Recovery Rates and Macroeconomic Conditions: The Role of Loan Covenants

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Abstract

For U.S. firms from 1988 to 2007, firms with stricter loan covenants had higher firm-level default recovery rates. Covenants were stricter, moreover, when set during downturns in the business cycle. This implies a negative dependence of recovery rates on lagged macroeconomic conditions. That is, bank loan contracts established in economic recessions have tight covenants, leading later to higher recovery rates. My empirical evidence suggests that private creditors have significant influence on firms' bankruptcy decisions through the channel of covenants in debt contracts.

Keywords: Recovery rate; Bankruptcy; Loan covenant; Creditor control; Business cycle.

JEL classification codes: G33, G32, E32, G21

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I Introduction

As a common characteristic of debt contracts, covenants are generally perceived to protect creditors against activities that transfer wealth from them to shareholders. While theory and anecdotal evidence suggest that covenants are an important consideration in financial contracting, there are limited empirical studies that examine this phenomenon. Consequently, a number of important questions remain unanswered: Do covenants effectively protect creditors? What is the magnitude of the economic impact to creditors of including strict covenants in a debt contract? How do features of financial contracts, such as contract incompleteness, affect creditors?

In this study, I attempt to answer these questions by exploring creditor recoveries observed in bankruptcy cases. I present empirical evidence that the strictness of loan covenants is a significant determinant of default recovery rates. My estimates suggest that a one-standard-deviation increase in the measure of covenant strictness is associated with an increase in expected default recovery rates of at least about 6% of principal, holding other explanatory variables constant. The dependence of recovery rates on loan covenants induces lagged systematic variation in recovery rates, because the strictness of bank loan covenants is counter-cyclical. So, not only do creditors' recovery rates respond to macroeconomic conditions at default, they also covary with macroeconomic conditions at the inception of bank loan contracts. Controlling for macroeconomic conditions at default, I find that a one-standard-deviation decrease in the measure of macroeconomic conditions at the origination of a loan is associated with an increase in expected recovery rates of about 5% of principal.

I focus on firm-wide default recovery rates, measured for each firm as the dollar-weighted sum of ultimate dollar recoveries relative to total claims. I do this because the default of one debt obligation often triggers cross-default contractual provisions of all other debt of the same firm. Consequently, the binding loan covenants for all of the debt of a firm are typically those of the loans with the strictest covenants.

Following Bradley and Roberts (2004), I construct a measure of the strictness of bank loan covenants, a "covenant-intensity index." This index is the sum of six covenant indicator variables: one each for collateral, dividend restrictions, asset sales sweep, debt issuance sweep, equity issuance sweep, and the existence of more than three financial-ratio covenants. I also use alternative covenant strictness measures, based on different indicator weights, for the purpose of robustness analysis.

In order to empirically investigate the effect of loan covenants on default recovery rates, I take three steps. First, I estimate a multivariate econometric model relating recovery rates to lagged macroeconomic conditions. I find significant lagged systematic variation in recovery rates. Second, I examine the counter-cyclicality of covenant strictness by regressing the covenant-intensity index on various measures of macroeconomic conditions, controlling for firm characteristics. My results provide empirical support for the presence of time-varying loan standards. Finally, I establish a direct relationship between recovery rates and covenant strictness, controlling for other determinants of recovery rates. I find a positive and significant association, consistent with the hypothesis that stricter covenants help increase default recoveries. When the covenant-intensity index is included as a covariate, the dependence of default recoveries on lagged macroeconomic conditions becomes insignificant, suggesting that lagged systematic variation in recovery rates is mainly through the process of setting bank loan covenants.

This paper extends the existing empirical literature on financial contracting. In particular, my results provide the first direct and quantitative evidence that covenants in debt contracts protect creditors in the event of bankruptcy. Moreover, my estimates suggest that private creditors, through the channel of restrictive covenants, have and often exert significant influence on firms' operation decisions, in particular on when to file for bankruptcy. Ultimate recovery rates are mainly determined by two factors, namely the firm value at bankruptcy filing and costs during the bankruptcy process. But even after controlling for factors that are most likely to determine the post-filing deadweight loss, including the borrower's tangible assets, industry, and debt structure, my results show that strict covenants still have a significant positive impact on the total recovery to all creditors. This implies that stricter covenants are likely to be associated with higher firm value at the time of bankruptcy filing. This finding complements the existing empirical evidence that covenants influence both firm investment policy [Chava and Roberts (2008) and Nini, Smith, and Sufi (2009)] and firm financial policy [Roberts and Sufi (2009a) and Sufi (2009)].

I also add to the empirical literature on the determinants of covenants in bond and loan contracts. Due to data availability, most previous studies of debt covenants have analyzed public debt issues, which have represented a minority of corporate debt financing.[1] It has been documented that public debentures are more likely to include covenants if issuers have smaller sizes, higher leverages [Malitz (1986)], less assets in place, less operating cash flows [Begley (1994)], and more growth opportunities [Nash, Netter, and Poulsen (2003)]. Bradley and Roberts (2004) examine commercial loan covenants and find that, in addition to the these effects, macroeconomic factors, such as indicators for recessionary periods and the prevailing credit spreads, are positively related to the strictness of loan covenants. Demiroglu and James (2007) find that tighter covenants are associated with improvements in future performance and lower borrowing costs. In this paper, I show that covenant strictness is also associated positively with the lead bank's leverage and negatively with the concentration of the lending parties.

The empirical literature on recovery rates documents that market-wide average default recovery in a given year depends positively on macroeconomic performance.[2] Acharya, Bharath, and Srinivasan (2007) find evidence of the presence of a fire-sale effect on default recoveries, as proposed by Shleifer and Vishny (1992). Acharya, Bharath, and Srinivasan (2007) analyze the ultimate recovery rates of individual securities rather than firm-wide default recoveries. Carey and Gordy (2007) find that the debt structure, in particular the bank-debt share in the total debt of a firm, is a crucial determinant of firm recovery rates: The higher is the bank-debt share, the more creditors tend to recover on average.

I go beyond the previous literature by showing that recovery is positively affected by loan covenant strictness, and therefore by macroeconomic conditions at

[1] Houston and James (1996) estimate that the majority of firms borrow exclusively from banks and private lenders, and that public debt accounts for only 17% of the total debt outstanding.

[2] See, for example, , Frye (2000a), Frye (2000b), Hu and Perraudin (2002), Pykhtin (2003), Düllmann and Trapp (2004), and Altman, Brady, Resti, and Sironi (2005).

loan origination, even after controlling for macroeconomic conditions at default, the fire-sale effect, and bank-debt share. Moreover, I show that a more concentrated bank-debt structure improves default recovery. This is consistent with the prediction by Bris and Welch (2006) that lower coordination costs among multiple lenders improve default recovery.

In summary, there is extensive prior research investigating the determinants of recovery rates and of debt covenants. This is the first empirical study that links default recoveries and covenant strictness. This is also the first study that finds a connection between default recovery and macroeconomic conditions at loan origination.

The remainder of this paper proceeds as follows. Section II states testable hypotheses regarding the impacts of covenant strictness and macroeconomic conditions at loan origination on default recovery. Section III describes the data sources, measures of recovery rates and covenant strictness, and other determinants of recovery rates and the strictness of loan covenants. Section III also provides summary statistics for my sample and examines potential data selection biases. Section IV presents empirical results on lagged systematic variation in recovery rates, time-varying loan covenant strictness, and the role of state-contingent covenant strictness in determining systematic variation in recovery rates on current and lagged macroeconomic conditions. Section V checks the robustness of some of the key results. Section VI concludes.

II Testable Hypotheses

Of central interest is the question: Do bank loan covenants affect recovery rates[3] in the event of default, and if so, does this contribute to systematic variation of recovery rates? The latter question arises because there is evidence that commercial loan standards vary counter-cyclically. To answer this, I examine the determinants of

[3] I employ the recovery concept that specifies recovery rate as a fraction of the face value. Other recovery concepts employed in the literature include the "*Recovery of Market Value*," which defines the recovery rate as a fraction of the pre-default market value, and the "*Recovery of Treasury*," which defines the recovery rate as a fraction of the present value of face. For a detailed discussion on different definitions of recovery rates, see Bakshi, Madan, and Zhang (2006).

firm-level default recovery rates. This section describes testable hypotheses regarding the determinants of default recovery, particularly the "lagged-covenant effect" that links macroeconomic conditions at loan origination with subsequent default recovery through loan covenants.

The lagged-covenant effect involves four hypotheses described in this section.

First of all, strict loan covenants preserve the liquidation value of the borrower, and hence help improve default recovery. In general, after a debt contract is in place, the borrower may have incentives to take advantage of the creditor, leading to such agency problems as asset substitution and strategic default. This *ex-post* misalignment of the interests of equityholders and creditors has been well documented and studied in the corporate finance literature. Debt contracts, in particular bank-loan contracts, therefore often include covenants that mitigate these problems in a number of ways [Drucker and Puri (2008)]. First, strict covenants help screen borrowers *ex-ante*. Because covenants restrain the borrowers from detrimental actions, a firm accepting strict covenant terms signals positive private information about its quality. Second, covenants serve as a cheap monitoring device [Berlin and Loeys (1988)] and provide incentives for the creditors to monitor [Rajan and Winton (1995)]. Finally, strict covenants attribute more *ex-post* control rights to the creditors [Garleanu and Zwiebel (2008)]. Upon violation of a covenant, also known as a "technical default," the creditors have the option to early terminate the loan before a severe deterioration in firm value, although the creditors often choose to renegotiate the contract instead.[4]

In fact, covenants may impose various types of restrictions on the borrower. For example, financial-ratio covenants, such as covenants on interest coverage, fixed-charge coverage, leverage ratio, and net worth, require the borrower to remain financially healthy. Others, such as covenants on indebtedness, asset sales, and restricted payments, restrict the borrower from destructive operations. All of these serve one purpose: to preserve the asset value of the borrowing firm and hence to mitigate the above-mentioned agency problems. Typically, the stricter are the covenants, the

[4] See, for example, Smith and Warner (1979), Smith (1993), Chen and Wei (1993), Beneish and Press (1995), Chava and Roberts (2008), and Roberts and Sufi (2009b).

better is the asset value preserved.[5]

Upon default, the firm value is divided among the creditors and the borrower. A high liquidation value at default is expected to lead to a high recovery to the creditors, holding other factors constant. This is intuitive in a Chapter 7 (liquidation) bankruptcy. With a debt-restructuring, under Chapter 11 or out of court, creditors may have more bargaining power when the alternative of liquidating the firm is attractive, and hence may be able to extract higher default recovery. These effects are summarized in the following hypothesis:

Hypothesis 1 (Default recovery and covenant strictness) *Default recovery rates are positively associated with the covenant strictness of the loan contract in place at default, controlling for other factors determining recovery rates.*

The strictness of loan covenants depends not only on borrower-specific characteristics, but also on bank lending standards. When drawing up a contract, it is often impracticable for the banks to specify all the relevant contingencies and maintain a lending standard invariant to fluctuations in macroeconomic conditions. In good times, banks expand their lending activities. Arguably, this may induce laxity in bank lending standards. In contrast, during credit-tightening periods, banks tend to limit their credit risk exposure by tightening loan standards. A large body of literature on banking and financial intermediation is dedicated to investigating this "flight-to-quality" phenomenon.[6] All else equal, covenants are stricter for loans originating in economic downturns than in booms.

Hypothesis 2 (Counter-cyclicality of covenant strictness) *The strictness of bank loan covenants is negatively related to macroeconomic conditions when the loan originates. That is, loan covenants are strict in economic contractions and loose in expansions.*

[5] Nini, Smith, and Sufi (2009) empirically find that firms obtaining contracts with a new covenant restriction have subsequent increasing market value and improving operating performance.

[6] See, among others, Rajan (1994), Lang and Nakamura (1995), Weinberg (1995), Asea and Blomberg (1998), Lown, Morgan, and Rohatgi (2000), Ruckes (2004), O'Keefe, Olin, and Richardson (2005), Dell'Ariccia and Marquez (2006), Caballero and Krishnamurthy (2008), Guner (2007), and Gorton and He (2008).

Combining the effects in Hypotheses 1 and 2, we identify a link between macroeconomic performance at loan origination and recovery in a subsequent default:

Hypothesis 3 (Lagged systematic variation in default recovery) *All else equal, default recovery rates are negatively associated with lagged macroeconomic conditions, those prevailing at loan origination.*

If the dependence of recovery rates on macroeconomic conditions at the time of loan origination is indeed induced through the proposed covenant channel, variation in recovery rates explained by macro factors should be fully explained by the covenant strictness. The remaining task is to directly examine whether variation in default recovery associated with previous macroeconomic conditions vanishes once we control for the strictness of loan covenants.

Hypothesis 4 (The channel of setting loan covenants) *Controlling for the strictness of loan covenants, the dependence of default recovery rates on lagged macroeconomic conditions is insignificant.*

III Data and Explanatory Variables

This section describes the construction of my dataset.

