, although it is hard for us to quantify the cost at which these amendments take place. That said, in columns (5) and (6), we drop firm-quarters in which the firm has a loan with a maintenance covenant that has been amended.[19] Consistent with our hypothesis on the nature of the bias, the estimated coefficients increase.

[TABLE VIII]

In Table VIII, we look at the impact of covenant violations on equity returns as a maintenance covenant violation shifts control rights to creditors or a latent incurrence covenant violation leads to a potential shift in firm value through contractual constraints. Note that ex ante it is not clear whether the covenants are intended to resolve the debt-equity value allocation problem or a total value problem. In other words, it could be that—as time passes and new information is revealed—management (shareholders) might have an incentive or opportunity to maximize their equity value at the expense of the creditors without affecting the value of the firm. We do not directly

[19] About a quarter of loans and firm-quarters in the estimation sample have an amendment.

distinguish between these two hypotheses; instead, in both scenarios, the covenants are intended to preserve the value to the debtholders, which carries negative implications for the value of equity. We measure the return on equity as the cumulative daily stock return (as a percentage) over a quarter. Our pooled results in column (1) indicate a strong decline in equity returns of close to 8 percent after a covenant violation. When we allow the response to differ across incurrence and maintenance covenants in column (2), we see that both maintenance and incurrence covenant violations lead to a significant drop in stock returns of about 6 percent. We cannot reject the null hypothesis that the two responses are similar based on any conventional significance level. Column (3) shows that the result remains similar after we interact all control variables and time fixed effects with dummy variables for each covenant type. Column (4) shows a qualitatively similar effect when we focus on firms that have both types of covenants, although the effects for incurrence triggers are somewhat larger than for maintenance violations. Yet, a statistical test cannot reject the hypothesis that the effects are the same across the two types of covenants.

C. Debt and Leverage

Overall, our results suggest that the investment rate drops significantly after incurrence covenant restrictions are triggered. How exactly do the restricted actions specified in the loan agreement tie to the impact on investments? Although the mechanism is different, the intuition is similar to the way we would think about it in the context of traditional maintenance covenants. Once the control rights shift to the creditors, why they would be interested in cutting investments is somewhat of an unknown. Arguably, reducing investments would be consistent with creditors' desire to limit indebtedness and control actions that increase the firm's risk—ones that are similar to those specified in the restricted actions of an incurrence covenant. Importantly, we might have greater visibility into the exact tie to the investment decisions in the context of incurrence

covenants since the control rights stay in the hands of shareholders. Whatever the restricted actions might be, to the degree that they are binding and stand in the way of maximizing equity value (as we just saw in Table IV), relieving this constraint requires improving financial ratios.[20] The great majority of firms trying to get in the "green zone" need to lower their net debt/EBITDA, irrespective of the nature of the restricted actions.[21] One way to do so is to boost EBITDA by cost-cutting and/or equity injection, which often is counted toward EBITDA in private-equity-sponsored deals. But another evident channel is to reduce net debt, and constraining investment that requires financing (with moderately growing EBITDA in the background) can offer covenant relief.

[TABLE IX]

In Table IX, we zoom in on the net-debt-reduction channel by studying the impact of covenant violations on a firm's debt financing. The regression design follows that of the previous subsection. In columns (1) through (3) we show the change in the debt-to-assets ratio in response to a covenant violation. The pooled coefficient in column (1) is negative, indicating a drop in the growth of debt of about 2.7 percentage points. When we analyze the violation of incurrence and maintenance covenants separately in column (2), we find that the violation of an incurrence covenant leads to a greater decline in debt growth compared with the violation of a maintenance covenant, about 2.7 percentage points versus 1.6 percentage points. This finding is consistent with the greater decline of capital expenditures due to incurrence covenant violations that we found in the preceding

[20] As discussed above, the impact on investments might be a direct consequence of restricted actions, as opposed to actions that lead to improvements of financial ratios used in incurrence covenants. In fact, in Table VII, we showed that the effect on investment holds when we exclude loans that have incurrence covenants directly restricting investments.

[21] In the case of maintenance covenants, there is no clear rule for what shifts the control rights back to the shareholders. The specific conditions are the result of negotiation, and—as we noted—they can be overreaching and inflexible.

section, and we can reject the null hypothesis that the two effects are similar with a *p*-value well below 0.1, even after we control for covenant-type specific effects in column (3).

Finally, in columns (4) through (6), we look at the firm's leverage ratio (net debt/EBITDA) after the violation, which is the predominant financial ratio constrained by either type of covenant. A maintenance covenant violation would lead to a reduction in this ratio due to the transfer of control rights to the lender, which in turn engages in actions that increase the likelihood of recuperating its funds, such as accelerating debt or cutting costs. Similarly, a firm bound by incurrence covenant triggers ought to improve this ratio to get back into the green zone and not be bound by restrictions. Accordingly, column (4) shows that the leverage ratio decreases, on average, by about 2.1x after either type of violation. The reduction in debt after a latent incurrence violation leads to a lower leverage ratio of about 1.8x, whereas we find somewhat stronger effects of deleveraging after a maintenance covenant violation, with a reduction of about 2.3x (column 5). The results presented in column (6) show similar effects when we restrict the sample to loans with both types of covenants. Overall, the debt reduction and deleveraging are consistent with the restrictions affecting investment through a reduction in debt that is similar to the debt reduction that occurs following a shift in control rights.

