Covenant Violations and Dynamic Loan Contracting

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Abstract

This paper examines the dynamic allocation of control rights in private debt contracts of firms that repeatedly borrow in the syndicated loan market using a hand-collected sample of loans extended to U.S. firms during the 1996 to 2010 period. We develop a new and intuitive measure that quantifies the tightness or looseness of financial covenants which we call the "Distance to Covenant Violation" or ("DCV") – measure. We find that new loans after covenant violations have 18bps higher spreads and include more and tighter financial covenants. Lenders increase the number of profitability-based covenants, particularly for those borrowers who require less monitoring based on private information. These results are consistent with the interpretation that covenant violations increase the agency costs of borrowers. Interestingly, we document that repeated borrowing has, on average, no effect on loan spreads but a sizable effect on non-price terms as to fewer and less restrictive covenants emphasizing the importance of non-price loan terms in addressing informational and agency problems. We also find evidence that the number of lenders is insignificantly different for loans to borrowers who have violated covenants from those who have not violated covenants in the past, consistent with covenants mitigating supply side frictions in primary loan markets.

JEL Classification: G21, G32, G33.
Keywords: Dynamic Contracting, Covenant Violation, Moral Hazard, Monitoring.

Covenants are "restrictions in credit agreements that dictate, to varying degrees, how borrowers can operate, financially and otherwise."

<div align="right">LSTA Handbook of Loan Syndication and Trading</div>

1. Introduction

The early literature on the use of debt covenants has largely focused on giving shareholders mechanisms to monitor the actions of management (Jensen and Meckling, 1976; Smith and Warner, 1979), rather than as control mechanisms for creditors, consistent with much of the corporate governance literature that classifies creditors as passive investors (Townsend, 1979; Gale and Hellwig, 1985; Hart and Moore, 1998). However, the more recent literature recognizes the role of creditors in monitoring borrowers by renegotiating loan contracts before firms default (Chava and Roberts, 2008; Roberts and Sufi, 2009a, b; Nini et al., 2009, 2012; Roberts, 2012).

In this paper, we analyze the *dynamic* allocation of control rights over consecutive private debt contracts of the *same borrower* exploiting the cross-sectional as well as time-series variation among firms that violate or do not violate covenants. We focus on firms that are recurring borrowers in the syndicated loan market and analyze the contractual design of newly issued loans. Specifically, we explore the change in loan contract terms in a *new* loan when a borrower has violated covenants in the prior loan contract. By contrast, the prior literature has focused on investigating renegotiations of *existing* loans after covenant violations.

In this paper we seek to answer questions such as: How do price and covenant terms change when borrowers repeatedly enter private debt markets? How do loan contract terms change after covenant violations in subsequently issued loans? What type of covenants do lenders modify in new loans to a particular borrower after violations? And, how do loans to borrowers who have violated covenants in prior loans perform differently from loans to non-violating borrowers? We empirically explore these questions using a carefully selected sample of individual loan contracts, focusing on loan contracting as mechanism to mitigate informational and agency problems. We contend that covenant violations increase the agency costs of borrowers. Consequently, loan

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contracts are designed to protect lenders from elevated risk shifting behavior by borrowers after loan origination. Covenants, in particular, are set by lenders in a way that closely monitors borrower behavior and to mitigate their risk shifting in the future.[1,2]

Empirical evidence suggests that covenants are part of virtually all private credit agreements (Roberts and Sufi, 2009a). Moreover, existing data sources such as LPC Dealscan have limitations in their keeping of full record of covenants as well as the complexity of covenant structures in loan contracts. At the core of our analysis is therefore a novel and hand-generated dynamic data set of individual borrower loans and covenants constructed from *original* loan contracts identified in borrowers' SEC filings. Our final sample comprises 3,813 loans made over the 1996 to 2010 period.[3] We collect more than 80 different covenant types and definitions from these loan contracts. We also know step-up and step-down provisions for each covenant. In testing our hypothesis that a covenant violation in a current loan is a signal of borrower moral hazard to the lender of a subsequent new loan, we use all the information available to us from these contracts to calculate covenant violations on a quarterly basis. Based on this, we build an indicator variable for covenant violations and match it to the subsequent new loan of the same borrower. Most importantly, we use all covenant information to develop a new measure of "covenant looseness."

We identify 80 covenant types and compute an index that represents the average distance a quantity based covenant value/ratio must deteriorate (in terms of its number of standard deviations) before a covenant threshold is violated. A higher value of the index suggests that covenants are, on average, "looser." This is an important contribution to the literature as this index is a coherent measure that allows for an economically meaningful comparison *across* firms. Moreover, it allows

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[1] Chava and Roberts (2008) explain in detail the economic taxonomy of debt covenants as an instrument to prevent value reduction and to define control rights.

[2] The theoretical literature supports this role for covenants. The existence of covenants increases the availability of credit (Stiglitz and Weiss, 1983; Diamond, 1984; Besanko and Kanatas, 1993). Covenants act as a tripwire mechanism, which immediately shifts control rights from borrowers back to lenders once they are violated (Jensen and Meckling, 1976; Smith and Warner, 1979; Aghion and Bolton, 1992; Berlin and Mester, 1992). The level of monitoring via covenants is thereby driven by borrower agency costs and accordingly the probability to grant loans to shirking borrowers (Besanko and Kanatas, 1993; Dewatripont and Tirole, 1994; Mester et al., 2007; Gârleanu and Zwiebel, 2009; Winton and Yeramilli, 2012).

[3] After applying a large number of filters and after matching these loan contracts to the LPC Dealscan and the merged CRSP/Compustat database.

us to test hypotheses relating to the role of covenants in loan contracting. Analogous to the "Distance to Default" ("DD") measure that is a well-used statistic to measure a firm's probability of default, our new index might be viewed as a "Distance to Covenant Violation" or ("DCV") – measure.

We analyze the dynamic allocation of control rights over consecutive private debt contracts of the same borrower, focusing on firms that are recurring borrowers in the syndicated loan market. We know which firms violate covenants and what covenants are violated at any moment in time. We also know how lenders react in any subsequent loan contract, how they set covenant levels and how these differ from prior loan contracts to the same borrower. We find that, after covenant violations in a prior loan contract, lenders demand higher spreads and also increase the number and tightness of covenants in the following (new) loan contracts, consistent with higher agency costs.

What distinguishes our study from earlier research is our emphasis on the effects of covenant violations on the contractual terms found in subsequent *new* loans to the same borrowers. This contrasts to prior literature on debt covenant violations which focuses on renegotiation outcomes of *existing* loans in which covenants are violated. Gârlenau and Zwiebel (2009) argue in a theoretical paper that in renegotiations of existing loans covenants typically weaken rather than tighten, while the empirical evidence is somewhat mixed as some covenants become stricter during renegotiations of existing loans while others do not change or are even set looser (Nini, Smith and Sufi, 2012). This literature also documents that loan renegotiations have important implications for borrower risk in multiple dimensions: In the immediate period after a violation borrowers reduce acquisitions, investments, leverage and shareholder payouts as well as limit risk shifting and improve their corporate governance (Chava and Roberts, 2008; Roberts and Sufi, 2009a, b; Nini , Smith and Sufi, 2009, 2012), thereby reducing borrower risk.

In this study, we provide corroborating evidence regarding the effect of loan renegotiations: More precisely, we document a continuous decrease of borrower risk (as measured by the probability of default (PD)) after covenant violations. The PD converges to the PD of similar, non-violating borrowers about 800 days after the violation. However, we find that subsequent *new* loans

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are originated, on average, 1,091 days after a violation. This suggests that borrowers who did or did not violate covenants in a previous loan exhibit similar default risk based on ex-ante observable characteristics at the time of a subsequent loan origination. We also provide a large array of robustness tests, such as propensity score matching models, a regression discontinuity design framework as well as other tests that provide supporting evidence that our results are not explained by higher ex-ante credit risk.

We then explore the dynamic development of loan contract terms over multiple consecutive new loan contracts to the same borrower as a function of whether or not the borrower violated covenants in the prior loan. Borrowers become less opaque the more frequently they borrow new loans in the syndicated loan market. Interestingly, we document that repeated borrowing has, on average, no effect on loan spreads but a sizable effect on non-price terms reflected in fewer and less restrictive covenants emphasizing the importance of non-price loan terms in addressing informational and agency problems. However, importantly, if borrowers violate covenants in a prior loan, lenders increase loan spreads as well as increase the number and tightness of covenants in a subsequent new loan, irrespective of the frequency of borrowing new loans.

In a next set of tests, we analyze the performance of loans after they have been originated. If covenant violations signal potentially higher ex-post moral hazard of borrowers, we expect to find a greater incidence of covenant violations among those borrowers, who have already violated covenants in a prior loan. Our results show that borrowers who have violated covenants in a prior contract are 30% more likely to violate covenants in a subsequent new loan. In addition, hazard rate regression results show that they also have a higher hazard rate and violate earlier in the subsequent new loan compared to borrowers with no violation in the prior contract.[4]

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[4] An alternative explanation for this result could simply be "bad luck" of borrowers who also violated covenants in prior loans. To address this, we use propensity score matching models where we additionally match borrower and loan pairs based on the number of covenants, covenant looseness and contract intensity. Again, we find a higher likelihood of future covenant violations of borrowers who have already violated covenants in prior loans which is consistent with our hypothesis.

We then ask what covenants lenders modify if they extend loans to a borrower who has violated covenants in the prior loan. Covenants can broadly be classified into two groups, profitability-based covenants and capital-based covenants (Christensen and Nikolaev, 2012). Lenders use capital-based covenants mainly to restrict leverage in order to ensure that firms maintain a specific level of equity within the firm. Profitability-based covenants are used such that lenders can immediately respond to a deteriorating performance of the firm. Accordingly, the role of covenants as tripwire mechanisms which allow for a higher level of monitoring more directly relate to the role of profitability-based covenants. Our results confirm a positive relationship between covenant violations in the prior loan contract and the number of profitability based covenants found in the subsequent new loan. This is consistent with lenders being more actively involved in the monitoring and controlling of borrower behavior when they have received a signal of moral hazard risk via covenant violations in a prior loan.[5]

We then investigate the effect of covenant violations on the size and composition of the lending syndicate in the following loan. We do not find significant differences in the number of lenders that participate in syndicates of loans to covenant violating and non-violating borrowers. Moreover, we find that borrowers who have violated covenants are neither more nor less likely to switch to new lenders consistent with the interpretation that the covenant structure helps to overcome supply side frictions in primary loan markets.

Our paper proceeds as follows. The next section describes how we construct our dataset, explains our covenant looseness measure in detail, and provides descriptive statistics. Section 3 empirically explores dynamic loan contract design after covenant violations and examines

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[5] One possible interpretation of an increased use of covenants in response to a covenant violation in the prior loan is that lenders increasingly use covenants to monitor a borrower instead of relying on private information about this borrower. Contracting based on covenants is less costly for lenders compared to monitoring via collecting private information about the borrower (Smith and Warner, 1979; Diamond, 1984). Moreover, covenants are written on specific financial characteristics of the firm, while monitoring based on banks' private information might provide very different information signals than covenants (Rajan and Winton, 1995). This also relates to the different lending technologies described in Berger and Udell (2006) who differentiate between lending based on hard, observable information (akin to covenants) and lending based on private information which may include collecting expensive soft information. Consistent with these arguments, we find that lenders increase covenants in new loans after violations in a prior loan particularly for those loans where private information is costly to collect.

alternative explanations for our findings. Section 4 investigates the performance of loans to borrowers who have violated covenants in the past. Section 5 provides further analyses. Section 6 concludes.

2. Data and Descriptive Statistics

2.1 Data

To investigate the effect of covenant violations on subsequent loan contracting, we construct a unique data set collecting original loan contracts directly from the Security and Exchange Commission (SEC) filings of public firms using EDGAR (Electronic Data-Gathering, Analysis and Retrieval). Material loan contracts have to be reported as required by the SEC and can be found as an exhibit to a 10-K, 10-Q or as an attachment to an 8-K filing. We start with the set of private credit agreements provided by Greg Nini, David Smith and Amir Sufi who collected these contracts over the 1996 to 2005 period and extend this set of contracts for 5 more years until the end of 2010 following their methodology. We add 1,276 loan contracts from EDGAR to the 3,720 contracts from Nini, Smith and Sufi (2009) and apply various filters to these 4,996 credit agreements.

We exclude all observations where we cannot identify a contract in Dealscan as well as loans specified as amendments in Dealscan or in the loan contract (Roberts, 2010). In other words, all contracts are *new* loans. This is important as a major contribution of our paper is to investigate the design of consecutive (new) loan contracts of the same borrower. As a result we deliberately exclude renegotiated contracts.

Private loan agreements typically include positive, negative, and financial covenants.[6] Negative covenants prevent the borrower from certain actions such as excessive investments,

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[6] We do not include positive covenants such as punctual payment of interest and principal, delivery of financial statements, property and equipment maintenance, compliance to accounting standards, or paying insurance and taxes, as these are often not observable, in line with, for example, Bradley and Roberts (2004) and Demiroglu and James (2010).

distribution of dividends, sale of assets, changes in company control, enter into sale-and-lease-back transactions, or changing business activities. Financial covenants are often termed "performance hurdles" or "trip wires" (e.g., Dichev and Skinner, 2002) due to their ability to shift control rights. Examples of financial covenants are accounting-based dollar amounts and ratios which can be found in the reporting data of the company (e.g., Taylor and Sansone, 2007; Nini, Smith and Sufi, 2009).[7] Although Dealscan already provides some information on negative financial covenants, we still find that several covenants are missing. Furthermore, the definition of seemingly similar covenants differs substantially between contracts and is aggregated in Dealscan without further information. Additionally, only one threshold for financial covenants is recorded in the database, but thresholds frequently change over the contract period via step-down or step-up provisions.[8] These cannot be found in Dealscan. We therefore manually collect a novel set of covenants in private credit agreements collecting all covenants from 3,813 contracts. Importantly, we do not use any text-search program to avoid possible misspecifications in the algorithm.