A Data sources and sample selection

The sample of recovery rates is a March 2008 extract of the Ultimate Recovery Database (URD) of Moody's, covering the period from April 1987 to July 2007.[7] In addition to security-level ultimate recovery rates for each default event, the URD also provides detailed descriptive information on each defaulted security of the firm, such as the instrument type, the principal amount outstanding at default, and its relative ranking in the company's debt structure. I manually collect detailed firm-by-firm information on loan covenants from SEC filings provided by the Electronic Data

[7] The ultimate recovery rate for a defaulted security is the eventual repayment to holders of this defaulted security, as a fraction of principals.

Gathering, Analysis, and Retrieval (EDGAR) system. Where possible, I complement information on loan covenants from LexisNexis Academics and Laser Disclosure disks from Thomson Financial.

I manually merge the recovery data with firm accounting information from COMPUSTAT, complemented when possible by SEC filings. To measure macroeconomic performance, I use the trailing 12-month U.S. GDP growth rate from U.S. Bureau of Economic Analysis, the trailing 12-month aggregate default rate of speculative-grade corporate bonds from Moody's, the current yield spread between Moody's BAA-rated and AAA-rated corporate bonds from Bloomberg, and the trailing 12-month return of the S&P 500 Composite Index.

For the years from 1987 to 2007, the URD contains 741 firm-default events with 3,678 defaulted securities. I exclude all firms with no bank credit facility in place at default. I then eliminate all firms whose SEC filings are not available in EDGAR, LexisNexis Academics, or Laser Disclosure disks. This yields a final sample of 422 firms with 2,071 defaulted securities from 1988 to 2007. This severe reduction of the sample size is mainly due to my focus on firms with bank debt and the difficulty in identifying loan contracts for many of the default events[8] before 1994. I examine potential selection biases at the end of this section.

B Measure of default recovery: Ultimate recovery rate

Two measures of default recoveries are provided in the URD: trading-price ultimate recovery rates and settlement ultimate recovery rates. For each measure, the URD provides both nominal and discounted recoveries. The discounted recovery rates are the nominal recovery rates discounted at the corresponding interest rate of that debt instrument, from the date on which the nominal recovery is received back to the last date before default that a cash payment of interest or principal was made.

[8] Out of the 319 firms excluded from the original sample in the URD, 128 do not have a bank credit facility at default. This large fraction of firms financing only through public debt is consistent with the empirical evidence in Cantillo and Wright (2000) that firms are more likely to issue either public or private debt, rather than a mixture of the two. Bank credit contracts cannot be identified for the rest 191 firms due to lack of SEC filing records.

Consider a defaulted security with a par value of V_0 and a continuously compounding yield of r. Suppose that holders of the security are repaid with n securities or assets with respective market values of $p_1, \ldots, p_n$ at settlement. By definition, the nominal and discounted settlement recovery rates are

$$RR_{NTP} = \frac{1}{V_0} \sum_{i=1}^{n} p_i$$

and

$$RR_{DTP} = e^{-rT} RR_{NTP},$$

respectively, where T is the time from the last interest payment before default to settlement.

If, however, the market values of these assets are not readily available at settlement but instead are known later when they are liquidated, the recovery is measured by the nominal and discounted trading price recovery rates, defined by

$$RR_{NS} = \frac{1}{V_0} \sum_{i=1}^{n} q_i$$

and

$$RR_{DS} = e^{-rT} RR_{NS},$$

respectively. Here, q_i is the liquidation value of security i, realized when the actual transaction takes place, which may be years after default settlement.

The "recommended ultimate recovery rate" (RUR), also provided in the URD, is either the settlement recovery rate or the trading price recovery rate. If a package of settlement instruments is received for the defaulted instrument and if their fair market prices are available, the RUR is defined to be the settlement recovery rate. Alternatively, in some cases such as liquidations, the fair value of the recovery package may not be accurately measured at settlement, and may not be known or estimated until an actual transaction takes place later. The RUR is defined to be the trading price recovery rates in such cases.

I focus on firm-wide ultimate recovery rates, a par-value-weighted average of the recommended instrumental recovery rates defined for firm i as

$$RR_i = \frac{\sum_{j=1}^{k} V_0^{ij} RR_{ij}}{\sum_{j=1}^{k} V_0^{ij}},$$

where RR_{ij} and V_0^{ij} are the recommended ultimate recovery rate and the par value of the j-th defaulted instrument, respectively.

C Covenant-intensity index

Following Bradley and Roberts (2004), I construct a measure of the strictness of bank loan covenants, a "covenant-intensity index." This index is the sum of six covenant-indicator variables: one each for collateral, dividend restrictions, asset sales sweep,[9] debt issuance sweep, equity issuance sweep, and the existence of more than three (rather than two as in Bradley and Roberts (2004)) financial-ratio covenants. Each indicator is 1 if the corresponding covenant is included in the loan contract and 0 otherwise. I also use alternative covenant strictness measures, based on different indicator weights, for the purpose of robustness analysis.

Some firms have more than one credit agreement in force at the same time. In such cases, the effectively binding covenant level is typically determined by the strictest loan contract. In order to study the effects of loan contract terms on default recovery rates, one should ideally first determine which are the covenants that the defaulted firm has violated, if any. The corresponding contract is likely to be the effective determinant of bankruptcy. Because firms are not required to report precisely what triggered a bankruptcy filing, it is difficult to identify the binding contract.

Fortunately, most U.S. firms borrow from only one bank or one syndicate of banks. In my sample, 364 of the 422 firms borrowed under one credit agreement.

[9] A "sweep" covenant mandates early retirement of a loan conditional on a specified event, such as a security issuance or asset sale.

For these firms, the current credit agreement is therefore the binding contract. For the remaining 58 firms, I instead examine all coexisting loan contracts for the firm and identify the contract with the highest covenant-intensity index, taking this contract as a proxy for the binding contract. As a robustness check, I exclude firms with multiple credit agreements at default. The results are consistent with results for the entire sample of firms. This finding is discussed in more detail in Section V.

D Independent variables

This section introduces independent variables used in my empirical analyses of recovery rates and loan covenant strictness.

D.1 Determinants of recovery rates

In my empirical analysis of the lagged-covenant effect, I control for other determinants of recovery rates. My choice of control variables is motivated by existing empirical and theoretical studies of corporate default recoveries.

Macroeconomic conditions at default. Macroeconomic conditions at default have significant impacts on recovery rates. Two effects are at work. The economic-downturn effect is that default recoveries are low in bad times because the valuations of firms' assets are on average low. The fire-sale effect, suggested by Shleifer and Vishny (1992), is that default recoveries for firms in a distressed industry tend to be low because the assets of these firms are mainly of use to peer firms, who typically have a low demand for capacity-increasing assets at such times.

I measure macroeconomic conditions with four variables: the trailing 12-month U.S. GDP growth rate from U.S. Bureau of Economic Analysis, the trailing 12-month aggregate default rate of speculative-grade corporate bonds from Moody's, the current yield spread between Moody's BAA-rated and AAA-rated corporate bonds from Bloomberg, and the trailing 12-month S&P 500 Composite Index return from CRSP. One predicts a positive impact of macroeconomic conditions at default on recovery rates.

Bank-debt share in total debt. Private debt, in particular bank debt, differs from public debt in many respects. As financial intermediaries, banks are considered to have informational and coordination advantages over dispersed public bondholders. Specifically, prior theoretical research often assumes that, relative to public bond investors, banks can assess private information at lower cost, monitor more efficiently, and are better at coordinating with each other and with the borrower during renegotiation, reorganization, and liquidation.[10] Motivated by these advantages of bank debt, Carey and Gordy (2007) provide a theoretical model predicting that a higher bank-debt share in total debt implies a higher optimal firm value at default, which leads to higher default recovery rates. They find empirical evidence that bank-debt share is positively related with recovery rates.

Bank debt share is measured by the total principal amount of bank debt at default as a fraction of total principal amount of all defaulted debt.[11] I control for each firm's bank-debt share in estimating models of default recovery rates. I anticipate positive impacts of bank-debt share on recovery rates.

Bank-debt concentration. Coordination among creditors plays an important role in determining the speed, cost, and final outcome of the reorganization process. Based on the Trust Indenture Act of 1939, no material changes to the indenture terms of public debt can be made without the unanimous consent of each and every debtholder. This usually makes restructurings of public debt extremely costly. A feasible alternative is an exchange offer, which, however, has holdout problems.[12] Coordination failure can in some cases actually benefit creditors, as it may provide them with stronger bargaining power. In order to succeed in a restructuring, a firm must offer high enough recovery to lead a sufficient number of dispersed public debtholders to tender. Private lenders including banks are not subject to the Trust

[10] See Leland and Pyle (1977), Campbell and Kracaw (1977), Ramakrishnan and Thakor (1984), Boyd and Prescott (1986), and Bris and Welch (2006), among others.

[11] Bank debt here refers to all private debt from both banks and non-bank financial institutions. Out of the 422 firms in the final sample, 29 firms borrow from non-bank financial institutions. My estimates, however, are qualitatively unaffected if we exclude these firms.

[12] See, for example, Gertner and Scharfstein (1991) and Kahan and Tuckman (1993).

Indenture Act of 1939, making it less expensive for them to renegotiate the terms of loan contracts or to restructure their debt contracts. The participation of banks is thus important to the success of an exchange offer.[13]

For Chapter 11 bankruptcy, as opposed to restructuring out of court, the consent of public debtholders may be overridden by the court. Under Chapter 11, a reorganization plan places creditors holding similarly prioritized debt claims (according to security and subordination) into the same class. Creditors whose legal rights are altered by the plan may vote on the plan.[14] If a class votes against the plan, the court may still approve the plan (a "cram-down") if the court finds that the plan is "fair and equitable," which in practice usually means voting approval by higher-priority classes. Hence, the bargaining power of creditors is reduced under Chapter 11 compared to an out-of-court restructuring. In order to collect their recoveries, creditors might incur costs. Bris and Welch (2006) argue that dispersed public debtholders suffer from a free-rider problem, being reluctant to exert effort to collect on claims. As a result, they fare worse than concentrated bank creditors. Bris and Welch (2006) predict that a higher concentration of bank debt improves recovery rates.

In my empirical analysis, bank-debt concentration is measured by the Herfindahl-Hirschman (HH) index of the nominal amounts of bank debt instruments of the firm, across different lenders, defined by

$$HHI_i = \frac{\sum_j L_{ij}^2}{\left(\sum_j L_{ij}\right)^2}, \tag{1}$$

where L_{ij} is the face value at offering of the j-th loan of firm i. The HH index is one if there is a single bank loan in the capital structure, and is near zero with many lenders holding similar face values. Following Bris and Welch (2006), I expect a positive association between recovery rates and the HH index of bank-debt concentration.

[13] See James (1996), for example.

[14] Section 1126 of the Bankruptcy Code defines acceptance of a plan by a class of claim holders as such plan being "accepted by creditors... that hold at least two-thirds in amount and more than one-half in number of the allowed claims of such class held by creditors."

Leverage. Suppose that a firm defaults at time T and that the most recent contractual covenant-monitoring date before default is S. The firm's value at default is likely to depend on the company's leverage at time S. As an alternative to leverage, "distance to default," inspired by the models of Black and Scholes (1973) and Merton (1974), is a volatility-adjusted measure of how far a company is from some notion of a default boundary.[15] A small distance to default means that the company is close to default, and when the firm defaults one period later, the firm value may be deteriorated so much that it is far below the level of firm value that can trigger a default. We expect a negative association with leverage and a positive association between recovery rates and distance to default.

I examine the relationship between recovery rates and the firm's debt-to-assets ratio and distance to default, measured one quarter before the company defaults. Distance to default is obtained by solving the Merton (1974) model for each firm, following the algorithm of Duffie, Saita, and Wang (2007).[16]

Out-of-court versus in-court reorganizations. The two major forms of debt restructuring are out-of-court exchange offers and in-court Chapter 11 bankruptcy. In an out-of-court restructuring, creditors hold extra bargaining power stemming from regulations such as the Trust Indenture Act of 1939. In order to get enough tendering creditors to allow for a successful offer, the firm may need to offer creditors better terms than they would receive in a bankruptcy, implying higher predicted recovery rates.

In contrast, a firm may have more control with an in-court (Chapter 11) bankruptcy. Once a firm files under Chapter 11, all of its debt becomes due, but an automatic stay is invoked, stopping essentially all principal and interest payments. Secured creditors typically lose the right to take possession of their collateral. Under Chapter 11, the control of a firm, through the debtor in possession (DIP) provisions, typically remains with the current management and board of directors. Moreover,

[15] See, for example, Bharath and Shumway (2008) and Duffie, Saita, and Wang (2007).

[16] Bharath and Shumway (2008) show that, at least for default prediction, the details of the construction of distance to default are not especially important.

according to Section 1121 of the Bankruptcy Code, the DIP has the exclusive right to propose a plan for the first 120 days after filing the bankruptcy petition. This exclusivity period can be, and often is, extended by the court for lengthy periods. Only after exclusivity is lifted may creditors propose a plan. Finally, as previously discussed, the bargaining power of creditors is also reduced by Chapter 11 voting rules.

Therefore, firm-wide recovery rates in distressed-exchange cases (of which there are 83 in the sample studied in this paper) are expected to be higher than those in formal Chapter-11 reorganizations.