IV. CONCLUSIONS

The US leveraged (that is, high-yield) loan market more than doubled in size following the Great Financial Crisis, growing to nearly $1.2 trillion in outstanding debt by 2019 (Standard & Poor's Leveraged Commentary & Data) and becoming a frequent subject of discussion of central bankers and other policymakers. Leveraged loans—similar to high-yield bonds—are characterized by incurrence, or "cov-lite," financial covenants. A traditional loan agreement requires continuous compliance with financial covenants, and their violation—in the absence of a waiver or

amendment granted by creditors—shifts the control rights to the creditors with some severe consequences. Incurrence covenants, instead, include triggers that activate a set of restrictions on the borrower that are pre-specified in the loan agreement. Incurrence covenants therefore do not immediately lead to defaults and do not shift control rights, but as we show in this paper, their triggers nevertheless impose significant constraints on investments indirectly: The drop in investments is as sudden as the decline associated with the shift of control rights to creditors, and it is economically large.

The deleveraging and drop in market value associated with the contractual constraints under the incurrence covenants point to a novel shock amplification mechanism in a highly leveraged economy. This mechanism is essential for understanding the propagation of demand shocks such as the COVID-19 pandemic, and it is independent of whether the firms eventually file for bankruptcy.

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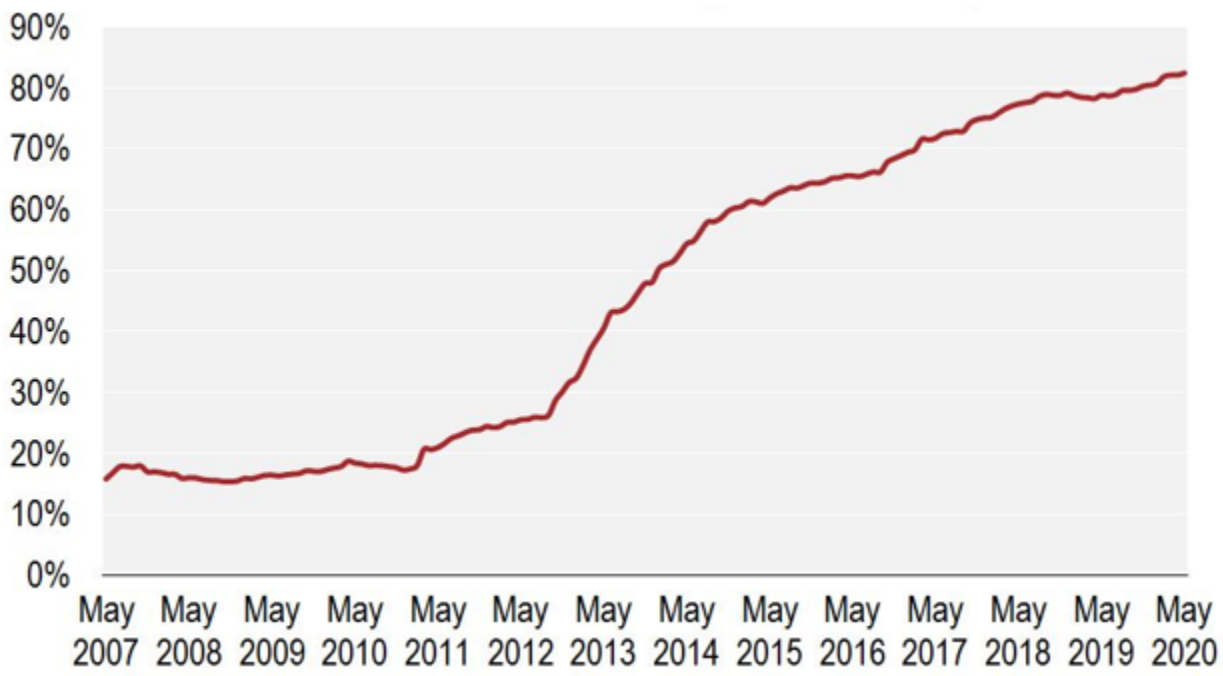
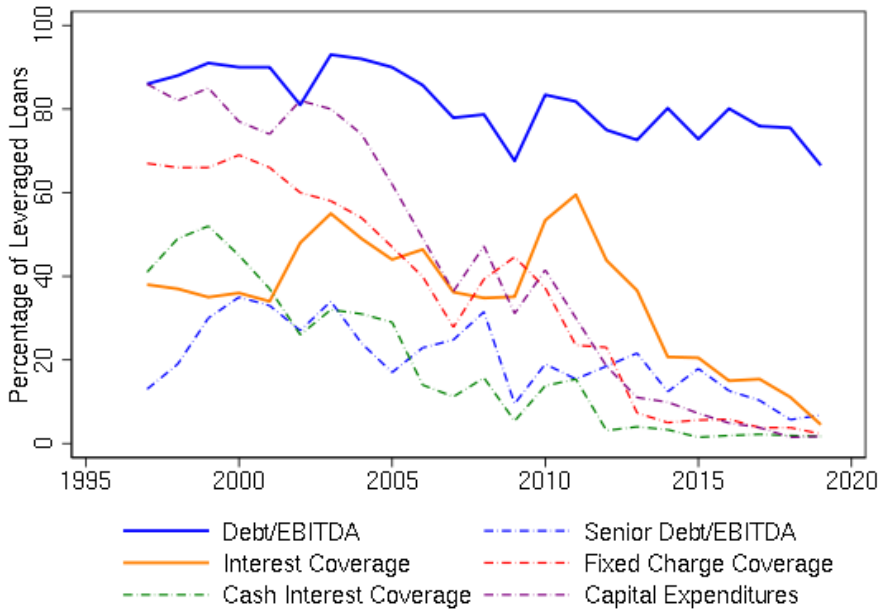
FIGURE 1 – RISE OF COV-LITE LENDING IN THE U.S. LEVERAGED-LOAN MARKET