We record the covenant threshold for each loan for each quarter from origination to final maturity so as to allow for the step-down or step-up provisions in many loans. Furthermore, we find about 80 different descriptions of covenants and classify them, for brevity, into 17 main covenant types.[9] We also classify covenants into profitability-based covenants and capital-based covenants similar to Christensen and Nikolaev (2012). Lenders use capital-based covenants largely to restrict leverage in order to ensure that firms maintain a specific level of equity capital within the firm. Profitability-based covenants, on the other hand, are used to ex-post allocate control rights to the lender. Since they are based on the current performance of the borrower (that is why they are also called performance covenants), lenders can immediately respond to a deteriorating

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[7] There also exist maintenance and incurrence covenants. The former imply that the borrower has to meet certain criteria on a regular basis where the latter refer to a predetermined event, such as the issuance of new debt or the acquisition of another company.

[8] Appendix I shows an example of a financial covenant section in a loan contract.

[9] The substantially larger number of covenants can be explained by the variety of definitions of the respective variables. Consider for example a debt to capitalization covenant. Debt can be senior, long term or the total value. Capitalization can refer to net worth plus equity or tangible net worth plus equity.

performance of the firm. Irrespective of the classifications, we use the definitions of all 80 covenants to identify covenant violations using the corresponding information from the company's financial statements.

Using the covenants collected from the SEC filings, we construct several proxies as to the strictness of contracts and covenant violations. We define the Number of Financial Covenants simply as the number of financial covenants in each loan contract. A contract with more covenants is more restrictive compared to a contract with fewer covenants. We also utilize a Contract Intensity Index that reflects the overall restrictiveness of the loan on the actions of the borrower's management following Bradley and Roberts (2004). It includes not only financial but also negative covenants. The index ranges from zero to six with high values indicating contract intensity. It is constructed by adding the indicator variables for dividend restriction, equity sweep, asset sweep, debt sweep, securitization, and a binary variable that is one if the contract includes two or more financial covenants. We furthermore introduce a new measure for the average looseness of covenants, explained in detail in the following subsection.

A borrower has to comply with most financial covenants on a quarterly basis (Roberts and Sufi (2009a)). A covenant violation constitutes a *technical default*. We calculate whether the borrower complies with the covenants in each quarter after loan origination until the maturity of the loan. The terms technical default and *covenant violation* are used interchangeably throughout this paper. A variable 'Days to Contract Violation' is measured as the difference in time between inception of the contract until the end of the quarter during which a financial covenant is violated for the first time.

To construct our final data set, we merge the contracts from EDGAR with several other data sources. We obtain loan contract information from Dealscan including loan spread (AISD), maturity, loan amount and lender identity. To identify repeated borrowing from the same lender as well as switching between lenders, we construct the merger history for each lender in Dealscan using information obtained from the FDIC and the National Information Center (NIC). Using Robert's Dealscan-Compustat Linking Database (Chava and Roberts, 2008), we collect quarterly

financial statement information from Compustat and merge it to each loan contract. Finally, we obtain borrower default information via the Chapter 11 filings in the UCLA-LoPucki bankruptcy research database. We define a company as being in *default* if it files for either Chapter 11 or bankruptcy and this is recorded in the LoPucki database.[10] All variables are described in Table I. The final dataset includes 3,813 loans with 5,411 loan facilities from 1,544 borrowers.[11]

[Table I]

2.2 Covenant Looseness

We propose a new measure for the strictness of covenants which we call "Looseness" of covenants based on the way it is constructed. Most prior studies only concentrate on specific covenant types when discussing covenant strictness (e.g., Dichev and Skinner, 2002; Chava and Roberts, 2008; Drucker and Puri, 2009; Gow, 2009; Zhang, 2011; Nini et al., 2012). Our measure is closest to that proposed in Murfin (2011) but we focus only on average covenant strictness. Although this implies some loss in the full set of desirable properties of a strictness measure it allows for a straightforward and intuitive interpretation. We first calculate the standard deviation for each of the accounting variables that are part of all 80 different covenants using the 12 quarters prior to the loan origination date. We then derive the slack for each covenant which is the (absolute) difference between the observed accounting value/ratio and the covenant threshold that is specified in the loan contract. Each slack is normalized by its respective standard deviation. The value thus reflects the number of standard deviations an accounting value/ratio may deteriorate before the covenant threshold is violated. To derive the average looseness of all covenants in a loan contract we use two aggregation levels. First, we calculate the average looseness of all covenants within each of our 17 main covenant types. We then average again across all main covenant types to calculate our measure. The looseness measure accordingly reflects the average number of standard

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[10] Only 1.4% of all defaults are Chapter 7 (Liquidation), therefore, we do not differentiate between Chapter 7 and Chapter 11 filings.
[11] In the following, we perform our analyses at the facility level. However, we repeat all tests also at the loan level. The results are the same.

deviations covenants may deteriorate before a contract is violated. A contract with looser covenants is less restrictive compared to a contract with tighter covenants.[12]

As an example for our covenant looseness measure consider the covenants in Gray Communications Systems' loan contract on July 31st, 1998 shown in Appendix II. It contains 6 covenants in 5 main covenant types:

    i.   an adjusted debt service coverage ratio of 1.1,

    ii.   a senior debt to adjusted EBITDA ratio of 4.25,

    iii.   an adjusted fixed charge coverage ratio of 1,

    iv.   an adjusted interest coverage ratio of 1.5,

    v.   a debt to adjusted EBITDA ratio of 6.9, and

    vi.   an adjusted debt to adjusted EBITDA ratio of 6.75,

        where the two latter both belong to the Debt to EBITDA covenant main type.[13]

We derive the slack or difference between each accounting variable as calculated prior to the loan and that specified in the covenant and divide it by the variable's standard deviation. The accounting value for the adjusted debt service coverage ratio which is the cash flow to interest and principal payment on July 31st, 1998 is 1.62. Subtracting the covenant threshold of 1.1 and dividing the result by a standard deviation of 0.1882 gives a value of 2.763. It reflects the fact that the Cash Flow to Interest and Principal Payment ratio may decrease 2.763 times its standard deviation of 0.1882, i.e. by 0.52, before the covenant is violated.[14] The calculation for the other covenants follows the same approach. These values are then aggregated up to their main financial covenant type. Accordingly, the values for debt to adjusted EBITDA of 0.191 and adjusted debt to adjusted EBITDA ratio of 0.127 are averaged to 0.159 for the Debt to EBITDA main covenant type, where

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[12] Note that as a robustness check, we also used in all analyses only the least loose covenant in each loan contract as a measure for covenant looseness. The results are very similar with a statistically stronger outcome in some cases. We do not report them for brevity.

[13] "Adjusted" refers to any definition different from the variable on a stand-alone basis.

[14] A covenant is violated if the corresponding accounting value is above (a max. threshold type in Appendix II) or below (a min. threshold type in Appendix II) its respective threshold.

the remaining covenants all belong to different main types. Finally, the total covenant looseness of 1.0064 is derived as the mean of all five main financial covenant types.

2.3 Descriptive Statistics

The final data set consists of 3,813 loans with 5,411 loan facilities from 1,544 borrowers over the 1996 to 2010 period. Table II provides detailed summary statistics on loan and borrower characteristics. All data are measured in real terms with 2000 as the base year.

[Table II]

The average borrower default rate is 2.5%, the average loan facility is $298 million with an All-In-Spread-Drawn (AISD) of 183 basis points (bps) and 2.55 covenants. Average covenant looseness is 3.95, that is, covenants can change, on average, by 3.95 standard deviations before a contract violation occurs. The contract intensity index is derived following Bradley and Roberts (2004) and loans contain, on average, 4.55 out of 6 possible restrictions. Note that we need to rely on data reported by Dealscan when collecting these restrictions. As we require all 6 indicator variables to be observable, but information about asset sweep, debt sweep or equity sweep is missing in many cases, constructing this index reduces the number of observations in our data set by more than 70%. 55% of the loans are violated and these violations occur on average 14 months (427 days) after the loan origination date. Borrowers switch banks in 35.1% of all cases and violate a financial covenant in more than half (57.2%) of all of their prior loan contracts while it takes about 3 years (1,091 days) before a subsequent new loan is initiated.

The average borrower size is $3,291 million with a profitability of 17%, a current ratio of 1.84, a leverage ratio of 0.33, an interest coverage ratio of 15.44, and a market-to-book ratio of 1.68. Panel B of Table II reports these statistics. More than half of the loans are rated and 24.1% are classified as investment and 34.5% as non-investment grade.[15]

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[15] Note that our descriptive statistics are very comparable to Nini et al. (2009) when we use the time period 1996 to 2005 as in their study.

Panel C of Table II shows the distribution of covenants across all risk classes. More than 60% of all loan contracts contain Debt to EBITDA covenants followed by Interest Coverage (44%) and Fixed Charge Coverage (42%). Interestingly, while Debt to EBITDA is the most frequently used covenant, Interest Coverage and, particularly, covenants specifying a maximum level of leverage (Debt to Capitalization, Debt to Net Worth, Senior Debt to Capitalization) are used for larger loans.

In Table III, we segregate the entire sample based on whether or not the borrower violated a covenant in the prior contract.

[Table III]

Columns (A) and (B) of Table III show mean and median characteristics for borrowers who did not violate a covenant in the prior contract and for those who did. The last column reports the parametric t-statistic (nonparametric z-statistic) of the difference in means (medians) test. Table III shows that the differences between both groups are substantial. On average, borrowers who have violated a covenant in the prior loan contract have to pay a 98 bps higher spread in the subsequent new loan, accept 0.6 more financial covenants which are in addition significantly (2.98 standard deviations) more restrictive. New loan contracts become stricter after a covenant violation in the prior loan, also reflected in the Contract Intensity Index. Note that the occurrence of profitability-based covenants in subsequent loans is significantly higher after violations in the prior loan, while the occurrence of capital-based covenants is lower. This is consistent with lenders becoming more active monitors following covenant violations as we will explain in more detail later on. Borrowers who violate a covenant in the prior loan contract again violate contract terms in 70% of all subsequent new loans and the violation occurs within a shorter time period (79 days earlier) from the contract start date.

Table III also shows that borrowers who violated covenants are more likely to switch lenders in the next loan. We furthermore find that subsequent loan amounts decrease after a covenant violation in a prior loan. Moreover, the percentage of secured loans almost doubles.

Borrowers who violate covenants are also smaller, higher leveraged with lower interest coverage and market-to-book ratios and are lower rated.

3. Covenant Violations and Loan Contract Design

How do loan contract terms change in new loans after covenant violations? We hypothesize that covenant violations increase the agency costs of borrowers and lenders respond to potentially higher ex-post risk shifting of borrowers adjusting both price and covenant loan terms. We then provide several robustness tests that help to rule out alternative hypotheses that might explain our findings such as higher ex-ante credit risk of borrowers who have violated covenants in earlier loans.

3.1 Dynamic Loan Contracting following Covenant Violations in the Prior Loan

In this subsection, we analyze how price and covenant loan terms change in new loans after covenant violations. If covenant violations increase the agency costs of borrowers, this will be reflected in loan contract terms. More precisely, we expect to find higher loan spreads and more and tighter use of covenants in new loans as lenders want to become more active monitors to mitigate risk shifting once the loan is originated. Our basic regression specification has the following form:

$$LCT = a + b * Prior\ Covenant\ Violation + c * Loan\ Characteristics$$
$$+ d * Borrower\ Characteristics + e * Other\ Controls + \varepsilon$$

LCT ('Loan Contract Terms') refers to two different groups of dependent variables. The first group contains a common proxy to measure the cost of debt (AISD), the second group describes the new covenant package as measured by i) the Number of Covenants, ii) Covenant Looseness, and iii) Contract Intensity. The results are reported in Table IV.

[Table IV]

Table IV reports four models with different dependent variables. It also shows the regression methodology used in each regression. In addition to the reported variables, all regressions further include year and industry fixed effects, indicator variables for the different rating classes of borrowers, loan type and loan purpose fixed effects. All variables are defined in Table I. Standard errors are robust to heteroscedasticity and clustered at the borrower level.

Column 1 of Table IV reports the results of an OLS regression relating AISD to prior covenant violations and our other control variables. We find that covenant violations in a prior contract increase loan spreads in the subsequent loan by an average of 18 bps, significant at the 1% level and economically meaningful. It translates into $0.54 million higher annual loan costs on average for a borrower who violated covenants in the prior contract. Most of the other control variables are also highly significant and carry the expected signs. For example, larger loans and loans containing performance pricing grids have lower spreads, secured loans and loans of highly leveraged borrowers carry larger spreads.

We next explore the implications of prior covenant violations on the covenant package of the subsequent new loan. If prior covenant violations increase information asymmetries between borrowers and lenders, we expect to find that the covenant package overall becomes more restrictive in the subsequent contract in line with theory (Garleanu and Zwiebel, 2009). This allows lenders to better monitor borrowers thereby constraining ex post risk shifting in the new contract. Columns 2 to 4 of Table IV report the results. First, we relate the number of financial covenants in the new contract to prior covenant violations and our control variables using ordered logit regressions.[16] We find that prior violations increase the number of financial covenants used by lenders in the subsequent loan contract. The coefficient is significant at the 1% level. The coefficient for loan maturity is positive and significant which is consistent with Rajan and Winton (1995) who argue that long term loans have more covenants. In other words, monitoring via short

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[16] We use ordered logit regressions because the number of covenants is an ordinal measure in our context. In robustness tests, we also use OLS models as well as Poisson models and get similar results. We do not report these tests for brevity.

term debt or via covenants on longer term loans are substitutes. The OLS regression results for covenant looseness are shown in Column 3. A covenant violation in the prior contract leads to stricter covenants, with thresholds in the subsequent contract set 1.5 standard deviations closer to the actual accounting value at the time the loan is made. Column 4 in Table IV reports the impact of covenant violations in the prior loan on contract intensity in the subsequent loan using an ordered logit regression. It shows that contract intensity is increasing, the coefficient, however, is only weakly significant. Note that the number of observations drops by almost 70% in Column 4 because we need to rely on data recorded in Dealscan in order to calculate the index in a similar way as in Bradley and Roberts (2004), Demiroglu and James (2010) and Bharath et al. (2011). Information about asset sweep, debt sweep or equity sweep is missing in many cases.

