The Debt Market Role of Asset Valuation Uncertainty*

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ABSTRACT

We study ranges of asset liquidation values estimated by distressed firms in their reorganization plans filed with U.S. Bankruptcy Courts. We find that the average range of the liquidation value of firms' total assets is 27% of the mid-point of the range, which is about 44% of the reported book value, suggesting significant uncertainty in recovery rate estimates. We aggregate historical estimated liquidation value ranges by industry and asset class annually and construct a firm-specific measure that captures the uncertainty in the valuation of reported assets, "Liquidation Value Uncertainty" (LVU). We document that LVU is associated with smaller syndicated loan amounts, relative to assets available as collateral, and lower loan borrowing bases. In addition, LVU is associated with fewer balance sheet covenants and looser covenant thresholds in loan agreements. We further document that loans issued by high LVU borrowers experience lower prices and greater illiquidity in the secondary loan market, especially when borrowers are credit risky. We further focus on distressed events experienced by borrowers and find that high LVU is related to steeper loan price discounts and larger decreases in ownership by Collateralized Loan Obligations that are prominent investors in the secondary loan market. Overall, the evidence suggests that LVU, our proxy for balance sheet asset valuation uncertainty, reflects information relevant to participants in the syndicated loan market.

Keywords: Bankruptcy, Chapter 11, Asset liquidation values, Recovery rates, Valuation uncertainty, Syndicated loans

JEL Classifications: M41, G32, G34, G12.

1. Introduction

Lenders' credit risk analysis of a typical borrower involves both the assessment of probability of default and potential recovery upon default. Debt recovery upon default or its opposite, loss given default, is difficult to estimate ex ante at the time of debt issuance because restructuring outcomes that follow defaults depend not only on the legal priority of various debt securities entitled to claims (i.e., a borrower's liability structure), but crucially also on the overall value of a borrower's assets that is distributable to claimholders (i.e., asset recovery rates). This study brings new empirical evidence in this area by: (i) providing insights on the uncertainty of asset recovery rates upon a borrower's default and proposing an ex ante measure of this construct; and (ii) examining whether lenders recognize the implications of this uncertainty in their loan origination and trading decisions.

A significant amount of attention has been devoted to the estimation of the probability of default in the credit risk literature. However, little has been done to understand the distribution of debt recovery rates and, in particular, the uncertainty associated with the valuation of assets used as collateral in debt contracts, despite its importance to lending practice (e.g., Altman et al. 2019). For example, the Basel Committee on Banking Supervision in its guidance on credit risk management (BCBS 2000) notes that: "Banks should have policies covering the acceptability of various forms of collateral, procedures for the ongoing valuation of such collateral, and a process to ensure that collateral is, and continues to be, enforceable and realizable."[1] Similarly, in its loss given default (LGD) assessment methodology, Moody's (2007) recognizes that "forecasts of instrument-level LGD rates could be made more accurate if it were possible to improve estimates

[1] Most bank lenders list "Collateral" as one of the key five "C factors" used to assess a borrower's creditworthiness. The other four factors include information about credit history ("Character"), the ability to repay the debt ("Capacity"), investments and cash on hand ("Capital") and external factors and use of money ("Conditions").

of enterprise value at default resolution for individual firms."[2] Given the absence of asset market values on the balance sheet of a typical company, we argue that historical data on estimated asset liquidation values by asset type disclosed in bankruptcy filings could provide useful information to lenders of firms in the same industry. In particular, historical asset liquidation value data can reflect the *uncertainty* in the value of a borrower's individual assets, supporting lenders' ex ante assessment of the risk that asset recovery rates upon a borrower's default will be lower.

Borrowers that file for bankruptcy in a U.S. court usually provide, along with a reorganization plan, an analysis of asset recovery values that could be obtained in a hypothetical liquidation scenario – this is known as the "Liquidation Analysis". The role of this disclosure is to provide evidence to the bankruptcy court which, before approving a reorganization plan, must ensure that individual creditors receive under the plan at least what they would recover if the borrower was liquidated.[3] Liquidation analyses typically show range estimates of liquidation values by asset class although asset classifications are not standard and often vary from one company to another. The provision of these ranges likely reflects difficulty in ascertaining liquidation values of usually highly illiquid assets. We rely on these unique disclosures provided over time and hand collect a sample of liquidation analyses from 332 U.S. based publicly listed firms that filed restructuring plans under Chapter 11 between 2002 and 2020. This hand-collection process allows us to assemble a dataset of granular estimated liquidation value ranges by asset class and over time for a reasonably diverse set of borrowers in various industries.

We first provide descriptive evidence on expected recovery rates by type of assets in liquidation, as reported by borrowers in court filings. We find that the average liquidation value of

[2] In liquidation scenarios, the distributable value does not include a going concern element and is essentially the liquidation value of the debtor's assets.

[3] This Chapter 11 plan confirmation requirement is referred to as the "best interests of creditors" test, as further explained in Section 2.

borrowers' total assets, as measured by the mid-range of the reported estimates, is about 44% of the reported balance sheet book value. Current assets are expected to have a significantly higher recovery as a percentage of balance sheet values (60%) compared to fixed assets (38.5%). Amongst current assets, cash (100%), accounts receivables (58.3%), and inventories (44%) have the highest recovery rates, while prepayments (18.8%) and other current assets (22%) have the lowest rates. Not surprisingly, goodwill has recovery rate of zero, while the rates for other intangible assets and property plant and equipment are estimated at about 37%. Recovery values for individual asset classes also vary over time and across industries.

We scale the disclosed asset liquidation value ranges by the mid-point of the range and find that the scaled range for total assets is 26.6%, suggesting significant uncertainty in the average estimated recovery rate for the overall assets. The scaled range measure is highest for deferred tax assets (94%) and current financial assets such as prepayments (75%), followed by intangible assets other than goodwill (51%). We also document that the total asset liquidation value range scaled by the mid-point of the range decreases with firm size and the proportion of tangible assets on the balance sheet, as one would expect. In addition, the total asset scaled range decreases when borrowers have more debt and take more time to disclose liquidation analyses, suggesting that greater lender scrutiny contributes to more accuracy in the estimation of asset liquidation values.

Next, we use historical hand-collected individual asset valuation ranges and their mid-points provided in actual Chapter 11 filings to construct an *ex ante* measure that reflects the uncertainty associated with the asset valuations of any firm. Specifically, we compute the means of scaled asset valuation ranges disclosed by borrowers in bankruptcy filings for each industry, year and asset-class group available in our sample. We then average these industry-year-asset class group means over the previous three years. Next, we aggregate these averages across all assets of a firm using as weights the proportion of each individual asset class on the balance sheet of a firm,

as reported in the current year. We thus obtain a firm-year specific measure, "Liquidation Value Uncertainty" (LVU), which potentially reflects the ex ante uncertainty in estimation of the asset liquidation values for a firm, based on observed historical liquidation values for the same asset classes, as disclosed by bankrupt firms in the same industry over the previous three years.[4] We observe an average LVU of 31% over our sample period and find that LVU reaches a peak following the financial crisis of 2008/09, as one would expect given the increased overall uncertainty due to the larger number of bankruptcy filings.

In our first set of multivariate tests, we validate LVU by studying its association with loan contract features that are negotiated in the primary syndicated loan market.[5] We first document that LVU is associated with lower "loan-to-value" ratios for syndicated loan facilities, suggesting that lenders provide less funding against a given dollar amount of available collateral assets on a borrower's balance sheet (as measured by the level of property, plant and equipment, PPE, or overall tangible assets) when they face greater asset valuation uncertainty. In economic terms, a one standard deviation increase in LVU is associated with a 0.372 (0.054) decrease in the loan amount to PPE (Tangible Assets) ratio, that is a 20.4% (15.5%) decrease relative to the ratios' mean. We also focus on a subsample of loans with borrowing bases, a feature that directly links the size of the credit line that can be drawn by the borrower to the level of assets such as inventories or accounts receivable reported on its balance sheet. We document that greater LVU is associated

[4] It is possible that managers exhibit a bias to keep the firm as a going concern, and thus systematically understate average liquidation values (e.g., Alderson and Betker 1995, Altman et al. 2019). Our measure addresses this by focusing on the range of reported liquidation values rather than the expected value and by aggregating the liquidation value uncertainty measure to the industry level to mitigate idiosyncratic biases (our empirical tests further include industry fixed effects).

[5] Asset valuation uncertainty is likely critical in this market setting. First, syndicated loans are mostly secured with asset collateral. Second, most loan syndicates rely on financial accounting information, including reported assets on the balance sheet, to monitor the loans via financial covenants. Third, if a borrower gets into distress, syndicated loan investors will always be involved in the restructuring process as their seniority in the capital structure ensures an economic interest at stake during bankruptcy court proceedings. In contrast, shareholders might be out of the money and thus not have a say in court.

with more restrictive borrowing bases (i.e., lower credit line advance limits). A one-standard deviation increase in the LVU for inventory or accounts receivable is associated with an approximately 4% increase in the probability that the borrowing base limit on these assets is in the bottom quartile of the sample distribution. We further investigate the association of LVU with financial covenants that rely on balance sheet information which are critical monitoring features in loan contracts. We find that greater LVU is associated with fewer balance sheet covenants in syndicated loan contracts but not with the number of income-statement covenants. In addition, greater LVU is associated with looser financial covenant thresholds. Overall, these primary market tests validate our empirical construct in the primary loan market. When LVU is higher, lenders require more collateral on the balance sheet and loan contracts include fewer and looser covenants to avoid unwarranted covenant breaches and renegotiation costs.

In the second set of tests, we examine whether LVU is priced in the secondary syndicated loan market and is associated with loan holdings by Collateralized Loan Obligations (CLOs) that are the largest set of investors in the secondary syndicated loan market. We obtain secondary loan prices and holdings data from portfolio holdings and trades reported by CLO managers during the 2009-2019 period using the Creditflux CLO-i database. We find that high LVU borrowers experience lower secondary market loan prices, especially when borrowers have high credit risk, and that this result is not driven by lower loan ownership by CLOs. On the contrary, CLOs tend to invest more in loans with higher LVU and riskier borrowers, consistent with CLOs' preference for loans that generate higher yields. Nevertheless, we show that the loans of high LVU borrowers have lower secondary market liquidity, especially when borrowers are credit risky.

In the third set of tests, we focus on a sub-sample of borrowers that experience a distress event, specifically a downgrade to a CCC rating or below, a loan default, a distressed debt exchange, or a firm bankruptcy filing. We investigate the evolution of secondary loan prices and

loan ownership around these distress events because the importance of asset valuation uncertainty (and thus our LVU measure) is likely to be higher when liquidation risk increases. In addition, CLOs face explicit and implicit pressures to sell the loans issued by distressed borrowers.[6] We document that LVU is associated with significantly lower loan prices around the distress event. Specifically, we find that, in the one-month window around a distress event, the prices of loans issued by borrowers with high LVU trade lower by 6.3 percentage points on average, compared to loans issued by low LVU borrowers. This effect is over 10 times larger around distress events, than the overall effect we document for non-distressed borrowers. In additional tests, we find that LVU is gradually reflected in secondary loan prices as the borrower approaches a distress event, suggesting that market participants pay more attention to asset valuation uncertainty as liquidation risk increases. Finally, we document that, in contrast to the tests for performing loans, when borrowers are distressed, LVU is negatively associated with loan ownership by CLOs. That is, CLOs are more likely to offload distressed loans with high LVU. The large economic magnitude of this effect helps to explain the lower secondary loan prices documented around distress events.

Our paper makes several contributions to the literature. First, we add to the literature on the prediction of loss given default. Research on the determinants of loss given default in accounting is rather underdeveloped compared to the extensive research on default probability estimation. This is surprising as loss given default estimates are key components of credit risk assessments and these estimates strongly rely on reported accounting numbers. Exceptions include Carrizosa and Ryan (2013) and Donovan et al. (2015), who provide evidence that accounting conservatism helps determine loss given default, and Amiram and Owens (2021), who document the predictive power of historical financial statements-based measures for ex post loss realizations.

[6] CLOs cannot hold more than a certain pre-specified percentage of loans that are in default or are rated CCC and below in their portfolio (e.g., Loumioti and Vasvari 2019).

A relatively rich literature in financial economics, reviewed by Altman et al. (2019), focuses on the link between the probability of default and the loss given default.[7] Our findings indicate that *uncertainty* in the valuation of borrowers' assets reported on the balance sheet is relevant to lenders and plays a role in their estimation of recovery rates upon default.

Second, we introduce a new construct that captures uncertainty in the measurement of different types of assets, which can be interpreted as a measure of balance sheet quality. Prior studies have extensively explored the structuring and determinants of loan contract features, such as the inclusion or restrictiveness of covenants in loan contracts.[8] A large part of this literature focuses on the effects of information uncertainty as reflected in the quality and reliability of financial reports and reported earnings in particular (Bharath et al. 2008, Graham et al. 2008, Costello and Wittenberg-Moerman 2011, Dhaliwal et al. 2011). An implicit assumption in these papers is that earnings quality affects lenders' ability to reliably assess future expected cash flows and thus their ability to estimate the probability that the borrower will default. However, there is surprisingly scant evidence on lenders' assessment of balance sheet quality which has implications with respect to collateral value and recovery rates on defaulted debt securities and, to some extent, on the ability to monitor financial covenants.[9] Our study is focused on a clearer balance sheet measure of quality that ex ante reflects asset valuation uncertainty using disclosures provided by

[7] For example, Altman et al. (2019, p. 308) notes that: "This traditional focus on default analysis has been partly reversed by the recent increase in the number of studies dedicated to the subject of recovery rate estimation and the relationship between the probability of default and the recovery rate" (see for example Fridson, Garman, and Okashima 2000; Frye 2000a, 2000b, and 2000c; Gupton, Gates, and Carty 2000; Jarrow 2001; Hu and Perraudin 2002; Jokivuolle and Peura 2003; Altman, Resti, and Sironi 2001 and Brady 2005).

[8] See for example: Dichev and Skinner (2002), Bradley and Roberts (2004), Christensen and Nikolaev (2012), Chava and Roberts (2008), Drucker and Puri (2009), Demerjian (2011), Chava et al. (2010), Murfin (2012), Li et al. (2016), Bozanic et al. (2018).

[9] A notable exception is Sunder et al. (2018), who use balance sheet conservatism based on accounting numbers as an inverse proxy for uncertainty in liquidation recoveries and show that higher balance sheet conservatism is related to lower borrowing costs and less restrictive loan contract terms. Related, Arora, Richardson, and Tuna (2013) find that asset reliability issues, due to SFAS 157 disclosures of Level 2 and 3 financial assets for a set of U.S. financial institutions, are a significant determinant of short-term credit spreads and the shape of the general credit term structure. Song et al. (2010) and Kolev (2011) examine similar relations between asset reliability and stock prices.

bankrupt borrowers that are in the same industry and own the same types of assets. Specifically, instead of examining a generic or model-based measure of accounting quality, we focus on a targeted measure of asset value uncertainty based on data directly relevant to lenders given its required disclosure in bankruptcy filings. Our analysis serves the dual objective of showing how lenders incorporate asset valuation uncertainty into their decision-making as well as validating the LVU measure we propose.

Third, our research adds to the limited finance literature on bankruptcy that has used time-clustered and small samples of realized defaults with fewer than 100 observations. Franks and Torous (1994) find a median overall recovery rate of 51% as a percentage of debt claims' face value, with a recovery of 80% (29%) for secured (unsecured) debtholders. Also, debt recovery rates are significantly higher in the case of prepackaged Chapter 11 filings (see Tashjian et al. 1996). In contrast to this prior evidence, our hand-collected data is on the recovery value of assets not specific debt claims.[10] We show that in hypothetical liquidation scenarios, all claimants can negotiate to split the equivalent of 44% of the overall book value of assets subject to liquidation and that there is significant valuation uncertainty around this number. Information on potential asset recoveries in liquidation scenarios helps lenders, regardless of the seniority of their claims in the capital structure, establish lower bound estimates for recoveries on their claims.

2. Background on Chapter 11 and related work

When a company (or debtor) is unable to pay a debt that is due, the company becomes insolvent. If the company cannot obtain the necessary financing through additional borrowing or an equity infusion from shareholders, an out-of-court restructuring or workout of the outstanding

[10] Debt recovery rates are driven by other factors unrelated to assets' valuation such as the concentration of debt ownership, types of debt holders, debt seniority, court deviations from the absolute priority rule to ensure a successful restructuring or the need of debtor-in-possession financing.

debt may be attempted. Basically, the borrower contacts key creditors and solicits their support to seek waivers, extensions or debt write-offs. A workout requires obtaining a consensus among the various impaired creditors, a difficult and perhaps infeasible task. If this process fails, the borrower may restructure its debt using a legal process, usually involving filing a petition in court under Chapter 11 of the U.S. Bankruptcy Code.[11]

A central goal of the Chapter 11 process is to provide a financially troubled but operationally viable business an opportunity for a "fresh start". Once a company (or debtor) enters Chapter 11 proceedings, it has an exclusive period of 120 days to file a plan of reorganization with the court.[12] The plan proposes a restructuring of the company's debts and/or its business' operations. If the debtor's plan expires without the approval of creditors whose rights are affected (i.e., impaired creditors) within 180 days, the creditors may propose their own reorganization plan. The plan must be accepted by at least two-thirds of the value of each class of impaired creditors.