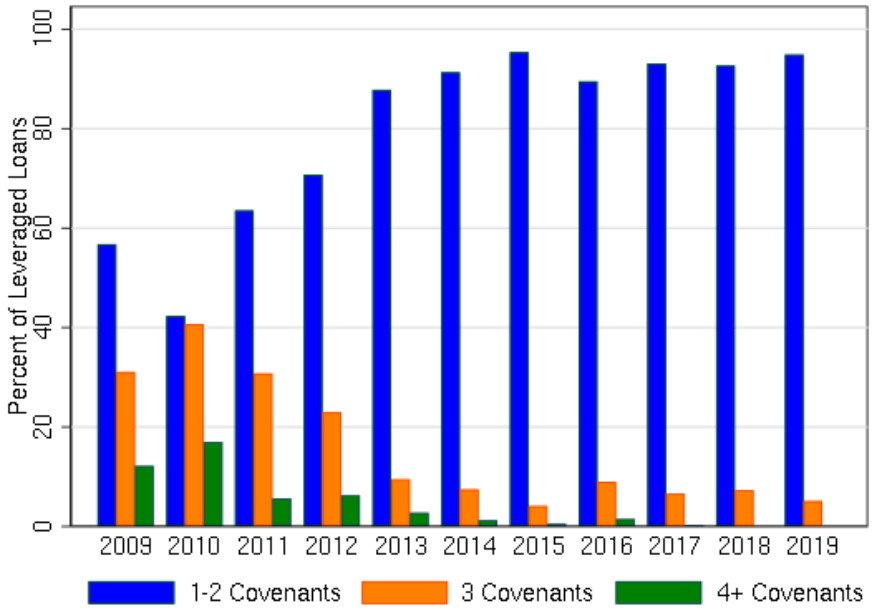
Notes: The figure is taken from S&P LCD and shows the share of total outstanding U.S. leveraged loans that are cov-lite loans.

FIGURE 2 – FINANCIAL COVENANTS IN THE LEVERAGED-LOAN MARKET

PANEL A: TYPES OF COVENANTS



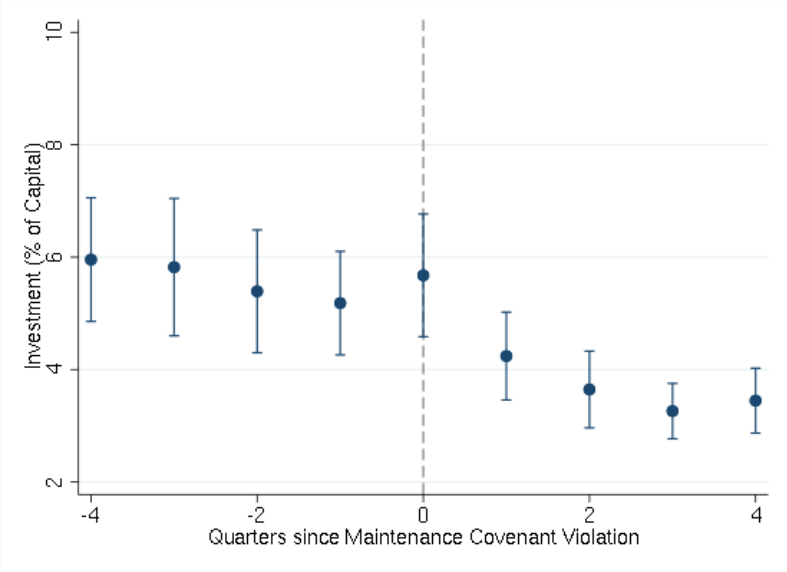
PANEL B: NUMBER OF COVENANTS



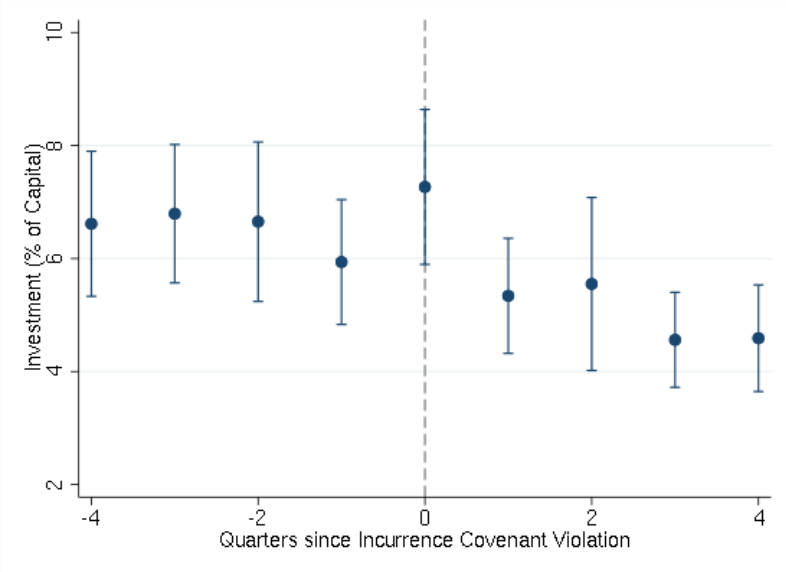
Note: Types of covenants (Panel A) and number of covenants (Panel B) in cov-strong loans. Data are compiled from S&P LCD.