In my empirical study, the form of reorganization is represented by an indicator variable, *Distressed Exchange*, which is set to 1 if the default event is an out-of-court distressed exchange and 0 otherwise.

D.2 Determinants of loan covenant strictness

I control for other determinants of loan covenant strictness in my empirical test of the counter-cyclicality prediction. As a loan contract typically results from negotiations between the borrower and the lender, the control variables of both parties are relevant.

Borrower debt-to-assets ratio. Firms with a high debt-to-assets ratio have high exposure to default risk and hence are more likely to have strict covenants in their debt. This prediction finds support in prior empirical evidence on the covenants of both public bonds and bank loans.[17]

A borrower's debt-to-assets ratio is measured by the ratio of total debt to total book assets. Consistent with previous studies, I expect a negative association between a borrower's debt-to-assets ratio and covenant-intensity index.

Bank-debt share in total debt. A high bank-debt share in total debt suggests strong dependence of the borrowing firm on bank financing, which may strengthen

[17] See, for example, Malitz (1986), Begley (1994), Nash, Netter, and Poulsen (2003), Bradley and Roberts (2004), and Demiroglu and James (2007).

the control and bargaining power of the bank. For example, empirical evidence from Houston and James (1996) suggests that the management decisions of a firm borrowing from a single bank are strongly influenced by that bank. Carey and Gordy (2007) suggest that the positive relation between recovery rates and bank-debt share comes from the high bankruptcy thresholds set by banks for borrowers with more bank debt. In summary, it is reasonable to hypothesize a positive impact of bank-debt share on loan covenant strictness.

Syndicated loans. Syndicated-loan financing for non-financial U.S. corporations has experienced strong growth in the past two decades, increasing from $137 million in 1987 to $1.5 trillion in 2005. In my final sample, 81% of the 422 firms borrowed under syndicated credit facilities. In contrast with a loan from a single lender, a syndicated loan is underwritten and financed by a group of banks, insurance companies, and other financing institutions. The "lead agent" acts as an intermediary between the borrowing firm and other lenders. The lead agent negotiates the terms of the contract with the firm and monitors the firm's performance. "Participant" lenders are largely left out of these processes. As information asymmetry and creditor monitoring play an important role in determining the restrictiveness of loan contracts, one expects more restrictive loan covenants for syndicated loans than for bilateral loans.[18]

In my empirical analysis, I use an indicator variable, *Syndicated Loan*, set to 1 if the most restrictive loan is syndicated, and 0 otherwise. A positive relation between *Syndicated Loan* and the covenant-intensity index is expected.

Bank liabilities-to-assets ratio. Due to information asymmetry between borrowers and banks, loan covenants can serve as a screening device at loan origination. That is, good firms signal their high quality by accepting strict loan covenants, as it is costly for bad firms that are close to covenant violation to mimic. Hence unobserved firm quality is expected to be positively related to covenant strictness.

[18] Bradley and Roberts (2004) find that large lending syndicates incorporate more covenants into their debt contracts.

Banks are subject to risk-based capital adequacy requirements, which demand higher marginal capital for loans to riskier borrowers than to less risky borrowers. In choosing their portfolios, banks trade off loan interests and risk-dependent capital requirements. For example, if a bank is well-capitalized, its lending costs associated with additional marginal capital requirements are low, implying that the bank may prefer risky but highly profitable loans to risky borrowers.[19]

Bank leverage is measured by the ratio of a bank's total liabilities to the unweighted sum of its total assets.[20] A high liabilities-to-assets ratio indicates an under-capitalized bank, which may be inclined to lend to safe borrowers that accept strict loan covenants. One expects a positive relation between covenant strictness and bank liabilities-to-assets ratio.

For syndicated loans, I use the lead agent's bank leverage, because the terms of the contract are negotiated between the borrowing firm and the lead agent.

E Summary statistics

Table 1 shows some summary statistics of the final sample (Panel A) and of the full URD sample (Panel B). For the final sample, the average recovery rate is 56%, with a standard deviation of 27%. The total amount of debt outstanding at default ranges across firms from $14.5 million to $23.4 billion, with a mean of $831.9 million and a median of $319.5 million. This sample is skewed by the presence of many small firms. At the median, a firm in the sample has 4 different debt instruments, with a maximum of 80 debt instruments for US Airways, Inc. The distribution of the bank-debt share has a mean of 44% and a median of 41%. The cross-sectional distribution of the bank-debt concentration (the HH index defined by (1)) has significant mass at 1, consistent with the presence of many firms borrowing under one credit agreement.

[19] This relates to the literature on the bank capital channel, i.e., the effect of bank capital on bank lending behavior. For detailed discussions, see Haubrich and Wachtel (1993), Grenadier and Hall (1996), Furfine (2001), Van den Heuvel (2002), Gambacorta and Mistrulli (2004), Bolton and Freixas (2006), and Van den Heuvel (2007).

[20] In the Bank Regulatory database, bank liabilities are given by variable RCFD2950, and bank unweighted total assets are given by variable RCFD2170.

The average time in bankruptcy is around one year. The summary statistics for the full URD sample of 722 firms are similar to those of the final sample. Of the firms in the URD, 84% had at least one bank loan.

In order to investigate potential sample-selection bias, Appendix A compares my final sample and the full URD sample with a broader sample of default events. My final sample, relative to the larger comparison sample, focuses more on recent (post-1994) default events, includes some small firms not covered by Moody's, and excludes firms in three highly regulated industries, namely Agriculture, Forestry, and Fishing; Finance, Insurance, and Real Estate; and Public Administration.

IV Empirical Results

This section presents the empirical results. The lagged-covenant effect is tested in three steps. First, I examine whether there is systematic variation in recovery rates with lagged macroeconomic conditions. Second, I investigate the counter-cyclicality of the strictness of loan covenants. Finally, I directly compare the dependence of recovery rates on lagged macroeconomic conditions before and after controlling for the strictness of loan covenants.

A Descriptive evidence

I first show some evidence from a selection of summary statistics.

Table 3 presents descriptive statistics of the firms in the final sample, grouped by the covenant-intensity index (Panel A) and by inclusion of each of the six covenants (Panel B). The first row in Panel A illustrates that average recovery rates increase as the covenant-intensity index increases, supporting Hypothesis 1.[21] Moreover, defaulted firms with fewer covenants appear to spend more time in bankruptcy than

[21] For the 128 firms with no bank debt in the URD sample, the average firm-level recovery rate is 39.1%, significantly lower than the average recovery rate of 55.5% for the remaining firms with bank debt in the URD sample. The t-statistic is 5.7 for the t-test comparing the group means. This is consistent with Hypothesis 1 as there are no loan covenants for these 128 firms, although this effect is likely related also to their zero bank-debt shares.

do firms with more covenants. The statistics shown in Panel B suggest that the inclusion of a covenant may help improve recovery rates. Moreover, loan covenants are more frequently included for firms with more debt and higher debt-to-assets ratios. Finally, firms with a restrictive covenant included in their loan contracts tend to spend less time in the restructuring process and more time between the origination of the loan and default.

B Lagged macroeconomic conditions as determinants of recovery rates

Hypothesis 3, formulated in Section II, states that bad macroeconomic conditions at loan origination are expected to be associated with high recovery rates at subsequent defaults, controlling for other effects. I test this hypothesis with multivariate OLS and two-sided Tobit regression models of recovery rates, controlling for other factors that may affect recovery rates, such as firm characteristics, macroeconomic conditions at default, bank-debt share, and bank-debt concentration.[22]

Panel A of Table 4 reports the results of OLS regressions of firm-wide recovery rates on lagged macroeconomic variables, controlling for firm characteristics and other determinants of default recoveries, using models of the form

$$\begin{aligned} RecoveryRate_{it} &= \alpha + \beta_1 \ln(TotalBookAssets_{it}) \\ &\quad + \beta_2 Debt\text{-}to\text{-}Assets_{i(t-1)} + \beta_3 BankShare_{it} \\ &\quad + \beta_4 HHI_{it} + \beta_5 DistressedExchange_{it} \\ &\quad + \beta_6 MacroFactor_t + \beta_7 MacroFactor_\tau + \varepsilon_{it}, \end{aligned} \tag{2}$$

[22] My recovery data sample follows a data structure called *pooled cross sections over time*. That is, during each year a new random sample of defaulted firms adds to my recovery database. It is important not to confuse my sample data structure with panel data, where we follow the same group of firms over time. Methods for pure cross section analysis, such as OLS, Tobit, Probit, and Poisson regressions, can all be applied to pooled cross sections. However, for pooled cross sections, year (or other time periods) dummies are usually included to account for aggregate changes over time. (For a more detailed discussion on pooled cross sections, see Wooldridge (2002), Chapter 6.3.1.) In my empirical analyses, instead of using year dummies, I use macroeconomic variables to control for aggregate changes over time.

where t is the quarter of default, $(t-1)$ is one quarter before default, τ is the origination date of the credit agreement before default, and ε_{it} is the error term.

Columns 1 to 4 in Panel A of Table 4 show that *Lagged GDP Growth* and *Lagged S&P 500 Return* are both negatively and statistically significantly related to firm-level recovery rates (at standard test levels of significance). The relationship between recovery rates with *Lagged Default Rate* and *Lagged Bond Spread* are both positive and statistically significant. As to the magnitude of the lagged systematic variation, my estimates suggest that a one-standard-deviation decrease in the measure of macroeconomic conditions at the origination of a loan is associated with an increase in expected default recovery rates of about 5% of principal, holding other explanatory variables constant. In estimating these effects, I have controlled for firm characteristics and other determinants of recovery rates, such as the total book assets, debt-to-assets ratio, bank-debt share in total debt, concentration of the amounts of lending to the given firm among the various banks offering loans to that firm, and the form of reorganization at default, whether out-of-court restructuring or filing for bankruptcy under Chapter 11. These results are at least consistent with the hypothesis that bad macroeconomic performance at loan origination results in high recovery rates in subsequent defaults.

In addition, the estimates in Panel A of Table 4 suggest that firms with a higher fraction of bank debt tend to have higher recovery rates. A one-standard-deviation (28%) increase in bank-debt share, controlling for other variables, is estimated to increase recovery rate by 7% of total principal. This is consistent with the finding by Carey and Gordy (2007) that banks set higher bankruptcy thresholds for firms with more bank-debt share in order to improve recovery rates.

I also find a positive and statistically significant relationship between bank-debt concentration and recovery rates, consistent with the prediction of Bris and Welch (2006) that a more concentrated debt structure improves default recovery. For illustration, controlling for other effects, a firm whose debt is all to one bank is predicted to have 12% higher recovery than that of a firm who has equally-sized loans to each of three banks.

I find that the form of reorganization also has a significant impact on recovery rates. My estimate of the coefficient on the *Distressed Exchange* suggests that, on average, a distressed exchange has a 25% higher recovery rate than formal Chapter 11 bankruptcy, controlling for other effects.[23]

Recovery rates are positively associated with macroeconomic conditions at default, consistent with the economic-downturn effect documented in previous literature. Controlling for macroeconomic conditions at the inception of a loan, a one-standard-deviation improvement in any of several standard macroeconomic performance variables at default is associated with an estimated increase in the expected firm recovery rate of about 7% of the total debt principal. Moreover, a firm's debt-to-assets ratio one quarter before default is negatively associated with recovery rates, even after controlling for the bank-debt share in total debt. Finally, I found no significant relationship between recovery rates and total book assets.

Recovery rates are all between 0 and 1, except for a few firms whose recovery rates are slightly greater than 1. A considerable number of firm-wide recoveries are clustered near 0 and 1. This raises a concern that OLS regressions may yield inconsistent estimates because the reported recovery rates are censored between 0 and 1. To address this concern, I also estimate a two-sided Tobit regression, with upper and lower boundaries set to 1 and 0, respectively.[24] Panel B of Table 4 presents the Tobit regression results, which resemble the OLS results in Panel A. For conciseness, I present only OLS estimates for the rest of the paper.

C Counter-cyclicality of covenant strictness

Before directly testing the association between recovery rates and covenant strictness, I examine the counter-cyclicality of loan covenant strictness (Hypothesis 2). Because the covenant-intensity index is an integer between 0 and 6, a Poisson regression model (in addition to an OLS regression) is used to examine the determinants of loan

[23] One may be concerned that the choice of an out-of-court distressed exchange or an in-court bankruptcy is endogenous. My estimates show that, after excluding distressed exchange cases, the estimated coefficients of other variables remain largely unchanged.

[24] Tobit regression handles linear models with observations of the dependent variable, truncated or censored above and/or below certain values.

covenant strictness. Moreover, likely determinants of the inclusion of each covenant in a loan contract are investigated by estimating a probit model.

Panel A of Table 5 reports estimates of OLS regression models relating the covenant-intensity index to macroeconomic conditions, of the form

$$\begin{aligned} CovenantIntensity_{it} = {} & \alpha + \beta_1 \ln\left(TotalBookAssets_{it}\right) \\ & +\beta_2 Debt\text{-}to\text{-}Assets_{it} + \beta_3 BankShare_{it} \\ & +\beta_4 SyndicatedLoan_{it} + \beta_5 \ln\left(LoanSze\right)_{it} \\ & +\beta_6 \left(BankLiabilities/Assets\right)_{it} \\ & +\beta_7 MacroFactors_t + \varepsilon_{it}. \end{aligned} \tag{3}$$

In estimating these models, I control for firm size (logarithm of total book assets), firm debt-to-assets ratio, the bank-debt share in total debt, loan size, the ratio of bank liabilities to total assets, and whether the loan is syndicated. These variables are measured at the origination of the bank loan contract.