3.2 Covenant Violation and Borrower Credit Risk

An alternative explanation for our results could be higher ex-ante credit risk of borrowers who have violated covenants in previous loans. In this sub-section, we provide several robustness tests to address this. We first investigate a borrower's PD in the immediate period after a covenant violation. We then examine our findings in propensity score matching models, a regression discontinuity design, and a specification accounting for refinancing opportunities of borrowers to ensure that our results hold for very similar borrowers matched on observables and are also not driven by unobserved borrower heterogeneity.

3.2.1 Borrower Credit Risk immediately after a Covenant Violation

We investigate whether a covenant violation reflects differences in borrower PDs and how these differences evolve over time after the violation. A covenant violation denotes a technical default of the borrower. Demiroglu and James (2010)) show that a covenant violation increases the probability of a bad outcome[17] in the same loan depending on the monitoring intensity of the lender.

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[17] A bad outcome is defined in their study as a delisting of the borrower from CRSP due to poor performance (delisting codes 400–499 and 550–600), a declaration of bankruptcy, or a termination of the loan because of an inability to cure covenant violations during the three years after loan inception.

Furthermore, the violation of a financial covenant indicates that at least some of a borrower's financial characteristics have substantially worsened. However, the recent literature on renegotiation outcomes reveals that the shift in control rights to lenders due to a covenant violation might have important implications on borrower risk. After a covenant violation borrowers reduce acquisitions and investments, do not assume further leverage and decrease shareholder payouts, while risk shifting is limited and corporate governance improved (Chava and Roberts, 2008; Roberts and Sufi, 2009a, b; Nini et al., 2009, 2012). A testable hypothesis is that borrower PD is high at the time of a covenant violation and conditional on not declaring bankruptcy later on, decreases again over the subsequent periods. We investigate this in more detail.

We augment our loan data with Chapter 11 filings obtained from the UCLA-LoPucki bankruptcy research database which ultimately collects its information from court files or SEC filings. Most importantly, we derive the exact default date of each borrower from LoPucki. We also need a starting point from which we estimate a borrower's PD. If a covenant is violated we take the violation date, if no covenant violation occurs we choose the contract end date as the date for repaying the loan without violating a covenant. Figure 1 plots the default probability[18] for borrowers after no covenant violation (Figure 1.A) and after a covenant was violated (Figure 1.B).

[Figure 1]

Figure 1.A plots the development of a borrower`s PD over time after no covenant has been violated. Directly after the full repayment of the loan borrowers have a PD of almost zero. In line with Flannery (1994), the PD increases (for levered firms) the longer the time period. Figure 1.B plots the development of a borrower`s PD over time *after* a covenant violation occurred. Borrowers have, on average, a PD of 30.26% at the first day after the violation (not plotted for scaling purposes). Panel B shows that a borrower`s PD is substantially higher in the period immediately following the violation and decreases as a convex function over time. Borrowers exhibit a

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[18] In our analyses, we refer to the model-implied PD of a logistic regression model employing average values of our variables in Appendix III Column (1). We use a logistic model due to its closed form solution which allows for a simple graphical analysis of PD over time.

substantially higher likelihood to default especially in the first 100 days after a violation. Figure 1 implies that the PD decays to a level comparable with the PD of non-violating borrowers approximately after two years (882 days).

Table II shows that a new loan is initiated on average 1,091 days after a covenant violation has occurred. This relates to the finding in Chava and Roberts (2008) that the median covenant violation occurs in the first third of the period from origination to maturity, which is confirmed in Table II for our data. Accordingly, the contract terms of renegotiated loans due to covenant violations might substantially be influenced by borrower risk. However, our results suggest that borrowers who did or did not violate covenants in a previous loan exhibit similar default risk, based on ex-ante observable characteristics, when new loans are originated,

3.2.2 Borrower Credit Risk at the Initiation of the Subsequent New Loan

We provide several robustness tests that seek to rule out that our results are driven by borrower credit risk. We address this in three ways.

First, we use propensity score matching models following the approach outlined in Rosenbaum and Rubin (1983).[19] We match borrowers who have violated a covenant to borrowers who did not violate a covenant based on their characteristics at the time of (no) violation. These characteristics include size, profitability, current ratio, leverage, coverage, market-to-book ratio, industry and rating class and the number of previous loans. Furthermore, we require the loan characteristics (maturity, size, secured, performance pricing), the loan type and the loan purpose as well as the year of (no) covenant violation to be comparable. We also add the *change* in all borrower characteristics as well as in borrower credit rating from the time of (no) covenant violation until the initiation of the subsequent loan contract to the matching model. This ensures that borrower characteristics and credit rating between violators and non-violators are comparable at the time of

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[19] Propensity score matching models have been used extensively in the finance literature to compare outcomes across different types of firms. Recent examples include Drucker and Puri (2005), Bharath et al. (2011) and Saunders and Steffen (2011).

(no) violation as well as the change in their characteristics and credit quality is similar until the initiation of the new contract.

Propensity score matching has several advantages.[20] For example, matched samples reduce estimation biases and are generally more robust to model specifications (Rubin and Thomas ,2000). Moreover, matching does not impose any functional form. We use different estimation methods: Nearest Neighbor Matching and Local Linear Regressions (LLR) using both the Gaussian and the Epanechnikov kernel. In contrast to Nearest Neighbor Matching, LLR uses all information from the matched sample weighting the observations based on the differences in the propensity score between borrowers who violated and those who did not.

Panel A of Table V reports the results which are very similar to our earlier tests. Borrowers who have violated covenants in the prior loan pay higher spreads and face more and stricter covenants in the subsequent loan also when they are matched by their characteristics and their credit quality as well as the change of these until the initiation of the new contract.

[Table V]

Second, we use a regression discontinuity design similar to the approach in Chava and Roberts (2008). We cannot exactly replicate their design because they are able to use quarterly consecutive data in their analysis while we have unbalanced panel data. The basic idea behind a regression discontinuity design is to compare effects between comparable borrowers which only differ in the discontinuity of a covenant violation. Chava and Roberts (2008) investigate the effects of a covenant violation, controlling for borrower characteristics at the time of violation, on capital investment of the firm in the subsequent quarter. If we directly transferred this idea to our setting, we would investigate the effects of a covenant violation, controlling for borrower characteristics at the time of (no) violation, on the contract terms of the subsequent loan which might be initiated several years after the covenant violation. However, borrower characteristics might change

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[20] Propensity score matching also has some disadvantages. One concern might be that borrowers are only matched on observables. Accordingly, the results might still be influenced by unobserved, omitted, characteristics. Therefore, we also repeat in unreported regressions all analyses from Table IV including borrower fixed effects. The results are very similar.

substantially over such a long period and we would not compare effects between similar borrowers. We therefore seek to minimize this by only examining a subsample of borrowers who have an ongoing loan contract in the year prior to the initiation of the new loan and use the covenant (violation) information of these loans for our analysis.

Intuitively, we investigate price and covenant terms of two similar borrowers who are close to a covenant threshold where one is slightly above and the other slightly below the threshold. That is, price and covenant term changes in the subsequent loan are then unlikely to be driven by borrower credit risk. For each new contract, we examine the distance of each covenant in a borrower's prior loan to its respective covenant threshold at the end of the year prior to the initiation of the new loan. In this analysis, we only include borrowers where at least one covenant in the old contract is close to its threshold. To determine how close a covenant is to its threshold we calculate the individual covenant's looseness and use 1 standard deviation from covenant violation as a cutoff point. We assume that all covenant types are equally important and exclude all contracts where no covenant was 1 standard deviation around its threshold at the end of the year prior to the initiation of the new loan.[21] We then re-estimate the tests from Table IV. The results are reported in Panel B of Table V. All control variables from Table IV are included but not shown for brevity. The results are similar to our previous results. Borrowers pay higher spreads and face tighter covenants after having violated covenants in the prior loan consistent with our hypothesis.

Third, refinancing possibilities of borrowers could be related to borrower risk and that might be reflected in our results. A potential concern might be that some borrowers refinance their existing loans before a violation actually occurs. These borrowers could strategically negotiate different terms for the new loan and, therefore, not violate the covenants of the existing loan. In our data set, we are not able to differentiate between a "new" loan and a loan that was issued to refinance an existing one. An alternative explanation of our findings could thus be adverse selection of borrowers of lower quality are not able to refinance the loan and eventually violate covenants.

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[21] Note that although a 0.5 standard deviation as cut-off further reduces the number of observations the results are very similar.

To address this potential concern, we exclude all overlapping loans. That is, we identify all new loans that borrowers issue while their existing loans are yet to mature and drop them from our sample. Note that this does not exclude loans which are rolled over to finance projects which take longer to build when the roll over occurs at maturity of the old loan. We repeat our regressions and report the results in Panel C of Table V. Again, all control variables from Table IV are included but not shown for brevity. The results are very similar to those reported earlier. Borrowers with prior violations pay higher spreads, and face more covenants which are on average more restrictive.

Overall, the results are consistent with covenant violations reflecting the existence of information asymmetries among borrowers and lenders. Covenant violations in current loans signal moral hazard to lenders such that these account for the higher propensity of future risk shifting in a subsequent loan. Lenders thus increase the number and tightness of covenants in the subsequent new loan and gain more control rights over the firm. They further demand higher interest compensation on new loans when the probability for future risk shifting is higher consistent with higher monitoring costs.

3.3 The Dynamic Effect of Past Covenant Violations on New Loan Contract Terms

In this sub-section, we investigate how price and covenant loan terms change when firms repeatedly borrow in private loan markets. We first graphically explore the dynamics of average loan spreads, number of covenants in loan contracts, covenant looseness, and contract strictness as a function of repeated borrowing in the loan market. Figure 2 shows how the four measures develop over time for borrowers who repeatedly obtain new loans. The number of observations is provided in parentheses.

[Figure 2]

A first time borrower pays on average 178 bps above LIBOR which decreases to 108 bps in its fourth loan contract, conditional on never having violated a covenant. Borrowers become less opaque if they frequently borrow in the loan market. At the same time, violating a covenant in the

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first three loans increases loan spreads to 238 bps in the fourth loan. A violation in the first loan increases loan spreads to 228 bps, not violating a covenant in the second loan reduces spreads to 148 bps in the third loan. Overall, Figure 2 shows that covenant violations result in higher spreads for covenant violating borrowers in subsequent loans.

A similar pattern is observable with respect to the number of financial covenants in new loan contracts. Panel B shows how the average number of the financial covenants develops over time as borrowers return to the loan market for subsequent loans. Not violating covenants reduces the number of covenants in subsequent loans, whereas the number of covenants increases following a covenant violation in the prior loan contract.

Panel C and D show the results for covenant looseness and contract intensity. The figures depict comparable patterns again. Covenant violations result in stricter covenant thresholds and contract terms in subsequent loans. Not violating a financial covenant causes thresholds and contracts to be less strict. Note that decreasing borrower opaqueness due to repeated borrowing seems to cause covenant thresholds to adjust to comparable levels in the fourth loan offsetting, to some extent, the effect of violating a covenant. That is, there is an effect of loan frequency on loan contracts that had prior covenant violations.

Interestingly, comparing average loan spreads and covenant terms in the first and fourth loan path shows that average spreads are not significantly different when firms repeatedly borrow in loan markets. However, loans have on average significantly fewer and looser covenants in the fourth loan path compared to the first which also emphasizes the importance of non-price (and particular) covenant loan terms in addressing agency problems in loan markets.

We also explore price and contract terms dynamically over the second and third loan as a function of whether or not the borrower violated a covenant in the prior loan in a multivariate setting. Second Loan is an indicator variable equal to one if the borrower has obtained a second loan in our sample period (the first loan is the base case). "Second Loan, Violation in First Loan" is an indicator that is one if the borrower violated a covenant in the first loan. Third Loan and "Third Loan, Violation in Second Loan" are defined accordingly. The fourth (or even later) loan

of borrowers is excluded from this analysis to ensure statistical power. We report the results in Table VI.

[Table VI]

We find that borrowers who do not violate covenants receive lower interest rates in the subsequent loan; however, the coefficients are not statistically different from zero. Similar, those borrowers face fewer restrictions as to fewer financial covenants as well as looser covenants. These benefits accumulate over the second and third loan. Consistent with our earlier findings, after a covenant violation in either the first or the second loan, lenders increase interest rates of the second and third loan, respectively. Moreover, they also increase the number of covenants and make them stricter. These results, reflecting the dynamic effects of covenant violations on subsequent loan contract terms, are illustrated in Figure 2.

4. Covenant Violations and (Future) Loan Performance

We hypothesize that a covenant violation in a current loan is a signal of borrower moral hazard to the lender of a subsequent new loan. In our results above we show that lenders adjust contract terms of a new loan that allow for more intense monitoring of borrowers who have signaled a higher propensity for risk shifting by means of covenant violations in a prior loan. In this subsection, we investigate this in more detail by examining borrowers actual ex post behavior in new loans. In particular, we hypothesize that borrowers who violated covenants in a prior loan have a higher propensity for risk shifting also in a subsequent new loan, reflected in a higher propensity to violate covenants in the new loan.

To test this hypothesis empirically, we first examine the likelihood of covenant violations in the subsequent new loan contract when a covenant was violated in the prior loan using the following logit regression model.

$$Pr(VIOL) = a + b * Prior\ Covenant\ Violation + c * Loan\ Characteristics$$
$$+ d * Borrower\ Characteristics + e * Other\ Controls + \varepsilon$$

Pr(VIOL) is an indicator variable that is 1 if the borrower violates at least 1 covenant in the new loan. The results are reported in Table VII.