The plan is a formal offer by the debtor to the various claimants to recontract under conditions other than the original debt terms prior to the Chapter 11 filing. The plan usually classifies the claimants in classes (usually based on the seniority of their claims), estimates the going concern value of the firm by forecasting the expected future cash flows, and lays out the distributions (e.g., cash, debt claims or equity in the reorganized firm) to be made to each class of claimants based on their class. Some plans may also explain how the debtor plans to restructure its operations.

The reorganization plan is approved if it is "feasible", meaning that the debtor is unlikely to become distressed in the foreseeable future. Furthermore, as a key requirement for the plan's

[11] The United States Trustee Program, a division of the U.S. Department of Justice, oversees the administration of a bankruptcy case and serves as the watchdog over the bankruptcy process to ensure that the debtor acts in good faith and in conformity with the Bankruptcy Code.

[12] In many cases, debtors provide a pre-negotiated or pre-packaged plan of reorganization at the time of filing for Chapter 11.

approval, the debtor must demonstrate to the bankruptcy court that it is more valuable as a continuing reorganized entity than in liquidation. To prove this point, the debtor must conduct a so called "best interests of creditors test".[13] This test is a representation to each individual claim holder in the firm that it should receive at least as much in the proposed reorganization as it would in a hypothetical liquidation. Operationally, this representation implies that any value exceeding the firm's liquidation value is subject to the vote of a group (or class) of claimants rather than the individual vote of a claimant. Thus, each individual member of a class can either: (1) accept the reorganization plan, or (2) receive assets that have present value equal to that participant's hypothetical distribution, if the debtor company were liquidated instead of being reorganized. This hypothetical recovery in case of liquidation is provided in a "liquidation analysis" which is part of a "disclosure statement" that typically accompanies the reorganization plan submitted to the court and all claimants.

The liquidation analysis exhibits are typically prepared by the debtor's management with help from advisory firms (e.g., Alix Partners, Alvarez & Marsal, and FTI Consulting, among others). The debtors and advisory firms may themselves obtain input concerning liquidation values from lenders that engage in secured or asset-based lending activities. The liquidation analysis typically sets out: (1) hypothetical liquidation value ranges by asset class, (2) secured claims, if any, against those assets, (3) projected Chapter 11 administrative expenses, (4) priority claims and unsecured claims, and (5) a calculation of the percentage distribution to each type of claim. The debtor and its advisors prepare this analysis by assuming an immediate sale of individual assets. The assumptions used in the analysis are unaudited and conditional on significant uncertainties and contingencies, many of which may be beyond debtor's control. In addition, any liquidation

[13] This test is codified in Section 1129(a)(7) of the 1978 Bankruptcy Reform Act.

would take place in the future, at which time circumstances may change. Accordingly, the values assumed in the liquidation analysis are realized only if the debtor's assets are liquidated and are not guaranteed.

We present an example of a liquidation analysis in Appendix A. As can be seen in the exhibit, the debtor provides an estimate of the value of assets that can be recovered in liquidation as a percentage of the amounts on the most recent balance sheet of the company. The estimates are provided in a range (low to high values) which reflects the uncertainty of the value estimates. The overall value of the assets reflects the total proceeds that are available for distribution to various claimholders in a hypothetical liquidation scenario. After deducting several administrative costs (e.g., wind-down costs, fees for trustees, financial advisors and legal advisors), as well as priority tax claims, altogether between 7.1% and 7.4% of total liquidation proceeds, the remaining amount or the encumbered asset base is distributable to creditors. The encumbered assets are then allocated to creditors based on their seniority in the capital structure. In the example presented, the first lien lenders' claims, with a claim that has a face value of $33.7 million, are able to recover between 32.7% and 41.9% of their original claim while second lien lenders with a claim of $28 million are not expected to recover anything. In addition, deficiency claims (i.e., the claims of the first and second lien creditors that were not secured by collateral) and other unsecured claims (e.g., claims of suppliers), receive zero recovery given that they rank below the senior secured creditor claims.

Similar to our paper, two recent concurrent working papers (Kermani and Ma 2020a; Kermani and Ma 2020b) also use hypothetical liquidation values reported in Chapter 11 disclosure statements. However, their objective is to infer measures of asset specificity for non-financial firms and to study the relation between liquidation values and lender monitoring intensity. Our study focuses on the uncertainty in the assessment of liquidation values, rather than the level of these values. In addition, a recent paper by Chen (2021) and a registered report proposal by Baastiansen

et al. (2022) utilize disclosures made in liquidation analyses to explain cross-sectional variation in disclosure choices. Our paper differs from these studies in that we aggregate and construct an ex ante liquidation value uncertainty measure from these disclosures and pose research questions related to the debt market role of uncertainty in hypothetical future liquidations.

3. Sample Selection and Descriptive Statistics

Our main source of data is liquidation analyses provided in exhibits included in Chapter 11 disclosure statements. In Panel A of Table 1, we describe the sample selection process. The Chapter 11 disclosure statements containing the liquidation analysis exhibits are obtained via a one-time file transfer from New Generation Research, a U.S.-based bankruptcy data provider.[14] We identify and collect 1,314 liquidation analyses of debtors that were publicly listed prior to their Chapter 11 filing. Of these exhibits, we exclude 599 that are insufficiently granular enough or lack estimated recoveries by asset class. We further exclude duplicate liquidation analysis filings: in 294 cases, the same debtor included liquidation analysis exhibits in multiple subsequently amended or modified disclosure statements. In these cases, we pick the first available liquidation analysis exhibit.[15] Further, we require the debtors in our sample to have non-missing book values for the asset classes reported in the liquidation analyses, and to have available financial data in Compustat in the year prior to the disclosure statement filing. This results in a further exclusion of 89 cases, giving us a usable sample of 332 liquidation analysis exhibits for the construction of our main empirical measure.

In untabulated analyses, we examine the intertemporal distribution of the liquidation

[14] For the 94 disclosure statements that had the liquidation analysis exhibits missing, we checked bankruptcy filings in Lexis Advance Quicklaw and Public Access to Court Electronic Records (PACER) databases. This search resulted in the collection and inclusion of 41 additional liquidation analysis exhibits.

[15] We focus on the first available liquidation analysis exhibit rather than the final one because cases with several disclosure statements take substantially more time and reflect larger changes in debtors' assets and capital structure (e.g., asset sales, and additional lender negotiations), thus departing further from the pre-filing balance-sheet of the debtor and decreasing comparability with the other liquidation analyses in our sample.

analysis exhibits. We note predictable frequency spikes after the financial crisis of 2007/08 (bankruptcy filings usually come with a lag) and in 2016/17 owing to a large number of bankruptcies in the oil & gas sector.[16] Otherwise, we observe a fairly even spread across the entire sample period, suggesting that many bankruptcies are due to company specific financial and operational issues rather than sector or macro specific drivers. Furthermore, we inspect the industry distribution of liquidation analyses used in our study (untabulated). By and large, the bankruptcies are distributed evenly across industries, with the largest representation being from manufacturing-related industries. This is not surprising given that these industry sectors are capital intensive and may rely on significant amounts of debt to finance asset purchases.

In Panel B of Table 1, we present a snapshot of liquidation values by asset class as a percentage of the assets' book value that we hand-collected from liquidation analysis exhibits. On average, debtors in our sample estimate that their total assets would have a hypothetical recovery of approximately 44% of the recognized book value in liquidation. The average hypothetical liquidation recovery on current assets (60%) is significantly greater than that on fixed long-term assets (37%), but not different from the recovery on other long-term assets (56%). Not surprisingly, the liquidation value of cash is at 100% of its book value.[17] We note that there is a significant divergence between estimated liquidation values within an asset class. For example, in the case of current assets, the average liquidation recoveries on financial assets such as prepayments and accounts receivables range from 18% to 59% of book value. Recoveries on certain hard to value assets are expectedly low — for instance, the estimated liquidation recovery from goodwill is zero

[16] About a third of Chapter 11 filings in 2016 and 2017 were by firms in the oil & gas sector (the SIC industry codes 1311 to 1389).

[17] We find that the debtor's estimated recovery of restricted cash can deviate from this full estimated recovery of the cash account. In 74 cases the estimated value is below par, while 17 liquidation analyses estimate a recovery rate that exceeds 100%. Below par values estimates are likely due to expected costs necessary to monitor and recover restricted cash holdings, while estimates above 100% are likely due to cash inflows expected to arrive after the liquidation analysis date.

for all cases except one. Liquidation values on other intangible assets, such as patents, are estimated by debtors to be typically lower than tangible assets (close to 40% of book value), potentially also reflecting that these assets are not easily transferable and may lose value during bankruptcy. Average liquidation values for tangible assets such as inventory and fixed long-term assets (which are mainly property, plant and equipment) is 44% and 36% of book values.

Figure 1 depicts the industry-wise breakdown of the average midpoint estimated liquidation value as a percentage of book value for each asset class, as well as the range (high minus low) of the reported liquidation values as a percentage of the midpoint. We first discuss the patterns in liquidation recovery rates as a percentage of book values. For accounts receivables, we note that average estimated liquidation values range from approximately 50% to 70% of book value, with liquidation values being the highest in the services sector. We note that recoveries are generally lower for utilities that likely have more receivables from retail customers with small notional values that are difficult to collect. Next, consistent with business intuition, we note that the average inventory liquidation recovery in the wholesale and retail sectors is higher than that for other industries, likely due to the fact that these sectors' inventories consist mainly of finished goods that can be easily resold. We find significant dispersion in the estimated liquidation recoveries for non-goodwill intangible assets, ranging from approximately 20% to 60% of their book value. This dispersion likely reflects the inherent difficulty in the valuation of intangible assets across various industries as well as variation in the accounting recognition of these assets under the current accounting standards (for instance, software internally developed is more readily recognized on balance sheets, while brands or patents internally developed are not). For fixed long-term assets, we observe lower liquidation recoveries in the range of approximately 30% to 50% of their book value. The low liquidation recoveries for fixed assets likely reflect the difficulty in the redeployment of these assets due to their specificity to the firm.

In Panel C of Table 1, we provide summary statistics for liquidation recovery ranges by asset class. On average, the estimated range of liquidation values for a debtor's total assets is approximately 27% of the range midpoint (the range midpoint basically reflects the average expected liquidation value). We notice a significant dispersion in reported liquidation recovery ranges by asset class, with the average recovery range for current assets (14%) being tighter than that for long-term assets (approximately 45% to 51%). As expected, there is very little uncertainty in the valuation of cash equivalents. However, the valuation range is substantial for certain financial assets such as deferred tax assets (94% of midpoint) and prepayments (75%). We also find large liquidation value ranges for non-goodwill intangibles (51% of midpoint), inventory (43%), and fixed long-term assets (44%). These observations are further depicted in Figure 1, where we provide an industry-based breakdown of liquidation value ranges by asset class. Consistent with our discussion above, we first notice that the liquidation recovery range for accounts receivables (approximately 15% to 30%) is relatively lower than that of other asset classes, reflecting the lower degree of the uncertainty in valuation of these financial assets. The uncertainty in liquidation recoveries is generally higher for inventory, with the range being as high as 70% for the services sector. As expected, hypothetical liquidation ranges are high for intangible assets (being greater than 50% of the midpoint for several industry groups). Similarly, valuation uncertainty implied by liquidation value ranges is rather high for long term fixed assets (approximately 35% to 60%), suggesting difficulties in redeploying fixed assets within manufacturing industries.

4. Empirical Analyses

4.1. Liquidation Value Uncertainty (LVU)

We use the valuation ranges disclosed by debtors to infer the uncertainty associated with the estimation of the liquidation value of the assets. Ideally, we could simply use the specific ranges

reported by each debtor as a measure of valuation uncertainty. However, as we are interested in analyzing how lenders assess valuation uncertainty on an ex ante basis when contracting or when trading loans in the secondary market, we do not use the ex post hypothetical values that are released in the final stages of a Chapter 11 process. Further, there is considerable heterogeneity in the level of asset disaggregation provided in liquidation analysis exhibits across debtors that would severely limit the sample size needed to conduct our subsequent empirical analyses. Table 1, Panel C highlights this sample problem. For instance, only 61% of the debtors report liquidation value range for inventories separately. For other assets such as accounts receivables (86% reporting) or fixed long-term assets (84% reporting) analyses are included more frequently. More aggregated reporting could be due to factors such as the asset class or its liquidation value being immaterial or zero, or lenders having security interests in substantially all assets, making aggregated reporting more relevant. These data issues suggest that for loan trading decisions, lenders must rely on historical industry and asset class level data to estimate expected recoveries and assess the value of their claims when debtors are close to default.

Therefore, our ex ante measure aggregates the recovery data based on asset classes and industries.[18] We measure "Liquidation Value Uncertainty" (LVU) in two steps. First, we aggregate asset liquidation value ranges at the Asset-Class × Industry × Year level using the previously reported liquidation analyses. Specifically, for each year, industry and asset class combination, we compute a rolling three-year average of the estimated liquidation value range scaled by the mid-

[18] A simple numerical example illustrates our focus on measurement of uncertainty at the asset class and industry level. Assume that firm A's assets are comprised equally of $50 cash and $50 inventory, while firm B's assets are $50 cash and $50 accounts receivable (A/R). Assume cash, inventory and A/R have recovery rates of 100%, between 40 and 60%, and between 0 and 100%, respectively. Both firms have an expected recovery of 75%; however, firm B exhibits higher liquidation value uncertainty, as liquidation proceeds can range from 50 to 100%. Alternatively, suppose firm A* has the same asset composition of cash and inventory as firm A, but operates in a different industry that exhibits a wider recovery range for inventory – between 20 and 80%. The expected recovery for firm A* is again 75%, but has higher liquidation value uncertainty than firm A.

point of the range, $\gamma_{Asset\ Class,j,t-1}$. In the second step, we measure LVU for firm i in one-digit SIC industry j in year t as the weighted average of the firm-year specific asset class weights based on firm i's book values for the asset types in the most recent reported balance sheet, $\omega_{Asset\ Class,i,t}$. We extract these weights using the quarterly Compustat balance sheet data for each company in our sample. Thus, for each firm-year, we obtain an ex ante LVU measure that is specific to a firm's asset composition on the measurement date. We use the six asset classes most frequently reported in liquidation analyses (cash, accounts receivable, inventory, fixed long-term assets, goodwill, intangibles assets), in addition to the "catch-all" classes of other current assets and other long-term assets:

$$LVU_{i,t} = \sum \gamma_{Asset\ Class,j,t-1} \times \omega_{Asset\ Class,i,t} = \gamma_{Cash,j,t-1} \times \frac{Cash_i,t}{Total\ Assets_{i,t}} + \gamma_{A/R,j,t-1} \times$$

$$\frac{A/R_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Inventory,j,t-1} \times \frac{Inventory_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Fixed\ LT\ Assets,j,t-1} \times \frac{Fixed\ LT\ Assets_{i,t}}{Total\ Assets_{i,t}} +$$

$$\gamma_{Goodwill,j,t-1} \times \frac{Goodwill_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Intangible\ Assets,j,t-1} \times \frac{Intangible\ Assets_{i,t}}{Total\ Assets_{i,t}} +$$

$$\gamma_{Other\ Current\ Assets,j,t-1} \times \frac{Other\ Current\ Assets_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Other\ LT\ Assets,j,t-1} \times \frac{Other\ LT\ Assets_{i,t}}{Total\ Assets_{i,t}},$$

As a robustness check, we compute this measure using alternative specifications. For instance, we change the measurement window for $\gamma_{Asset\ Class,j,t-1}$ from the three-year average within each industry to one- or three-year averages across all industries, as well as any bankruptcy since 2002, when our sample starts, until year t within a one-digit SIC industry. The correlation between these LVU measures is high, in excess of 0.7.[19] In unreported analyses, we construct the LVU measure using more aggregated asset-classes, for instance by summing up non-cash current assets, as well as all current assets and the subsequent results are similar.

[19] We separately construct cumulative distributions of the absolute difference between the reported liquidation ranges and the LVU measures. The cumulative error term follows a similar distribution path across all alternative LVU measures, with more than 70% of observations falling within the range of 0 to 0.3.