The results support Hypothesis 2. For all four different measures of macroeconomic conditions, the regressions reveal significant counter-cyclicality of the covenant-intensity index, consistent with the results of Bradley and Roberts (2004). I also document that covenant strictness is significantly and positively associated with a firm's leverage and bank-debt share of total debt. In addition, the results show a positive and statistically significant association between the covenant-intensity index and the lead bank's ratio of total liabilities to total assets, suggesting that the financial flexibility of lenders plays a role in determining loan contract strictness. Finally, my results indicate that syndicated loans tend to be more restrictive than single-lender loans.

Panel B of Table 5 presents the results of Poisson regressions, which are consistent with the results of the OLS regressions.

The covenant-intensity index puts equal weights on all six indicators, an arbitrary choice. To check the robustness of the results to weighting the indicators, I modify the covenant-intensity index by counting the three sweep covenants only once (so that the index ranges from 0 to 4), and by including in the count all categories of financial-ratio covenants. The corresponding regression results (not reported here for brevity) are similar to those in Table 5.

Turning to the likelihood of a particular covenant being included in a debt contract, I estimate a separate probit model for each of the six types of loan covenants. The dependent variable is an indicator that is set to be 1 if the covenant is included in the firm's loan contract and 0 otherwise. The independent variables include the logarithm of total book assets, firm debt-to-assets ratio, bank-debt share in total debt at default, loan size, the ratio of bank liabilities to total assets, whether the loan is syndicated, and the trailing-quarter U.S. GDP growth rate at loan origination. The results are presented in Table 6. Other proxies for macroeconomic conditions lead to similar estimates.

The data suggest that macroeconomic conditions are negatively and statistically significantly associated with the likelihood of inclusion of each of the six covenants. That is, the worse are macroeconomic conditions at loan origination, the more likely is a covenant to be included, supportive of Hypothesis 2. Moreover, the lead bank's ratio of liabilities to assets is positively associated with the probability of covenant inclusion, suggesting again the significant impact of lender's financial flexibility on contractual restrictions. For example, a one-standard-deviation shift in the lender's ratio of liabilities to assets is associated with an estimated increase of 12% in the probability of inclusion of a debt issuance covenant.

D Impacts of covenant strictness and the covenant-setting channel

I have shown evidence that recovery rates are negatively associated with lagged macroeconomic conditions (Hypothesis 3), and that loan covenant strictness is countercyclical (Hypothesis 2). A critical question is whether lagged systematic variation in recovery rates is induced mainly through covenant setting. This subsection addresses this question directly by testing Hypotheses 1 and 4. Five different specifications are examined: a base-case regression without lagged macroeconomic variables, and four other regressions that include different measures of macroeconomic conditions at loan origination. These regressions take the form

$$\begin{aligned} RecoveryRate_{it} &= \alpha + \beta_1 \ln(TotalBookAssets_{it}) \\ &+\beta_2 Debt\text{-}to\text{-}Assets_{i(t-1)} + \beta_3 BankShare_{it} \\ &+\beta_4 HHI_{it} + \beta_5 DistressedExchange_{it} \\ &+\beta_6 CovenantIndex_{i\tau} + \beta_7 MacroFactor_t + \varepsilon_{it}, \end{aligned} \tag{4}$$

and

$$\begin{aligned} RecoveryRate_{it} &= \alpha + \beta_1 \ln(TotalBookAssets_{it}) \\ &+\beta_2 Debt\text{-}to\text{-}Assets_{i(t-1)} + \beta_3 BankShare_{it} \\ &+\beta_4 HHI_{it} + \beta_5 DistressedExchange_{it} \\ &+\beta_6 CovenantIndex_{i\tau} + \beta_7 MacroFactor_t \\ &+\beta_8 MacroFactor_\tau + \varepsilon_{it}. \end{aligned} \tag{5}$$

Panel A of Table 7 presents the OLS regression results. The results of the base-case regression in Column 1 show that covenant strictness is positively and statistically significantly related to recovery rates, consistent with Hypothesis 1. The results are robust to the choice of the measure of macroeconomic conditions at default. As to the magnitude of the impact, a one-unit increase in the covenant-intensity index is associated with an estimated increase of 4% in recovery of total debt principal, after controlling for macroeconomic conditions at default and for firm characteristics.

I test Hypothesis 4 by examining the impact of the covenant-intensity index on the dependence of recovery rates on lagged macroeconomic conditions. Columns 2 to 4 present regression results with both the covenant-intensity index and macroeconomic conditions at loan origination as independent variables. The coefficients on the lagged macroeconomic variables, which are significant when the covenant-intensity index is not included (Table 4), are now statistically insignificant. This effect is robust to different measures of macroeconomic conditions. This empirical evidence supports

Hypothesis 4.

After controlling for the covenant-intensity index, recovery rates are still positively and statistically significantly related to the bank-debt share, bank-debt concentration, indicator for distressed exchange, and macroeconomic conditions at default. These results suggest that these four macroeconomic factors may influence default recoveries above and beyond their effects on covenant strictness. In other words, while loan covenants play a central role in determining a firm's value at default, macroeconomic conditions may affect recovery rates during the process of renegotiation and reorganization after default.

To check the robustness of these findings, I use an alternative measure of a firm's financial soundness, the distance to default. Since the construction of distance to default requires a time series of stock prices, the sample for these regressions is smaller. The regression results, presented in Panel B of Table 7, are similar to the previous results.

V Robustness

This section contains some additional checks on the robustness of my results.

A Alternative interpretations

I have controlled for macroeconomic conditions at default when investigating the impacts of lagged macroeconomic conditions on subsequent default recoveries. One may be concerned that macroeconomic conditions are negatively correlated over a business cycle. Maybe the opposite impacts on recovery of the macroeconomic conditions at loan origination and at default result from this negative autocorrelation. To address this, I estimate Equation (5) for two different samples: (1) firms with at least 1 year between loan origination and default, and (2) firms with at least 2 years between loan origination and default. Panels A and B of Table 8 present the results, which resemble those of Table 7. This robustness to different time horizons suggests that the measured role of macroeconomic conditions is unlikely to be driven by the negative autocorrelation of macroeconomic conditions.

B Robustness to measurement and model specification

The measure of covenant strictness that I have used is merely the sum of six equally-weighted indicator variables. To check the robustness of my estimates, I try two other measures of covenant strictness, both of which support my results.

The first alternative measure counts sweep covenants only once. Under this alternative, the strictness index is the sum of four indicator variables, one each for collateral, dividend restrictions, more than three financial-ratio covenants, and at least one sweep covenant. The estimates of the determinants of default recovery rates are shown in Panel C of Table 8, and are similar to those for the original measure of covenant strictness, shown in Panel A of Table 7.

The second alternative measure is the total number of financial-ratio covenants in the binding loan contract. The corresponding estimates of the determinants of default recovery rates are in Panel D of Table 8. The estimates are, again, consistent with those based on the original covenant-intensity index.

Another potential concern is the role of multiple coexisting credit agreements. As I have explained, the effectively binding contract is not necessarily the most restrictive one. One way to deal with this concern is to analyze firms with only one bank-debt contract at default. Fortunately, 364 of the 422 firms in the final sample have only one bank-debt contract at default. Panel E of Table 8 shows estimates of the regression of recovery rates on potential explanatory variables for firms with only one credit agreement. The results are similar to those for the entire sample of 422 firms.

Another way to deal with this concern is to include in the regression an indicator that is 1 if there is only one credit agreement at default and 0 otherwise. The coefficient on this indicator is expected to be statistically insignificant if the most restrictive contract is a valid proxy. Panel F of Table 8 shows that the changes of the coefficient estimates caused by including the dummy variable are negligible, and shows that the coefficient on this dummy variable is statistically indistinguishable from zero.

With a couple of exceptions, the distribution of recovery rates in the final sample is between 0 and 1, with clusters near 0 and 1. This raises a concern about whether the coefficient estimates of the linear regressions are unbiased. In order to address this question, I analyzed the relationship between recovery rates and the suggested determinants using two-sided Tobit regressions. The results are virtually unchanged. For conciseness, the results are not reported here.

C Endogeneity

The main question investigated in this paper is the impact of covenant strictness on subsequent default recovery rates. One may argue that the default recovery predicted at origination of a loan may play a role in determining covenants. For instance, a bank may demand stricter covenants if the borrowing firm has less tangible assets, which typically leads to a lower post-default firm value and lower expected recovery rates. Ideally, this challenge to the identification of the covenant effect on recovery rates can be treated by an instrumental variable that is correlated with covenant strictness and that is not otherwise correlated with recovery rates. With no suitably effective instrumental variable, first I show instead the direction and the potential magnitude of the effect of endogeneity on my estimates, and then I use macroeconomic conditions at origination as an imperfect instrumental variable to illustrate the analysis.

First, if the expected default at origination affects covenants in the postulated way, then my OLS estimates understate the true covenant effect on default recovery rates. Appendix B considers a simple model of endogeneity captured by a latent variable, and formally deduces this conclusion. Based on this model, my regression results suggest that if a one-standard-deviation decrease in expected recovery at origination induces a one-standard-deviation increase in the covenant-intensity index, then the true impact of covenant strictness on recovery rates is estimated to be 200% higher than the reported OLS estimates. Other potential degrees of bias are illustrated in Appendix B. This conclusion is consistent across various measures of macroeconomic conditions.

To test the consistency of the analysis with the data, I conduct two-stage least square (2SLS) regressions using macroeconomic conditions at loan as a imperfect instrumental variable. The first stage involves regressing covenant strictness on the instrument and controls. The second stage involves regressing recovery rates on the estimated covenant strictness and control variables, including macroeconomic conditions at default. The estimates, presented in Panel G of Table 8, are largely unchanged compared with those in Table 7, except that the effect of covenant strictness on recovery rates is almost twice as strong. The stronger covenant effect in the 2SLS is consistent with the analysis that the reverse causality weakens our estimates. Moreover, based on the curves in Figure 3, the estimates suggest that the strength of the reverse causality, β, is about $\frac{1}{3}$, meaning that a one-standard-deviation incease in expected recovery on average includes a one-third-standard-deviation decrease in covenant strictness ex ante.

VI Conclusion

I investigated the effect of bank loan covenants on default recovery rates by examining a comprehensive dataset of firm-wide recovery rates for U.S. firms from 1988 to 2007. The main finding is that stricter covenants are strongly associated with higher recovery rates, suggesting that loan covenants may be effective in protecting creditors in the event of default. Moreover, as bank-loan standards are counter-cyclical, default recovery rates depend negatively on lagged macroeconomic performance. In particular, the evidence suggests that in good times covenants tend to be loose, and that recovery rates are likely to be low if and when the firm later defaults. In contrast, in bad times covenants are usually strict and help limit the losses of creditors in the event of default. The benefits of bank monitoring arising from the lagged-covenant effect could be substantial. Although I have not established the degree of causality, my estimates of the likely effects of endogeneity suggest significant causality.

These results highlight that covenants, often considered a measure of creditor control outside of bankruptcy, also significantly influence the outcome of bankruptcy. An interesting question that remains open for debate is: At what exact moment do creditors exercise control?[25] Empirical evidence on this question would shed light on the governance role of large creditors.

Appendix A. Potential sample-selection bias

As noted previously, my final sample contains 422 default events, a severe reduction from the 722 firms in the URD. Moreover, there are at least 1,300 defaults during the same period among all firms covered by Moody's Default Risk Service (DRS), almost twice as many as the URD sample. This section examines the potential for sample-selection bias by comparing the three sets of firms.

The DRS dataset contains credit histories of about 10,000 corporate and sovereign entities and over 200,000 individual debt securities, going back to 1970. The DRS data include rating histories, default histories, as well as descriptive data on issuers and debt instruments. The version of the dataset that I use includes defaults from February 1970 to June 2006, covering 1543 default events for 1409 distinct firms during this period. Default events are categorized into 20 types, such as missed interest or principal payment, Chapter 11 bankruptcy, and distressed exchange.

Figure 1 presents a longitudinal view of the default events in my final sample, the URD sample, and the DRS dataset. The plots in Panel A illustrate the distribution of defaulted firms in the three samples by year, over the period from 1987 to 2006. The DRS data show two peak periods for default events, around 1990 and 2001. The timing of default events for the URD sample, shown in the second graph in Panel A, resembles this pattern. The final sample does not show these peak default periods. The defaults in the URD dataset seem to well represent the defaults in the DRS dataset, while the defaults in the final sample are more concentrated in the period after 1994.

Panel B of Figure 1 illustrates the distribution of firms in the final sample by default type and by the date of loan origination. The last graph in Panel B of Figure 1 shows the distribution across firms of the time between the last bank loan

[25] See Roberts and Sufi (2009c) for a comprehensive survey of the literature on financial contracting.

origination and default. The median time lag is 6 quarters, although a few firms have lags of up to 7 or 8 years.