FIGURE 3 – INVESTMENT RESPONSE TO (LATENT) COVENANT VIOLATION

PANEL A: MAINTENANCE



PANEL B: INCURRENCE



Notes: Average investment rates, defined as capital expenditures (investment) as a percentage of beginning-of-quarter property, plants, and equipment (capital), and 95% confidence intervals relative to the quarter of the first (latent) covenant violation.

TABLE I – DATA COVERAGE IN DEALSCAN

	Sample:	DealScan, all	DealScan and LCD	Cov-lite (LCD flag)	Cov-strong (LCD flag)
		(1)	(2)	(3)	(4)
(a)	1994-2005 (Chava and Roberts 2008)	8,626	1,946	16	1,930
			22.6%	*0.8%*	*99.2%*
			=(2)/(1)	*=(3)/(2)*	*=(4)/(2)*
(b)	1994-2005, with covenant data in DealScan	3,598	1,246	6	1,240
		41.7%	*64.0%*	*0.5%*	*99.5%*
		=(b)/(a)	*=(b)/(a)*	*=(3)/(2)*	*=(4)/(2)*
(c)	1994-2005, with indebtedness covenant in DealScan	3,037	1,167	6	1,161
		35.2%	*60.0%*	*0.5%*	*99.5%*
		=(c)/(a)	*=(c)/(a)*	*=(3)/(2)*	*=(4)/(2)*
(d)	1994-2005, with interest coverage covenant in DealScan	2,250	843	3	840
		26.1%	*43.3%*	*0.4%*	*99.6%*
		=(d)/(a)	*=(d)/(a)*	*=(3)/(2)*	*=(4)/(2)*
(e)	2017-2019	1,879	784	483	301
			41.7%	*61.6%*	*38.4%*
			=(2)/(1)	*=(3)/(2)*	*=(4)/(2)*
(f)	2017-2019, with covenant data in DealScan	488	176	52	124
		26.0%	*22.4%*	*29.5%*	*70.5%*
		=(f)/(e)	*=(f)/(e)*	*=(3)/(2)*	*=(4)/(2)*
(g)	2017-2019, with indebtedness covenant in DealScan	434	170	51	119
		23.1%	*21.7%*	*30.0%*	*70.0%*
		=(g)/(e)	*=(g)/(e)*	*=(3)/(2)*	*=(4)/(2)*
(h)	2017-2019, with interest coverage covenant in DealScan	258	85	17	68
		13.7%	*10.8%*	*20.0%*	*80.0%*
		=(h)/(e)	*=(h)/(e)*	*=(3)/(2)*	*=(4)/(2)*

Notes: For each period, the sample includes all DealScan loans that we can map to Compustat.

TABLE II – SUMMARY STATISTICS ON DATA COLLECTION

Number of Loans	Total		Incurrence Only	Maintenance Only	Both
With hand-collected information	222		83	28	111
not in DealScan	35	*(15.8%)*	15	3	17
in DealScan, without covenant info	119	*(53.6%)*	60	18	41
in DealScan, with covenant info	68	*(30.6%)*	8	7	53
Covenant information from DealScan	56		0	56	0
	278		83	84	111

Notes: This table shows the source of covenant information for the loans in our baseline sample. The sample is restricted to loans by firms with financial information in Compustat and loans that have either a leverage or interest-coverage ratio covenant. The column labeled *Both* refers to loans that have both incurrence and maintenance covenants.

TABLE III –SUMMARY STATISTICS ON INCURRENCE AND MAINTENANCE COVENANTS

	Total	Leverage			Interest Coverage		
	Obs.	Obs.	Mean	Median	Obs.	Mean	Median
Maintenance Covenants	169	144	4.39	4.25	119	2.63	3
Incurrence Covenants	500	463	3.61	3.5	53	1.98	2
Restricted Payments	194	184	3.35	3.3	16	2.11	2
Indebtedness	172	151	3.91	3.75	31	2.01	2
Investments	122	119	3.59	3.5	3	2	2
Other	12	9	3.89	3.75	3	1	1

Notes: This table provides a breakdown of the covenant information used in this paper. Restricted actions related to incurrence covenants are grouped as follows: (i) restricted payments, (ii) incur indebtedness (for example, incurring indebtedness and modifying junior debt), (iii) investments (for example, capital expenditures and acquisitions), and (iv) other. Some loans have different incurrence covenants related to the same type of restricted actions.

TABLE IV – LOAN SUMMARY STATISTICS AND COVENANT VIOLATIONS

	Incurrence Only			Maintenance Only			Both		
	Leverage	Int Cov.	Either	Leverage	Int. Cov.	Either	Leverage	Int. Cov.	Either
Number of Loans	64	29	68	59	45	71	98	80	98
Number of Violating Loans	50	8	51	31	7	33	68	14	68
Number of Firms	47	21	50	51	36	59	87	73	87
Number of Violating Firms	38	5	39	25	5	26	61	14	61
Number of Firm-Quarters	545	248	584	538	407	638	969	803	969
Number of Violating Firm-Quarters	302	32	316	119	19	133	406	40	413

Notes: Note that these numbers count only violations of the strictest loan covenant a firm is under in a given quarter. One loan with a maintenance covenant is associated with a firm that has no financial data reported in the origination quarter, hence the discrepancy in observations with Table II.