In Panel A of Figure 2, we plot the yearly averages across firms of the reported liquidation valuation ranges scaled by range midpoints and weighted by the asset sizes and LVU.[20] The reported estimated liquidation value range, depicted by the solid line, follows a pattern consistent with our priors — the mean uncertainty is high at 40% or above during turbulent market periods in 2002, 2007/08, 2012, 2016/17, and 2020. During low default frequency years, the average reported liquidation ranges tend to drop to 30% or below (for example, pre-2007 or in 2015). Our LVU measure, the dashed line, follows a similarly predictable pattern although with a lag, because it is calculated as a moving average over three years. We note an increased valuation uncertainty in years immediately after the financial crisis of 2007/08. As an initial validation check, in Panel B of Figure 2 we show a scatterplot of our LVU measure (as described earlier) against the actual debtor-specific recovery ranges reported in hypothetical liquidation analyses. While there is expected dispersion in the plot, there is a strong positive relationship between our ex ante LVU measure and the debtor specific liquidation valuation ranges reported ex post by debtors in liquidation analyses. The Spearman (Pearson) correlation between these variables is 0.30 (0.29) and statistically significant at the 1% level. Panel C of Figure 2 reports the difference between the LVU measure and the reported liquidation value range measures is within one standard deviation (0.29) around its mean of 0.01 for over 70% of observations (170 out of 235). While some error is naturally expected given the time difference in the measurement of variables, a near zero mean difference suggests little systematic bias in either direction.

We conduct multivariate regression analyses to understand the variation in reported liquidation value ranges. Specifically, we examine the potential determinants (such as debtor and

[20] The reported liquidation value range measure is computed using the same approach as that of LVU but replacing the three-year rolling averages with the estimated valuation range reported by a debtor for a particular asset class in its disclosure statement. If an asset class is not reported separately, we set the amount of asset class to zero (i.e., assume the amount is immaterial).

bankruptcy case characteristics) of these ex post liquidation ranges reported by debtors in liquidation analyses. Panel A of Table 2 provides summary statistics for the regressors used in the test. The dependent variable in Table 3 is the hypothetical liquidation value range, scaled by its midpoint. We include several debtor- and case-level variables as explanatory variables. We observe associations that are largely consistent with our priors. Debtor size (measured as the logarithm of total assets) at the time of filing is negatively associated with liquidation value range, suggesting that large firms have better information environments. Further reflecting the relative ease in valuing tangible versus intangible assets, debtors with higher asset tangibility report lower liquidation value ranges. We also find lower valuation ranges for firms with more debt and when firms take more time to disclose liquidation analyses (as reflected in the number of days between the bankruptcy filing date and the liquidation disclosure statement date). This finding suggests that borrowers facing greater scrutiny from lenders provide narrower liquidation ranges. Moreover, industries with a larger number of bankruptcies during the preceding 12 months exhibit higher asset liquidation value ranges, as demonstrated by a positive coefficient on the variable — this finding likely reflects the greater valuation uncertainty that typically surrounds distressed industries and business environments. Overall, the results in Table 3 serve to validate the valuation numbers reported in the liquidation analysis exhibits. In other words, the liquidation analyses used in our study are economically meaningful, despite their hypothetical nature.

4.2. LVU and Loan-to-Value

We begin the analysis of the debt market role of LVU by first investigating its effects in the primary loan market. Specifically, we examine whether LVU affects the "loan-to-value" (LTV) ratio for syndicated loan facilities (i.e., the extent to which lenders are willing to lend against a given dollar amount of collateral). Panel B of Table 2 provides descriptive statistics on the variables used in this primary market analysis. Specifically, we observe that the average LTV ratio

with collateral value based on PPE (tangible assets) [total assets] is 1.82 (0.35) [0.22] percent, with significant dispersion around the mean.

Panel A of Table 4 presents the multivariate regression analyses. The dependent variable in Columns (1) and (2) of Table 4 is the ratio of loan amount to property, plant and equipment at the time of origination. The dependent variable in Columns (3) and (4) is the ratio of loan amount to total tangible assets, while the ratio of ratio of loan amount to total assets is the dependent variable in Columns (5) and (6). The main explanatory variable is LVU. We include several firm and loan level control variables as well as industry and year fixed effects. In line with our expectations, the coefficient on LVU is negative and statistically significant at the 1% level across Columns (1) to (4). Specifically, in Column (2), the coefficient on LVU is -2.860, which suggests that a one standard deviation increase in LVU is associated with an LTV ratio lower by 37 basis points. The coefficients in Columns (5) and (6) are not statistically significant, potentially reflecting the fact that LTV ratios are typically determined in relation to tangible assets due to the difficulty in valuing intangible assets.

4.3. LVU and Borrowing Base Assessments

We next analyze the debt market role of LVU by investigating borrowing base facilities, which are typically extended to fulfill borrowers' working capital needs. Bank lenders often provide these credit facilities by restricting the size of the credit line to the value of a pool of assets on the company's balance sheet, referred to as the "borrowing base". In other words, the amount of credit granted is determined by the size of the company's reported asset base. This pool of assets naturally varies over the maturity of the credit facility, meaning that the capital availability under the facility will vary accordingly. As a result, borrowing base facilities are an ideal setting to examine how the collateral assets' valuation uncertainty impacts lenders' assessment of the collateral quality, a variable that drives first order changes in borrowing base limits.

We obtain a sample of borrowing base credit facilities originated from the Loan Pricing Corporation's Dealscan database. Such facilities are separately identified and maintained on Dealscan under the "Borrowing Base" data subset. Given the measurement period of LVU, we focus our attention on facilities issued between 2006 and 2019. We then manually match the credit facilities to borrower-level data on Compustat, removing borrowers in regulated utilities as well as financial and unclassified industries (SIC codes of 4900-4999, 6000-6999 and 9000-9999). We further exclude loans with maturities shorter than a year and observations that are missing the loan characteristics required for our empirical tests.

We examine the two most widely used collateral classes in borrowing base facilities – inventories and accounts receivables (A/R), and we disregard the other assets.[21] The basic premise of these tests is that risk-averse lenders set lower borrowing base limits ("advance rates") when the underlying asset class exhibits high valuation uncertainty. The dependent variable is the borrowing base percentage for either inventory or A/R while our main test variable is LVU for inventory or A/R. . We include several borrower-specific control variables measured at the end of the most recent quarter prior to the contracting date, including firm size, profitability, asset tangibility, book leverage, and liquidity (current ratio). We also include several loan-specific variables including the amount, maturity, number of covenants, number of lenders in the syndicate, and variables indicating whether the loan is secured and whether it is rated by S&P or Moody's. We describe in detail the computation of all these variables in Appendix B.

Panel B of Table 2 provides descriptive statistics for the variables used in these analyses. We note that the Inventory [A/R] borrowing bases are set on average at approximately 67 % [83%].

[21] While inventory and accounts receivables are the most commonly used asset classes for setting borrowing base limits, other asset classes may be used depending upon the industry and business context. For example, borrowing bases based on reserves are common in the oil & gas industry, while limits based on real estate in various stages of development are in the homebuilding industry. Property plant and equipment-based borrowing bases are observed in the manufacturing sector.

Our key test variables for these analyses – *LVU Inventory* and *LVU A/R* – show significant dispersion around the mean, with *LVU Inventory* on average exceeding *LVU A/R*. This reflects the relative ease in estimating the values of financial current assets such as A/R relative to inventory, which may be debtor-specific and hence harder to value.

The results in Column (1) of Table 4 Panel B show that borrowing base limits based on inventory collateral are lower when inventory exhibits higher valuation uncertainty as captured by a greater LVU. Specifically, the coefficient on *LVU Inventory* (-8.3) is statistically significant at the 5% level. Acknowledging that these limits are often set based on ad hoc percentage steps rather than a continuum, in Column (2), we use an empirically determined ex ante cutoff of 50% borrowing base advance rate for inventory. This cutoff roughly coincides with the bottom quartile of the inventory borrowing base limits in our sample. The dependent variable is an indicator variable that takes on a value of one if the borrowing base limit is less than 50%. The results in Column (2) echo our observations in Column (1) – high LVUs for inventories reduce the ability of a debtor to borrow against this asset class. Specifically, the coefficient on *LVU Inventory* (0.2) is statistically significant at the 1% level, indicating that a one standard deviation increase in *LVU Inventory* translates to a 3.8% greater likelihood of Inventory borrowing base being below the 50% limit.

Furthermore, critics of the bankruptcy process (e.g., Alderson and Betker 1995, Altman et al. 2019) suggest that liquidation values may be biased downward by the debtor management due to continuation bias. Although we do not believe such a bias systematically affects our firm-level results given that our metric is computed at the industry level and liquidation analyses are filed in bankruptcy court, we control for potential managerial biases by including the mid-point of reported liquidation values as an additional control variable. Column (3) presents the results, which show that the relationship between LVU and probability of a lower inventory borrowing base limit

continues to persist. In an unreported test, we find a similar statistically significant result for the borrowing base advance rate for inventory.

In Columns (4) through (6) of Table 4 Panel B, we conduct tests analogous to those reported in Columns (1) to (3), but for accounts receivable. The borrowing base advance rates for A/R are clustered, with nearly three quarters of the advance rates set at 85%. We do not find a significant coefficient when we use a continuous variable in Column (4). However, in Column (5), when we use a dependent variable indicating borrowing base limits of less than 85% (which approximately corresponds to the bottom quartile of the A/R borrowing base limits), we observe a positive and significant coefficient on *LVU A/R* (0.44, statistically significant at the 1% level). In terms of economic significance, a one standard deviation increase in *LVU A/R* corresponds to a 4.4% greater likelihood of the A/R borrowing base being below the 85% limit. Controlling for the mid-point of the liquidation value of A/R does not alter the statistical significance or economic magnitude of this association.

Overall, the evidence in Panel B of Table 4 adds to the limited but economically important literature on lenders' monitoring of debtors using borrowing base limits. Studies such as Flannery and Wang (2011), Frankel et al. (2011), Nini, Smith, and Sufi (2012), Carrizosa and Ryan (2017), and Mutlu (2020) collectively examine the interplay between borrower risk and lender monitoring through borrowing base limits and other mechanisms. By documenting that uncertainty in asset liquidation values is associated with the magnitude of the asset collateral required in lending contracts, we bring new evidence to a question of first order relevance in this important yet under-researched segment of the loan market.

4.3. LVU and Financial Maintenance Covenants

The previous set of analyses provides evidence on the association between LVU and the extent to which banks lend against assets reported on the balance sheet. We next investigate

whether lenders also consider collateral value uncertainty when setting other contractual features, even when the drawdowns of lending facilities are not directly linked to reported collateral values. We note that lenders estimate collateral value occurs before they set the terms of the lending contract and thus far in advance of any subsequent distress event for the borrower (by definition, at the time of debt contracting, all borrowers are solvent). Thus, at the contracting date, lenders likely assess collateral values using historical asset class and industry metrics similar to our LVU measure.

We examine whether LVU is associated with the inclusion of restrictive financial covenants in syndicated loan contracts. This relation is a priori unclear. On one hand, incomplete contracting theory (Klein, Crawford, and Alchian 1978; Grossman and Hart 1986; Aghion and Bolton 1992; Christensen et al. 2016) suggests that risk-averse lenders concerned about recoveries upon any default likely place restrictive contractual provisions, such as financial maintenance covenants. When violated those provisions effectively transfer control to lenders. Such control transfer enables timely loan restructuring and corrective actions that mitigate further deterioration in the value of the underlying collateral. On the other hand, lenders that face significant uncertainty in assessing borrowers' reported accounting numbers likely are wary about the ability of financial covenants to monitor borrowers effectively and are thus less likely to use these covenants.

In Panel A of Table 5, we therefore test the association of LVU with the inclusion and intensity of both income statement or cash flow-based covenants (I/S covenants), and balance sheet based covenants (B/S covenants). Columns (1) and (2) show the relation between LVU and the number of B/S and I/S covenants, respectively, in a loan package. Appendix B lists all individual covenants reflected in variable descriptions. In Panel E of Table 2 we present descriptive statistics for the variables used in these analyses. Consistent with the development of "covenant-lite" loans over the past couple of decades, the average numbers of I/S and B/S-based covenants are both less

than one (around 0.44). Compared to firms in the borrowing base only sample used in Table 4 Panel B, the firms in the Table 5 sample are much larger.

The regression results presented in Table 5 are inconsistent with the incomplete contracting theory arguments discussed above. Rather, consistent with LVU reducing the reliability of asset values for debt contracting purposes, we observe a negative and significant coefficient in Column (1). This finding suggests that lenders are less likely to include B/S covenants when asset valuation uncertainty is higher. In terms of economic significance, a one standard deviation increase in LVU translates to 0.041 fewer B/S covenants, corresponding to an approximately 9% decrease relative to the variable's mean of 0.44. Focusing on the count of I/S covenants in Column (3), we find a statistically insignificant coefficient on LVU. Columns (5) and (7) show similar effects for covenant intensity—measured as the ratio of B/S or I/S covenants to the total number of covenants, respectively—for which a significant negative relationship between LVU and covenant intensity existing only for B/S covenants. As discussed earlier, we attempt to control for managerial bias in estimating liquidation values by adding the mid-point liquidation value as an additional regressor in Columns (2), (4), (6) and (8), and our inferences remain unchanged. These results suggest that when the value of the collateral is more uncertain, lenders rely less on contracting based on financial statements. Arguably, as LVU is an ex ante measure of valuation uncertainty, we expect and find the effect of LVU to be stronger for B/S-based covenants than for income statement-based covenants.[22]

Panel B of Table 5 provides corroborative evidence using covenant restrictiveness as the dependent variable. Specifically, the dependent variable in all columns is an indicator variable that

[22] In unreported analyses, we use an indicator variable equal to one if LVU is above the median, zero otherwise. We also measure the asset-class uncertainty weights using one-year within industry and three-year across industries windows, as well as within the same SIC one-digit industry across any horizon in the past. All results are similar to those reported at conventional levels of statistical significance.

takes on a value of one (zero) if a loan covenant threshold included in a loan package is looser (stricter) the median threshold level for the same covenant within the credit rating group (A and above, BBB, BB, B, CCC and below). The main test variable in all columns is LVU. Columns (1) and (3) [(2) and (4)] present results excluding [including] the mid-point liquidation value as an additional regressor. Columns (3) and (4) present results after excluding borrowing base loans. The coefficients on LVU are positive and statistically significant at the 10% level or better across all specifications. We further inspect the drivers of these results by estimating the same regression by covenant type. The three most frequently observed covenants in the full sample are Max debt to EBITDA, Min interest coverage, and Max leverage ratio. We restrict the samples to these individual covenants in Columns (5), (6), and (7), respectively. When we use the slack in Max debt to EBITDA and Min interest coverage as dependent variable in Columns (5) and (6) we document positive and statistically significant coefficients on LVU. However, the coefficient on LVU in Column (7) is statistically insignificant, partially reflecting lower statistical power due to the relative infrequency of the Max leverage ratio covenant. Overall, these results corroborate the evidence in Panel A that lenders with measurement uncertainty set the covenant thresholds loosely to avoid unwarranted breaches and renegotiation costs.[23]

The above analyses concerning covenants beg the question of whether and how lenders ex ante protect themselves, if at all, in the face of asset valuation uncertainty. We thus investigate if high LVU is reflected in higher loan spreads at origination. Untabulated analyses show an insignificant relationship between LVU and loan spreads in lending contracts. We conjecture that this insignificant relation may reflect the effect of competitive lending markets when setting loan spreads. In other words, lenders may not make sufficient pricing adjustments for uncertainty in the

[23] The evidence that more risky firms have looser covenant thresholds at loan inception is consistent with the findings in Li, Wittenberg-Moerman, and Vasvari (2016).

valuation of assets used as collateral at the origination stage.

4.5. LVU and the Secondary Loan Trading

The primary market results presented in Tables 4 and 5 provide initial evidence that lenders factor in the uncertainty in asset valuation when determining loan contractual terms at origination (such as loan-to-value ratios and loan covenant inclusion and restrictiveness), suggesting that our proposed LVU captures collateral quality. We next examine whether LVU is associated with secondary loan market prices and loan holdings by CLOs. We obtain secondary loan prices and holdings data from portfolio holdings and trades reported by CLO managers during the 2009-2019 period using the Creditflux CLO-i database. This database is used in several studies in accounting and finance (e.g., Benmelech et al. 2012; Liebscher and Mählmann 2017; Bozanic et al. 2018; Loumioti and Vasvari 2019). CLO-i gathers the holdings and trades data from monthly CLO trustee reports, including borrower name and industry, and basic loan details like loan type, interest rate, maturity, credit rating and principal balance held, but not individual loan identifiers. For some distressed loans (analyzed in the next section 4.5), CLO managers give additional details of the date and loan price at default. Data on individual loan trades includes the specific loans traded by a CLO manager (borrower name and loan type), the direction of the trades (sale or purchase), the trade price, and the face amount traded.