[Table VII]

The results reported in column 1 in Panel A in Table imply that borrowers who have violated covenants in the prior contract are 30% more likely to violate covenants also in the subsequent loan. The signs of the control variables' coefficients are as expected, larger firms with a higher market to book ratio are less likely to violate, whereas firms with a higher leverage have a higher probability of covenant violation.

We then examine whether borrowers also violate earlier on in a new loan contract following covenant violations in the prior loan contract. More precisely, conditional on borrowers violating covenants in the new loan, we focus on the time period between contract initiation date and covenant violation date (DAYS) in an OLS model with the following specification.

$$DAYS = a + b * Prior\ Covenant\ Violation + e * Loan\ Characteristics$$
$$+ f * Borrower\ Characteristics + g * Other\ Controls + \varepsilon$$

Column 2 in Panel A in Table VII reports the results. We find that borrowers who have violated covenants in the prior contract violate almost 109 days earlier in the subsequent new loan compared to borrowers with no prior violation. We additionally employ a hazard rate model for robustness. Note that a positive coefficient implies an earlier occurrence of covenant violations. Column 3 in Panel A in Table VII shows similar findings to our OLS model. Borrowers who violate a covenant in the prior contract have a higher hazard rate to do so again in the subsequent loan.

An alternative explanation of our result could simply be driven by the "bad luck" of borrowers who violated covenants in earlier loans without any intention to shift risks in the new contract. We use propensity score matching models to address this.

We match borrowers who have violated a covenant in the prior loan to borrowers who did not violate a covenant in the prior loan based on their characteristics at the time of the initiation of the subsequent new contract. These characteristics include size, profitability, current ratio, leverage, coverage, market-to-book ratio, industry and rating class and the number of previous

loans. Furthermore, we require the loan characteristics (maturity, size, secured, performance pricing), the loan type and the loan purpose as well as the year of the new loan to be comparable. We also add the loan contract terms of the new loan to the matching sample to account for the aforementioned possible change in the monitoring intensity of the lender in the new loan after a covenant violation in the prior loan contract, that is, potentially more restrictive contract terms in the new loan causing new violations. These terms are the number of covenants, covenant looseness, the contract's covenant intensity, and all possible combinations of these measures, as shown on the top of each column in Panels B and C. This implies that we compare the impact of a covenant violation in the prior loan on the probability for covenant violation in the subsequent loan between similar borrowers with similar loans and similar contract terms. If covenants are violated because of "bad luck" we expect the difference of the violation rates in the subsequent contract to be insignificant between borrowers who violated a covenant in the prior loan and those who did not.

Panel B and C of Table VII report the results which are very similar to our tests in Panel A, that is, borrowers who have violated covenants in the prior contract are more likely to violate covenants also in the subsequent loan. Also when borrowers are matched by their characteristics and their credit quality as well as their contract terms of the subsequent new contract we find that those who have violated covenants in the prior loan are about 30 percent more likely to violate covenants in the subsequent loan and this occurs earlier, compared to borrowers without violations in the prior loan contract. This is consistent with the interpretation that generally covenants are not violated due to "bad luck". Specifically, lenders adjust their monitoring and control of borrowers who have violated covenants in the prior loan to account for the higher probability of risk shifting in the subsequent new loan and implement stricter contract terms.

5. Discussion and Extensions

5.1 Profitability-Based versus Capital-Based Covenants

Our results show that, on average, the number of financial covenants is larger when borrowers have violated covenants in their prior loan contract. In this subsection, we investigate what type of covenants lenders modify in new loans after covenant violations which allow for a closer monitoring and more control of borrowers in response to higher agency costs. Similar to Christensen and Nikolaev (2012), we split covenants into two groups, profitability-based covenants and capital-based covenants. As explained earlier, we hypothesize that lenders will increase the number of profitability-based covenants following covenant violations to increase the states of the world in which they gain control rights over the firm. In other words, we expect to find a positive effect of prior covenant violations on the number of profitability based covenants in the subsequent loan if lenders want to be more actively involved in the monitoring and controlling of the firm.

Appendix IV reports a univariate analysis of profitability-based versus capital-based covenants for loans of borrowers that have (not) violated covenants in the prior loan.[22] (Senior) Debt to EBITDA and Fixed Charge Coverage are more frequently used after covenant violations. Interestingly, capital-based covenants, which indicate short-term changes, such as the current ratio, are also more likely to be used in the new loan.

[Table VIII]

Column (1) (Column (2)) of Table VIII reports regression results using the Number of Profitability Covenants (Number of Capital Covenants) as the dependent variable in multivariate tests. We use ordered logit models for estimation purposes and include the same control variables we also use in Table IV. Consistent with our hypothesis we find that the coefficient of the prior violation indicator is positive and significant at the 1% level explaining an elevated use of profitability based covenants in loan contracts of borrowers who have violated covenants in the

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[22] We list 16 out of our 17 types here because Cash & Cash Equivalents can neither be categorized as profitability nor as capital based covenant. Furthermore, we do not show multivariate results by covenant type because most tests lack statistical power due to the rather small occurrence of most types if investigated separately.

prior contract relative to those who have not. There is however no difference with respect to capital-based covenants. This is consistent with more monitoring and controlling from debtholders in subsequent new loans after covenant violations in the prior loan.

The switch in signs between the coefficients from Column (1) to Column (2) is important and consistent with the correlations reported in Christensen and Nikolaev (2012). It is suggestive of the differential use of these two types of covenants. For example, longer maturity loans have more profitability-based and fewer capital-based covenants relative to short-term loans which is intuitive because lenders cannot demand repayment unless borrowers are in violation of covenants. Monitoring and controlling by lenders via profitability-based covenants is thus more important if loans have longer maturities. This argument extends to higher levered firms as well as to firms with higher market to book ratios. Loan contracts that include performance pricing provisions, on the other hand, include a larger number of capital-based covenants. As the consequences of contingencies specified in the performance pricing provision are contracted upon ex-ante, lenders have already relinquished control in these states to the borrower. In other words, lenders try to align their incentives with those of shareholders by including capital-based covenants, giving the latter higher incentives to monitor because of their higher exposure to the firm. Overall, our results show that lenders use specific types of covenants to monitor and control, especially after covenant violations in the prior loan.

5.2 Covenants as Substitutes for (Expensive) Private Information

Our previous results suggest that lenders increase the number of covenants in new loans after violations because they want to more actively monitor and control the firm and constrain the probability of future risk shifting. In this subsection we test if lenders increase covenants after violations particularly for those new loans where there is usually less monitoring based on private and even more expensive soft information.

Diamond (1991) provides testable implications and proposes that monitoring of firms in the middle of the rating spectrum is most valuable to lenders. Highly rated borrowers need to maintain their high rating to borrow at lower costs. Monitoring via private information accordingly has little value and these firms issue debt with covenants. Low rated borrowers have little to lose if bad information is revealed through monitoring. Monitoring using private information is thus also less useful for these borrowers. We therefore define Low Monitoring as a binary variable that is 1 if the borrower is rated better than BBB+ or worse than BB- and classify the remaining six rating notches surrounding the barrier between investment and non-investment grade rated firms as especially beneficial for bank monitoring based on (more costly) private information. The results are reported in Table IX.

[Table IX]

We use four dependent variables, which are the number of covenants, the number of profitability based covenants, the number of capital covenants, and the percentage of profitability covenants. We find that borrowers who require less bank monitoring based on the above definition and have no covenant violations in the prior loan contract have fewer covenants in the subsequent loan contract. More importantly, lenders significantly increase the number of covenants and, in particular, profitability based covenants for those borrowers who are usually monitored less based on private and even more expensive soft information, consistent with our hypothesis that monitoring via covenants is a substitute for monitoring via (expensive) private information for specific borrower types. Accordingly, following a covenant violation in the prior loan, banks use covenants to monitor specifically those borrowers where private information is less valuable. In line with the terminology of Berger and Udell (2006), the use of covenants to monitor thus depends on the monitoring technology of the lender.

5.3 Covenant Violations and the Supply Side of Capital

Drucker and Puri (2009) find that loans that are sold in secondary loan markets exhibit more and tighter covenants. We argue above that more intensive use of covenants is used by lenders in new contracts to mitigate higher agency costs of borrowers after covenant violations. In this sub-section, we thus investigate the effect of covenant violations on the size and composition of the lending syndicate in the new loan subsequent to a covenant violation in a prior loan. If the covenant structure implemented by lenders successfully addresses agency concerns, we expect to find syndicates of similar size in loans to both violating and non-violating borrowers. We test this using the number of syndicate participants as the dependent variable.

[Tabel X]

The results are reported in column (1) of Table X. We do not find significant differences in the number of lenders that participate in syndicates of loans to violating and non-violating borrowers. The coefficient on our covenant violation indicator is even positive. This is consistent with covenants mitigating agency problems and increasing lender participation in the primary loan market. Intuitively, larger loans are positively related to the number of lenders. To ensure that our results are not driven by loan size, we scale the number of lenders by the dollar facility amount and run the same specification. We report the results in column (2) and obtain very similar results.

Finally, we show that borrowers who have violated covenants are not less or more likely to switch to a new lender in the loan following a covenant violation. We define Switch as an indicator variable equal to 1 when the borrower did not have a lending relationship with the lead arranger in a new contract for at least 1 year and zero otherwise (Ioannidou and Ongena, 2010).[23] Column (3) of Table X reports the results. Borrowers who have violated covenants in the previous loan are not more likely to switch to new lenders.

Overall, these results suggest that the covenant structure helps to overcome supply side frictions in primary loan markets.

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[23] We use other definitions for Switch in robustness tests and find similar results.

6. Conclusion

Covenants are an important element of loan contracts and can be found in almost every private credit agreement. In this paper, we analyze the effect of covenant violations on the design of the subsequent new loan contract to the same borrower. In particular, we focus on loan contracting as mechanism to mitigate informational and agency problems. We contend that covenant violations increase agency costs of borrowers and covenants, in particular, are set by lenders in a way to closely monitor borrowers and mitigate future risk shifting. Overall, we provide empirical evidence consistent with this prediction.

At the heart of our paper is a novel and hand-collected data set of covenants found in 5,411 loan facilities over the 1996 to 2010 period. We develop a new and intuitive measure that quantifies the looseness of financial covenants which can be viewed as the "Distance to Covenant Violation" or ("DCV") – measure.

We find that lenders increase loan spreads and implement more and tighter covenants upon covenant violations in newly issued loans consistent with elevated moral hazard concerns. We provide an array of robustness tests (for example, propensity score matching methods, a regression discontinuity design and other tests) to rule out the alternative hypothesis that borrowers who have violated covenants are of lower credit quality.

We then analyze the different loan paths of borrowers who violate or do not violate covenants when they repeatedly borrow in loan markets. Interestingly, on average, we find insignificant differences in loan spreads comparing the first loan with the last loan of each borrower. However, covenants become less numerous and looser over time highlighting the importance of covenants to mitigate agency problems in loan markets. Our earlier results as to higher loan spreads and tighter covenants after violations extend to the second and third violation of a borrower, respectively.

Analyzing how loans perform after origination and conditioning on the number and strictness of covenants as well as other loan and borrower characteristics, we document that

borrowers who have previously violated covenants are also more likely to violate in future loans. In further tests, we find that lenders particularly increase the number of so-called profitability-based covenants which allow them to actively intervene in the firms when their financial situation deteriorates. Moreover, lenders use covenants particularly for those borrowers where private information is less valuable.

Finally, we document that the number of lenders in syndicates of loans to borrowers that have violated covenants before is insignificantly different from those loans with non-violating borrowers. Moreover, we do not find differences in the switching of borrowers with or without prior violations suggesting that covenants help mitigate supply side friction in primary loan markets.

There are several avenues for future research. First, it would be interesting to compare new bond issuances of borrowers that have violated covenants both with bond issuances of non-violating borrowers and with loans to both type of firms. Bond holders, due to their more dispersed ownership are less able to monitor and often free-ride. Second are the implications of our findings on the secondary market for loans. For example, how do secondary market prices of loans react when borrowers are found to have violated covenants? Hopefully, our covenant looseness metric will help answer those questions and enhance our understanding on the role of financial contracting in addressing informational and agency problems in debt markets.

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Figure 1
Borrower Default Probability after No Covenant Violation and after a Covenant Violation

The figure shows the probability of default for a borrower not violating a financial covenant (Panel A) and for a borrower violating a financial covenant (Panel B). In Panel A, "Days since Past Contract without Violation" denotes the number of days from the end of a loan contract in which no covenant was violated. In Panel B, "Days since Covenant Violation" represents the number of days from a covenant violation in a loan contract.