TABLE V – LOAN SUMMARY STATISTICS AND FIRM FINANCIALS

	Incurrence Only (A)		Maintenance Only (B)		Both (C)		*p*-value for difference in means		
	Mean	Median	Mean	Median	Mean	Median	(B) vs. (A)	(C) vs. (A)	(B) vs. (C)
Assets ($ Billion)	3.074	2.318	3.841	2.362	4.285	2.431	0.246	0.058	0.582
Market to Book Ratio	1.686	1.582	1.737	1.541	1.781	1.567	0.731	0.489	0.772
Macro Q	21.634	12.641	14.509	8.316	20.542	11.576	0.070	0.870	0.142
ROA	0.034	0.033	0.031	0.032	0.036	0.033	0.426	0.579	0.072
Capital/Assets	0.155	0.115	0.242	0.157	0.164	0.112	0.005	0.646	0.011
Investment/Capital	0.066	0.065	0.058	0.042	0.068	0.049	0.267	0.813	0.253
Cash Flow	0.267	0.143	0.461	0.130	0.362	0.171	0.352	0.462	0.672
Loan Size ($ Billion)	1.089	0.775	0.832	0.650	1.174	0.958	0.085	0.591	0.000
Loan Size/Assets	0.439	0.373	0.312	0.267	0.421	0.387	0.008	0.715	0.000
Initial Leverage Covenant	3.377	3.375	4.470	4.250	4.346	4.250	0.000	0.000	0.447
Initial Leverage Tightness	-0.086	0.414	1.908	1.697	2.049	1.793	0.000	0.000	0.551
Initial Interest Coverage Covenant	2.009	2.000	2.357	2.500	2.759	3.000	0.031	0.000	0.019
Initial Interest Coverage Tightness	3.668	3.393	6.452	4.583	4.501	3.974	0.006	0.328	0.000
Number of Loans	68		71		98				

Notes: All firm financials are reported as of the originating quarter of the loan. *Market-to-Book Ratio* is the market value of assets to book total assets, where the numerator is defined as the sum of market equity, total debt, and preferred stock liquidation value less deferred taxes and investment tax credits. *Macro Q* is the sum of total book debt and market equity less total inventories divided by the start-of-period capital stock measured by net property, plant, and equipment. *ROA* is the ratio of operating income before depreciation to total assets. *Capital/Assets* is the ratio of total property, plant, and equipment to total assets. *Investment/Capital* is the ratio of capital expenditures to the start-of-period property, plant, and equipment. *Cash Flow* is the ratio of income before extraordinary items plus depreciation and amortization to start-of-period property, plant, and equipment. Covenant *Tightness* is measured as the difference between the threshold value for the financial ratio specified in the covenant and the firm's actual financial ratio in the quarter of origination. One loan with a maintenance covenant is associated with a firm that has no financial data reported in the origination quarter, hence the discrepancy in observations with Table II.

TABLE VI – INVESTMENT AND (LATENT) COVENANT VIOLATION

	Investment (% Capital)							
			Only incurrence		Only maintenance			Both types
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bind	-1.59***							
	(0.34)							
Incurrence Bind		-1.92***	-1.84**			-1.84***	-1.83***	-1.87***
		(0.43)	(0.66)			(0.41)	(0.36)	(0.44)
Maintenance Bind				-0.95**	-0.84**	-0.74**	-0.94***	-0.95**
				(0.36)	(0.38)	(0.34)	(0.30)	(0.44)
Observations	1,759	1,759	481	1,759	497	1,759	1,759	774
R-squared	0.72	0.72	0.71	0.72	0.68	0.73	0.74	0.76
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls*Cov-Type	No	No	No	No	No	No	Yes	Yes
Quarter FE*Cov-Type	No	No	No	No	No	No	Yes	Yes
H_0: Incurrence=Maintenance						1.103	0.893	0.921
p-value						0.0292	0.0278	0.0764

Note: The table reports the effect of covenant violations on investment using data at the firm-quarter level. The dependent variable *Investment* is defined as capital expenditures as a percentage of beginning-of-quarter net property, plants, and equipment. *Bind* is a dummy variable that equals 1 if the firm is in (latent) violation of a financial covenant and 0 otherwise. *Incurrence Bind* is a dummy variable that equals 1 if the firm is in (latent) violation of an incurrence covenant. *Maintenance Bind* is a dummy variable that equals 1 if the firm is in violation of a maintenance covenant. All columns include the same baseline controls from Chava and Roberts (2008): log(assets), cash flow, macro q, and a polynomial of order two in the distance to default. All variables except cash flow are lagged by one period. The sample period includes all firm-quarters from 2017:Q1 through 2020:Q4, where the firm was restricted by a covenant of a leveraged loan originated from 2017 through 2019. Columns (3), (5), and (8) restrict the sample to firms with loan that have only incurrence covenants, only maintenance covenants, or both incurrence and maintenance covenants, respectively. Standard errors, reported in parentheses, are two-way clustered at the firm and time level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

TABLE VII – THE ROLE OF DIRECT RESTRICTIONS ON INVESTMENT, QUASI-COV-LITE LOANS AND AMENDED CONTRACTS

	Investment (% Capital)					
	Excl. Incurrence w/ Investment Restrictions		Excl. Maintenance on Revolving Line		Excl. Contracts w/ Amendments	
	(1)	(2)	(3)	(4)	(5)	(6)
Incurrence Bind	-2.16***	-2.08***	-2.14***	-2.01***	-1.88***	-1.86***
	(0.47)	(0.41)	(0.58)	(0.60)	(0.46)	(0.43)
Maintenance Bind	-0.63	-1.09**	-1.04**	-1.11**	-0.83*	-1.18***
	(0.45)	(0.46)	(0.38)	(0.38)	(0.40)	(0.36)
Observations	1,022	1,022	1,039	1,037	1,567	1,567
R-squared	0.72	0.75	0.70	0.71	0.70	0.71
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls*Cov-Type	No	Yes	No	Yes	No	Yes
Quarter FE*Cov-Type	No	Yes	No	Yes	No	Yes
H_0: Incurrence=Maintenance	1.522	0.989	1.102	0.898	1.042	0.681
p-value	0.00643	0.0573	0.0618	0.114	0.0486	0.117

Note: The table reports the effect of covenant violations on investment using data at the firm-quarter level, similar to the baseline results in Table VI, columns (6) and (7). However, columns (1) and (2) drop loans that have incurrence covenants that directly restrict investments once the covenant threshold is crossed. Column (3) and (4) drop loans from the sample that have a maintenance covenant restricted to the revolving credit line facility. Columns (5) and (6) drop loans after they have been amended.