We first study the association between the LVU measure and the average loan prices or CLO holdings in any quarter with an outstanding loan traded or held by CLOs. The summary statistics for this large sample are reported in Panel D of Table 2. We note that the average secondary loan price is just below par at around 96.7. The mean of CLO holdings amounts to approximately 12% of a borrower's assets, with a substantial standard deviation around the mean. In Table 6, we examine whether the valuation uncertainty is reflected in pricing and CLO holdings for a generic borrower. In tests, we control for several firm and CLO characteristics, in addition to

borrowing firm and credit rating fixed effects, and year-quarter effects. In Columns (1) to (3), the dependent variable is the loan size weighted average price observed during the fiscal quarter. In Columns (4) to (6), the dependent variable is the total outstanding loan amount of a borrower held across all CLO managers during the quarter, scaled by borrower's total assets at the end of the quarter. In Columns (1) and (4), we estimate the models on full samples, while in Columns (2) and (5) [(3) and (6)], we restrict the samples to observations with credit ratings above [below] the median rating level of B+. The coefficient on LVU (our main variable of interest) is negative and statistically significant at the 10% level or better for the full [high credit risk] sample in Columns (1) and (4) [columns (3) and (6)]. The results in Columns (1) to (3) [(4) to (6)] suggest that high LVU is associated with lower secondary market loan prices for (greater CLO holdings of) loans of borrowers with higher credit risk. These findings indicate that the lower loan prices in the secondary market are not driven by lower CLO holdings. In terms of economic significance, a one standard deviation increase in LVU is associated with 49 basis points lower loan price in Column (1). This increase corresponds to 66 basis points greater CLO holdings of a borrower's loans, which is approximately 5.5% of the variable mean in Column (4).

In Table 7, we examine the association between LVU and the liquidity in the secondary loan market, and we provide the descriptive statistics of the sample in Panel D of Table 2. The specification used is similar to that in Table 6, except that the dependent variables in Table 7 reflect various measures for secondary loan market liquidity. In Columns (1) to (3), the explained variable is trading volume, measured as one plus the logarithm of the sum of the dollar amounts of CLO trades of a borrower's loans during a quarter. The mean quarterly volume of trade amounts to $58 million. In Columns (4) to (6), the dependent variable is the logarithm of number of CLO trades of a borrower's loans in a quarter. In the sample, the average number of trades during a quarter is 53.5 with the standard deviation of 89. In Columns (7) to (9), the dependent variable is the ratio of

days with at least one CLO trade of a borrower's loan to the number of business trading days in a quarter. The mean ratio is 0.21, meaning that on average a loan is traded every fifth business day. In Columns (1), (4), and (7), we estimate the model on the full sample of firm-quarters, whereas in Columns (2), (5) and (8) [(3), (6) and (9)], we restrict the sample to observations with credit rating above [below] the median rating of B+. The results across columns (1) to (9) indicate that high LVU is associated with lower secondary market liquidity for loans issued by borrowers with higher credit risk. The coefficient on LVU is negative and significant at the 10% level or better in the full sample, estimated in Columns (1) and (4), and in the high credit risk sample, estimated in Columns (3), (6), and (9). In terms of economic significance, a one standard deviation increase in LVU corresponds to 6.6 percent lower trading volume and 7 percent fewer trades.

4.5. LVU and the Secondary Market Trading of Distressed Loans

If contractual pricing adjustments are incomplete, then it is likely that the valuation uncertainty of assets used as collateral will be reflected in secondary loan market prices. As the likelihood of liquidating assets to cover debt claims is low at loan origination, it is unsurprising that lenders do not adequately recognize the effects of assets' valuation uncertainty at the time. We thus analyze the role of liquidation value uncertainty of a company's assets in the secondary loan market when borrowing firms enter financial distress.

We focus on the evolution of secondary loan prices around distress events for two reasons. First, we argue that the a priori importance of asset valuation uncertainty (and thus our LVU measure) in the determination of loan prices is higher when liquidation risk increases. Second, key loan investors, such as Collateralized Loan Obligations (CLOs), face explicit and implicit pressures to sell distressed loans.[24] CLOs cannot hold in their portfolio more than a certain pre-

[24] CLOs hold over 70% of the below investment grade loans outstanding in the U.S. (Standard and Poor's 2015).

specified percentage of loans that are in default or are rated CCC and below (e.g., Loumioti and Vasvari 2019). As a result of this selling pressure, the secondary market prices of loans of distressed borrowers drop significantly and the loans start trading at large bid-ask spreads.

After retrieving secondary loan prices using the procedure described in section 4.4, we concentrate on corporate developments that these investors view as distress events including bankruptcy filings, debt defaults, and downgrades to a CCC credit rating or below.[25] For each of these specific distress period-windows, we first collapse individual CLO manager-loan-day-prices as available across the holdings and transactions databases into weighted-average prices at the individual borrower-day level using loan principal balances as weights given that borrowers often have multiple loans outstanding. Next, we average these loan prices during the one month period around the distress event. We then merge the loan pricing data with our dataset which includes our test variable (LVU) and the control variables obtained from Compustat and Dealscan. This selection process yields a testable sample of 363 firm-distress observations available to conduct our main analyses.

In Table 2, Panel E, we provide descriptive statistics for the variables used in the secondary distressed loan pricing tests. The average loan trading price is about 80 percent of par value, as expected since we analyze pricing around distress events. Also reflecting financial distress, equity returns are generally negative during the test window and the borrowers predictably exhibit a significantly high leverage in this sample (74%). The average LVU in this sample is similar to that observed in earlier analyses. In Table 8, we regress the borrower's average loan price on the borrowing firm's LVU, controlling for firm characteristics, loan contract features, characteristics of CLO investors in a borrower, contemporaneous equity returns, as well as issuer's one-digit SIC

[25] We collect information on these distress events from multiple databases, including the New Generation Research bankruptcy database, CLO-i, FISD Mergent, and Moody's Default and Recovery databases.

industry fixed effects, and event year effects. The choice of control variables reflects the possibility that loan prices may be driven by concurrent considerations other than the potential effects of liquidation risk and the uncertainty in realization upon liquidation. The dependent variable is a borrower specific loan size weighted average price in the thirty day window centered around the event date (i.e., -15 to +14 days around the distress event date – please refer to Appendix B for variable construction details).

We present the results in Panel A of Table 8. Column (1) shows the base specification with several firm-level controls as well as CLO variables that might correlate with liquidity and selling pressure in the secondary loan market, including the proportion of a borrower's loans held by CLO investors, the number of distinct CLO managers holding the borrower's loans, and the weighted average remaining maturity of the borrower's loans that are held by CLOs in the month immediately prior to the distress event. We account for the possibility that traders in the secondary loan markets pick up publicly available signals from the equity markets rather than assess asset valuation uncertainty by controlling for concurrent equity returns. We employ an indicator variable for observations with missing equity returns and populate missing equity returns with zeros. We additionally control for the mid-point liquidation value in Column (2) to account for possible managerial downward bias in estimating liquidation values. Columns (3) to (5) estimate the results using limited credit event definitions. Specifically, Column (3) [4] {5} provides results when the distress events are restricted to (bankruptcies and payment defaults) [credit rating downgrades to the CCC category or lower] {all rating downgrades}. We observe a negative and statistically significant coefficient on the LVU variable across all specifications in Table 8, with the exception of Column (5). The results reported in Column (5) are statistically insignificant and weaker in economic magnitude. This is not surprising as rating downgrades above CCC, while adverse from a credit risk point of view, do not necessarily constitute extreme distress events. Thus, liquidation

risk is incomparably lower that during other credit events examined in Columns (1) to (5). Moreover, downgrades to higher-than-CCC ratings are unlikely to trigger forced sales by CLOs. The coefficients are also economically meaningful. For instance, in our baseline model in Column (1), a one standard deviation increase in LVU translates to a further loan price discount to par of 6.3 percentage points. This represents approximately 8% of the average price of 79.4.[26] It is worth noting that the relationship between LVU and loan prices is significantly stronger in distress (the magnitude of its effect is over 10 times larger than the effect observed in the overall sample used in Table 6 comprising all loan trades by CLOs).

The combined results presented so far suggest that, while lenders adjust some ex ante contractual terms for the potential effects of LVU at the origination stage, the pricing adjustment is likely incomplete. In other words, as non-price contract terms are fixed at the origination stage, any subsequent changes in the liquidation risk are reflected in secondary market loan prices. Figure 3 provides a graphical representation of the results in Table 8 Panel A, and documents how the prices evolve in the quarters before and during the distress event. We split borrowers around the median of LVU (0.33) into buckets of high and low LVU borrowers (N=130 and N=128, respectively). We find that the trading price of loans issued by high LVU borrowers is consistently lower than that of low LVU borrowers.

In Panel B of Table 8, we replicate the main analyses in Table 8 after controlling for past loan prices to understand the evolution of the effects of LVU on loan prices over time as the borrower's liquidation risk increases. We sequentially include as control variables the average loan price in the quarters just prior to the distress event. In Panel C, we redefine the dependent variable as the difference between the average price in the thirty-day window around the distress event and

[26] In an untabulated test, we estimate the elasticities by log-transforming both the dependent variable and LVU. The coefficient at log(LVU) is -0.86 with the t-statistic of -4.6. The economic interpretation is similar in magnitude, as a 10% increase in LVU corresponds to about 8% lower loan prices in the secondary market.

the average loan price in the quarters prior to it. We note that while there is some pricing of the asset valuation uncertainty in the time periods preceding the distress event, the effect increases almost monotonically as the distress event approaches and liquidation risk increases. In all specifications, except the second column in Panel B, we find that LVU is negatively and significantly related to secondary loan prices during distress events. The results in Panels B and C basically corroborate our priors in conducting the Panel A analyses that LVU gets gradually reflected in secondary loan prices as the distress event comes closer.

In Table 9, we supplement the main evidence provided in Table 8 using CLO's distressed loan holding patterns approaching distress events. As in Table 8, these distress events include bankruptcy filings, debt defaults, and rating downgrades to CCC or below. The dependent variable in Column (1) is the average dollar amount of a borrower's loan held by CLOs during the month prior to the distress event. The dependent variable in Columns (2) to (5) is the average loan amount held by CLOs during each of the four quarters prior to the distress event. The coefficient on the main variable of interest, LVU, is negative and statistically significant across all specifications, suggesting that CLOs are more likely to offload distressed loans that exhibit high LVU. This result is in contrast with the findings using the overall sample of loans in Table 6, where we observed a positive association between LVU and CLO holdings. In terms of economic significance, a one standard deviation increase in LVU is associated with the average CLO holdings lower by 0.16 percentage points, or almost 80% of the variable mean. This large economic magnitude is not surprising as CLOs which are typically constrained to limit their holdings of distressed loans, accelerate the sale of loans issued by borrowers approaching distress events. The results in Table 9 suggest that at least some of the negative loan price movement approaching a distressed event (observed in Table 8) may be driven by selling activity for such loans by CLOs.

We next address concerns that our results are driven by specific sample and event window

construction approaches. As discussed above, in our primary analyses in Table 8 we focus on distress event windows during which liquidation risk (and thereby the potential effects of LVU) are high. We thus perform subsample analyses (untabulated) to mitigate concerns that correlated factors other than loan traders' assessment of LVU are driving the observed results. We first observe that the secondary pricing results hold across subsamples with and without an earnings announcement by the borrower during the distress event window, and the economic magnitude of the coefficients is similar. These findings mitigate concerns that earnings news, rather than LVU-induced valuation uncertainty, drive the results. Next, we partition the sample based on the expected liquidation recovery rate for a specific debtor. Untabulated analyses reveal that the results hold across these subsamples, albeit they are slightly stronger for the subsample with a lower recovery rate. This suggests that asset valuation uncertainty affects traders' decisions more when the mean expected recovery upon liquidation is low. In further robustness checks, we conduct further subsample analyses based on the existence of a borrowing base facility or a balance-sheet based covenant, and based on the extent to which a debtor's loans are held by CLOs. The results hold across these different subsamples, suggesting that omitted variables that are potentially correlated and reflect these partitions are unlikely to explain away the effects attributed to LVU. Overall, these untabulated analyses suggest that our main findings from Table 8 hold across the alternative specifications and are not an artefact of specific sample construction approaches.

In further untabulated additional analyses, we examine the effect of valuation uncertainty in different asset classes on secondary loan prices leading to a distress event to understand which asset classes are more important. We observe that the effect on distressed loan prices is the strongest for LVU related to intangible assets followed by LVU related to PP&E and inventories. The observation that the effect of valuation uncertainty concerning intangible assets is the strongest is rather intuitive – these assets are hard to measure and yet are economically important. In fact,

prior work (e.g., Lev 2019) argues that the book values of these assets are not meaningful. Thus, changes in expectations about realizations upon liquidation are likely more extreme and lead to more pronounced loan pricing effects. The effect of LVU related to other assets is not statistically significant. This likely reflects the relative ease in measurement of financial assets such as marketable securities and accounts receivables that are included in the "other assets" class. We next attempt to provide further validation for these results by examining subsamples where we expect the effects of valuation uncertainty on specific asset classes to vary. We first conjecture that LVU related to PP&E and inventories is more important in cases where the borrower exhibits greater asset tangibility (i.e., tangible assets are a more economically important subset of their asset base), and vice versa for borrowers with low asset tangibility. Consistent with this reasoning, we find that LVU related to tangible (intangible) assets has a predictably stronger effect when debtors have high (low) asset tangibility. Next, we further partition our sample by industry: services sectors and other sectors. As the services sector is less capital intensive, we expect intangible (tangible) assets to be economically more (less) important for such firms. Thus, consistent with the expectation that valuation uncertainty concerning intangible (tangible) assets influences secondary loan prices more (less), we find that the LVU related to intangible (tangible) assets is significant (insignificant) for the services (other sectors) subsample.

In addition to the above tests, we carry out a battery of other unreported analyses using alternative measurement approaches for LVU. First, to mitigate concerns related to measurement error in and the distribution of continuous variables, we discretize the main regressor into an indicator variable equal to one if LVU is above the median, zero otherwise. We continue to observe a negative association between the asset uncertainty and secondary debt price during distress. Specifically, the coefficient at the indicator is -6.1 (t-stat of 2.84), which compares well with economic magnitudes reported in tests using the continuous variable. Second, we vary the

measurement of asset-class uncertainty weights from industry-three-year windows to one-year and three-year windows across all industries, as well as within the same SIC one-digit industry across any horizon in the past. The results are qualitatively similar at conventional levels of statistical significance. Third, we redefine the asset classes used in the calculation of the firm-year LVU. For example, in one instance we bundle all non-cash current assets, or in another sum up all current assets, leaving the remaining asset classes unchanged. The results are broadly similar, albeit we observe that the more aggregated the measure, the lower is the LVU's statistical significance. When we exclude the "other LT assets" term from LVU (as it may be less precise and not well-defined as an asset class), our inferences remain the same and the statistical significance of the LVU coefficient becomes stronger. We interpret these results as consistent with less granular/noisier information impairing the explanatory power of LVU.

The collective results in Tables 8, 9, and related unreported analyses, provide robust evidence that a relatively simple Asset-Class × Industry level measure of asset valuation uncertainty computed based on borrower disclosures filed in court is strongly associated with distressed loan prices in the secondary market, suggesting that loan investors likely put more weight on assessing asset valuation uncertainty. Combined with our evidence on the relevance of liquidation value uncertainty in the primary loan market, the results suggest that creditors' assessments of liquidation values evolve over time and become more salient as liquidation risk increases. The evidence in Tables 6 to 9 further complements the burgeoning literature on the incentives, performance, and trading behavior of CLOs – an important subset of loan investors (e.g., Loumioti and Vasvari 2019).

5. Conclusions

Estimating hypothetical liquidation values is important to lenders' evaluation of asset valuation uncertainty; however, such estimates are typically not available from general purpose

financial statements. The U.S. Bankruptcy Code requires Chapter 11 plan proponents to provide hypothetical liquidation analyses to satisfy the "best interests of creditors test" for the approval of the reorganization plans in courts. This test requires an analysis showing that the potential recoveries to creditors under the proposed reorganization plan are at least as much as their recoveries under a hypothetical liquidation scenario. Debtors thus provide liquidation analyses along with the reorganization plans in disclosure statements furnished to the bankruptcy court. These liquidation analyses typically provide an asset class-level breakdown of hypothetical liquidation proceeds and provide a schedule of potential recoveries to claimants based on the priority scheme laid down in the Bankruptcy Code.