Panel A: Probability of Default for Borrowers after No Covenant Violation

Panel B: Probability of Default for Borrowers after a Covenant Violation

33
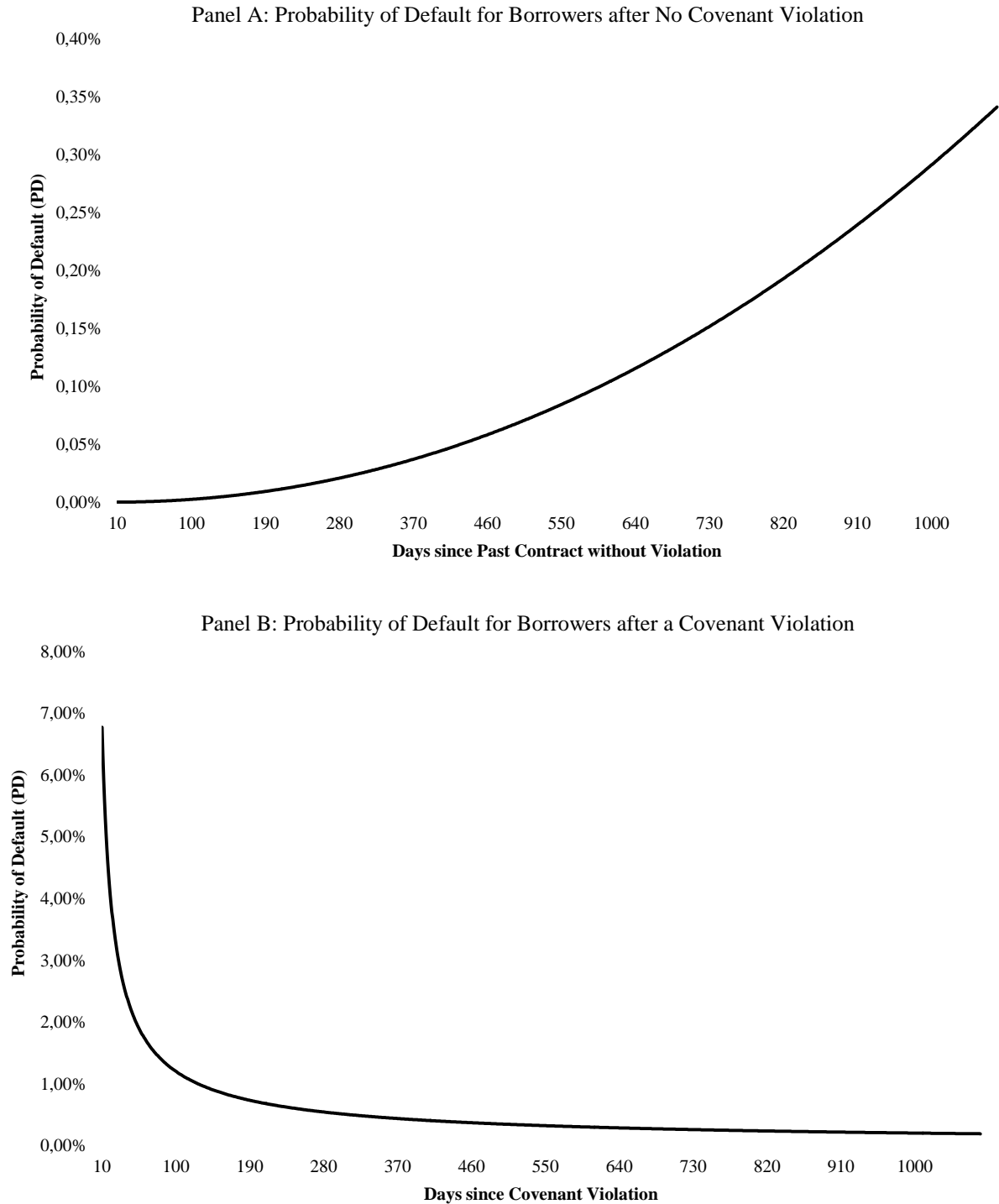
Figure 2
The Dynamic Effect of Past Covenant Violations on Loan Contract Terms

The figure shows how loan contract terms evolve over the number of loans a borrower obtains. It is split into whether a covenant was violated in the prior loan (1) or not (0). The number of loan observations is shown in parentheses. The loan contract terms are the average All-in-Spread-Drawn (Panel A), the number of financial covenants (Panel B), the covenant looseness (Panel C) and the contract strictness (Panel D). The variables are defined in Table I.

Panel A: The Effect of Past Covenant Violations on the All-in-Spread Drawn
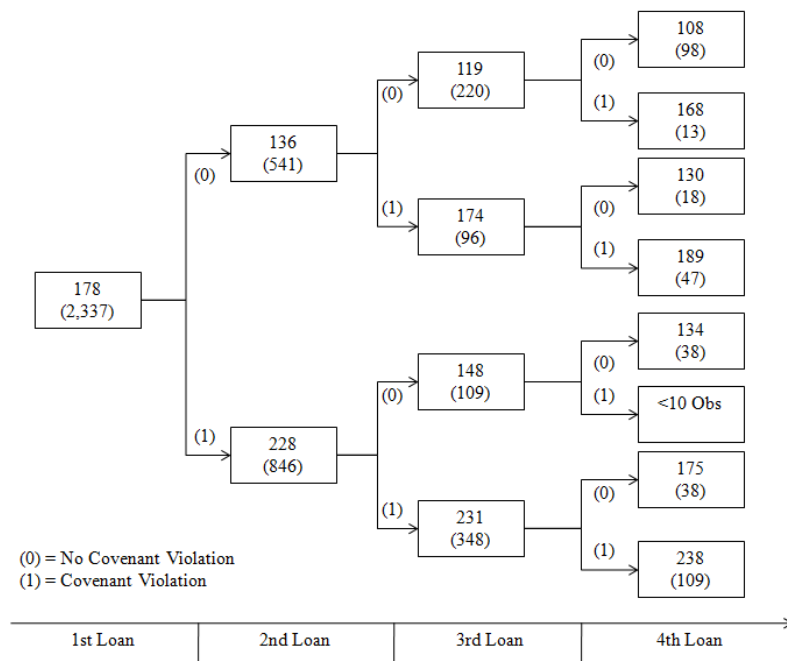
Panel B: The Effect of Past Covenant Violations on the Number of Covenants
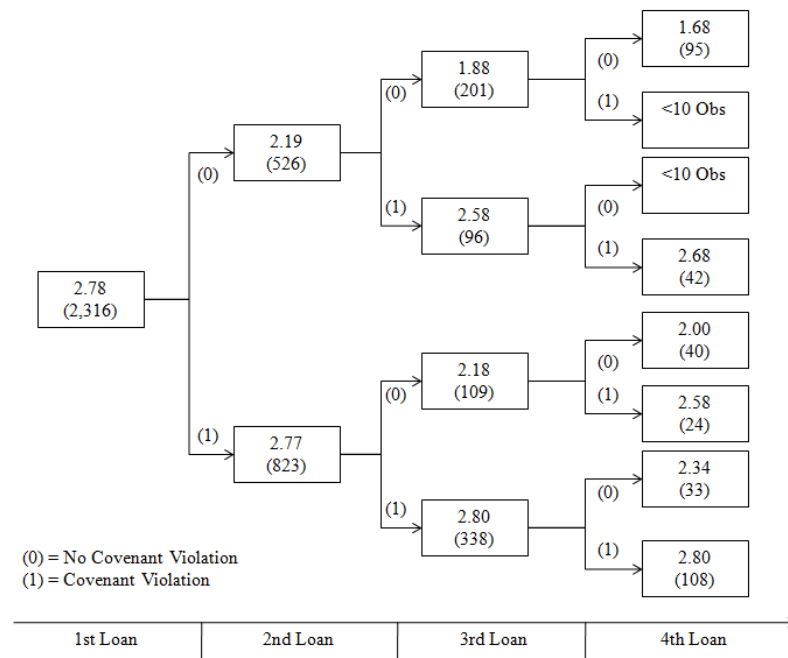
Figure 2 continued
The Dynamic Effect of Past Covenant Violations on Loan Contract Terms

Panel C: The Effect of Past Covenant Violations on the Covenant Looseness


```
                                                      (0)   5.30
                                            7.14            (90)
                                      (0)   (181)
                                                      (1)   3.62
                          5.93                              (10)
                          (457)
                      (0)                             (0)   4.04
                                      (1)   4.06            (17)
                                            (81)
                                                      (1)   2.87
        3.62                                               (39)
        (1,986)
                                                      (0)   4.60
                                            5.45            (36)
                                      (0)   (92)
                                                      (1)   4.04
                          2.72                             (23)
                      (1)  (679)
                                                      (0)   4.77
                                      (1)   2.50            (28)
                                            (275)
                                                      (1)   3.21
                                                           (84)
```

(0) = No Covenant Violation
(1) = Covenant Violation

| 1st Loan | 2nd Loan | 3rd Loan | 4th Loan |
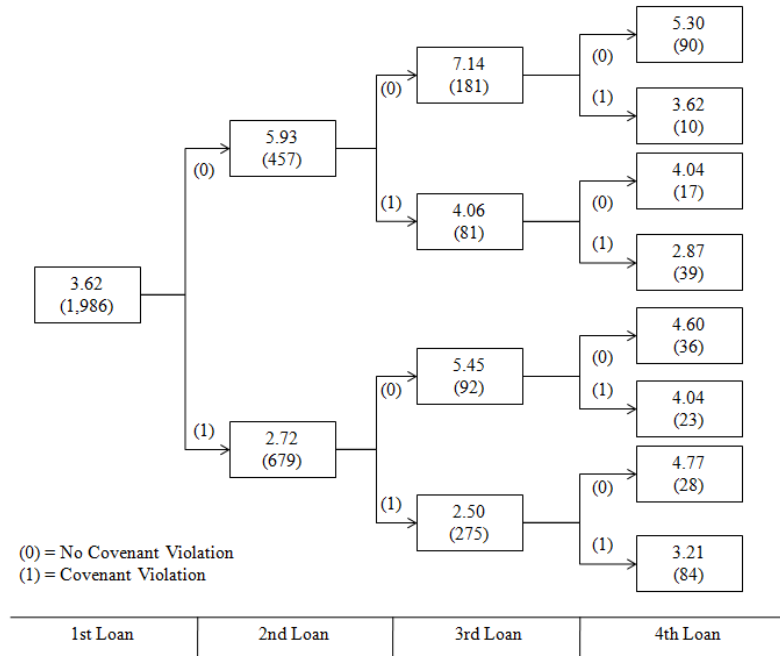
Panel D: The Effect of Past Covenant Violations on the Contract Intensity


```
                                                      (0)   <10 Obs
                                            4.16
                                      (0)   (25)
                                                      (1)   <10 Obs
                          4.49
                          (114)
                      (0)                             (0)   <10 Obs
                                      (1)   4.88
                                            (34)
                                                      (1)   <10 Obs
        4.17
        (1,100)
                                                      (0)   <10 Obs
                                            <10 Obs
                                      (0)
                                                      (1)   <10 Obs
                          5.01
                      (1)  (396)
                                                      (0)   <10 Obs
                                      (1)   5.26
                                            (138)
                                                      (1)   5.5
                                                           (40)
```

(0) = No Covenant Violation
(1) = Covenant Violation

| 1st Loan | 2nd Loan | 3rd Loan | 4th Loan |
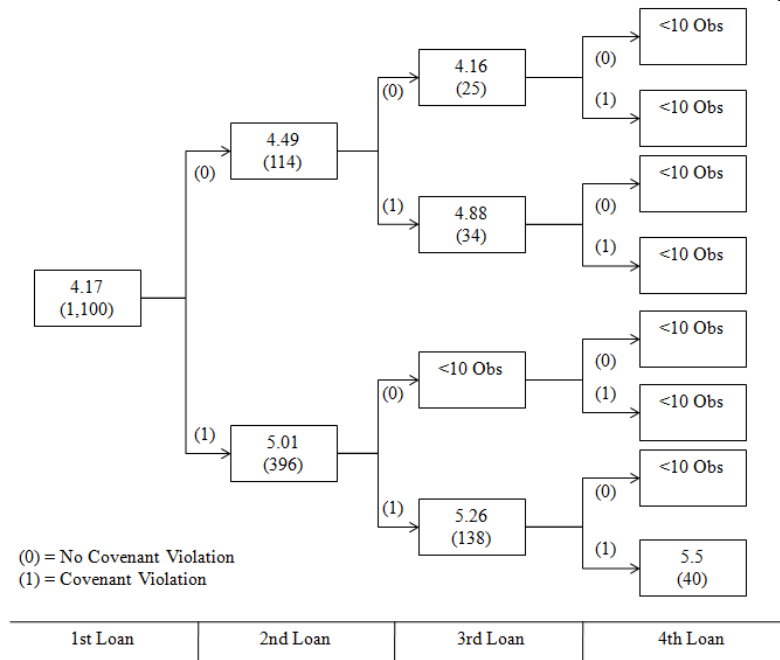
Table I
Variable Definitions

Variable	Description	Source
DEPENDENT VARIABLES		
Default	Dummy variable equal to one if the borrower defaults.	UCLA Bankruptcy
All-in-Spread-Drawn	All-in-Spread-Drawn (in bps) is the coupon spread over LIBOR plus one time fees on the drawn portion of the loan.	LPC Dealscan
Number of Financial Covenants	Number of financial covenants per contract.	SEC Filings
Covenant Looseness	For each covenant, the slack at loan origination is normalized by the covenant's standard deviation. Slack is the (absolute) difference between the actual value derived from accounting data and the covenant value. The covenant's standard deviation is derived from accounting data over the previous 12 quarters. Covenant Looseness reflects how many standard deviations the accounting variable/ratio can change before the covenant is violated. The about 80 individual covenants are consolidated to 1 value per contract using 2 aggregation levels. First, the average within each of the 17 different financial covenant types defined below is calculated. Second, the average across these 17 covenant types is derived.	Own Calculation
Contract Intensity	Index according to Bradley and Roberts (2004) ranging from 0 to 6. It is calculated as the sum of indicator variables for dividend restriction, asset-, equity-, debt sweep, secured, and 2 financial covenants or more.	LPC Dealscan
Number of Profitability Covenants	The number of profitability-based covenants following Christensen and Nikolaev (2011).	SEC Filings
Number of Capital Covenants	The number of capital-based covenants following Christensen and Nikolaev (2011).	SEC Filings
Percentage of Profitability Covenants	The percentage of profitability based covenants following Christensen and Nikolaev (2011) defined as profitablity covenants / (profitability covenants + capital covenants).	Own Calculation
Contract Violation	Dummy variable equal to one if the borrower violates at least one of the financial covenants in the loan agreement.	Own Calculation
Days to Contract Violation	Days from contract initiation date until the first financial covenant violation.	Own Calculation
Switch	Dummy variable equal to one for the first loan from this lender or if the borrower did not obtain a loan from the same lender over at least one year after the prior loan from this lender matured.	LPC Dealscan, NIC
INDEPENDENT VARIABLES		
Loan Characteristics		
Prior Covenant Violation	Dummy variable equal to one if the borrower violated a covenant in the prior loan of our sample.	Own Calculation
Days Violation to Subsequent Loan	Days from the violation of a financial covenant until the initiation of the subsequent loan.	Own Calculation
Facility Size	Facility amount of the loan in year 2000 $ million.	LPC Dealscan
Maturity (Months)	Maturity of the loan in months.	LPC Dealscan
Secured	Dummy variable equal to one if the loan is secured.	LPC Dealscan
Number of Loans	Number of loans the respective borrower has since the introduction of LPC Dealscan in 1987.	LPC Dealscan
Performance Pricing	Dummy variable equal to one, if the loan contains a performance pricing grid.	LPC Dealscan
Violation in Past Contract	Dummy equal to one, if the borrower violated a financial covenant in the respective past loan.	Own Calculation
Days since Past Contract (Violation)	Number of days from the end of the respective past loan contract until the current loan under investigation if no financial covenant was violated and the number of days from the covenant violation in the respective past loan contract until the current loan under investigation if a financial covenant was violated.	Own Calculation
Number of loans with no violation in between	Number of loans without a financial covenant violation between the respective past loan and the current loan under investigation.	Own Calculation
Low Monitoring	Dummy variable equal to one if the borrower has a rating higher than BBB+ or lower than BB- following Diamond (1991).	Compustat
Loan Purpose		
Corporate	Dummy variable equal to one, if the loan issuance purpose is "General" in the database.	LPC Dealscan
Recapitalization	Dummy variable equal to one, if the loan issuance purpose is "Recapitalization" in the database.	LPC Dealscan
Acquisition	Dummy variable equal to one, if the loan issuance purpose is "Acquisition" in the database.	LPC Dealscan
LBO	Dummy variable equal to one, if the loan issuance purpose is "Leveraged Buy Out" in the database.	LPC Dealscan
Back Up	Dummy variable equal to one, if the loan issuance purpose is "Back Up" in the database.	LPC Dealscan
Other	Dummy variable equal to one, if the loan issuance purpose is "Other" in the database.	LPC Dealscan
Loan Type		
Revolver < 1 Year	Dummy variable equal to one, if the loan type is "Revolver < 1 Year" in the database.	LPC Dealscan
Revolver ≥ 1 Year	Dummy variable equal to one, if the loan type is "Revolver ≥ 1 Year" in the database.	LPC Dealscan
Bridge Loan	Dummy variable equal to one, if the loan type is "Bridge Loan" in the database.	LPC Dealscan
364 - Day Facility	Dummy variable equal to one, if the loan type is "364 - Day Facility" in the database.	LPC Dealscan
Term Loan	Dummy variable equal to one, if the loan type is "Term Loan" in the database.	LPC Dealscan