Panel A of Figure 2 plots the ratio of the numbers of firms in the final sample and the URD sample to the number of DRS firms, by year of default. There are noticeable upward jumps in this ratio around the recessions of 1989-1990 and 2001-2002, indicating that the URD sample focuses more on firms that defaulted during credit-market turmoils.

I also compare the URD and DRS datasets in terms of form of default resolution. Panels A, B and C of Table 2 show that:

- Chapter 11 bankruptcies and missed interest payments account for most of the default events (89.4% for the final sample, 85.7% for URD, and 79.6% for DRS).
- Most bankrupt firms had their reorganization plans confirmed and emerged from Chapter 11 (76.4% for the final sample, 72.6% for URD, and 65.7% for DRS).
- Acquired and liquidated firms total 25 of the 422 URD firms in my final sample. Of the remaining 397 firms, all emerged from default, and their operations continued.

Panel D of Table 2 categorizes firms by SIC code. Industry classifications are based on the SIC manual from the U.S. Department of Labor website.[26] In order to visualize the comparison, Panel B of Figure 2 plots the number of firms in the final sample and the URD as fractions of the number of DRS firms in each industry division. For most industries, the distribution of firms across industries is flat, as the fraction ranges from 60% to 100% for the URD and from 30% to 50% for the final sample. The final sample does not contain firms in three industry groups:

[26]Specifically, the divisions are as follows. Division A: Agriculture, Forestry, and Fishing; Division B: Mining; Division C: Construction; Division D: Manufacturing; Division E: Transportation, Communications, Electric, Gas, and Sanitary Services; Division F: Wholesale Trade; Division G: Retail Trade; Division H: Finance, Insurance, and Real Estate; Division I: Services; Division J: Public Administration. For details, see their website at http://www.osha.gov/ pls/imis/sic_manual.html.

Agriculture, Forestry, and Fishing; Finance, Insurance, and Real Estate; and Public Administration. This suggests that, except for the exclusion of firms in these highly regulated industries, the URD sample and my final sample exhibit no bias on industry groups.

Appendix B. Covenant endogeneity

In order to address the endogeneity problem described in Section V, consider the model:

$$y_i = a + bx_i + \varepsilon_i, \tag{B1}$$

and

$$x_i = \alpha + \beta y_i + z_i\gamma + \eta_i, \tag{B2}$$

where i denotes firm i, y_i is the default recovery rate, x_i is a covenant-intensity index, z_i are some independent variables that affect covenant strictness but are uncorrelated with recovery rates, and ε_i and η_i are error terms satisfying

$$E\left(\varepsilon_i z_j\right) = E\left(\varepsilon_i \eta_j\right) = E\left(z_i \eta_j\right) = E\left(\varepsilon_i\right) = E\left(\eta_i\right) = 0,$$

for all i and j. Moreover, we assume that each of the three series, $\{z_i\}$, $\{\varepsilon_i\}$, and $\{\eta_i\}$ is independent and identically distributed with finitie fourth moments.

Denote $\bar{x}$, $\bar{y}$, and $\bar{\varepsilon}$ the sample averages of x, y, and ε, respectively. Then the OLS estimate of b from (B1) is

$$\hat{b} = \frac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)\left(y_i - \bar{y}\right)}{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2} = b + \frac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)\left(\varepsilon_i - \bar{\varepsilon}\right)}{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2}. \tag{B3}$$

Moreover, plugging (B1) into (B2) and re-arranging terms, we get

$$\left(1 - b\beta\right) x_i = \alpha + a\beta + \beta\varepsilon_i + \gamma z_i + \eta_i. \tag{B4}$$

It then follows from the independence assumption that the series $\{x_i\varepsilon_j\}$ and $\{x_ix_j\}$ are both independent with finite variances. From the weak law of large numbers,[27] we get

$$\frac{1}{n-1}\sum_{i=1}^{n}(x_i-\bar{x})(\varepsilon_i-\bar{\varepsilon}) \xrightarrow{p} E(x_i\varepsilon_i)=\sigma_{x\varepsilon} \quad \text{as } n\to\infty,$$

where $\sigma_{x\varepsilon}$ denotes the covariance between x_i and ε_i, and

$$\frac{1}{n-1}\sum_{i=1}^{n}(x_i-\bar{x})^2 \xrightarrow{p} \sigma_x^2 \quad \text{as } n\to\infty,$$

where σ_x^2 is the variance of x_i. The continuous mapping theorem[28] implies

$$\frac{\sum_{i=1}^{n}(x_i-\bar{x})(\varepsilon_i-\bar{\varepsilon})}{\sum_{i=1}^{n}(x_i-\bar{x})^2} \xrightarrow{p} \frac{\sigma_{x\varepsilon}}{\sigma_x^2} \quad \text{as } n\to\infty. \tag{B5}$$

Plugging (B5) into (B3), we get

$$\left(\hat{b}-b\right) \xrightarrow{p} \frac{\sigma_{x\varepsilon}}{\sigma_x^2} \quad \text{as } n\to\infty. \tag{B6}$$

Multiplying both sides of (B4) by ε_i and taking expectations, we get

$$\sigma_{x\varepsilon}=\frac{\beta}{1-b\beta}\sigma_\varepsilon^2. \tag{B7}$$

Combining (B6) and (B7), we get

$$\left(\hat{b}-b\right) \xrightarrow{p} \frac{\beta}{1-b\beta}\frac{\sigma_\varepsilon^2}{\sigma_x^2} \quad \text{as } n\to\infty. \tag{B8}$$

The endogeneity hypothesis is that low expected recovery rates lead to stricter

[27] For a detailed discussion of the weak law of large numbers, see Durrett (2005) (page 35).

[28] For an application of the continuous mapping theorem to convergence in probability to a constant, see Billingsley (1968) (page 31, Corollary 2).

covenants, implying a negative coefficient β. It follows from (B8) that for large n, the OLS estimate $\hat{b}$ understates the true impact of covenant strictness on recovery rates. Given that we have estimated statistically significant impacts of the covenant-intensity index on default recovery rates based on the OLS model (B1), the true effect of stricter covenants on recovery rates should also be statistically significant, and even greater.

To show quantitatively how much the endogeneity problem may affect the magnitude of my estimates, I approximate $\hat{b}$ in the sense of convergence in probability:

$$\left(\hat{b} - b\right) \simeq \frac{\beta}{1 - b\beta} \frac{\sigma_{\varepsilon}^2}{\sigma_x^2}. \tag{B9}$$

We approximate the population variance of ε_i, σ_{ε}^2, by our sample estimate $\hat{\sigma}_{\varepsilon}^2 = \frac{1}{n-1} \sum_{i=1}^{n} e_i^2$, where $e_i = (y_i - \bar{y}) - \hat{b}\,(x_i - \bar{x})$, and the population variance of x_i, σ_x^2, by the sample estimate, $\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2$. Now we have from (B9)

$$\hat{b} \simeq b + \frac{\beta}{1 - b\beta} \frac{\hat{\sigma}_{\varepsilon}^2}{\hat{\sigma}_x^2}. \tag{B10}$$

Based on my OLS estimates from Table 7 with macroeconomic conditions measured by GDP growth, we have $\hat{\sigma}_{\varepsilon}^2 = 0.0565$, $\hat{\sigma}_x^2 = 2.2992$, and $\hat{b} = 0.0398$. For a given β, we can solve from (B10) an approximation of b. The relation between the approximation of b and β is shown in the first panel of Figure 3. The graph suggests that if a one-standard-deviation decrease in the expected recovery rate alone induces, through the precautionary motives of the bank at the time of the loan negotiation, a one-standard-deviation increase in the covenant-intensity index, then the true impact of covenant strictness on recovery rates will be 200% higher than the OLS estimates.

This effect is consistent across the four different measures of macroeconomic conditions, as shown in Figure 3.

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Table 1: Summary Statistics

The table below presents summary statistics for Moody's Ultimate Recovery Database (URD). Panel A is for defaulted firms in my final sample, which includes firms that have defaulted bank debt and the related credit agreement(s) can be identified. Panel B is for the entire sample. *Total Book Assets* are derived from COMPUSTAT, complemented when possible by firms' SEC filings. *Total Debt* is the sum of all defaulted debt. *Debt-to-Assets* is the ratio of *Total Debt* to *Total Book Assets*. *Bank Share* is the share of bank debt in *Total Debt*. *HHI* is the Herfindahl-Hirschman index of the nominal amounts of bank debt instruments of the firm, across different lenders. *Time Lag* is the time between the orgination of the bank credit facility and default. *Recovery rates* are the firm-wide default recovery rates, measured for each firm as the dollar-weighted sum of ultimate dollar recoveries relative to total claims.

	Total book Assets ($ Mil)	Total Debt ($ Mil)	Debt -to- Assets	Bank Share	N of Debt Issues	N of Bank Debt	N of Credit Facilities	HHI of Bank Debt	Time Lag $T_{def} - T_{org}$ (in Years)	Recovery Rates
Panel A. Final Sample (Number of Defaults=422)										
Mean	1453.69	831.87	0.86	0.44	5.13	2.33	1.26	0.68	1.90	0.56
Standard Deviation	4634.00	2027.92	0.48	0.29	5.78	1.46	0.63	0.28	1.28	0.27
Minimum	11.42	14.50	0.05	0.00	1	1	1	0.00	0.01	0.00
25-Percentile	183.60	159.46	0.54	0.21	3	1	1	0.40	0.90	0.33
Median	437.59	319.47	0.80	0.41	4	2	1	0.61	1.69	0.55
75-Percentile	1032.37	690.69	1.07	0.62	6	3	1	1.00	2.63	0.76
Maximum	71704.00	23410.00	3.26	1.00	80	11	7	1.00	6.77	1.06
Panel B. Full URD Sample (Number of Defaults=741)										
Mean	1516.59	737.11	0.87	0.36	4.96	1.89	1.04	0.57	2.02	0.53
Standard Deviation	6246.51	2049.55	0.51	0.31	5.94	1.57	0.76	0.36	1.40	0.29
Minimum	11.42	1.98	0.05	0.00	1	0	0	0.00	0.01	0.00
25-Percentile	178.33	131.94	0.51	0.08	2	1	1	0.33	0.94	0.29
Median	384.47	264.25	0.80	0.31	4	2	1	0.54	1.78	0.52
75-Percentile	947.76	599.04	1.09	0.55	6	3	1	1.00	2.73	0.74
Maximum	103803.00	33073.53	3.26	1.00	80	11	7	1.00	8.00	1.44

Table 2: Comparison of DRS and URD

This table compares Moody's Default Risk Service (DRS) database, the entire Ultimate Recovery Database (URD), and the URD firms in my final sample. The DRS database covers default events from 1970 to 2006, while the URD covers defaults from 1987 to 2007. Panel A presents the distribution of Total Book Assets, Panel B shows the distribution of firms by default type, Panel C presents the distribution of firms by resolution type, and finally Panel D shows the distribution of firms by indutry group.

	DRS		URD Full		URD Final	
	(70-06)	(87-06)	All	Public	All	Public
Panel A. Summary Statistics by Total Book Assets ($ millions)						
Mean	1529.9	1466.0	1517.3	1623.8	1296.7	1374.9
Standard Deviation	6872.8	6535.2	6241.4	6592.6	4306.1	4553.8
Minimum	0.2	0.2	11.4	11.4	11.4	11.4
25-Percentile	151.8	168.9	179.9	178.4	185.9	188.7
Median	366.9	398.1	387.3	400.2	417.2	438.8
75-Percentile	1064.1	1106.8	964.6	1007.7	920.9	984.7
Maximum	103803	103803	103803	103803	71704	71704
Panel B. Summary Statistics by Default Type (%)						
Missed interest payment	48.6	50.7	35.0	35.2	37.0	36.2
Chapter 11	25.7	24.7	19.4	19.7	21.1	21.2
Distressed exchange	9.7	9.2	4.9	4.9	4.3	4.0
Grace period default	2.9	3.3	0.5	0.6	0.5	0.5
Suspension of payments	2.3	2.7	0.9	0.6	0.9	0.5
Missed principal and interest payments	2.2	2.4	0.9	0.8	0.2	0.3
Prepackaged Chapter 11	1.9	2.1	1.9	1.7	1.2	0.8
Others	6.5	4.8	25.0	25.7	22.5	23.6
Not in Moody's	0.1	0.0	11.5	10.6	12.3	12.9
Panel C. Summary Statistics by Resolution Type (%)						
Reorganization plan confirmed	27.3	29.3	30.6	32.5	36.3	37.3
Emerged from Chapter 11	15.7	16.6	13.0	11.7	9.5	8.6
Distressed exchange	9.7	9.2	4.9	4.3	3.6	2.7
Liquidated	6.0	6.5	3.4	3.8	2.8	2.9
Acquired	4.3	4.9	2.8	2.4	3.1	2.4
Made interest payment	3.6	3.9	0.7	0.8	0.5	0.5
Emerged from bankruptcy	2.1	2.4	2.4	2.4	3.8	3.5
Others	0.7	0.8	0.1	0.2	0.0	0.0
N/A	30.5	26.4	30.6	31.3	28.2	29.2
Not in Moody's	0.1	0.0	11.5	10.6	12.3	12.9
Panel D. Summary Statistics by Industry (%)						
A: Agriculture, Forestry, Fishing	0.2	0.2	0.4	0.3	0.0	0.0
B: Mining	3.4	3.1	6.1	5.6	6.4	5.9
C: Construction	1.3	1.4	1.6	1.6	1.4	1.3
D: Manufacturing	24.0	24.6	34.4	35.9	37.4	38.3
E: Transportation, Communications, Electric, Gas, Sanitary Services	13.7	14.3	18.9	19.5	17.8	18.2
F: Wholesale Trade	2.5	2.5	4.0	3.5	2.8	2.9
G: Retail Trade	8.1	8.6	14.6	13.8	13.3	12.6
H: Finance, Insurance, Real Estate	5.6	5.8	3.1	2.9	3.6	2.9
I: Services	8.0	8.8	16.9	17.0	17.3	17.7
J: Public Administration	0.6	0.5	0.0	0.0	0.0	0.0
N/A	32.5	30.4	0.0	0.0	0.0	0.0
Number of firms (all panels)	1543	1319	741	630	422	373

Table 3: Summary Statistics by Covenant Inclusion

This table presents descriptive statistics of firms in my final sample by covenant inclusion. Panel A shows summary statistics by the covenant-intensity index, while Panel B shows summary statistics by inclusion of each of the six covenants. *Recovery Rate* is the firm-wide ultimate default recovery rate. *Total Assets* is a firm's total book assets. *Total Debt* is the sum of the face value of all defaulted debt. *Debt-to-Assets* is the ratio of Total Debt to Total Assets. *Time Lag* is the time between the orgination of the bank credit facility and default. *TIB* (*Time in Bankruptcy*) is the time that a defaulted firm stays in bankruptcy.