We use this unique feature of Chapter 11 plans – the requirement to satisfy the "best interests of creditors test" – to collect hypothetical liquidation analyses provided by debtors along with their proposed reorganization plans in bankruptcy filings. We compute an ex ante measure of liquidation value uncertainty (LVU) by aggregating the asset-class level liquidation value ranges provided in these analyses. We validate this measure by showing that lenders make contracting decisions consistent with the use of measures that are plausibly correlated with our LVU measure. Specifically, we show that loans to borrowers with high LVU receive higher collateral requirements and lower borrowing base limits. In addition, high LVU borrowers' loan packages exhibit less reliance on balance-sheet based debt covenants and feature looser financial covenants. We find a statistically insignificant relation between LVU and loan spreads at origination, suggesting an incomplete initial adjustment for the effects of uncertainty in potential recoveries upon liquidation. We next show that loans trade at a discount to par value and are more illiquid if the loans are issued by borrowers with high liquidation value uncertainty, especially if they are credit risky. The price discounts increase significantly as they approach a distress event and the liquidation risk increases. In addition, high LVU loans of borrowers in distress experience large

drops in the ownership by collateralized loan obligations (CLO), the largest loan investors.

Collectively, our results suggest that a simple asset-class and industry level aggregation of hypothetical liquidation value ranges from Chapter 11 disclosure statements can be used to construct asset valuation uncertainty measures that are informative to participants in the loan market. We contribute to the extensive literature on the determinants of debt contractual features by documenting the importance of an important but under-researched aspect of lender due diligence – the assessment of uncertainty in collateral values. Further, we contribute to a vast literature on measurement of accounting quality by proposing an asset valuation uncertainty measure that reflects balance sheet quality. In addition, our evidence on secondary loan prices sheds new light on the trading decisions of an economically important subset of loan investors – CLOs. Future research could examine whether distressed debt investors can combine their insights on liquidation values with an understanding of CLOs' portfolio constraints to implement profitable trading strategies.

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Appendix A: Example of Liquidation Analysis and the LVU Measure Construction

Excerpt from the Amended Disclosure Statement filed on Sept 17, 2020 by Remora Petroleum.

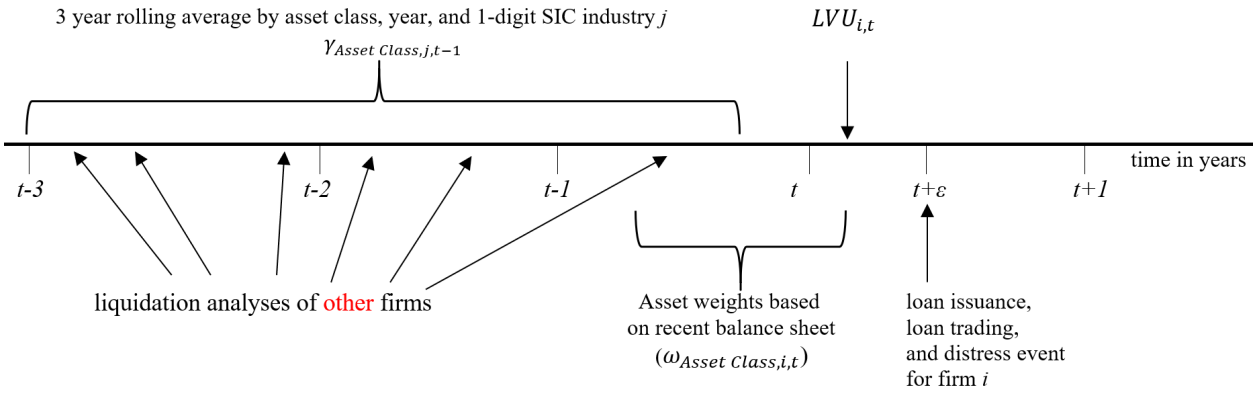
Liquidation Analysis	Note	Balance Sheet as of 10/18/2020	Low $	Low %	High $	High %
Gross Liquidation Proceeds:						
Cash & Cash Equivalents	A	$0.1	$0.1	100.0%	$0.1	100.0%
Accounts Receivable - Trade	B	3.4	2.4	70.0%	2.6	75.0%
Prepaid Expenses and Deposits	C	0.5	0.0	0.0%	0.0	10.0%
Property and equipment, net	D	34.2	9.4	27.3%	12.5	36.5%
Other assets, non-current	E	0.3	0.0	0.0%	0.0	10.0%
Total Gross Liquidation Proceeds		**$44.2**	**$11.9**		**$15.2**	
(-)Unencumbered Assets (and as % of Total Proceeds)			0.8	7.1%	1.1	7.4%
Encumbered Assets (and as % of Total Proceeds)			$11.0	92.9%	$14.1	92.6%

Distribution of Encumbered Assets	Note	Claims Estimates	Low $	Low %	High $	High %
1. First Lien RBL	F	$33.7	$11.0	32.7%	$14.1	41.9%
2. Second Lien Term Loan	G	28.0	0.0	0.0%	0.0	0.0%
Total		**$61.7**	**$11.0**		**$14.1**	

Net Liquidation Proceeds from Unencumbered Assets	Note	Claims Estimates	Low $	Low %	High $	High %
Unencumbered Assets			$0.8		$1.1	
Estimated Admin and Priority Claims	H					
Priority tax claims	I	$0.1	$0.1	100.0%	$0.1	100.0%
Net wind-down expenses	J	0.3	0.3	100.0%	0.3	100.0%
Trustee fees	K	0.2	0.1	71.1%	0.2	100.0%
Trustee legal & financial advisors	L	0.5	0.4	71.1%	0.5	100.0%
Total Net Liquidation Proceeds from Unencumbered Assets		**$1.0**	**$0.0**		**$0.1**	

Distribution of Unencumbered Assets	Note	Low	High	Low $	Low %	High $	High %
Value available for Unsecured Claims	M			$0.0		$0.09	
First Lien RBL Deficiency Claims		$22.7	$19.6	$0.0	0.0%	$0.03	0.17%
Second Lien Term Loan Deficiency Claims		28.0	28.0	0.0	0.0%	0.05	0.17%
General Unsecured Claims		8.0	8.0	0.0	0.0%	0.01	0.17%
Total		**$58.7**	**$55.6**	**$0.0**		**$0.09**	

Below, we present a timeline that depicts the LVU measure construction, in which information in the exhibit by Remona Petroleum, among other exhibits, is used to construct the measure for firm *i*.



$$LVU_{i,t} = \sum \gamma_{Asset\ Class,j,t-1} \times \omega_{Asset\ Class,i,t} = \gamma_{Cash,j,t-1} \times \frac{Cash_{i,t}}{Total\ Assets_{i,t}} +$$

$$+ \gamma_{A/R,j,t-1} \times \frac{A/R_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Inventory,j,t-1} \times \frac{Inventory_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Fixed\ LT\ Assets,j,t-1} \times \frac{Fixed\ LT\ Assets_{i,t}}{Total\ Assets_{i,t}} +$$

$$+ \gamma_{Goodwill,j,t-} \times \frac{Goodwill_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Intangible\ Assets,j,t-1} \times \frac{Intangible\ Assets_{i,t}}{Total\ Assets_{i,t}} +$$

$$+ \gamma_{Other\ Current\ Assets,j,t-1} \times \frac{Other\ Current\ Assets_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Other\ LT\ Assets,j,t-1} \times \frac{Other\ LT\ Assets_{i,t}}{Total\ Assets_{i,t}}$$

Appendix B: Variable Descriptions

This table provides the description and measurement of variables used in the paper.

Dependent variables – the primary loan market	
Loan amt to PPE	The principal amount of the loan facility scaled by the borrower's fixed assets
[Tangible Assets] {Assets}	[tangible assets – the difference between total assets and intangible assets and goodwill] {total assets}.
Inv borrowing base	The loan facility's borrowing base advance rate for Inventory.
I(Inv BB below 50)	Indicator variable equal to one if the loan facility's borrowing base advance rate for Inventory is below 50%, zero otherwise.
A/R borrowing base	The loan facility's borrowing base advance rate for Accounts Receivables.
I(A/R BB below 85)	Indicator variable equal to one if the loan facility's borrowing base advance rate for Accounts Receivables is below 85%, zero otherwise.
I/S cov	The count of Income Statement covenants in a loan facility (including Max Capex, Min cash interest coverage, Min debt service coverage, Min EBITDA, Min fixed charge coverage, Min interest coverage).
B/S cov	The count of Balance Sheet covenants in a loan facility (Max debt to EBITDA, Max debt to equity, Max debt to tangible net worth, Max leverage ratio, Max senior debt to EBITDA, Max senior leverage, Min current ratio, Min quick ratio, Net worth, Tangible net worth, Min net worth to total asset, Max loan to value).
I/S [B/S] cov intensity	The ratio of I/S [B/S] cov to the sum of I/S cov and B/S cov, and zero if the sum is null.
I(Covenant threshold looser than group median)	Indicator variable equal to one if the loan covenant threshold is looser than group median, calculated by comparing the loan covenant's threshold to the median threshold for the same covenant within a rating category for loans issued in the most recent three years. The five S&P rating categories are A and above, BBB, BB, B, and CCC and below. The covenants included are: Max debt to EBITDA, Min interest coverage, Max leverage ratio, Min fixed charge coverage, Max senior debt to EBITDA, Min current ratio, Max debt to tangible net worth, Min debt service coverage, Max debt to equity, Max senior leverage ratio.
Dependent variables – the secondary loan market	
CLO holdings (quarter)	The average CLO holdings of a borrower's debt during a borrower's fiscal quarter. We firstly prepare a panel at the borrower-day level, aggregating individual CLO portfolio holdings on trustee reports on a given day for each firm. Second, we average the non-missing daily holdings during the borrower's fiscal quarter. Third, we scale the CLO holding values by the borrower's total assets reported in the financials for the fiscal quarter.
CLO holdings (before distress)	The average CLO holdings of a borrower's debt in the month immediately prior to the distress event, scaled by the total assets from the quarterly financials immediately prior the distress event. The calculation is similar to "CLO holdings (quarter)", as we average the daily CLO values during a month.
CLO holdings (Q-1) [Q-2] {Q-3} «Q-4»	The average CLO holdings of a borrower's debt in the quarter [the second quarter] {third quarter} «fourth quarter» immediately prior to the distress event, scaled by the total assets from the quarterly financials immediately before the distress event. The calculation is similar to "CLO holdings (quarter)", with the difference being the average of daily CLO values during the three months periods preceding a distress event.
Ratio of CLO holdings before distress to (Q-1) [Q-2] {Q-3} «Q-4»	The ratio of variables "CLO holdings (before distress)" to "CLO holdings (Q-1) [Q-2] {Q-3} «Q-4»".

Trade volume (log)	Using the CLO transactions data, we sum the values of trade transactions that occurred during a borrower's fiscal quarter, log transformed.
Number of trades (log)	Using the CLO transactions data, we sum the total number of trade transactions that occurred during a borrower's fiscal quarter, log-transformed.
Days with trades to Trading days	The ratio of days with at least one trade transaction during a borrower's fiscal quarter to the number of days in a quarter excluding Saturdays and Sundays.
Price average (quarter) [(distress)]	The loan-size weighted average price of loans in the fiscal quarter [thirty day window centered around the distress event date]. We firstly prepare three panels at the borrower-day level. Using secondary individual loan trades, we calculate the transaction-weighted average trade price for any firm-day. We aggregate individual CLO portfolio holdings on trustee reports into a weighted-average loan price with loan outstanding balances as weights. We also collapse default prices reported by CLO managers for individual loan holdings using loan outstanding balances as weights into a weighted-average default price on the default date CLO managers reported. Second, we combine three panels of prices, keeping non-duplicated borrower-day observations transactions, then holdings, then defaults. Third, we average non-missing prices during the fiscal quarter to create the average price per firm-quarter [during the period -15 to 14 days around the distress event, t=0, to create the average price per borrower-distress event].
Price change (distress vs -90 -15) [(distress vs -180 -90)] {(distress vs -270 -180)} «(distress vs -360 -270)»	The difference between the average price in the period -15 to 14 days and -90 and -15 [-180 -90] {-270 -180} «-360 -270» days, where 0 is the distress event date, as defined above.
Firm characteristics	
LVU	First, for each year and industry and asset class combination, we compute a rolling three-year average range of the estimated liquidation value range scaled by the mid-point of the range. Second, for each firm-year we multiply the Asset-Class × Industry × Year rolling average over three years, γ, with the firm-year specific asset class weights based on book values in the most recent reported quarterly balance sheet, ω. We use the following asset classes: cash, accounts receivable, inventory, fixed long-term assets, goodwill, intangibles asset, in addition to the "catch-all" other current and other long-term assets: $LVU_{i,t} = \sum \gamma_{Asset\ Class,j,t-1} \times \omega_{Asset\ Class,i,t} = \gamma_{Cash,j,t-1} \times \frac{Cash_{i,t}}{Total\ Assets_{i,t}} + \gamma_{A/R,j,t-1} \times \frac{A/R_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Inventory,j,t-1} \times \frac{Inventory_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Fixed\ LT\ Assets,j,t-1} \times \frac{Fixed\ LT\ Assets_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Goodwill,j,t-1} \times \frac{Goodwill_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Intangible\ Assets,j,t-1} \times \frac{Intangible\ Assets_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Other\ Current\ Assets,j,t-1} \times \frac{Other\ Current\ Assets_{i,t}}{Total\ Assets_{i,t}} + \gamma_{Other\ LT\ Assets,j,t-1} \times \frac{Other\ LT\ Assets_{i,t}}{Total\ Assets_{i,t}}$, where *i* denotes individual firms, *j* stands for the one-digit SIC industry of the firm *i*, and *t* signifies the year.
LVU Inventory	The product of the balance sheet value of inventory to total assets and the rolling three-year average range of the estimated liquidation value range scaled by the mid-point of the range of inventory in the industry of the borrower in the year prior to the loan issuance.
LVU A/R	The product of the balance sheet value of accounts receivables to total assets and the rolling three-year average range of the estimated liquidation value range scaled by the mid-point of the range of accounts receivables in the industry of the borrower in the year prior to the loan issuance.

Liquidation Value – Mid	First, for each year and industry and asset class combination, we compute a rolling three-year average mid-point of the estimated liquidation dollar value range scaled by the book value of asset class. Second, for each firm-year we multiply the Asset-Class × Industry × Year rolling average over three years, γ, with the firm-year specific asset class weights based on book values in the most recent reported quarterly balance sheet. The calculation is similar to LVU using the same asset classes.
Size (log)	Total sales, using the values from quarterly financials immediately prior to the distress event, log-transformed.
Leverage ratio	The ratio of the sum of long term debt and short-term portion of long term debt to total assets, using the values from the quarterly financials immediately prior to the distress event.
Tangibility ratio	The ratio of total assets less intangible assets and goodwill to total assets, using the values from the quarterly financials immediately prior to the distress event.
Profitability	The ratio of EBITDA to sales, using the values from quarterly financials immediately prior to the distress event.
Current ratio	The ratio of current assets to current liabilities, using the values from quarterly financials immediately prior to the distress event.
I(Earnings Announcement)	Indicator variable equal to one if the borrower had an earnings announcement during the -15 to 14 days window, where 0 is the distress event date.
I(Bankruptcy)	Indicator variable equal to one if the distress event is a Chapter 11 filing for bankruptcy, zero otherwise.
I(CCC)	Indicator variable equal to one if the distress event is a rating downgrade into CCC rating or below, zero otherwise.
I(Missing equity returns)	Indicator variable equal to one if the equity returns are missing around the distress event.
Equity returns (distress)	The equity returns in the period (-15 to 14) days, where 0 is the distress event date if available, and zero if missing.
Debt and debtholders' characteristics	
CLO holdings	The sum of outstanding loan balances of a borrower across all CLO managers at the end of the month immediately prior to the distress event, scaled by the total assets from the quarterly financials immediately before the distress event.
CLO N managers (log)	The number of unique CLO managers holding the borrower's loan at the end of the month immediately prior to the distress event, log-transformed.
CLO mean maturity (log)	The loan outstanding balance-weighted average of count of months till loan maturity at the month-end right before to the distress event, log-transformed.
Price average (-90 -15) [(-180 -90)] {(-270 -180)} «(-360 -270)»	The average price in the period -90 to -15 [-180 to -90] {-270 to -180 } «-360 to -270» days, where 0 is the distress event, using computations similar to the Price average (distress) definition above.
Loan characteristics	
Num covenants (log)	The sum of I/S cov and B/S cov, log-transformed.
Num lenders (log)	The number of unique lenders for the given loan facility, log-transformed.
Facility amt (log)	The principal amount of the loan facility, log-transformed.
Maturity (log)	The number of months between the loan's start and end dates, log-transformed.
I(Secured)	Indicator variable equal to one if the loan facility is secured, zero if the loan is unsecured or if this field is missing.
I(Borrowing base)	Indicator variable equal to one if the loan facility contains a borrowing base provision, zero otherwise.
I(Rated)	Indicator variable equal to one if the borrower does not have an S&P credit rating in the month the loan facility's issuance, zero otherwise.