Table I continued
Variable Definitions

Variable	Description	Source
Borrower Characteristics		
Total Assets	Total assets of the borrower in year 2000 $ million.	Compustat
Profitability	Ratio of EBITDA to sales.	Compustat
Current Ratio	Ratio of current assets to current liabilities.	Compustat
Leverage Ratio	Ratio of book value of total debt to book value of total assets.	Compustat
Coverage	Ratio of EBITDA to interest expenses.	Compustat
Market to Book	Ratio of the sum of book value of liabilities and market value of equity to book value of total assets.	Compustat
Borrower IPO (Years)	Years since the IPO of the borrower.	Compustat
Young	Dummy variable equal to one, if the borrower IPO date is less than 3 years ago.	Compustat
Small	Dummy variable equal to one, if the borrower is within the first quantile in year 2000 $ million asset size.	
Rating		
Investment Grade Rating	Dummy variable equal to one, if the borrower's S&P long-term issuer rating is BBB- or better.	LPC Dealscan
Non-Investment Grade Rating	Dummy variable equal to one, if the borrower's S&P long-term issuer rating is BB+ or worse.	LPC Dealscan
Not Rated	Dummy variable equal to one, if the borrower is not rated by S&P.	LPC Dealscan
Financial Covenants		
Asset Coverage Ratio	Current Assets to Liabilities	SEC Filings
Cash and Cash Equivalents	Cash and Cash Equivalents	SEC Filings
Current Ratio	Current Assets to Current Liabilities	SEC Filings
Debt Service Coverage Ratio	EBITDA to Interest Expense and Principal Payment	SEC Filings
Debt to Capitalization	Debt to Capitalization (Total Debt and Equity)	SEC Filings
Debt to EBITDA	Debt to EBITDA	SEC Filings
Debt to Net Worth	Debt to Net Worth	SEC Filings
EBITDA	EBITDA	SEC Filings
Fixed Charge Coverage Ratio	EBITDA to Interest Expense, Principal Payment, Income Tax and Dividend on Preferred Stock	SEC Filings
Interest Coverage Ratio	EBITDA to Interest Expense	SEC Filings
Net Worth	Net Worth	SEC Filings
Quick Ratio	Current Assets minus Inventory to Current Liabilities	SEC Filings
Senior Debt to Capitalization	Senior Debt to Capitalization (Total Debt and Equity)	SEC Filings
Senior Debt to EBITDA	Senior Debt to EBITDA	SEC Filings
Senior Debt to Net Worth	Senior Debt to Net Worth	SEC Filings
Tangible Net Worth	Tangible Net Worth	SEC Filings
Working Capital	Current Assets minus Current Liabilities	SEC Filings
Profitability Covenants	Debt to EBITDA, Debt Service Coverage Ratio, EBITDA, Fixed Charge Coverage Ratio, Interest Coverage Ratio, Senior Debt to EBITDA	
Capital Covenants	Asset Coverage Ratio, Current Ratio, Debt to Capitalization, Debt-to-Equity Ratio, Debt to Net Worth, Net Worth, Senior Debt to Net Worth, Working Capital, Quick Ratio	

Table II
Descriptive Statistics

The table shows descriptive statistics of loan and borrower characteristics for 5,411 loan facilities originated in the 1996 to 2010 period. Borrower data is from the year prior to loan origination. Detailed definitions of the variables are provided in Table I. All variables are winsorized at the 1% and 99% level.

	Obs	Mean	Std. Dev.	P 5	Median	P 95
Panel A: Dependent Variables						
Default	5,411	2.5%	15.7%	-	-	-
All-in-Spread-Drawn	5,315	183	124	30	162	400
Number of Financial Covenants	5,163	2.55	1.16	1	2	4
Covenant Looseness	4,978	3.95	5.75	0.25	2.32	12.21
Contract Intensity Index	1,985	4.55	1.66	1	5	6
Capital Covenants	5,163	57.7%	49.4%	-	-	-
Profitability Covenants	5,163	87.5%	33.0%	-	-	-
Contract Violation	5,163	55.0%	49.8%	-	-	-
Days to Contract Violation	3,023	427	397	96	288	1223
Switch	5,346	35.1%	47.7%	-	-	-
Panel B: Independent Variables						
B.1 Loan Characteristics						
Prior Covenant Violation	2,971	57.2%	49.5%	-	-	-
Days Violation to Subsequent Loan	1,699	1091.29	727.71	231	918	2457
Facility Size (Year 2000 USD mm)	5,411	298	415	11	151	1,139
Maturity (Months)	5,349	48	22	12	57	84
Secured	5,371	63.6%	48.1%	-	-	-
Number of Loans	5,411	7.91	6.06	2	6	19
Performance Pricing	5,411	68.8%	46.3%	-	-	-
Loan Purpose in % of Firms						
Corporate	5,411	45.7%	49.8%	-	-	-
Recapitalization	5,411	21.5%	41.1%	-	-	-
Acquisition	5,411	19.9%	39.9%	-	-	-
Back Up	5,411	6.5%	24.7%	-	-	-
Other	5,411	4.9%	21.6%	-	-	-
LBO	5,411	1.6%	12.4%	-	-	-
Loan Type in % of Firms						
Revolver ≥ 1 Year	5,411	60.2%	49.0%	-	-	-
Term Loans	5,411	26.3%	44.0%	-	-	-
364 - Day Facility	5,411	9.1%	28.7%	-	-	-
Revolver < 1 Year	5,411	2.1%	14.2%	-	-	-
Bridge Loan	5,411	1.6%	12.6%	-	-	-
B.2 Borrower Characteristics						
Total Assets (Year 2000 USD mm)	5,409	3,291	6,667	65	854	17,155
Profitability	5,376	0.17	0.14	0.01	0.14	0.46
Current Ratio	5,333	1.84	1.12	0.58	1.59	3.83
Leverage	5,401	0.33	0.22	0.007	0.30	0.73
Coverage	5,241	15.44	40.75	0.39	4.48	66.67
Market to Book	5,330	1.68	0.89	0.85	1.40	3.45
Borrower IPO (Years)	4,476	45	46	1.61	12.96	104.96
Credit Rating						
Investment Grade Rating	5,411	24.1%	42.8%	-	-	-
Non-Investment Grade Rating	5,411	34.5%	47.5%	-	-	-
Not Rated	5,411	41.4%	49.3%	-	-	-

Table II continued
Descriptive Statistics

	Obs	Mean	Std. Dev.	Loan Amount ($Bil)		
Panel C: Distribution of Covenants				Average	Median	Total
Debt to EBITDA	5,163	61.70%	48.60%	0.27	0.14	860
Interest Coverage	5,163	44.30%	49.70%	0.34	0.19	778
Fixed Charge Coverage	5,163	41.70%	49.30%	0.18	0.1	388
Net Worth	5,163	23.80%	42.60%	0.26	0.13	319
Debt to Capitalization	5,163	20.00%	40.00%	0.39	0.22	403
Tangible Net Worth	5,163	14.40%	35.10%	0.16	0.07	119
Senior Debt to EBITDA	5,163	13.30%	34.00%	0.22	0.14	151
EBITDA	5,163	11.90%	32.40%	0.11	0.05	68
Current Ratio	5,163	6.90%	25.30%	0.14	0.07	50
Debt Service Coverage	5,163	4.60%	21.00%	0.17	0.08	40
Debt to Net Worth	5,163	4.10%	19.90%	0.42	0.06	88
Quick Ratio	5,163	1.80%	13.40%	0.08	0.04	7
Asset Coverage Ratio	5,163	1.60%	12.60%	0.19	0.14	16
Cash and Cash Equivalents	5,163	1.10%	10.60%	0.21	0.05	12
Senior Debt to Capitalization	5,163	0.90%	9.40%	0.33	0.11	15
Working Capital	5,163	0.80%	8.80%	0.1	0.05	4
Senior Debt to Net Worth	5,163	0.30%	5.70%	0.11	0.05	2

	Obs	Mean	Std. Dev.	Loan Amount ($Bil)		
Panel D: Profitability vs. Capital Covenants				Average	Median	Total
Capital Covenants	5,163	57.7%	49.4%	0.29	0.13	859
Profitability Covenants	5,163	87.5%	33.0%	0.28	0.14	1,269

Table III
Descriptive Statistics by Covenant Violation in the Prior Loan Contract

The table shows the mean and median of loan contract terms, and loan and borrower characteristics for granted loans in the time period 1996 to 2010 split into whether a covenant was violated in the prior loan ("Violation") or no covenant violation ("No Violation") occurred. The statistical significance of the difference between "Violation" and "No Violation" of each variable is tested via a t-test and a Wilcoxon rank sum test where the last two columns provide the corresponding t- and z-statistic. All variables are defined in Table I. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

	No Violation (A)		Violation (B)		(A) - (B)	
	Mean	Median	Mean	Median	t-statistic	z-statistic
Panel A: Dependent Variables						
Default	0.008	0	0.041	0	-5.350***	-5.330***
All-in-Spread-Drawn	131	100	229	220	-21.920***	-23.140***
Number of Financial Covenants	2.02	2	2.62	3	-15.030***	-14.600***
Covenant Looseness	5.82	3.76	2.84	1.78	13.108***	18.101***
Contract Intensity Index	4.57	5	5.12	5	-5.340***	-4.430***
Capital Covenants	0.56	1	0.46	0	5.79***	5.75***
Profitability Covenants	0.77	1	0.94	1	-13.64***	-13.21***
Contract Violation	0.28	0	0.70	1	-24.630***	-22.340***
Days to Contract Violation	493	399	414	206	2.960***	1.690*
Switch	0.20	0	0.28	0	-5.160***	-5.140***
Panel B: Independent Variables						
B.1 Loan Characteristics						
Facility Size (Year 2000 USD mm)	428	252	287	155	8.670***	10.600***
Maturity (Months)	44.0	50.0	51.0	60.0	-8.730***	-7.520***
Secured	0.40	0	0.79	1	-23.200***	-21.330***
Number of Loans	10.46	9	9.44	8	4.286***	4.796***
Performance Pricing	0.73	1	0.63	1	6.273***	6.232***
Loan Purpose in % of Firms						
Corporate	0.61	1	0.48	0	7.340***	7.270***
Recapitalization	0.10	0	0.16	0	-4.430***	-4.410***
Acquisition	0.09	0	0.25	0	-11.530***	-11.280***
Back Up	0.12	0	0.02	0	11.090***	10.870***
Other	0.04	0	0.05	0	-1.64	-1.64
LBO	0.02	0	0.02	0	-0.51	-0.51
Loan Type in % of Firms						
Revolver ≥ 1 Year	0.64	1	0.56	1	4.380***	4.360***
Term Loans	0.16	0	0.36	0	-11.680***	-11.430***
364 - Day Facility	0.15	0	0.04	0	9.910***	9.750***
Revolver < 1 Year	0.02	0	0.02	0	0.48	0.48
Bridge Loan	0.02	0	0.02	0	0.77	0.77
B.2 Borrower Characteristics						
Total Assets (Year 2000 USD mm)	5,737	2,161	2,938	907	10.510***	13.530***
Profitability	0.18	0.16	0.17	0.14	1.920**	3.510***
Current Ratio	1.68	1.50	1.71	1.53	-0.98	-1.37
Leverage	0.28	0.26	0.38	0.37	-13.470***	-13.800***
Coverage	17.96	6.68	10.01	3.57	6.460***	15.550***
Market to Book	1.68	1.41	1.57	1.33	6.740***	5.990***
Borrower IPO (Years)	50	17	42	13	4.640***	6.240***
Credit Rating						
Investment Grade Rating	0.47	0	0.13	0	21.530***	20.030***
Non-Investment Grade Rating	0.24	0	0.53	1	-16.850***	-16.100***
Not Rated	0.29	0	0.34	0	-2.290**	-2.280**