TABLE VIII – STOCK PRICE RESPONSE TO (LATENT) COVENANT VIOLATION

	Stock Return (%)			
				Both types
	(1)	(2)	(3)	(4)
Bind	-7.86***			
	(1.94)			
Incurrence Bind		-5.67**	-6.59**	-7.06**
		(2.19)	(2.37)	(2.65)
Maintenance Bind		-5.74***	-5.69**	-4.45*
		(1.91)	(2.02)	(2.40)
Observations	1,234	1,234	1,234	764
R-squared	0.54	0.54	0.55	0.57
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Controls*Cov-Type	No	No	Yes	Yes
Quarter FE*Cov-Type	No	No	Yes	Yes
H_0: Incurrence=Maintenance		-0.0621	0.893	2.614
p-value		0.986	0.767	0.523

Note: This tables shows the effect of covenant violation on equity returns at the firm-quarter level. The dependent variable *Stock Return* is the cumulative three-month daily stock return as a percentage. *Bind* is a dummy variable that equals 1 if the firm is in (latent) violation of a financial covenant and 0 otherwise. *Incurrence Bind* is a dummy variable that equals 1 if the firm is in (latent) violation of an incurrence covenant. *Maintenance Bind* is a dummy variable that equals 1 if the firm is in violation of a maintenance covenant. All columns include the same baseline controls from Chava and Roberts (2008): log(assets), cash flow, macro q, and a polynomial of order two in the distance to default. All variables except cash flow are lagged by one period. The sample period includes all firm-quarters from 2017:Q1 through 2020:Q4, where the firm was restricted by a covenant of a leveraged loan originated from 2017 through 2019. Standard errors, reported in parentheses, are two-way clustered at the firm and time level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

TABLE IX – DEBT RESPONSE TO COVENANT TRIGGER

	Δ Debt/Asset (ppt)			Δ Leverage Ratio		
			Both types			Both types
	(1)	(2)	(3)	(4)	(5)	(6)
Bind	-2.70***			-2.07***		
	(0.48)			(0.47)		
Incurrence Bind		-2.66***	-2.69***		-1.81***	-1.74***
		(0.55)	(0.60)		(0.59)	(0.53)
Maintenance Bind		-1.58***	-0.93**		-2.27***	-2.66***
		(0.38)	(0.43)		(0.66)	(0.88)
Observations	1,260	1,260	773	1,271	1,271	778
R-squared	0.34	0.36	0.35	0.11	0.15	0.22
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls*Cov-Type	No	Yes	Yes	No	Yes	Yes
Quarter FE*Cov-Type	No	Yes	Yes	No	Yes	Yes
H_0: Incurrence=Maintenance		1.084	1.748		-0.460	-0.924
p-val		0.0519	0.0143		0.547	0.316

Note: This tables shows the effect of covenant violation on quantity and cost of debt at the firm-quarter level. In columns (1) through (3), the dependent variable, *Δ Debt/Asset,* is defined as the change in total debt over assets (as a percentage). In columns (4) through (6), the dependent variable, *Δ Leverage Ratio,* is defined as the change in net debt over EBITDA. *Bind* is a dummy variable that equals 1 if the firm is in (latent) violation of a financial covenant and 0 otherwise. *Incurrence Bind* is a dummy variable that equals 1 if the firm is in (latent) violation of an incurrence covenant. *Maintenance Bind* is a dummy variable that equals 1 if the firm is in violation of a maintenance covenant. All columns include the same baseline controls from Chava and Roberts (2008): log(assets), cash flow, macro q, and a polynomial of order two in the distance to default. All variables except cash flow are lagged by one period. The sample period includes all firm-quarters from 2017:Q1 through 2020:Q4, where the firm was restricted by a covenant of a leveraged loan originated from 2017 through 2019. Standard errors, reported in parentheses, are two-way clustered at the firm and time level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

APPENDIX

A. – Example of Financial Covenants Data Collection

The following excerpt shows an example of a covenant in our data-collection process. The passage comes from the loan agreement entered by Lattice Semiconductor Corp (LCD Loan ID 9087) and can be found on pages 90 and 105 (97 and 112 in the PDF):

> *"ARTICLE IX*
>
> *NEGATIVE COVENANTS*
>
> *Until all of the Obligations (other than contingent indemnification obligations and expense reimbursement obligations not then due and payable) have been paid and satisfied in full in cash, all Letters of Credit have been terminated or expired (or been Cash Collateralized) and the Commitments terminated, the Credit Parties will not, and will not permit any of their respective Subsidiaries to:*
>
> *(…)*
>
> *Section 9.12 Financial Covenants*
>
> *(a) Consolidated Total Leverage Ratio. As of the last day of any fiscal quarter ending during the periods specified below (which dates shall be deemed to correspond to the fiscal quarter ending on or about such applicable date), permit the Consolidated Total Leverage Ratio to be greater than the corresponding ratio set forth below:*

Period	*Maximum Ratio*
June 30, 2019 through June 30, 2020	*3.25 to 1.00*
September 30, 2020 through June 30, 2021	*3.00 to 1.00*
September 30, 2021 and thereafter	*2.75 to 1.00*

> *"*

Thus, this contract restricts the permitted leverage ratio to at or below the maximum ratio defined in the table. The example was chosen to highlight that the maximum ratios can vary over time, and we incorporate this feature to some extent in our data-collection process as follows: We take the maximum leverage ratio at loan origination and at loan maturity and interpolate the values for the quarters in between.