Figure 1: Industry Distribution of Recovery Rates and Recovery Ranges

This figure presents the industry distribution of recovery rates by asset type (as a percentage of book value) and the range of the liquidation values scaled by the mid-point of the range. In Panels 1A, 1B, 1C, and 1D, we provide the industry breakdown of these values for Accounts Receivables, Inventory, Intangible Assets excluding Goodwill, and Fixed Long-Term Assets, respectively. The horizonal labels refer to SIC industry codes as tabulated below.

LABEL	INDUSTRY	LABEL	INDUSTRY
SIC 1	Mining, Construction, Oil and Gas	SIC 5	Wholesale Trade, Retail Trade
SIC 2	Manufacturing (Food Processing, Textile, Lumber & Chemical Products)	SIC 7	Services (Hotels, Recreation, Advertising, Software)
SIC 3	Manufacturing (Plastic, Glass, Steel works, Machinery, Automobile)	SIC 8	Services (Healthcare, Legal/Engineering/Accounting Services)
SIC 4	Transportation, Communications, Electric, Gas and Sanitary service		

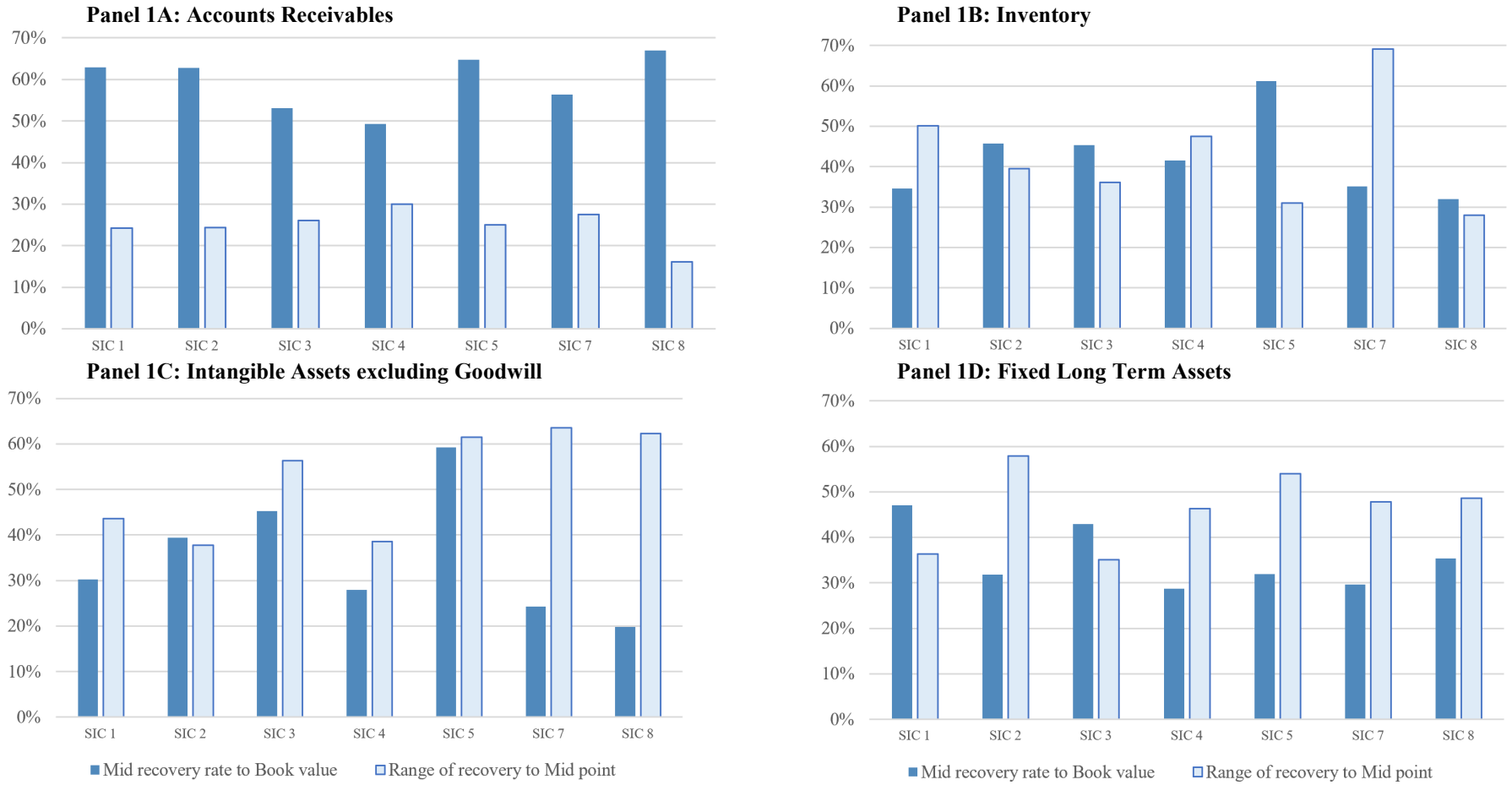
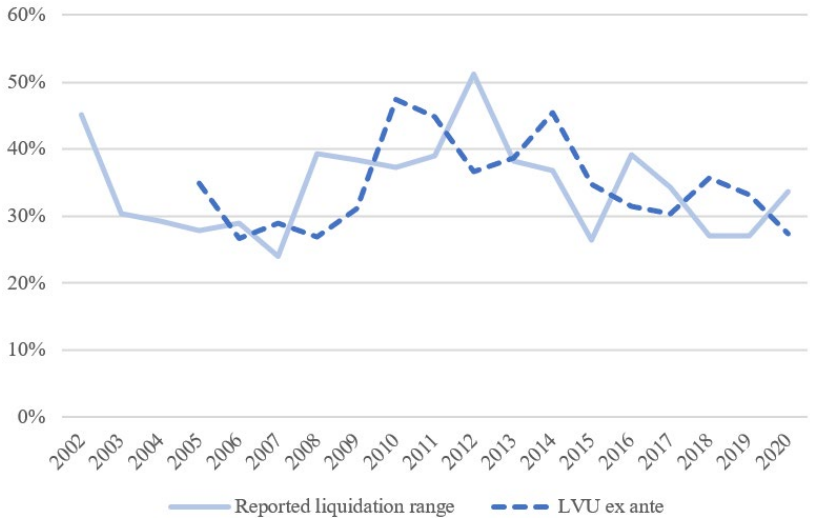


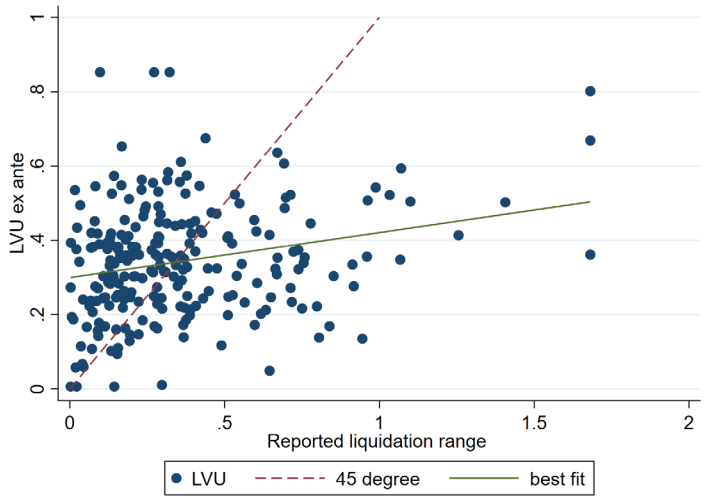
Figure 2: Descriptives on the LVU measure

In Panel 2A, we plot the average of the reported liquidation range and LVU (ex ante) over time. The solid line traces the liquidation ranges reported in liquidation analyses in a given year. The dashed line shows the values of LVU calculated using the rolling average of three year within a given industry. In the scatterplot in Panel 2B, the horizontal axis reports the individual observations of reported liquidation range in liquidation analyses which are plotted against LVU (ex ante) for the same asset class. The solid (dashed) line is the best-fit line (45 degree line). Panel 2C displays the distribution of the difference between the two measures: Reported liquidation range less LVU (ex ante). The solid vertical line represents the mean difference of 0.01, and the dashed vertical lines mark one standard deviation of 0.29 around the mean.

Panel 2A: Averages of reported liquidation range and LVU ex ante



Panel 2B: Reported liquidation range vs. LVU ex ante



Panel 2C: Histogram: Difference between Reported liquidation range and LVU ex ante

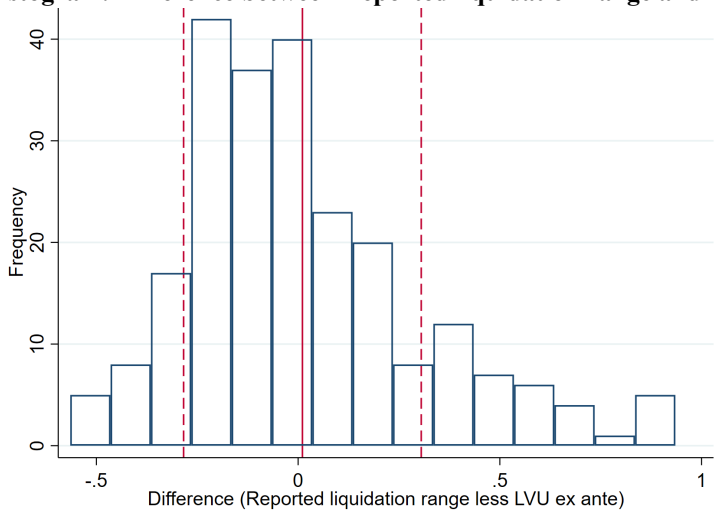


Figure 3: Average Loan Prices prior to and during the Distress Event

This figure depicts the evolution of borrower's loan prices during each of the quarters around a distress event, split by the median LVU. Each bar represents the average loan price during 90 days for borrowers split around the median of the LVU distribution, except the thirty day distress event window. -Q4 refers to the window between -360 to -270 days, -Q3 is -270 to -180 days, -Q2 is -180 to -90 days, -Q1 is -90 to -15 days, +Q1 is 15 to 90, etc., while the Distress window is -15 to 14 days, where 0 is the distress event date. The dark (light) shaded bars represent observations for firms with low (high) LVU.

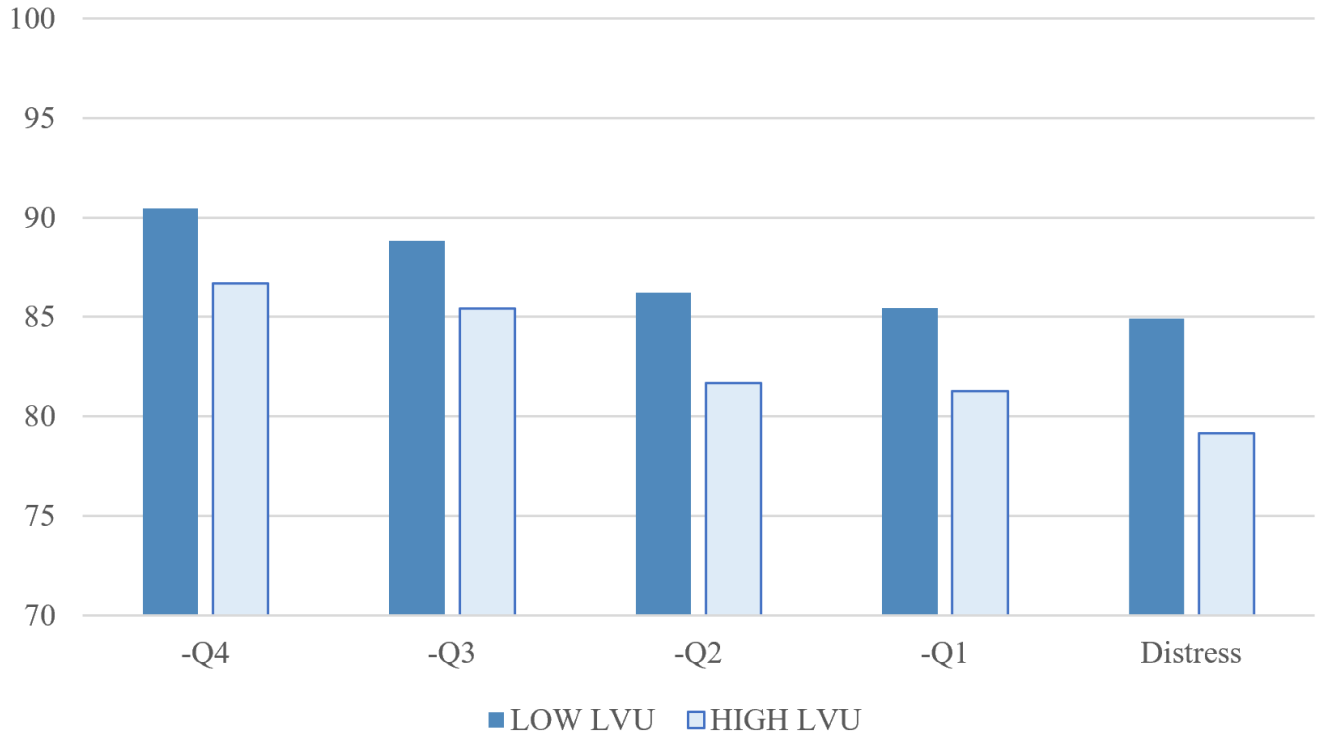


Table 1: Descriptive Statistics for Liquidation Analyses

This table reports descriptive statistics for the liquidation analyses collected from Chapter 11 filings. Panel A presents the sample selection process. Panel B gives the details of descriptive statistics by asset class for average recovery rates scaled by book values. Panel C shows the descriptive statistics by asset class for the range of liquidation values scaled by the mid-point. In Panels B and C, the last column reports the percentage of the 332 liquidation analyses that report liquidation values for a given asset class.

Panel A: Selection of Liquidation Analyses

Collected liquidation analyses in Chapter 11 filings		1314
Dropped missing explicit asset recoveries	(599)	
		715
Dropped duplicated liquidation analyses per bankruptcy	(294)	
		421
Match with available Compustat data	(46)	
		375
Dropped missing book values of assets in liquidation analyses	(43)	
Final Sample		332

Panel B: Mid-point Recovery Rate scaled by Book Value (in percentages)

ASSET CLASS	N	mean	sd	p25	p50	p75	% available (out of 332)
Cash	301	102.0	68.8	100.0	100.0	100.0	90.7
Accounts Receivable	289	58.3	28.9	36.4	65.4	80.6	87.0
Prepayments	112	18.8	25.0	0	6.8	34.4	33.7
Inventory	203	44.3	28.4	20.0	41.2	63.8	61.1
Other Current Assets	245	22.2	25.9	1.9	10.1	37.6	73.8
Current Assets	319	60.1	28.5	41.6	63.3	81.1	96.1
Fixed Long Term Assets	279	36.5	32.4	12.5	29.2	49.3	84.0
Other Long Term Assets	176	55.6	144.4	0	12.2	58.3	53.0
Intangibles ex Goodwill	137	37.3	81.1	0.0	9.1	40.9	41.3
Goodwill	44	1.1	7.5	0	0	0	13.3
Deferred Tax Asset	46	7.3	19.9	0	0	0	13.9
Total Assets	332	43.8	31.7	20.5	37.2	59.2	100

Panel C: Range of Liquidation Values, scaled by the mid-point of the range (in percentages)

ASSET CLASS	N	mean	sd	p25	p50	p75	% available (out of 332)
Cash	301	1.4	6.4	0	0	0	90.7
Accounts Receivable	285	25.9	26.7	9.5	20.7	33.7	85.8
Prepayments	84	75.4	73.1	14.7	59.1	110.0	25.3
Inventory	198	43.3	45.4	11.1	32.5	66.6	59.6
Other Current Assets	203	79.7	74.4	21.0	45.7	156.7	61.1
Current Assets	321	13.9	15.4	2.1	10.1	20.1	96.7
Fixed Long Term Assets	279	44.9	41.5	16.9	34.5	64.5	84.0
Other Long Term Assets	150	50.8	58.2	7.1	32.5	66.7	45.2
Intangibles ex Goodwill	150	51.5	66.3	0	24.3	75.5	45.2
Goodwill	N/A	0	0	0	0	0	N/A
Deferred Tax Asset	7	94.4	76.5	32.1	66.7	200.0	2.1
Total Assets	332	26.6	28.0	10.5	22.0	34.4	100

Table 2: Descriptive Statistics

This table reports descriptive statistics for the variables used in subsequent multivariate analyses, broken down by each sample test. Panel A gives summary statistics for the sample of determinants of reported liquidation value ranges. Panels B and C provide sample details on loan amounts, borrowing base, and covenants in the primary loan market. Panel D summarizes the variables used in the secondary market tests, while Panel E gives details on the sample of distressed loans.