Table IV
Dynamic Loan Contracting Following Covenant Violations in the Prior Loan
The table reports results from multivariate regressions of various price and non-price loan contract terms on covenant violations and control variables. These are the (1) All-in-Spread-Drawn, (2) the number of financial covenants, (3) the covenant looseness and (4) the contract intensity. Prior covenant violation is a dummy variable equal to one if the borrower violated a financial covenant in the prior loan contract. All variables are described in Table I. In Model (4) "Secured" is excluded as it is part of the dependent variable. Standard errors shown in parentheses are robust to heteroscedasticity and clustered at the firm level. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

	(1)	(2)	(3)	(4)
Dependent Variable	AISD	Covenant Number	Covenant Looseness	Contract Intensity
Regression Methodology	OLS	Ordered Logit	OLS	Ordered Logit
Prior Covenant Violation	17.706***	0.412***	-1.521***	0.463*
	(3.899)	(0.108)	(0.342)	(0.239)
Loan Characteristics				
Ln(Maturity in Months)	-13.996**	0.374**	0.510*	0.687***
	(6.209)	(0.148)	(0.274)	(0.231)
Secured	51.563***	0.012	-0.905*	
	(5.538)	(0.130)	(0.471)	
Log (Facility Size)	-12.320***	0.023	-0.258*	-0.162
	(2.371)	(0.057)	(0.136)	(0.127)
Ln(Number of Loans)	4.124	-0.210	-0.142	-0.252
	(4.211)	(0.131)	(0.376)	(0.282)
Performance Pricing	-39.950***	0.356***	0.489**	0.149
	(4.683)	(0.122)	(0.247)	(0.230)
Borrower Characteristics				
Profitability	-0.536**	0.005	-0.008	0.008
	(0.230)	(0.005)	(0.013)	(0.009)
Current Ratio	-0.064***	0.001	0.004*	-0.002
	(0.025)	(0.001)	(0.002)	(0.001)
Leverage	0.682***	0.003	-0.026***	0.003
	(0.142)	(0.004)	(0.009)	(0.006)
Coverage	-0.001**	5.97E-06	3.93E-04***	1.19E-04**
	(0.001)	(1.38E-05)	(1.05E-04)	(5.31E-05)
Market to Book	-0.118***	4.67E-04	0.002	-0.006***
	(0.027)	(0.001)	(0.003)	(0.001)
Log (Total Assets)	-5.249*	-0.380***	0.387*	-0.195
	(2.826)	(0.074)	(0.221)	(0.151)
Constant	483.514***	YES	17.402***	YES
	(41.432)		(4.142)	
Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Rating Class Fixed Effects	YES	YES	YES	YES
Loan Type Fixed Effects	YES	YES	YES	YES
Loan Purpose Fixed Effects	YES	YES	YES	YES
Number of Observations	2,786	2,709	2,572	848
R^2	0.664	0.165	0.221	0.185

Table V
Dynamic Loan Contracting Following Covenant Violations in the Prior Loan – Robustness

The table reports results from multivariate regressions of different dependent variables. These are the (1) All-in-Spread-Drawn, (2) the number of financial covenants, (3) the covenant looseness and (4) the contract intensity. Prior covenant violation is a dummy variable equal to one if the borrower violated a financial covenant in the prior loan contract. Panel A shows results from propensity score matching using a nearest neighbor estimator with 10, 50 and 100 nearest neighbors together with a Gaussian and an Epanechnikov kernel estimator with a bandwidth of 0.01. The propensity score is calculated using a probit regression of covenant violation on all control variables from Table V in addition to changes in the borrower characteristics variables in Table V, the change in facility size, and the change in borrower rating from the time of (no) violation until the initiation of the subsequent new contract. In parentheses bootstrapped standard errors are reported using 50 replications. Panel B reports the results from a regression discontinuity analysis. It only includes these new loans where in the prior contract the distance of at least one covenant to its respective covenant threshold is at maximum 1 standard deviation in the year prior to the new loan contract, that is, the covenant looseness of at least one covenant is in the interval (-1; 1) in the year before the new contract is initiated. Panel C reports the results excluding all overlapping loans of each borrower, that is, new loans that are originated while existing loans have not yet matured. All variables are described in Table I. In Model (4) "Secured" is excluded as it is part of the dependent variable. Standard errors shown in parentheses are robust to heteroscedasticity and clustered at the firm level. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

Panel A. Propensity Score Matching	(1)	(2)	(3)	(4)
	AISD	Covenant Number	Covenant Looseness	Contract Intensity
Prior Covenant Violation (Nearest Neighbor (n=10))	37.26* (17.437)	0.31*** (.123)	-0.71** (.318)	0.41 (.304)
Prior Covenant Violation (Nearest Neighbor (n=50))	48.39*** (9.373)	0.3** (.100)	-0.84*** (.265)	0.12 (.169)
Prior Covenant Violation (Nearest Neighbor (n=100))	53.79*** (7.275)	0.19** (.078)	-1.01*** (.267)	0.41** (.196)
Prior Covenant Violation (Gaussian)	23.21* (11.327)	0.32** (.143)	-0.71** (.320)	0.41 (.254)
Prior Covenant Violation (Epanechnikov)	42.81** (18.483)	0.35** (.167)	-1.03*** (.370)	0.44 (.368)

Panel B. Regression Discontinuity	(1)	(2)	(3)	(4)
Dependent Variable	AISD	Covenant Number	Covenant Looseness	Contract Intensity
Regression Methodology	OLS	Ordered Logit	OLS	Ordered Logit
Prior Covenant Violation	21.226** (9.962)	0.191 (0.256)	-0.562** (0.241)	Insufficient Observations
Loan Characteristics	YES	YES	YES	YES
Borrower Characteristics	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Rating Class Fixed Effects	YES	YES	YES	YES
Loan Type Fixed Effects	YES	YES	YES	YES
Loan Purpose Fixed Effects	YES	YES	YES	YES
Number of Observations	726	715	692	
R^2	0.509	0.164	0.124	

Table V continued
Dynamic Loan Contracting Following Covenant Violations in the Prior Loan - Robustness

Panel C. Excluding Overlapping Loans	(1)	(2)	(3)	(4)
Dependent Variable	AISD	Covenant Number	Covenant Looseness	Contract Intensity
Regression Methodology	OLS	Ordered Logit	OLS	Ordered Logit
Prior Covenant Violation	23.956***	0.358**	-2.365***	0.352
	(5.144)	(0.144)	(0.484)	(0.364)
Loan Characteristics	YES	YES	YES	YES
Borrower Characteristics	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Rating Class Fixed Effects	YES	YES	YES	YES
Loan Type Fixed Effects	YES	YES	YES	YES
Loan Purpose Fixed Effects	YES	YES	YES	YES
Number of Observations	1517	1463	1329	428
R^2	0.651	0.144	0.232	0.243

Table VI

The Dynamic Effect of Past Covenant Violations on Loan Contract Terms

The table reports results from multivariate regressions of various price and non-price loan contract terms on covenant violations and control variables. These are the (1) All-in-Spread-Drawn, (2) the number of financial covenants, (3) the covenant looseness and (4) the contract intensity. The regressions segregate the sample into different time periods reflecting the sequence of loans of individual borrowers. Second (Third) Loan is an indicator variable for the second (third) loan, the first loan is the base case. "Second Loan, Violation in First Loan" (Third Loan, Violation in Second Loan) is an indicator variable equal to 1 if the borrower has violated a covenant in the first (second) loan and obtains the second (third) loan. All variables are described in Table I. In Model (4) "Secured" is excluded as it is part of the dependent variable. Standard errors shown in parentheses are robust to heteroscedasticity and clustered at the firm level. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

	(1)	(2)	(3)	(4)
Dependent Variable	AISD	Covenant Number	Covenant Looseness	Contract Intensity
Regression Methodology	OLS	Ordered Logit	OLS	Ordered Logit
Second Loan	-6.432	-0.196*	1.706***	0.077
	(4.118)	(0.114)	(0.448)	(0.264)
Second Loan, Violation in First Loan	17.259***	0.351**	-1.782***	0.140
	(5.069)	(0.138)	(0.439)	(0.298)
Third Loan	-7.932	-0.157	2.309***	-0.045
	(5.719)	(0.134)	(0.637)	(0.345)
Third Loan, Violation in Second Loan	12.234*	0.347**	-2.404***	0.274
	(6.756)	(0.161)	(0.644)	(0.380)
Loan Characteristics	YES	YES	YES	YES
Borrower Characteristics	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Rating Class Fixed Effects	YES	YES	YES	YES
Loan Type Fixed Effects	YES	YES	YES	YES
Loan Purpose Fixed Effects	YES	YES	YES	YES
Number of Observations	4145	4074	3872	1684
R^2	0.620	0.132	0.170	0.193

Table VII
Covenant Violations and the Propensity for Violation in the Subsequent Loan Contract

The table reports results relating the propensity for covenant violations and the days until the violation occurs in the current contract to prior covenant violations. Panel A shows a logit regression of contract violation on prior covenant violation and other control variables. Contract violation is a dummy variable equal to one if the borrower violates a financial covenant in the current loan contract. Prior covenant violation is a dummy variable equal to one if the borrower violated a financial covenant in the prior loan contract. Panel A also shows an OLS and a hazard rate model of the number of days from contract initiation until a covenant violation occurs in the current contract on prior covenant violation and other control variables, conditional on violation. All variables are described in Table I. Standard errors shown in parentheses are robust to heteroscedasticity and clustered at the firm level. Panel B reports the average percentage difference of covenant violation in the current loan contract between borrowers with and without a covenant violation in the prior loan contract controlling for borrower and loan characteristics in a propensity score matching model. In addition, the propensity score matching model includes loan contract terms, shown at the top of each column, such as the number of covenants (1), the covenant looseness (2), the contract intensity (3), and all possible combinations of these. The propensity score is calculated using a probit regression of covenant violation on the aforementioned contract terms as well as the log of total assets, profitability, current ratio, leverage, coverage, market to book ratio, and industry and rating class fixed effects to control for borrower characteristics, and on the log of loan maturity in months, the facility size and the number of loans as well as dummy variables if the loan is secured and contains a performance pricing grid, and loan type and loan purpose fixed effects to control for loan characteristics. Further control variables are year fixed effects. Panel C reports the average difference in the number of days from contract initiation until a covenant violation occurs in the current contract between borrowers with and without a covenant violation in the prior loan contract controlling for borrower and loan characteristics in a propensity score matching model. In addition, the propensity score matching model includes loan contract terms, shown at the top of each column, such as the number of covenants (1), the covenant looseness (2), the contract intensity (3), and all possible combinations of these. The propensity score is derived as in Panel B. In Panels B and C we use a nearest neighbor estimator with 10, 50 and 100 nearest neighbors together with a Gaussian and an Epanechnikov kernel estimator with a bandwidth of 0.01. In parentheses bootstrapped standard errors are reported using 50 replications. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

Panel A. Regression Results	(1)	(2)	(3)
Dependent Variable	**Contract Violation**	**Days to Contract Violation**	
Regression Methodology	Logit	OLS	Hazard Model
Prior Covenant Violation	1.243***	-108.779***	0.310***
	(0.157)	(38.697)	(0.102)
Loan Characteristics			
Ln(Maturity in Months)	0.228	146.132***	-0.525***
	(0.159)	(28.821)	(0.095)
Secured	0.078	-29.553	0.047
	(0.191)	(33.865)	(0.112)
Log (Facility Size)	0.149*	-26.564	0.050
	(0.083)	(19.090)	(0.055)
Ln(Number of Loans)	0.233	-92.414**	0.367***
	(0.168)	(38.312)	(0.117)
Performance Pricing	0.266	21.744	-0.075
	(0.165)	(26.339)	(0.084)
Borrower Characteristics			
Profitability	0.001	1.074	-0.008**
	(0.007)	(1.211)	(0.004)
Current Ratio	3.94E-04	0.077	-1.97E-04
	(0.001)	(0.163)	(0.001)
Leverage	0.010**	-0.009	0.003
	(0.005)	(0.785)	(0.003)
Coverage	-1.16E-05	0.003	-7.72E-06
	(2.58E-05)	(0.004)	(1.10E-05)
Market to Book	-0.002**	-0.255	0.001*
	(0.001)	(0.230)	(0.001)
Log (Total Assets)	-0.205*	34.341	-0.109*
	(0.106)	(22.317)	(0.066)
Constant	-0.041	-606.719**	-
	(2.166)	(271.189)	
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Rating Class Fixed Effects	YES	YES	YES
Loan Type Fixed Effects	YES	YES	YES
Loan Purpose Fixed Effects	YES	YES	YES
Number of Observations	1,931	1,039	1,039
R^2	0.235	0.228	-

Table VII continued
Covenant Violations and the Propensity for Violation in the Subsequent Loan Contract

Panel B. Propensity Score Matching Estimation - Difference in Probability of Covenant Violation

Variable additionally included in propensity score matching model	Covenant Number (1)	Covenant Looseness (2)	Contract Intensity (3)	(1) + (2)	(1) + (3)	(2) + (3)	(1) + (2) + (3)
Estimator							
Nearest Neighbor (n = 10)	31.833%***	34.426%***	29.895%***	32.919%***	30.105%***	35.420%***	34.562%***
	(0.026)	(0.026)	(0.052)	(0.024)	(0.052)	(0.054)	(0.056)
Nearest Neighbor (n = 50)	31.564%***	33.153%***	31.714%***	32.333%***	31.805%***	31.989%***	31.416%***
	(0.021)	(0.023)	(0.042)	(0.029)	(0.050)	(0.060)	(0.054)
Nearest Neighbor (n = 100)	30.034%***	33.634%***	27.680%***	33.117%***	27.531%***	30.120%***	29.934%***
	(0.024)	(0.023)	(0.046)	(0.027)	(0.053)	(0.050)	(0.049)
Gaussian	31.520%***	34.792%***	33.080%***	33.125%***	29.914%***	34.810%***	33.743%***
	(0.027)	(0.029)	(0.046)	(0.028)	(0.066)	(0.078)	(0.075)
Epanechnikov	31.881%***	34.912%***	32.028%***	32.221%***	28.132%***	35.221%***	32.463%***
	(0.019)	(0.027)	(0.043)	(0.025)	(0.051)	(0.064)	(0.052)