B. – Examples of Incurrence Covenants

1. Ashland Inc, RC/TLa 6/17

"Restricted Payment" means any dividend or other distribution (whether in cash, securities or other property) with respect to any capital stock or other Equity Interest of any Person or any of its Subsidiaries, or any payment (whether in cash, securities or other property), including any sinking fund or similar deposit, on account of the purchase, redemption, retirement, defeasance, acquisition, cancellation or termination of any such capital stock or other Equity Interest, or on account of any return of capital to any Person's stockholders, partners or members (or the equivalent of any thereof).

…

the Borrower … shall not, nor shall it permit any Subsidiary to, directly or indirectly:

…

7.06 Restricted Payments. Declare or make, directly or indirectly, any Restricted Payment, or incur any obligation (contingent or otherwise) to do so, except that, so long as no Event of Default shall have occurred and be continuing at the time of any action described below or would result therefrom: …

---

2. Synchronoss Technologies, TL 2/17

10.6 Limitation on Investments. The Borrower will not, and will not permit any of its Restricted Subsidiaries to, make, purchase, or acquire any Investments, except (each, a "Permitted Investment"):

…

(y) so long as no Event of Default shall have occurred and be continuing at the time of such Investment, the Borrower or any Restricted Subsidiary may make additional Investments so long as, after giving effect thereto on a Pro Forma Basis, the Consolidated Total Debt to Consolidated EBITDA Ratio is not greater than 2.75:1.00;"

---

3. Cohu, TL 10/18

"Restricted Equity Payment" means (a) any dividend or other distribution, direct or indirect, on account of any shares of any class of stock of the Borrower now or hereafter outstanding, except a dividend payable solely in Capital Stock of the Borrower (other than Disqualified Capital Stock); (b) any redemption, retirement, sinking fund or similar payment, purchase or other acquisition for value, direct or indirect, of any shares of any class of stock of the Borrower now or hereafter outstanding, other than in exchange for Capital Stock of the Borrower (other than Disqualified Capital Stock); and (c) any payment made to retire, or to obtain the surrender of, any outstanding warrants, options or other rights to acquire shares of any class of stock of the Borrower now or hereafter outstanding, other than in exchange for Capital Stock of the Borrower (other than Disqualified Capital Stock).

"Restricted Junior Payment" means any Restricted Equity Payment and any Restricted Debt Payment.

…

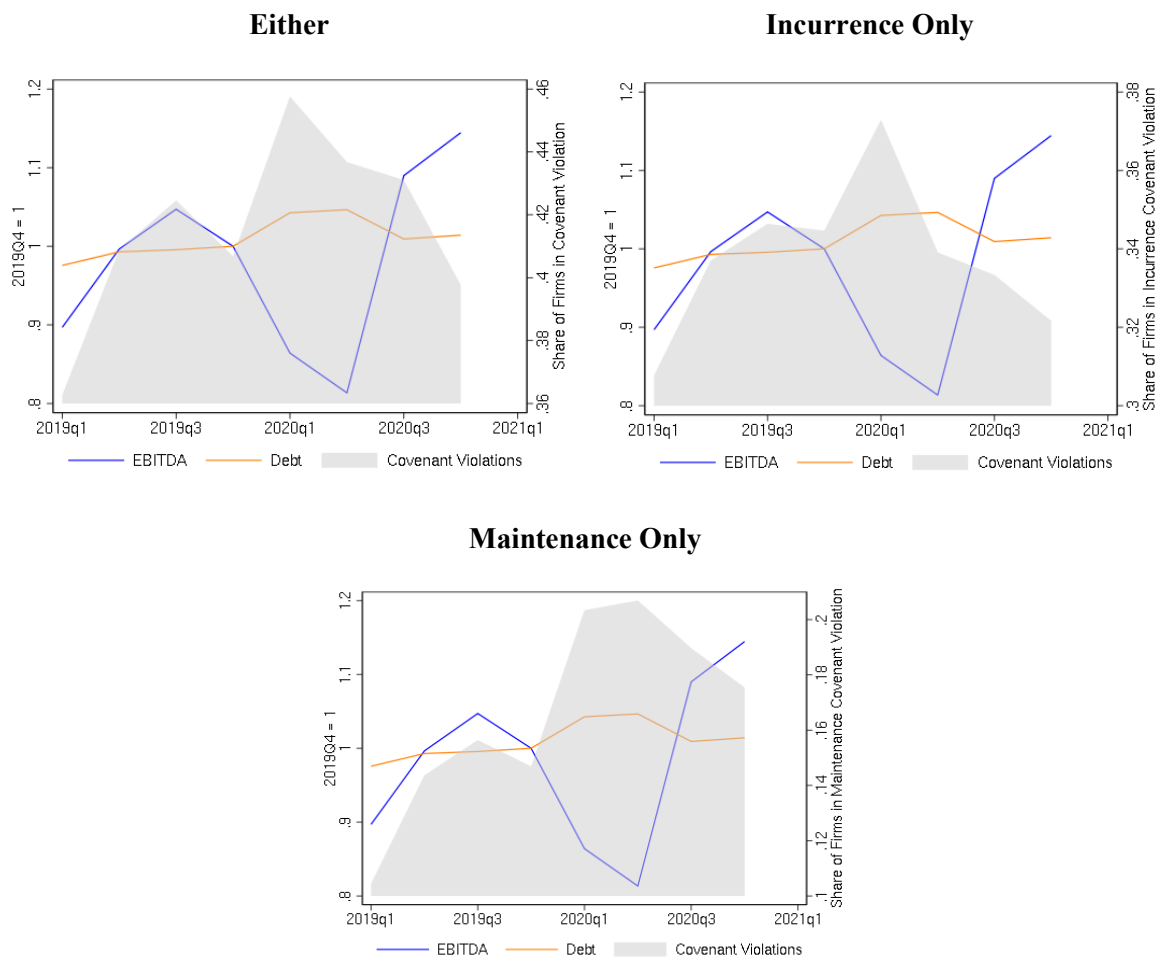
6.4 Restricted Junior Payments. The Borrower will not, nor will it permit any Subsidiary to, directly or indirectly, pay or make any Restricted Junior Payment except:

…

(g) Restricted Junior Payments in an aggregate amount not to exceed the Available Amount as in effect immediately before such Restricted Junior Payment; provided that (i) no Event of Default has occurred and is continuing or would result therefrom and (ii) the Total Net Leverage Ratio on a Pro Forma Basis would be less than or equal to 3.50:1.00;

(h) Restricted Equity Payments and Restricted Debt Payments, so long as (i) no Event of Default has occurred and is continuing at such time or would result from the making of such Restricted Junior Payment, (ii) the Total Net Leverage Ratio on a Pro Forma Basis would be less than or equal to 1.75:1.00."

FIGURE A.1 – EARNING, DEBT, AND COVENANT VIOLATIONS AROUND COVID-19 CRISIS



Note: Average earnings and debt of firms in our sample, normalized to value 1 in 2019:Q4 on the left scale, and the share of firms in violation of a covenant on the right scale. The sample uses all firm-quarters entered in our main regression.

TABLE A.I – COMPARISON OF COVENANTS: DEALSCAN VERSUS HAND-COLLECTED SAMPLE

		Hand collected		DealScan			
Covenant	Obs.	Mean	Median	Mean	Median	Diff. (by loan)	RMSE
Leverage	61	4.1	4.0	4.2	4.0	-0.03	0.45
Interest coverage	31	3.1	3.0	3.1	3.0	0.00	0.11

Note: This table looks at the financial-covenants threshold for the sample where we have both hand-collected and DealScan data. The legal language in the credit agreements is very complex, thus, the purpose of this table is to validate our approach by showing that our methodology is very close, if not identical, to the one used by Reuters DealScan.

TABLE A.II– TIME IN EACH STATE FOR LOANS WITH BOTH MAINTENANCE AND INCURRENCE COVENANTS

			Quarters between events				
	# Loans	# Instances	Mean	Std Dev.	p25	p50	p75
No Bind to Incurrence Bind	36	41	4.39	3.72	1	3	6
No Bind to Maintenance Bind	21	22	3.41	3.35	1	2	6
Incurrence Bind to No Bind	34	43	2.79	2.56	1	2	3
Incurrence Bind to Maintenance Bind	24	26	3.88	3.34	1	3	5
Maintenance Bind to No Bind	3	3	4	1	3	4	5
Maintenance Bind to Incurrence Bind	21	23	2	1.21	1	1	3

Note: Displayed is the time (in quarters) spend in each state (no covenants binds, incurrence covenant binds, or maintenance covenant binds) before transitioning to another state. The sample is restricted to the loans with both maintenance and incurrence covenants (those entering the regression in Table VI, column 8). Hence, maintenance binds means that incurrence binds as well, given that constraints on incurrence covenants are always tighter.

TABLE A.III – COMPARISON OF PAIRWISE OCCURRENCES OF RESTRICTED ACTIONS IN LOANS WITH INCURRENCE COVENANT

	All loans	Loans with single restricted action	Indebtedness	Investments	Restricted payments	Other
Indebtedness	122	14	-	74	101	6
Investments	95	3	74	-	88	3
Restricted payments	142	23	101	88	-	3
Other	6	0	6	3	3	-

Note: The purpose of this table is to analyze incidence of different restricted actions for the 193 loans with an incurrence covenant. In particular, the last four columns present a matrix that indicates how frequently different types of restricted actions can appear in the same loan contract. Each observation in this table is a loan contract, not a covenant.

TABLE A.IV – ROBUSTNESS TO COVID-19 SHOCK

	Investment/Capital (%)	
	(1)	(2)
Incurrence Bind	-1.71***	-1.84***
	(0.37)	(0.34)
Maintenance Bind	-0.79**	-0.96***
	(0.31)	(0.36)
Observations	1,746	1,705
R-squared	0.75	0.77
Firm FE	Yes	Yes
Quarter FE	Yes	Yes
Controls	Yes	Yes
Controls*Cov-Type	Yes	Yes
Quarter*Cov-Type FE	Yes	Yes
Quarter*COVID-affected Industry FE	Yes	No
Quarter*NAICS Industry FE	No	Yes
H_0: Incurrence=Maintenance	0.928	0.878
p-value	0.0146	0.0514

Notes: Results presented in this table are similar to the analysis in Table V but controls for COVID-affected-industries fixed effects. This classification is based on the one used by the Federal Reserve Bank of Chicago and categorizes NAICS industries into severely, substantially, moderately, or supply-chain-affected industries. The second column controls for NAICS two-digit industry fixed effects instead.