Panel A: Determinants of Reported Liquidation Range Analysis (Table 3)

Dependent variable	N	mean	sd	p25	p50	p75
Reported liquidation range	206	0.34	0.29	0.14	0.28	0.44
Firm characteristics	N	mean	sd	p25	p50	p75
Assets (log)	206	20.37	1.51	19.54	20.52	21.36
Assets (in $m)	206	2043.0	4543.6	306.8	817.3	1889.6
Leverage ratio (bankruptcy)	206	1.29	1.03	0.75	0.96	1.33
Tangibility ratio (bankruptcy)	206	0.90	0.19	0.91	1.00	1.00
Bankruptcy characteristics	N	mean	sd	p25	p50	p75
I(Prepack)	206	0.33	0.47	0.00	0.00	1.00
I(DIP financing)	206	0.60	0.49	0.00	1.00	1.00
I(363 Sale)	206	0.45	0.50	0.00	0.00	1.00
I(Liquidated)	206	0.08	0.27	0.00	0.00	0.00
Days to Disclosure Statement (log)	206	3.46	2.44	0.00	4.31	5.51
Num of same-industry bankruptcies (log)	206	2.76	0.61	2.40	2.64	3.18
Num of same-industry bankruptcies (#)	206	18.2	12.7	10	13	23

Panel B: Primary Market: Loan Amounts and Borrowing Base Analyses (Table 4)

Dependent variables	N	mean	sd	p25	p50	p75
Loan amt to PPE	7182	1.82	3.16	0.21	0.68	1.86
Loan amt to Tangible Assets	7182	0.35	0.38	0.09	0.22	0.45
Loan amt to Assets	7182	0.22	0.21	0.07	0.16	0.31
Inv borrowing base	755	67.2	18.1	60	70	85
I(Inv BB below 50)	755	0.10				
A/R borrowing base	876	83.7	6.20	85	85	85
I(A/R BB below 85)	876	0.19				
Firm characteristics	N	mean	sd	p25	p50	p75
LVU	7182	0.32	0.13	0.23	0.31	0.40
Liquidation Value – Mid	7182	0.44	0.27	0.28	0.40	0.51
LVU Inventory	755	0.34	0.17	0.22	0.32	0.48
Liquidation Value Inventory – Mid	755	0.51	0.14	0.43	0.53	0.58
LVU A/R	876	0.24	0.10	0.18	0.25	0.31
Liquidation Value A/R – Mid	876	0.59	0.11	0.52	0.60	0.65
Size (log of sales)	7182	6.22	1.55	5.18	6.17	7.24
Sales (in $m)	7182	1750.4	4286.1	176.4	474.9	1388.4
Leverage ratio	7182	0.34	0.23	0.19	0.32	0.47

Tangibility ratio	7182	0.76	0.23	0.60	0.83	0.97
Profitability	7182	0.19	0.17	0.09	0.16	0.28
Current ratio	7182	1.88	1.19	1.08	1.61	2.31
Loan characteristics	N	mean	sd	p25	p50	p75
Facility amt (log)	7182	19.73	1.26	18.98	19.81	20.62
Maturity (log)	7182	4.04	0.31	3.97	4.11	4.11
Num lenders (log)	7182	1.98	0.73	1.39	2.08	2.48
Num covenants (log)	7182	0.68	0.54	0.00	0.69	1.10
I(Secured)	7182	0.67				
I(Rated)	7182	0.61				
I(Borrowing base)	7182	0.17				

Panel C: Primary Market: Covenants Analyses (Table 5)

Dependent variables	N	mean	sd	p25	p50	p75
I/S cov	1216	0.44	0.65	0	0	1
B/S cov	1216	0.44	0.62	0	0	1
I/S cov intensity	1216	0.22	0.32	0	0	0.5
B/S cov intensity	1216	0.23	0.33	0	0	0.5
I(Covenant threshold looser than group median) *All covenants*	4693	0.44				
I(Covenant threshold looser than group median) *Max debt to EBITDA*	1744	0.43				
I(Covenant threshold looser than group median) *Min interest coverage*	1251	0.41				
I(Covenant threshold looser than group median) *Max leverage ratio*	783	0.46				
Firm characteristics	N	mean	sd	p25	p50	p75
LVU	1216	0.32	0.13	0.22	0.31	0.40
Liquidation Value – Mid	1216	0.49	0.29	0.32	0.43	0.56
LVU	4693	0.32	0.12	0.23	0.31	0.40
Liquidation Value – Mid	4693	0.40	0.25	0.25	0.37	0.47
Size (log of sales)	1216	6.39	1.65	5.27	6.34	7.49
Sales (in $m)	1216	2174.1	4753.6	194.1	563.8	1794.1
Leverage ratio	1216	0.30	0.21	0.15	0.28	0.41
Tangibility ratio	1216	0.77	0.21	0.64	0.84	0.96
Profitability	1216	0.15	0.15	0.07	0.12	0.21
Current ratio	1216	1.90	1.13	1.14	1.63	2.32
Loan characteristics	N	mean	sd	p25	p50	p75
Facility amt (log)	1216	19.70	1.31	18.83	19.76	20.62
Maturity (log)	1216	3.97	0.33	3.87	4.11	4.11
Num lenders (log)	1216	1.90	0.67	1.39	1.95	2.40
I(Secured)	1216	0.48				
I(Rated)	1216	0.53				
I(Borrowing base)	1216	0.17				

Panel D: Secondary Market: Loan Prices, CLO Holdings and Liquidity Analyses (Tables 6 and 7)

Dependent variables	N	mean	sd	p25	p50	p75
Price average (quarter)	5947	96.69	7.79	97.29	99.54	100.20
CLO holdings (quarter)	5947	0.12	0.18	0.03	0.07	0.15
Trade volume (log)	6341	16.93	1.44	16.03	16.98	17.91
Number of trades (log)	6341	3.20	1.27	2.30	3.18	4.08
Number of trades (#)	6341	53.5	89.0	9	23	58
Days with trades to Trading days	6341	0.21	0.16	0.10	0.17	0.30
Firm characteristics	N	mean	sd	p25	p50	p75
LVU	5947	0.32	0.13	0.24	0.32	0.40
Liquidation Value – Mid	5947	0.39	0.26	0.25	0.34	0.45
Size (log of sales)	5947	6.32	1.28	5.46	6.26	7.18
Sales (in $m)	5947	1244.5	1987.9	233.6	524.8	1316.0
Leverage ratio	5947	0.55	0.27	0.38	0.50	0.65
Tangibility ratio	5947	0.63	0.26	0.40	0.63	0.87
Profitability	5947	0.18	0.17	0.10	0.17	0.26
Current ratio	5947	1.78	1.08	1.04	1.56	2.21
Debt and debt holders' characteristics	N	mean	sd	p25	p50	p75
CLO holdings	5947	0.13	0.20	0.03	0.07	0.15
CLO N managers (log)	5947	3.20	0.71	2.77	3.30	3.71
CLO mean maturity (log)	5947	3.99	0.34	3.81	4.06	4.25

Panel E: Distressed Loans: Secondary Loan Prices and CLO Holdings Analyses (Tables 8 and 9)

Dependent variables	N	mean	sd	p25	p50	p75
Price average (distress)	363	79.4	22.4	66.3	87.8	99.0
Price change (distress vs -90 -15)	339	-1.46	9.78	-3.13	-0.02	1.90
Price change (distress vs -180 -90)	320	-2.31	14.7	-8.27	-0.12	3.04
Price change (distress vs -270 -180)	293	-6.86	19.7	-16.0	-0.53	2.40
Price change (distress vs -360 -270)	279	-8.20	21.2	-21.5	-1.30	2.35
CLO holdings (before distress)	355	0.201	0.834	0.026	0.058	0.130
CLO holdings (Q-1)	349	0.206	0.833	0.026	0.058	0.131
CLO holdings (Q-2)	344	0.203	0.804	0.024	0.058	0.127
CLO holdings (Q-3)	335	0.198	0.776	0.019	0.055	0.136
CLO holdings (Q-4)	329	0.189	0.727	0.015	0.050	0.130
Ratio of CLO hold before distress to Q-1	349	1.082	0.487	0.862	0.987	1.118
Ratio of CLO hold before distress to Q-2	344	1.341	1.143	0.796	1.022	1.303
Ratio of CLO hold before distress to Q-3	335	1.583	1.428	0.777	1.059	1.644
Ratio of CLO hold before distress to Q-4	329	1.963	2.132	0.824	1.180	2.272
Firm characteristics	N	mean	sd	p25	p50	p75
LVU	363	0.34	0.14	0.25	0.33	0.41
Liquidation Value – Mid	363	0.62	0.71	0.28	0.41	0.58
Size (log of sales)	363	5.94	1.37	5.11	5.85	6.85

Sales (in $m)	363	914.3	1617.9	164.3	347.0	940.0
Leverage ratio	363	0.74	0.42	0.46	0.68	0.87
Tangibility ratio	363	0.70	0.27	0.47	0.74	0.99
Profitability	363	0.08	0.43	0.04	0.12	0.24
Current ratio	363	1.27	0.93	0.60	1.07	1.75
I(Earnings Announcement)	363	0.32				
I(Bankruptcy)	363	0.10				
I(CCC)	363	0.52				
I(Missing equity returns)	363	0.38				
Equity returns (distress)	225	-4.14	30.7	-13.8	0.00	8.42
Debt and debt holders' characteristics	N	mean	sd	p25	p50	p75
CLO holdings	363	0.21	0.83	0.03	0.06	0.13
CLO N managers (log)	363	2.88	0.84	2.30	3.04	3.47
CLO mean maturity (log)	363	3.76	0.51	3.53	3.89	4.12
Price average (-90 -15)	339	81.3	20.7	67.8	88.9	99.0
Price average (-180 -90)	320	83.7	18.8	71.9	90.9	99.0
Price average (-270 -180)	293	87.3	15.5	80.5	93.4	98.9
Price average (-360 -270)	279	89.0	14.3	85.7	94.6	99.0

Table 3: Determinants of Reported Liquidation Range

This table examines the determinants of reported liquidation ranges. We regress the reported liquidation range values on the firm characteristics as reported in the bankruptcy filing, bankruptcy case characteristics, as well as issuer's 1-digit SIC industry fixed effects and year of bankruptcy effects. The dependent variable is the value of reported liquidation range scaled by the range midpoint as given in liquidation analyses. The calculation of liquidation range follows the same eight asset classes as in the LVU measure (Appendix B). Assets (log) is the value of assets reported in the bankruptcy filing (log-transformed), while the leverage ratio (bankruptcy) is the ratio of liabilities to assets reported in the filing. The tangibility ratio (bankruptcy) is the ratio of the total assets less intangible assets to total assets, using the book values reported in liquidation analyses. I(Prepack) is an indicator equal to one if the default is a prepackaged bankruptcy, zero otherwise. I(DIP financing) is an indicator equal to one if the debtor-in-possession financing is provided during bankruptcy, zero otherwise. I(363 Sale) is an indicator equal to one if some of debtor's assets are sold under Section 363 of the U.S. Bankruptcy Code, zero otherwise. I(Liquidated) is an indicator equal to one if the debtor firm is liquidated during the bankruptcy proceedings, zero otherwise. Days to Disclosure Statement (log) is the number of days between the bankruptcy filings date and the first disclosure statement with a liquidation analysis, log-transformed. Num of same-industry bankruptcies (log) refers to the number of firms filing for bankruptcy in the same 1 digit SIC industry over the three years immediately prior to the firm's bankruptcy filing, log-transformed. The unit of observation is a defaulting firm. Robust t-statistics using standard errors clustered at the industry-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

VARIABLE	(1) Reported liquidation range	(2) Reported liquidation range	(3) Reported liquidation range
Assets (log)	-0.033**	-0.047***	-0.047***
	(-2.57)	(-3.35)	(-3.23)
Leverage ratio (bankruptcy)	-0.061***	-0.067***	-0.061***
	(-4.12)	(-4.41)	(-3.61)
Tangibility ratio (bankruptcy)	-0.283**	-0.298**	-0.247*
	(-2.23)	(-2.17)	(-1.68)
I(Prepack)		0.040	0.036
		(0.90)	(0.84)
I(DIP financing)		0.034	0.075*
		(0.86)	(1.80)
I(363 Sale)		0.075	0.093*
		(1.44)	(1.70)
I(Liquidated)		-0.082	-0.121
		(-1.06)	(-1.17)
Days to Disclosure Statement (log)		-0.022*	-0.031**
		(-1.78)	(-2.43)
Num of same-industry bankruptcies (log)		0.064**	0.070*
		(2.15)	(1.95)
Observations	206	206	206
Adjusted R-squared	0.069	0.084	0.095
Industry FE	NO	YES	YES
Year FE	NO	NO	YES

Table 4: Primary Market – Loan amounts and Borrowing bases

This table investigates the role of LVU on the amount of financing raised and the borrowing base determination in the primary loan market. In Panel A, we regress loan amounts on the borrowing firms' LVU, controlling for firm characteristics, loan characteristics, as well as issuer's 1-digit SIC industry fixed effects and year of issuance effects. In Columns (1) and (2) [(3) and (4)] {(5) and (6)}, the dependent variable is the principal amount of the loan facility, scaled by the value of the fixed assets [tangible assets] {total assets} in the quarter immediately preceding the loan issuance. In Panel B, we regress loans' borrowing base advance rates for Inventory and Accounts Receivable (A/R) on the respective LVU measure, controlling for firm characteristics, loan characteristics, as well as issuer's 1-digit SIC industry fixed effects and year of issuance effects. In Columns (1) and (4), the dependent variable is the advance rate for Inventory and A/R, respectively. In Columns (2), (3), (5), and (6) the dependent variable is the indicator variable equal to one if the advance rate is in the bottom quartile of the rate distribution (50% for Inventory and 85% for A/R). In both panels, the unit of observation is a loan facility. Robust t-statistics using standard errors clustered at the industry-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix B.

Panel A

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Loan amt to PPE		Loan amt to Tangible Assets		Loan amt to Assets	
LVU	-2.911***	-2.860***	-0.431***	-0.414***	-0.003	-0.003
	(-5.85)	(-5.79)	(-5.54)	(-5.32)	(-0.13)	(-0.12)
Size (log of sales)	-0.584***	-0.589***	-0.131***	-0.130***	-0.078***	-0.078***
	(-13.59)	(-13.45)	(-28.52)	(-28.51)	(-29.05)	(-29.14)
Leverage ratio	-0.856***	-0.843***	0.153***	0.144***	0.047***	0.048***
	(-4.02)	(-3.93)	(5.14)	(4.89)	(3.09)	(3.09)
Tangibility ratio	-3.705***	-3.862***			0.017	0.016
	(-10.82)	(-11.21)			(0.85)	(0.76)
Profitability ratio	-0.578*	-0.497	0.036	0.013	-0.024	-0.024
	(-1.77)	(-1.50)	(0.81)	(0.32)	(-1.07)	(-1.08)
Current ratio	0.292***	0.270***	-0.011**	-0.005	0.003	0.003
	(6.28)	(5.61)	(-2.41)	(-1.03)	(0.99)	(0.95)
Maturity (log)	0.655***	0.668***	0.231***	0.227***	0.136***	0.136***
	(4.40)	(4.46)	(14.19)	(13.98)	(13.41)	(13.47)
I(Secured)	0.515***	0.498***	0.112***	0.115***	0.054***	0.054***
	(6.08)	(5.90)	(11.51)	(11.54)	(10.97)	(10.96)
Num covenants (log)	-0.299***	-0.297***	-0.026**	-0.027**	-0.005	-0.005
	(-3.22)	(-3.19)	(-2.41)	(-2.47)	(-0.83)	(-0.82)
Num lenders (log)	0.498***	0.511***	0.114***	0.111***	0.072***	0.072***
	(7.02)	(7.16)	(14.59)	(14.08)	(16.19)	(16.18)
I(Borrowing base)	-0.175	-0.162	-0.126***	-0.126***	-0.027***	-0.027***
	(-1.64)	(-1.52)	(-11.01)	(-11.30)	(-3.28)	(-3.27)
I(Rated)	-0.248**	-0.242**	-0.005	-0.008	-0.027***	-0.027***
	(-2.61)	(-2.52)	(-0.46)	(-0.69)	(-3.80)	(-3.80)
Liquidation Value – Mid		0.545**		-0.127***		0.003
		(2.19)		(-3.62)		(0.24)
Observations	7,182	7,182	7,182	7,182	7,182	7,182
Adjusted R-squared	0.297	0.298	0.339	0.345	0.360	0.360
Industry FE, Year FE	YES	YES	YES	YES	YES	YES