Panel C. Propensity Score Matching Estimation - Difference in Days to Covenant Violation

Variable additionally included in propensity score matching model	Covenant Number (1)	Covenant Looseness (2)	Contract Intensity (3)	(1) + (2)	(1) + (3)	(2) + (3)	(1) + (2) + (3)
Estimator							
Nearest Neighbor (n = 10)	-52.033	-103.922**	-173.991*	-84.171*	-178.392*	-160.434*	-166.075*
	(31.837)	(49.754)	(89.898)	(48.874)	(99.356)	(91.095)	(95.763)
Nearest Neighbor (n = 50)	-77.308**	-89.230**	-183.112**	-97.168**	-191.273***	-189.048**	-189.818**
	(35.354)	(41.695)	(77.731)	(41.766)	(70.687)	(76.159)	(96.386)
Nearest Neighbor (n = 100)	-73.738**	-97.381**	-166.642***	-112.398***	-166.642**	-161.556**	-161.556**
	(35.282)	(46.616)	(51.770)	(37.901)	(72.397)	(80.842)	(76.757)
Gaussian	-59.006*	-84.163*	-200.386*	-51.470	-167.908*	-191.263	-182.381
	(33.719)	(46.628)	(110.667)	(40.676)	(89.477)	(117.114)	(112.487)
Epanechnikov	-63.957*	-107.415**	-224.958**	-67.193*	-173.327**	-273.859***	-257.726***
	(35.032)	(43.220)	(98.815)	(37.130)	(83.258)	(102.990)	(94.301)

Table VIII
Profitability-Based versus Capital-Based Covenants and Dynamic Loan Contracting

The table reports results from the analysis of various covenant types. These are categorized into profitability-based and capital-based covenants following Christensen and Nikolaev (2012). Panel B reports the results from regressions relating the (1) number of profitability-based covenants, (2) the number of capital-based covenants, and (3) the percentage of profitability-based covenants to prior covenant violation. Prior covenant violation is a dummy variable equal to one if the borrower violated a financial covenant in the prior loan contract. All variables are described in Table I. In Model (4) "Secured" is excluded as it is part of the dependent variable. Standard errors shown in parentheses are robust to heteroscedasticity and clustered at the firm level. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

	(1)	(2)	(3)
Dependent Variable	**Number of Profitability Covenants**	**Number of Capital Covenants**	**Percentage of Profitability Covenants**
Regression Methodology	Ordered Logit	Ordered Logit	OLS
Prior Covenant Violation	0.415***	-0.012	0.041**
	(0.116)	(0.148)	(0.019)
Loan Characteristics			
Ln(Maturity in Months)	0.763***	-0.448***	0.061***
	(0.131)	(0.136)	(0.019)
Secured	0.239*	-0.300*	0.036
	(0.137)	(0.171)	(0.023)
Log (Facility Size)	0.076	-0.101	0.024***
	(0.063)	(0.063)	(0.009)
Ln(Number of Loans)	-0.272*	0.019	-0.018
	(0.150)	(0.156)	(0.022)
Performance Pricing	0.220*	0.331***	-0.014
	(0.124)	(0.127)	(0.018)
Borrower Characteristics			
Profitability	0.003	0.007	-0.001
	(0.006)	(0.006)	(0.001)
Current Ratio	-0.000	0.001	-0.000
	(0.001)	(0.001)	(0.000)
Leverage	0.014***	-0.022***	0.002***
	(0.004)	(0.005)	(0.000)
Coverage	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Market to Book	0.003***	-0.004***	0.001***
	(0.001)	(0.001)	(0.000)
Log (Total Assets)	-0.343***	-0.086	-0.029**
	(0.090)	(0.095)	(0.014)
Constant	YES	YES	0.341**
			(0.163)
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Rating Class Fixed Effects	YES	YES	YES
Loan Type Fixed Effects	YES	YES	YES
Loan Purpose Fixed Effects	YES	YES	YES
Number of Observations	2,699	2,699	2,693
R^2	0.201	0.161	0.308

Table IX
Covenants as Substitutes for Monitoring via Private Information

The table reports results from multivariate regressions using various loan contract terms as dependent variables. These are the (1) number of financial covenants, (2) the number of profitability-based covenants, (3) the number of capital-based covenants, and (4) the percentage of profitability-based covenants. Low Monitoring is a binary variable equal to 1 if the borrower has a rating better than BBB+ or worse than BB-; in all other rating classes, High Monitoring is 1. All variables are described in Table I. Standard errors shown in parentheses are robust to heteroscedasticity and clustered at the firm level. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

Dependent Variable	(1) Covenant Number	(2) Number of Profitability Covenants	(3) Number of Capital Covenants	(4) Percentage of Profitability Covenants
Regression Methodology	Ordered Logit	Ordered Logit	Ordered Logit	OLS
Low Monitoring	-1.267***	-0.985***	-0.306	-0.067
	(0.226)	(0.238)	(0.257)	(0.049)
Prior Covenant Violation * Low Monitoring	1.055***	1.013***	-0.419	0.119**
	(0.283)	(0.277)	(0.340)	(0.050)
Prior Covenant Violation * High Monitoring	0.426***	0.466***	-0.094	0.067**
	(0.149)	(0.161)	(0.204)	(0.029)
Loan Characteristics	YES	YES	YES	YES
Borrower Characteristics	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Loan Type Fixed Effects	YES	YES	YES	YES
Loan Purpose Fixed Effects	YES	YES	YES	YES
Wald Test for Equality of Interaction Terms (p-value)	0.000	0.000	0.464	0.012
Observations	1,821	1,813	1,813	1,808
R^2	0.189	0.213	0.156	0.308

Table X
Covenant Violations, Relationships and Loan Liquidity
The table reports results from multivariate regressions using various dependent variables. These are the (1) number of lenders, (2) number of lenders over facility size, and (3) switch. All variables are described in Table I. Standard errors shown in parentheses are robust to heteroscedasticity and clustered at the firm level. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

	(1)	(2)	(3)
Dependent Variable	Number of Lenders	Number of Lenders / Facility Size	Switch
Regression Methodology	OLS	OLS	Logit
Previous Covenant Violation	0.226	0.003	0.125
	(0.443)	(0.004)	(0.147)
Loan Characteristics			
Ln(Maturity in Months)	1.649***	-0.007	0.192
	(0.498)	(0.005)	(0.147)
Secured	0.732	0.013***	0.190
	(0.512)	(0.005)	(0.172)
Log (Facility Size)	2.131***		-0.151**
	(0.190)		(0.061)
Ln(Number of Loans)	0.618	0.000	-0.265*
	(0.397)	(0.004)	(0.154)
Performance Pricing	1.860***	-0.005	-0.086
	(0.378)	(0.005)	(0.135)
Borrower Characteristics			
Profitability	-0.006	0.000	0.001
	(0.020)	(0.000)	(0.006)
Current Ratio	-0.002	0.000*	0.000
	(0.002)	(0.000)	(0.001)
Leverage	0.009	0.000	0.004
	(0.011)	(0.000)	(0.004)
Coverage	-0.000	-0.000**	0.000**
	(0.000)	(0.000)	(0.000)
Market to Book	0.002	-0.000***	-0.002**
	(0.003)	(0.000)	(0.001)
Log (Total Assets)	1.557***	-0.014***	-0.182**
	(0.262)	(0.002)	(0.089)
Constant	-25.318***	0.160***	3.130*
	(4.297)	(0.040)	(1.729)
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Rating Class Fixed Effects	YES	YES	YES
Loan Type Fixed Effects	YES	YES	YES
Loan Purpose Fixed Effects	YES	YES	YES
Number of Observations	2826	2826	2779
R^2	0.393	0.129	0.107

Appendix I

SECTION 7.10. Certain Financial Covenants.

(a) Debt Ratio. The Borrower will not permit the Debt Ratio to exceed the following respective ratios at any time during the following respective periods:

Period	Ratio
From the date hereof through August 31, 2000	4.75 to 1
From September 1, 2000 through August 31, 2001	4.50 to 1
From September 1, 2001	4.25 to 1
and at all times thereafter	4.00 to 1

(b) Senior Debt Ratio. The Borrower will not permit the Senior Debt Ratio to exceed the following respective ratios at any time during the following respective periods:

Period	Ratio
From the date hereof through February 29, 2000	3.75 to 1
From March 1, 2000 through August 31, 2000	3.50 to 1
From September 1, 2000	3.00 to 1
and at all times thereafter	2.50 to 1

(c) Interest Coverage Ratio. The Borrower will not permit the Interest Coverage Ratio to be less than the following respective ratios at any time during the following respective periods:

Period	Ratio
From the date hereof through August 31, 2000	2.25 to 1
From September 1, 2000 through August 31, 2001	2.00 to 1
From September 1, 2001	1.75 to 1
and at all times thereafter	1.50 to 1

(d) Fixed-charges Ratio. The Borrower will not permit the Fixed-charges Ratio to be less than 1.00 to 1 as at the last day of any fiscal quarter of each fiscal year.

Appendix II

Company Name: Gray Communications Systems

Deal active date: July 31, 1998

Financial Covenant Type	Covenant Definition in Loan Contract	Threshold Type	Covenant Threshold	Slack scaled by Standard Deviation	Mean by Main Financial Covenant Type
Debt Service Coverage Ratio	Cash Flow to Interest and Principal Payment	Min.	1.10	2.763	2.763
Senior Debt to EBITDA	Senior Debt to Cash Flow	Max.	4.25	0.531	0.531
Fixed Charge Coverage Ratio	Cash Flow to Interest, Principal Payment, Income Taxes and Capital Expenditures	Min.	1.00	0.942	0.942
Interest Coverage Ratio	Cash Flow to Interest and Capital Distribution	Min.	1.50	0.637	0.637
Debt to EBITDA	Total Debt to Cash Flow	Max.	6.90	0.191	
Debt to EBITDA	Total Debt - Cash and Marketable Securities to Cash Flow	Max.	6.75	0.127	0.159

Covenant Looseness	1.0064

Appendix III

	(1)	(2)
Violation in Past Contract	21.341***	21.472***
	(6.783)	(6.499)
Ln[Days since Past Contract (Violation)]	2.251**	2.397**
	(0.943)	(0.938)
Violation in Past Contract * Ln[Days since Past Contract (Violation)]	-3.108***	-3.155***
	(0.978)	(0.898)
Number of loans with no violation in between		-1.164
		(0.958)
Loan Characteristics	YES	YES
Borrower Characteristics	YES	YES
Year Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
Rating Class Fixed Effects	YES	YES
Number of Observations	379	369
R^2	0.466	0.473

The table reports results from logit regressions relating borrower default to covenant violations in previous loan contracts. To investigate the impact of covenant violation on borrower PD in a regression model we use the entire universe of loan contracts of our sample borrowers. For each borrower, all prior loan contracts are matched to the most recent contract. "Violation in Past Contract" is one when the borrower violated a financial covenant in the past loan. "Ln[Days since Past Contract (Violation)]" is the natural logarithm of the number of days from the end of the past loan contract until the current loan if no financial covenant was violated and the number of days from the covenant violation in the past loan contract until the current loan if a financial covenant was violated. "Number of loans with no violation in between" is the number of loans without a financial covenant violation between the past loan and the current loan. Other control variables, defined in Table 1, are the logarithm of loan maturity, the facility size and the number of previous loans of the borrower as well as indicator variables if the loan is secured and if it contains a performance pricing grid to control for loan characteristics, borrower characteristics such as profitability, current ratio, leverage, coverage, market to book ratio, and the logarithm of total assets, and year, industry and rating class fixed effects. Standard errors shown in parentheses are robust to heteroscedasticity and clustered at the firm level. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level.

Appendix IV
Profitability-Based versus Capital-Based Covenants

This table shows univariate results of these covenants split into whether a covenant was violated in the prior loan ("Violation") or no covenant violation ("No Violation") occurred. The statistical significance of the difference, shown in the third column, between "Violation" and "No Violation" of each variable is tested via a t-test and a Wilcoxon rank sum test where the last two columns provide the corresponding t- and z-statistic.

Panel A: Profitability-based vs. capital-based covenants	No Violation	Violation	Difference		
	(A)	(B)	(A) - (B)	(A) - (B)	
	Mean	Mean	Mean	t-statistics	z-statistics
Profitability Covenants	1.312	2.014	-0.707***	-18.557***	-16.833***
Debt Service Coverage	0.012	0.037	-0.026***	-4.542***	-4.203***
Debt to EBITDA	0.497	0.709	-0.212***	-11.572***	-11.457***
EBITDA	0.048	0.131	-0.083***	-7.940***	-7.394***
Fixed Charge Coverage	0.244	0.494	-0.250***	-14.222***	-13.461***
Interest Coverage	0.457	0.445	0.012	0.637	0.637
Senior Debt to EBITDA	0.055	0.198	-0.143***	-11.991***	-10.906***
Capital Covenants	0.665	0.555	0.109***	4.225***	5.107***
Asset Coverage Ratio	0.006	0.017	-0.011***	-2.823***	-2.630***
Current Ratio	0.023	0.063	-0.040***	-5.301***	-4.951***
Debt to Capitalization	0.298	0.124	0.174***	11.199***	11.450***
Debt to Net Worth	0.038	0.012	0.026***	4.175***	4.473***
Net Worth	0.187	0.206	-0.019	-1.235	-1.228
Quick Ratio	0.013	0.007	0.006*	1.483*	1.544*
Senior Debt to Capitalization	0.005	0.004	0.001	0.244	0.247
Senior Debt to Net Worth	0.002	0.002	0.000	0.004	0.004
Tangible Net Worth	0.087	0.113	-0.026**	-2.276**	-2.237**
Working Capital	0.004	0.006	-0.002	-0.762	-0.741