Panel A. Summary statistics by the covenant-intensity index

Covenant Intensity Index	0	1	2	3	4	5	6
Recovery Rate	0.19	0.47	0.54	0.54	0.55	0.59	0.74
Total Assets ($mil)	705.98	1019.52	1356.04	1929.47	1803.84	894.14	1800.61
Total Debt ($mil)	681.54	670.48	537.02	990.48	1157.94	558.58	1255.76
Debt-to-Assets	1.24	0.77	0.81	0.87	0.91	0.92	0.87
Time Lag (years)	2.20	1.84	1.61	1.77	2.24	2.05	2.00
TIB (years)	1.80	1.35	1.25	1.08	1.16	1.03	1.08
Number of Firms	8	49	97	70	79	72	47

Panel B. Summary statistics by inclusion of individual covenant

	>3 Financial Ratios		Asset Sweep		Debt Sweep		Equity Sweep		Secured		Restricted Dividend	
	0	1	0	1	0	1	0	1	0	1	0	1
Recovery Rate	0.54	0.59	0.51	0.60	0.53	0.61	0.53	0.62	0.38	0.59	0.46	0.57
Total Assets ($mil)	1339.19	1625.38	1401.48	1497.58	1365.31	1613.28	1483.11	1383.46	1503.62	1442.30	927.31	1536.43
Total Debt ($mil)	694.26	1034.31	684.09	953.78	733.95	1003.61	822.07	849.04	873.38	821.90	642.33	859.22
Debt-to-Assets	0.86	0.87	0.83	0.90	0.85	0.90	0.84	0.91	0.92	0.86	0.89	0.86
Time Lag (years)	1.84	2.01	1.75	2.05	1.83	2.06	1.87	2.00	1.60	1.97	2.09	1.88
TIB (years)	1.24	1.07	1.26	1.10	1.17	1.16	1.21	1.08	1.41	1.12	1.26	1.16
Number of Firms	253	169	193	229	271	151	291	131	70	352	56	366
t-statistic	1.86		3.33		2.95		3.21		7.00		2.59	

Table 4: Dependence of Recovery Rates on Lagged Macroeconomic Conditions

This table presents multivariate regression results of firm-wide recovery rates on lagged macroeconomic conditions, controlling for other determinants of recovery rates. The dependent variable is the firm-wide ultimate recovery rates. Ln(*Total Book Assets*) is the natural logarithm of *Total Book Assets*, a proxy for firm size. *Debt-to-Assets* is the ratio of *Total Debt* to *Total Book Assets*. *Bank-Debt Share* is the portion of bank debt in *Total Debt*. *HH Index of Bank Debt* is the Herfindahl-Hirschman index of a firm's bank debt, measuring a firm's bank-debt concentration. *Distressed Exchange* is a dummy variable that is set to be 1 if the default leads to a distressed exchange, and 0 otherwise. The macroeconomic condition variables include *GDP Growth* (trailing four quarter U.S. GDP growth rates), *Default Rate* (Moody's trailing twelve month issuer-weighted global speculative grade corporate default rates), *Bond Spread* (yield spreads between Moody's BAA-rated and AAA-rated corporate bonds), and *S&P 500 Return* (trailing twelve month return of Standard & Poor's 500 index). The lagged values are taken at the origination of the credit facility, while the non-lagged values are taken at the time of default. Panel A reports the OLS regression results, and Panel B reports the two-sided Tobit regression results. The t-statistics are reported in parentheses. The superscripts a, b, and c represent significance at 1%, 5%, and 10% levels, respectively.

(Continued on the next page)

	Panel A. OLS regressions				Panel B. Poisson regressions			
	1	2	3	4	1	2	3	4
Intercept	0.387^a	0.423^a	0.472^a	0.372^a	0.402^a	0.444^a	0.497^a	0.390^a
	(3.148)	(3.790)	(3.882)	(3.275)	(2.956)	(3.566)	(3.632)	(3.112)
ln*(Total Book Assets)*	0.001	0.007	0.007	0.003	−0.005	0.001	0.002	−0.003
	(0.078)	(0.578)	(0.633)	(0.280)	(−0.390)	(0.081)	(0.125)	(−0.210)
Firm Debt-to-Assets	-0.070^b	-0.071^b	-0.069^b	-0.069^b	-0.091^a	-0.091^a	-0.089^a	-0.088^a
	(−2.452)	(−2.539)	(−2.440)	(−2.427)	(−2.870)	(−2.946)	(−2.837)	(−2.835)
Bank-Debt Share	0.311^a	0.321^a	0.315^a	0.317^a	0.379^a	0.391^a	0.383^a	0.386^a
	(6.764)	(7.196)	(7.005)	(6.982)	(7.450)	(7.907)	(7.679)	(7.687)
HH Index	0.135^a	0.127^a	0.137^a	0.129^a	0.168^a	0.158^a	0.169^a	0.160^a
	(2.699)	(2.638)	(2.819)	(2.623)	(3.062)	(2.991)	(3.168)	(2.966)
Distressed Exchange	0.196^a	0.210^a	0.214^a	0.203^a	0.195^a	0.210^a	0.212^a	0.201^a
	(4.923)	(5.418)	(5.439)	(5.125)	(4.516)	(5.011)	(5.011)	(4.701)
GDP Growth	0.025^a				0.026^a			
	(3.054)				(2.960)			
Lagged GDP Growth	-0.025^a				-0.026^a			
	(−2.769)				(−2.625)			
Default Rate		-0.023^a				-0.024^a		
		(−6.293)				(−6.223)		
Lagged Default Rate		0.011^a				0.012^a		
		(2.758)				(2.715)		
Bond Spread			-0.270^a				-0.283^a	
			(−5.460)				(−5.274)	
Lagged Bond Spread			0.124^b				0.125^b	
			(2.419)				(2.231)	
S&P 500 Return				0.323^a				0.346^a
				(4.590)				(4.539)
Lagged S&P 500 Return				-0.227^a				-0.254^a
				(−3.057)				(−3.129)
Adjusted R^2	0.185	0.232	0.216	0.205	0.182	0.229	0.213	0.203
Sample Size	422	422	422	422	422	422	422	422

Table 5: Counter-Cyclical Covenant Strictness

This table presents the estimates of loan-covenant strictness on macroeconomic conditions at origination of a credit facility, controlling for borrower and lender characteristics. OLS coefficients are reported in Panel A, and marginal effects of Poisson regressions are reported in Panel B. The dependent variable is the *Covenant-Intensity Index*, defined as the sum of six indicator functions including restricted dividend, secured, more than 3 financial ratio covenants, asset sweep, debt sweep, and equity sweep. Firm-specific *Total Book Assets* are obtained from COMPUSTAT, complemented when possible by firms' SEC filings. Ln(*Total Book Assets*) is the natural logarithm of *Total Book Assets*, a proxy for firm size. *Firm Debt-to-Assets* is the ratio of *Total Debt* to *Total Book Assets*. *Bank-Debt Share* is the bank-debt share in *Total Debt*. *Syndicated Loan* is an indicator variable that is set to be 1 if the credit facility is syndicated, and 0 otherwise. *Ln(Loan Size)* is the natural logarithm of the principal amount of the credit facility. *Bank Liabilities/Assets* is the ratio of the lead bank's total liabilities to its total book assets. The macroeconomic condition variables include *GDP Growth* (trailing four quarter U.S. GDP growth rates), *Default Rate* (Moody's trailing twelve month issuer-weighted global speculative grade corporate default rates), *Bond Spread* (yield spreads between Moody's BAA-rated and AAA-rated corporate bonds), and *S&P 500 Return* (trailing twelve month return of Standard & Poor's 500 index). Values are taken at the origination of the credit facility. The t-statistics are reported in parentheses. The superscripts a, b, and c represent significance at 1%, 5%, and 10% levels, respectively.

(Continued on the next page)

	Panel A. OLS regressions				Panel B. Poisson regressions			
	1	2	3	4	1	2	3	4
Intercept	0.683	−0.903	−1.359	−0.010	–	–	–	–
	(0.706)	(−0.956)	(−1.371)	(−0.011)				
ln(Total Book Assets)	0.101	0.050	0.088	0.079	0.045	0.023	0.039	0.036
	(1.059)	(0.528)	(0.923)	(0.841)	(1.058)	(0.544)	(0.903)	(0.833)
Firm Debt-to-Assets	0.479[a]	0.436[b]	0.420[b]	0.474[a]	0.073[b]	0.066[b]	0.066[b]	0.072[b]
	(2.616)	(2.429)	(2.297)	(2.628)	(2.401)	(2.162)	(2.153)	(2.362)
Bank-Debt Share	0.799[a]	0.758[a]	0.726[b]	0.797[a]	0.079[a]	0.075[a]	0.074[a]	0.079[a]
	(2.794)	(2.688)	(2.528)	(2.821)	(2.821)	(2.652)	(2.605)	(2.813)
Syndicated Loan	0.512[a]	0.509[a]	0.521[a]	0.545[a]	0.046	0.054[c]	0.051[c]	0.054[c]
	(2.711)	(2.726)	(2.740)	(2.918)	(1.630)	(1.896)	(1.767)	(1.888)
ln(Loan Size)	−0.000	−0.000	−0.000	−0.000	−0.017	−0.010	−0.018	−0.019
	(−0.320)	(−0.027)	(−0.320)	(−0.316)	(−0.461)	(−0.261)	(−0.469)	(−0.499)
Bank Liabilities/Assets	2.109[a]	2.339[a]	2.134[a]	2.308[a]	0.079[b]	0.088[a]	0.079[b]	0.086[b]
	(2.676)	(3.006)	(2.693)	(2.965)	(2.373)	(2.607)	(2.382)	(2.569)
GDP Growth Rate	−0.275[a]				−0.112[a]			
	(−4.833)				(−4.275)			
Default Rate		0.153[a]				0.136[a]		
		(5.841)				(5.138)		
Bond Spread			1.403[a]				0.106[a]	
			(4.277)				(3.896)	
S&P 500 Return				−2.638[a]				−0.131[a]
				(−5.785)				(−4.991)
Adjusted R^2	0.114	0.136	0.103	0.134	0.113	0.134	0.104	0.133
Sample Size	422	422	422	422	422	422	422	422

Table 6: Inclusion of Individual Covenants

This table presents Probit estimates of covenant inclusion (dividend restriction, secured, financial covenants, asset sweep, debt sweep, and equity sweep). The dependent variable is an indicator variable that is set to be 1 if a covenant is included in the credit facility, and 0 otherwise. Firm-specific *Total Book Assets* are obtained from COMPUSTAT, complemented when possible by firms' SEC filings. Ln(*Total Book Assets*) is the natural logarithm of *Total Book Assets*, a proxy for firm size. *Firm Debt-to-Assets* is the ratio of *Total Defaulted Debt* outstanding at default to *Total Book Assets*. *Bank-Debt Share* is the bank-debt share in *Total Defaulted Debt*. *Syndicated Loan* is an indicator variable that is set to be 1 if the credit facility is syndicated, and 0 otherwise. *Ln(Loan Size)* is the natural logarithm of the principal amount of the credit facility. *Bank Liabilities/Assets* is the ratio of the lead bank's total liabilities to its total book assets. The macroeconomic condition is measured by *GDP Growth* (annual U.S. GDP growth rates). Values are taken at the origination of the credit facility. The t-statistics are reported in parentheses. The superscripts a, b, and c represent significance at 1%, 5%, and 10% levels, respectively.

	Asset Sweep	Debt Sweep	Equity Sweep	Secured	Financial Covenant	Restricted Dividend
Intercept	-3.033^a	-3.978^a	-3.165^a	2.101^b	1.785^b	0.982
	(−3.255)	(−3.337)	(−2.691)	(2.279)	(2.212)	(1.044)
ln(Total Book Assets)	0.097	−0.030	−0.033	-0.300^a	−0.075	−0.146
	(1.018)	(−0.296)	(−0.326)	(−2.781)	(−0.881)	(−1.371)
Firm Debt-to-Assets	0.377^b	0.207	0.200	−0.277	−0.054	−0.245
	(2.262)	(1.229)	(1.185)	(−1.456)	(−0.336)	(−1.300)
Bank-Debt Share	0.235	0.103	0.369	0.524	0.240	-0.545^c
	(0.865)	(0.368)	(1.322)	(1.475)	(0.891)	(−1.721)
Syndicated Loan	0.089	0.108	0.123	0.068	0.318^a	0.038
	(1.173)	(1.437)	(1.640)	(0.799)	(4.262)	(0.409)
Ln(Loan Size)	0.129	0.227^b	0.080	0.036	−0.125	0.201^c
	(1.360)	(2.276)	(0.800)	(0.340)	(−1.543)	(1.876)
Bank Liabilities/Assets	2.104^a	3.061^b	2.678^b	1.507^b	−0.803	0.590
	(2.578)	(2.521)	(2.233)	(2.071)	(−1.198)	(0.776)
GDP Growth	-0.151^a	-0.140^a	-0.134^a	-0.244^a	-0.191^a	−0.019
	(−3.031)	(−2.825)	(−2.674)	(−3.483)	(−3.885)	(−0.313)
Adjusted R^2	0.093	0.092	0.046	0.068	0.027	0.003
Sample Size	422	422	422	422	422	422

Table 7: Impacts of Covenant Strictness on Firm Recovery Rates

This table presents multivariate OLS regression results of firm-wide recovery rates on *Covenant-Intensity Index*, controlling for other determinants of recovery rates such as lagged macroeconomic conditions. Ln(*Total Book Assets*) is the natural logarithm of *Total Book Assets*, a proxy for firm size. *Firm Debt-to-Assets* is the ratio of *Total Debt* to *Total Book Assets*. *Distance to Default* is a volatility-normalized measure of default risk, obtained by solving the Merton (1974) model for each firm following Duffie, Saita, and Wang (2007). *Bank-Debt Share* is the portion of bank debt in *Total Debt*. *HH Index of Bank Debt* is the Herfindahl-Hirschman index of bank debt, measuring a firm's bank-debt concentration. *Distressed Exchange* is a dummy variable that is set to be 1 if the default leads to a distressed exchange, and 0 otherwise. The macroeconomic condition variables include *GDP Growth* (trailing four quarter U.S. GDP growth rates), *Default Rate* (Moody's trailing twelve month issuer-weighted global speculative grade corporate default rates), *Bond Spread* (yield spreads between Moody's BAA-rated and AAA-rated corporate bonds), and *S&P 500 Return* (trailing twelve month return of Standard & Poor's 500 index). The lagged values are taken at the origination of the credit facility, while the non-lagged values are taken at the time of default. Panel A (B) reports the OLS regression results with *Firm Debt-to-Asset* (*Distance to Default*) as a proxy for default risk. The t-statistics are reported in parentheses. The superscripts a, b, and c represent significance at 1%, 5%, and 10% levels, respectively.

(Continued on the next page)

	Panel A. OLS regressions (Firm Debt-to-Assets)					Panel B. OLS regressions (Distance to Default)				
	1	2	3	4	5	1	2	3	4	5
Intercept	0.180	0.238[c]	0.333[a]	0.389[a]	0.247[b]	0.057	0.165	0.230[b]	0.268[b]	0.171
	(1.556)	(1.938)	(3.021)	(3.258)	(2.182)	(0.454)	(1.186)	(2.000)	(2.075)	(1.383)
ln*(Total Book Assets)*	−0.002	−0.002	0.003	0.003	0.000	0.010	0.009	0.013	0.014	0.009
	(−0.164)	(−0.209)	(0.301)	(0.293)	(0.020)	(0.751)	(0.657)	(1.014)	(1.042)	(0.676)
Firm Debt-to-Assets	−0.091[a]	−0.086[a]	−0.086[a]	−0.083[a]	−0.084[a]					
	(−3.251)	(−3.073)	(−3.140)	(−3.014)	(−3.030)					
Distance to Default						0.032[a]	0.032[a]	0.027[b]	0.029[b]	0.032[a]
						(2.680)	(2.657)	(2.270)	(2.437)	(2.660)
Bank-Debt Share	0.277[a]	0.280[a]	0.289[a]	0.286[a]	0.286[a]	0.316[a]	0.315[a]	0.322[a]	0.315[a]	0.317[a]
	(6.149)	(6.215)	(6.602)	(6.477)	(6.427)	(5.925)	(5.917)	(6.211)	(5.967)	(5.962)
HH Index	0.195[a]	0.181[a]	0.165[a]	0.175[a]	0.173[a]	0.155[b]	0.127[c]	0.132[b]	0.145[b]	0.138[b]
	(4.036)	(3.665)	(3.472)	(3.654)	(3.552)	(2.493)	(1.990)	(2.158)	(2.352)	(2.190)
Distressed Exchange	0.186[a]	0.185[a]	0.200[a]	0.200[a]	0.193[a]	0.240[a]	0.231[a]	0.238[a]	0.244[a]	0.234[a]
	(4.789)	(4.758)	(5.273)	(5.226)	(4.997)	(4.424)	(4.253)	(4.488)	(4.517)	(4.301)
Covenant-intensity Index	0.043[a]	0.040[a]	0.037[a]	0.038[a]	0.038[a]	0.035[a]	0.030[a]	0.027[a]	0.031[a]	0.030[a]
	(5.700)	(5.135)	(4.905)	(4.975)	(4.968)	(3.581)	(2.945)	(2.668)	(2.985)	(2.940)
GDP Growth	0.020[b]	0.021[a]				0.025[b]	0.028[b]			
	(2.513)	(2.664)				(2.318)	(2.535)			
Lagged GDP Growth		−0.013					−0.021[c]			
		(−1.392)					(−1.801)			
Default Rate			−0.020[a]					−0.021[a]		
			(−5.621)					(−4.494)		
Lagged Default Rate			0.005					0.010[c]		
			(1.278)					(1.946)		
Bond Spread				−0.234[a]					−0.219[a]	
				(−4.810)					(−3.318)	
Lagged Bond Spread				0.064					0.077	
				(1.235)					(1.154)	
S&P 500 Return					0.282[a]					0.247[a]
					(4.094)					(2.692)
Lagged S&P 500 Return					−0.118					−0.155
					(−1.559)					(−1.596)
Adjusted R^2	0.230	0.232	0.272	0.258	0.248	0.199	0.206	0.243	0.214	0.205
Sample Size	422	422	422	422	422	422	259	259	259	259

Table 8: Robustness

This table presents results of robustness checks. In all panels, the dependent variable is the firm-wide recovery rates. ln(*Total Book Assets*) is the natural logarithm of *Total Book Assets*, a proxy for firm size. *Firm Debt-to-Assets* is the ratio of *Total Defaulted Debt* to *Total Book Assets*. *Bank-Debt Share* is the portion of bank debt in *Total Defaulted Debt*. *HH Index of Bank Debt* is the Herfindahl-Hirschman index for bank debt, measuring a firm's bank-debt concentration. *Distressed Exchange* is a dummy variable that is set to be 1 if the default leads to a distressed exchange, and 0 otherwise. covenant-intensity Index measures covenant strictness, defined as the sum of six covenant indicator variables: one each for collateral, dividend restrictions, asset sales sweep, debt issuance sweep, equity issuance sweep, and the existence of more than three financial ratio covenants. The macroeconomic condition variables include *GDP Growth* (annual U.S. GDP growth rates), *Default Rate* (Moody's annual issuer-weighted global speculative grade corporate default rates), *Bond Spread* (yield spreads between Moody's BAA-rated and AAA-rated corporate bonds), and *S&P 500 Return* (annual return of Standard and Poor 500 stock index). The lagged values are taken at the origination of credit facility, while the non-lagged values are taken at the time of default. Panels A (B) shows estimates for firms that have at least 1 year (2 years) from the origination of the credit facility to default. Panels C and D use alternative measures of loan covenant strictness, namely counting the three sweep convenants once and counting financial ratio covenants only, respectively. Panels E and F show eatimates for firms with only one credit agreement at default. The variable *1 Contract* is a dummy variable taking the value 1 if the firm borrows under only 1 credit agreement at default, and 0 otherwise. Panel G presents the estimates of two-stage least squares regressions, where the first stage involves regressing covenant strictness on instrumental variables and the second stage involves regressing recovery rates on the estimated covenant strictness and control variables. The t-statistics are reported in parentheses. The superscripts a, b, and c represent significance at 1%, 5%, and 10% levels, respectively.

(Continued on the next page)

	Panel A. At least 1 year				**Panel B.** At least 2 years			
	1	2	3	4	1	2	3	4
Intercept	0.317^{b}	0.473^{a}	0.541^{a}	0.324^{b}	0.085	0.352^{c}	0.447^{b}	0.146
	(2.160)	(3.529)	(3.676)	(2.384)	(0.402)	(1.781)	(2.075)	(0.745)
ln*(Total Book Assets)*	−0.019	−0.014	−0.014	−0.016	0.003	0.006	0.007	0.005
	(−1.331)	(−1.006)	(−0.990)	(−1.162)	(0.119)	(0.273)	(0.342)	(0.244)
Firm Debt-to-Assets	-0.079^{b}	-0.078^{b}	-0.074^{b}	-0.079^{b}	−0.049	−0.057	−0.047	−0.052
	(−2.506)	(−2.553)	(−2.399)	(−2.550)	(−1.102)	(−1.340)	(−1.090)	(−1.193)
Bank-Debt Share	0.239^{a}	0.254^{a}	0.250^{a}	0.250^{a}	0.197^{a}	0.202^{a}	0.199^{a}	0.204^{a}
	(4.497)	(4.913)	(4.784)	(4.761)	(2.575)	(2.746)	(2.692)	(2.700)
HH Index	0.165^{a}	0.141^{b}	0.154^{a}	0.161^{a}	0.201^{b}	0.150^{c}	0.162^{b}	0.189^{b}
	(2.851)	(2.530)	(2.740)	(2.835)	(2.525)	(1.926)	(2.088)	(2.409)
Distressed Exchange	0.207^{a}	0.226^{a}	0.225^{a}	0.218^{a}	0.187^{a}	0.213^{a}	0.213^{a}	0.192^{a}
	(4.726)	(5.256)	(5.189)	(5.005)	(3.416)	(3.982)	(3.977)	(3.535)
Covenant-Intensity Index	0.039^{a}	0.035^{a}	0.038^{a}	0.041^{a}	0.060^{a}	0.055^{a}	0.056^{a}	0.059^{a}
	(4.221)	(3.886)	(4.255)	(4.440)	(4.745)	(4.532)	(4.826)	(4.644)
GDP Growth	0.024^{b}				0.030^{b}			
	(2.542)				(2.161)			
Lagged GDP Growth	−0.007				−0.005			
	(−0.569)				(−0.306)			
Default Rate		-0.020^{a}				-0.024^{a}		
		(−4.950)				(−4.175)		
Lagged Default Rate		0.002				−0.003		
		(0.342)				(−0.358)		
Bond Spread			-0.239^{a}				-0.318^{a}	
			(−4.285)				(−4.085)	
Lagged Bond Spread			0.019				0.012	
			(0.312)				(0.146)	
S&P 500 Return				0.304^{a}				0.304^{a}
				(3.886)				(2.711)
Lagged S&P 500 Return				−0.002				−0.069
				(−0.025)				(−0.418)
Adjusted R^2	0.230	0.273	0.258	0.250	0.232	0.284	0.280	0.248
Sample Size	301	301	301	301	176	176	176	176

	Panel C. Sweep Covenants Once				Panel D. Financial Ratio Covenants			
	1	2	3	4	1	2	3	4
Intercept	0.246^{c}	0.327^{a}	0.361^{a}	0.245^{b}	0.364^{a}	0.435^{a}	0.480^{a}	0.365^{a}
	(1.967)	(2.869)	(2.942)	(2.104)	(2.977)	(3.923)	(3.983)	(3.217)
ln*(Total Book Assets)*	−0.002	0.003	0.004	0.001	−0.002	0.003	0.004	0.000
	(−0.178)	(0.304)	(0.340)	(0.064)	(−0.192)	(0.299)	(0.341)	(0.032)
Firm Debt-to-Assets	−0.089^{a}	−0.088^{a}	−0.085^{a}	−0.087^{a}	−0.088^{a}	−0.088^{a}	−0.085^{a}	−0.085^{a}
	(−3.118)	(−3.178)	(−3.045)	(−3.065)	(−3.043)	(−3.116)	(−2.980)	(−2.980)
Bank-Debt Share	0.277^{a}	0.288^{a}	0.285^{a}	0.286^{a}	0.289^{a}	0.299^{a}	0.296^{a}	0.298^{a}
	(6.192)	(6.594)	(6.485)	(6.447)	(6.384)	(6.784)	(6.667)	(6.642)
HH Index	0.161^{a}	0.146^{a}	0.159^{a}	0.156^{a}	0.126^{a}	0.115^{b}	0.127^{a}	0.122^{b}
	(3.282)	(3.086)	(3.344)	(3.227)	(2.573)	(2.428)	(2.674)	(2.535)
Distressed Exchange	0.191^{a}	0.205^{a}	0.206^{a}	0.198^{a}	0.195^{a}	0.209^{a}	0.211^{a}	0.202^{a}
	(4.918)	(5.404)	(5.391)	(5.149)	(4.951)	(5.444)	(5.431)	(5.158)
Covenant-Intensity Index	0.056^{a}	0.051^{a}	0.053^{a}	0.053^{a}	0.016^{a}	0.015^{b}	0.015^{b}	0.015^{b}
	(4.472)	(4.116)	(4.362)	(4.277)	(2.682)	(2.570)	(2.494)	(2.433)
GDP Growth	0.021^{a}				0.024^{a}			
	(2.643)				(3.009)			
Lagged GDP Growth	−0.016^{c}				−0.019^{b}			
	(−1.747)				(−2.005)			
Default Rate		−0.020^{a}				−0.022^{a}		
		(−5.606)				(−6.062)		
Lagged Default Rate		0.007^{c}				0.009^{b}		
		(1.791)				(2.052)		
Bond Spread			−0.237^{a}				−0.253^{a}	
			(−4.872)				(−5.147)	
Lagged Bond Spread			0.090^{c}				0.099^{c}	
			(1.790)				(1.924)	
S&P 500 Return				0.282^{a}				0.303^{a}
				(4.098)				(4.357)
Lagged S&P 500 Return				−0.144^{c}				−0.178^{b}
				(−1.936)				(−2.364)
Adjusted R^2	0.226	0.265	0.253	0.242	0.202	0.247	0.231	0.220
Sample Size	422	422	422	422	422	422	422	422

	Panel E. One Credit Facility Only				**Panel F.** Dummy for 1-contract			
	1	2	3	4	1	2	3	4
Intercept	0.259[c]	0.364[a]	0.422[a]	0.284[b]	0.231[c]	0.351[a]	0.404[a]	0.267[b]
	(1.945)	(3.057)	(3.301)	(2.307)	(1.678)	(2.862)	(3.066)	(2.098)
ln*(Total Book Assets)*	−0.015	−0.008	−0.010	−0.013	−0.015	−0.009	−0.010	−0.013
	(−1.168)	(−0.672)	(−0.788)	(−1.015)	(−1.230)	(−0.709)	(−0.838)	(−1.059)
Firm Debt-to-Assets	−0.102[a]	−0.098[a]	−0.097[a]	−0.099[a]	−0.105[a]	−0.100[a]	−0.099[a]	−0.101[a]
	(−3.290)	(−3.265)	(−3.191)	(−3.247)	(−3.350)	(−3.289)	(−3.227)	(−3.282)
Bank-Debt Share	0.295[a]	0.310[a]	0.304[a]	0.302[a]	0.290[a]	0.307[a]	0.300[a]	0.299[a]
	(6.180)	(6.668)	(6.465)	(6.404)	(6.031)	(6.542)	(6.334)	(6.273)
HH Index	0.232[a]	0.212[a]	0.223[a]	0.219[a]	0.235[a]	0.213[a]	0.225[a]	0.221[a]
	(4.357)	(4.147)	(4.337)	(4.161)	(4.406)	(4.164)	(4.361)	(4.189)
Distressed Exchange	0.198[a]	0.210[a]	0.211[a]	0.207[a]	0.202[a]	0.213[a]	0.214[a]	0.210[a]
	(4.726)	(5.158)	(5.108)	(4.988)	(4.789)	(5.169)	(5.137)	(5.016)
Covenant-Intensity Index	0.041[a]	0.037[a]	0.039[a]	0.038[a]	0.041[a]	0.037[a]	0.039[a]	0.039[a]
	(4.820)	(4.441)	(4.673)	(4.571)	(4.864)	(4.458)	(4.694)	(4.596)
1 Contract					0.033	0.018	0.024	0.023
					(0.820)	(0.445)	(0.591)	(0.568)
GDP Growth	0.019[b]				0.019[b]			
	(2.210)				(2.190)			
Lagged GDP Growth	−0.009				−0.008			
	(−0.875)				(−0.767)			
Default Rate		−0.020[a]				−0.019[a]		
		(−5.105)				(−5.018)		
Lagged Default Rate		0.004				0.004		
		(0.938)				(0.875)		
Bond Spread			−0.215[a]				−0.212[a]	
			(−4.102)				(−4.030)	
Lagged Bond Spread			0.042				0.041	
			(0.756)				(0.740)	
S&P 500 Return				0.267[a]				0.264[a]
				(3.678)				(3.606)
Lagged S&P 500 Return				−0.100				−0.095
				(−1.224)				(−1.153)
Adjusted R^2	0.259	0.300	0.282	0.276	0.258	0.298	0.280	0.274
Sample Size	364	364	364	364	364	364	364	364

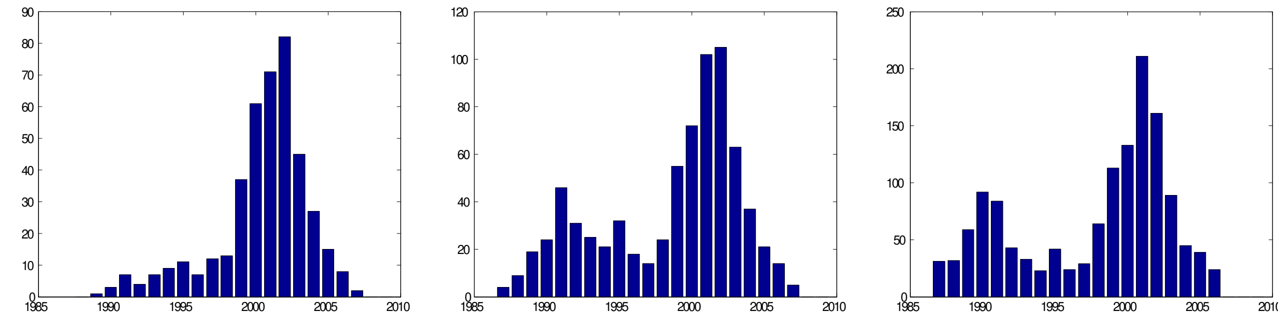
Panel G. Two-Stage Least Square Regressions

	GDP Growth	Default Rate	Bond Spread	S&P 500 Return
Intercept	0.221^c	0.383^a	0.480^a	0.259^b
	(1.785)	(3.253)	(3.836)	(2.180)
ln*(Total Book Assets)*	−0.016	−0.006	−0.006	−0.01
	(−1.221)	(−0.531)	(−0.492)	(−0.890)
Firm Debt-to-Assets	-0.115^a	-0.108^a	-0.103^a	-0.111^a
	(−3.632)	(−3.622)	(−3.309)	(−3.598)
Bank-Debt Share	0.224^a	0.241^a	0.247^a	0.235^a
	(4.144)	(4.799)	(4.640)	(4.500)
HH Index	0.141^a	0.135^a	0.144^a	0.137^a
	(2.807)	(2.764)	(2.928)	(2.759)
Distressed Exchange	0.187^a	0.202^a	0.203^a	0.190^a
	(4.595)	(5.090)	(5.050)	(4.694)
Covenant-intensity Index	0.076^a	0.069^a	0.064^b	0.071^a
	(2.849)	(3.004)	(2.298)	(3.005)
Macroeconomic Conditions	0.023^a	-0.021^a	-0.249^a	0.284^a
at Default	(2.815)	(−5.814)	(−4.986)	(4.019)
Adjusted R^2	0.181	0.224	0.207	0.195
Sample Size	422	422	422	422

Figure 1. Distributions of the URD and DRS Firms by Year

The graphs in Panel A show the number of defaulted firms by the year of default for my final sample, the full URD sample, and the DRS sample, respectively. The first two graphs in Panel B show the distribution of defaulted firms by their time of default and of loan origination, respectively. The last graph in Panel B shows the distribution of the time between loan origination and default for firms in my final sample.

Panel A. Firms in my final sample, the full URD sample, and the DRS sample by year of default



Panel B. Firms in my final sample by year of default, by year of loan origination, and by the time lag

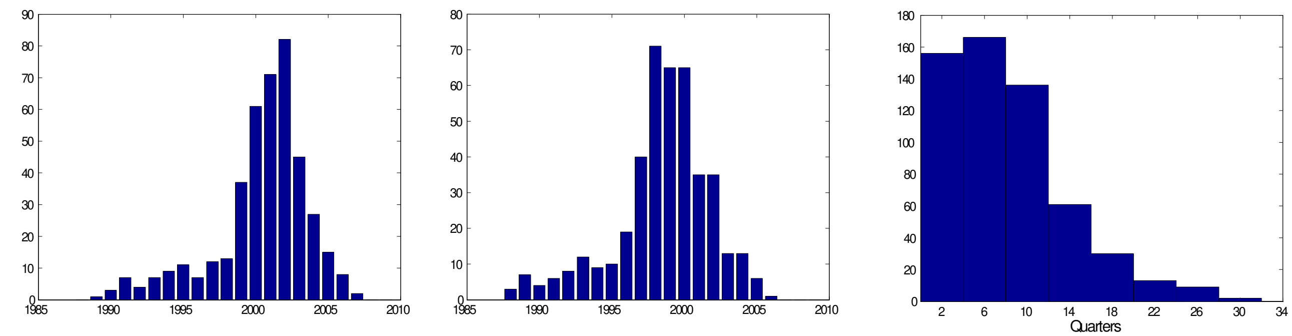


Figure 2. Firms in the Final Sample and the URD as a Fraction of the DRS Firms

The figure presents the number of firms in Moody's Ultimate Recovery Database (URD) as a fraction of the number of firms in Moody's Default Risk Service (DRS) dataset for the period between 1987 and 2006. Panel A shows the distribution of the fraction by year of default, and Panel B shows the distribution by industry. The industry divisions are defined as follows: Division A: Agriculture, Forestry, and Fishing; Division B: Mining; Division C: Construction; Division D: Manufacturing; Division E Transportation, Communications, Electric, Gas, and Sanitary Services; Division F: Wholesale Trade; Division G: Retail Trade; Division H: Finance, Insurance, and Real Estate; Division I: Services; and Division J: Public Administration.

Panel A. By year of default   Panel B. By industry

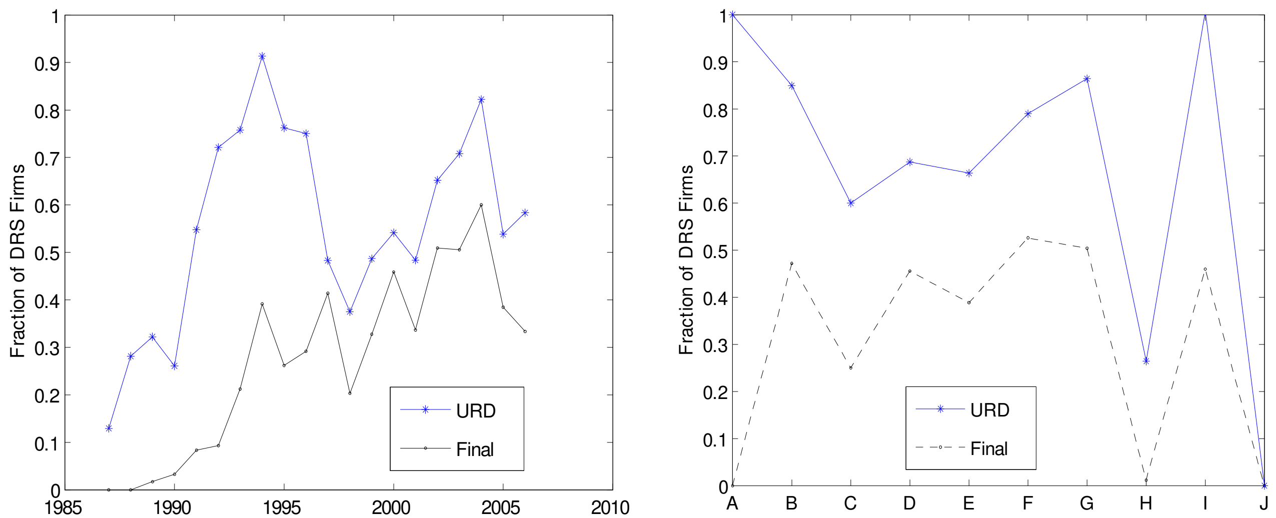


Figure 3. How does endogeneity affect my estimates?

This figure illustrates the relation between b_A, which is an approximation of the true covenant effect b, and the coefficient β, which is the assumed impact of expect recovery rates on covenant strictness.