Panel B

VARIABLES	(1) Inv borrowing base	(2) I(Inv BB below 50)	(3) I(Inv BB below 50)	(4) A/R borrowing base	(5) I(A/R BB below 85)	(6) I(A/R BB below 85)
LVU Inventory	-8.338**	0.222***	0.444***			
	(-2.24)	(2.88)	(3.67)			
LVU A/R				-0.917	0.436***	0.483***
				(-0.52)	(3.35)	(3.82)
Size (log of sales)	-2.385*	0.018	0.018	-1.120**	0.001	0.000
	(-1.98)	(0.98)	(0.99)	(-2.37)	(0.06)	(0.03)
Leverage ratio	1.825	-0.048	-0.050	-0.009	-0.032	-0.036
	(0.68)	(-1.26)	(-1.29)	(-0.01)	(-0.51)	(-0.57)
Tangibility ratio	-0.254	0.098	0.098	1.022	0.059	0.053
	(-0.07)	(1.38)	(1.43)	(0.71)	(0.94)	(0.82)
Profitability ratio	5.844	-0.346***	-0.374***	2.902**	-0.295***	-0.288***
	(1.04)	(-2.80)	(-3.20)	(2.01)	(-2.75)	(-2.67)
Current ratio	-0.951**	0.026*	0.026*	-0.392**	0.017	0.017
	(-2.06)	(1.88)	(1.89)	(-2.27)	(1.25)	(1.24)
Num covenants (log)	-4.553***	0.015	0.017	-0.430	0.024	0.025
	(-4.12)	(0.75)	(0.85)	(-1.12)	(0.85)	(0.87)
Num lenders (log)	-5.398***	0.099***	0.100***	-2.365***	0.161***	0.163***
	(-3.30)	(3.53)	(3.54)	(-3.61)	(4.61)	(4.65)
Facility amt (log)	9.767***	-0.125***	-0.125***	2.968***	-0.129***	-0.129***
	(5.32)	(-5.25)	(-5.25)	(3.65)	(-4.96)	(-4.97)
Maturity (log)	-1.078	0.042	0.047	0.634	-0.209***	-0.211***
	(-0.45)	(0.89)	(1.00)	(0.70)	(-3.99)	(-4.04)
I(Secured)	12.839***	0.098***	0.122***	1.451	-0.415*	-0.403*
	(5.69)	(2.73)	(3.78)	(1.10)	(-1.85)	(-1.79)
I(Rated)	1.808	0.025	0.024	0.871	-0.048	-0.048
	(1.29)	(1.01)	(0.96)	(1.48)	(-1.63)	(-1.64)
Liquidation Value Inventory – Mid			0.414***			
			(2.68)			
Liquidation Value A/R – Mid						-0.197*
						(-1.82)
Observations	755	755	755	876	876	876
Adjusted R-squared	0.315	0.154	0.163	0.126	0.173	0.175
Industry FE, Year FE	YES	YES	YES	YES	YES	YES

Table 5: Primary Market – Covenants

This table investigates the role of LVU on the debt covenants and pricing of loans in the primary market. We regress loans' covenant structure and covenant slack on the borrowing firms' LVU, controlling for firm characteristics, loan characteristics, issuer's 1-digit SIC industry fixed effects, year of issuance effects. In Panel A, in Columns (1) and (2) [(3) and (4)], the dependent variable is the number of balance sheet (B/S) [income statement (I/S)] covenants. In Columns (5) through (8), we examine the B/S and I/S covenant intensity. The unit of observation is a loan facility. In Panel B, the dependent variable is an indicator variable equal to one if the loan covenant threshold is looser than group median, calculated by comparing the loan covenant's threshold to the median threshold for the same covenant within a rating group for loans issued in the most recent three years. The five S&P rating groups are A and above, BBB, BB, B, and CCC and below. In Columns (1) to (4) all covenants are included: Max debt to EBITDA (37% of all observations in Column 1), Min interest coverage (27%), Max leverage ratio (17%), Min fixed charge coverage (11%), Max senior debt to EBITDA (5%), Min current ratio (2%), Max debt to tangible net worth (<1%), Min debt service coverage (<1%), Max debt to equity (<1%), Max senior leverage ratio (<1%). In Columns (3) and (4), we restrict the sample by excluding loans containing a borrowing base clause. In Columns (5), (6), and (7), we use partitions of the sample used in Column (2), estimating the regression for each of the three most frequently occurring covenants. The control variables estimated are as in Panel A, but not reported for brevity. The unit of observation is a loan covenant. In both panels, robust t-statistics using standard errors clustered at the industry-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix B.

Panel A

VARIABLES	(1) B/S cov	(2) B/S cov	(3) I/S cov	(4) I/S cov	(5) B/S cov intensity	(6) B/S cov intensity	(7) I/S cov intensity	(8) I/S cov intensity
LVU	-0.314**	-0.365***	-0.225	-0.251	-0.174**	-0.199***	-0.092	-0.107
	(-2.35)	(-2.82)	(-1.41)	(-1.62)	(-2.32)	(-2.70)	(-1.05)	(-1.27)
Size (log of sales)	-0.057***	-0.058***	-0.070***	-0.070***	-0.029***	-0.029***	-0.026***	-0.027***
	(-4.35)	(-4.41)	(-4.54)	(-4.58)	(-3.67)	(-3.71)	(-3.64)	(-3.69)
Leverage ratio	-0.188*	-0.200*	0.032	0.025	-0.142**	-0.148**	0.014	0.010
	(-1.73)	(-1.85)	(0.30)	(0.24)	(-2.48)	(-2.58)	(0.26)	(0.19)
Tangibility ratio	0.145*	0.223**	-0.007	0.033	0.126***	0.164***	-0.004	0.018
	(1.72)	(2.59)	(-0.09)	(0.38)	(2.65)	(3.39)	(-0.10)	(0.42)
Profitability ratio	-0.145	-0.175	-0.167	-0.182	-0.034	-0.049	-0.060	-0.069
	(-1.01)	(-1.26)	(-1.40)	(-1.52)	(-0.46)	(-0.69)	(-1.06)	(-1.20)
Current ratio	0.037*	0.039*	0.006	0.008	0.016	0.017	-0.001	-0.001
	(1.73)	(1.86)	(0.39)	(0.47)	(1.53)	(1.66)	(-0.18)	(-0.09)
Facility amt (log)	-0.051**	-0.050**	-0.060***	-0.060***	-0.006	-0.005	-0.022**	-0.021**
	(-2.18)	(-2.13)	(-3.06)	(-3.03)	(-0.49)	(-0.45)	(-2.30)	(-2.27)
Maturity (log)	-0.024	-0.020	0.086*	0.088*	-0.018	-0.016	0.092***	0.093***
	(-0.39)	(-0.32)	(1.92)	(1.94)	(-0.48)	(-0.42)	(4.01)	(4.03)

I(Secured)	0.239***	0.237***	0.240***	0.240***	0.097***	0.096***	0.088***	0.088***
	(6.13)	(6.14)	(5.94)	(5.97)	(4.42)	(4.40)	(5.09)	(5.11)
Num lenders (log)	0.240***	0.234***	0.203***	0.200***	0.123***	0.119***	0.103***	0.102***
	(6.18)	(6.16)	(6.28)	(6.19)	(5.40)	(5.36)	(6.80)	(6.65)
I(Rated)	0.002	0.002	-0.017	-0.017	0.034	0.034	0.008	0.009
	(0.05)	(0.06)	(-0.45)	(-0.44)	(1.49)	(1.48)	(0.50)	(0.51)
I(Borrowing base)	-0.513***	-0.514***	-0.079	-0.079	-0.222***	-0.222***	0.142***	0.142***
	(-7.88)	(-7.78)	(-1.13)	(-1.14)	(-7.07)	(-6.96)	(3.64)	(3.65)
Liquidation Value – Mid		-0.179**		-0.094		-0.088**		-0.052*
		(-2.24)		(-1.34)		(-2.15)		(-1.73)
Observations	1,216	1,216	1,216	1,216	1,216	1,216	1,216	1,216
Adjusted R-squared	0.176	0.180	0.178	0.179	0.115	0.118	0.185	0.186
Industry FE, Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Panel B

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLE	I(Covenant threshold looser than group median)						
Sample	Full	Full	Excl. borrowing base loans	Excl. borrowing base loans	Max debt to EBITDA	Min interest coverage	Max leverage ratio
% out of all loan-covenant observations in Column (1)	100%	100%	91%	91%	37%	27%	17%
LVU	0.138*	0.138*	0.159**	0.156**	0.369***	0.248*	0.049
	(1.78)	(1.79)	(2.17)	(2.16)	(3.24)	(1.86)	(0.30)
Liquidation Value – Mid		-0.114***		-0.135***	-0.073	0.071	-0.276***
		(-3.33)		(-3.21)	(-1.42)	(0.92)	(-2.73)
Observations	4,693	4,693	4,276	4,276	1,744	1,251	783
Adjusted R-squared	0.124	0.126	0.130	0.132	0.193	0.253	0.341
Other controls included	YES	YES	YES	YES	YES	YES	YES
Industry FE, Year FE, Credit rating FE	YES	YES	YES	YES	YES	YES	YES
Covenant type FE	YES	YES	YES	YES	NO	NO	NO

Table 6: Secondary Loan Trading – Pricing and CLO holdings

This table investigates the role of LVU on the pricing and investor holdings of loans in the secondary market. We regress the borrower's average loan price or average CLO holdings in the quarter on the borrowing firm's LVU, controlling for firm and CLO characteristics, as well as issuer's firm fixed effects, credit rating fixed effects, and year-quarter effects. In Columns (1) to (3), the dependent variable is the loan size weighted average price in the quarter, whereas in Columns (4) to (6), the dependent variable is the sum of outstanding loan balances of a borrower across all CLO managers during the quarter, scaled by the total assets from the prior quarter's financials. In Columns (1) and (4), we estimate the model on a full sample firm-quarters. In Columns (2) and (5) [(3) and (6)], we restrict the sample to observations with credit rating above [below] the median rating of B+. Robust t-statistics using standard errors clustered at the firm level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix B.

VARIABLES	(1) Price average (quarter)	(2) Price average (quarter)	(3) Price average (quarter)	(4) CLO holdings (quarter)	(5) CLO holdings (quarter)	(6) CLO holdings (quarter)
If subsample by credit rating:	ALL	HIGH	LOW	ALL	HIGH	LOW
LVU	-3.732*	-2.140	-6.819**	0.051*	0.034	0.120**
	(-1.67)	(-1.44)	(-2.12)	(1.70)	(0.95)	(2.59)
Size (log of sales)	-0.791	-0.004	-1.196	-0.027**	-0.026**	-0.030
	(-1.62)	(-0.01)	(-1.51)	(-2.32)	(-2.19)	(-1.34)
Leverage ratio	-4.251***	-4.603***	-2.536*	0.058**	0.066	0.050**
	(-3.72)	(-3.76)	(-1.77)	(2.24)	(1.10)	(2.02)
Tangibility ratio	-0.311	-1.506	0.216	0.178***	0.105**	0.259***
	(-0.21)	(-1.26)	(0.09)	(4.08)	(2.10)	(3.70)
Profitability ratio	6.093***	0.534	5.343**	0.036	0.039**	0.042
	(3.23)	(1.04)	(2.42)	(1.62)	(2.57)	(0.96)
Current ratio	-0.345	-0.138	-0.284	0.010	0.013	0.008
	(-1.64)	(-0.88)	(-0.98)	(1.14)	(1.17)	(0.97)
CLO holdings	1.408	-0.393	3.489			
	(0.82)	(-0.41)	(1.41)			
CLO N managers (log)	0.098	-0.244	0.529	0.076***	0.061***	0.095***
	(0.22)	(-1.17)	(0.73)	(7.51)	(4.71)	(5.50)
CLO mean remaining maturity (log)	-0.137	-0.976***	-0.440	-0.017**	-0.012	-0.005
	(-0.29)	(-2.66)	(-0.63)	(-2.14)	(-1.46)	(-0.33)
Liquidation Value – Mid	-0.840	0.259	1.722	-0.007	0.023	-0.027
	(-0.73)	(0.24)	(1.33)	(-0.47)	(0.78)	(-1.48)
Observations	5,947	2,957	2,927	5,947	2,957	2,927
Adjusted R-squared	0.685	0.741	0.751	0.770	0.741	0.802
Firm FE	YES	YES	YES	YES	YES	YES
Year-quarter FE	YES	YES	YES	YES	YES	YES
Credit rating FE	YES	YES	YES	YES	YES	YES

Table 7: Secondary Loan Trading – Liquidity

This table investigates the role of LVU on the secondary loan market's liquidity. We regress the trading of the borrowing firm's loans in a quarter on its LVU, controlling for firm and CLO characteristics, as well as issuer's firm and credit rating fixed effects, and year-quarter effects. In Columns (1) to (3) the dependent variable is the sum of CLO trading volume of a borrower's loans in a quarter, log-transformed. In Columns (4) to (6), the dependent variable is the number of trade transactions of a borrower's loans in a quarter, log-transformed. In Columns (7) to (9), the dependent variable is the ratio of days with at least one trade of a borrower's loan to the number of business trading days in a quarter. In Columns (1), (4), and (7), we estimate the model on a full sample firm-quarters. In Columns (2), (5) and (8) [(3), (6) and (9)], the sample is restricted to firm-quarters with credit rating above [below] the median rating of B+. Robust t-statistics using standard errors clustered at the firm level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix B.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Trade volume (log)			Number of trades (log)			Days with trades to Trading days		
Sample by credit rating:	ALL	HIGH	LOW	ALL	HIGH	LOW	ALL	HIGH	LOW
LVU	-0.412*	-0.174	-0.598**	-0.430**	-0.162	-0.534**	-0.047	-0.013	-0.071**
	(-1.79)	(-0.45)	(-2.19)	(-2.24)	(-0.46)	(-2.27)	(-1.46)	(-0.25)	(-2.16)
Liquidation Value – Mid	0.057	-0.085	0.117	0.091	0.020	0.131	0.012	0.025	0.020
	(0.54)	(-0.47)	(0.77)	(1.01)	(0.14)	(0.93)	(0.88)	(0.91)	(1.01)
Observations	6,341	3,087	3,195	6,341	3,087	3,195	6,341	3,087	3,195
Adjusted R-squared	0.514	0.515	0.532	0.538	0.535	0.561	0.592	0.624	0.616
Other controls included	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE, Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Credit rating FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 8: Secondary Loan Trading – Pricing of Distressed Loans

This table investigates the role of LVU on the pricing of distressed loans in the secondary market. We regress the borrowing firm's average loan price around a distress event on the its LVU, controlling for firm and CLO characteristics, contemporaneous equity returns, as well as issuer's 1-digit SIC industry fixed effects, and event year effects. The events include a borrower's bankruptcy, debt default, and downgrade to or below the CCC credit rating. In Panel A, the dependent variable is the loan size weighted average price in the thirty day window centered around the event date. In Column (2), we additionally control for the mid-point of liquidation value. The remaining Columns estimate the regression using samples with different distress events definitions: Column (3) [(4)] contains only a borrower's bankruptcy and debt default [credit rating downgrades to CCC or below]. In Column (5), we present a separate sample of any credit downgrades above the CCC rating. In Panel B, we regress the model using the same control variables as in Column (1) of Panel A, controlling for the past loan prices. We sequentially include and exclude as control variables the average loan price in the quarters prior to the distress event. In Panel C, we redefine the dependent variable to the difference between the average price in the thirty day window around the distress event and the average loan price in the quarters prior to it. Across all panels, the unit of observation is a firm-distress event. Robust t-statistics using standard errors clustered at the industry-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix B.

Panel A

VARIABLES	(1) Price average (distress)	(2) Price average (distress)	(3) Price average (distress)	(4) Price average (distress)	(5) Price average (distress)
Subsample:	Full	Full	Bankruptcies and Defaults	Downgrades to CCC	Other Downgrades
LVU	-44.888***	-40.760***	-37.885**	-41.922***	-4.011
	(-5.16)	(-4.43)	(-2.39)	(-3.91)	(-1.31)
Size (log of sales)	1.239	1.040	3.032	0.685	-0.009
	(1.09)	(0.87)	(1.12)	(0.57)	(-0.04)
Leverage ratio	-3.703	-6.205**	-6.631	-7.910**	-5.225***
	(-1.39)	(-2.04)	(-1.53)	(-2.29)	(-3.72)
Tangibility ratio	-1.802	-3.483	-21.730***	5.662	-0.231
	(-0.45)	(-0.85)	(-2.98)	(1.16)	(-0.15)
Profitability	8.252***	7.567***	6.775**	11.119**	6.557**
	(3.89)	(3.96)	(2.19)	(2.42)	(2.60)
Current ratio	1.556	1.182	1.295	1.300	0.851**
	(1.09)	(0.80)	(0.52)	(0.72)	(2.00)
I(Earnings Announcement)	-1.966	-2.409	-0.984	-5.234*	1.384**
	(-0.94)	(-1.15)	(-0.32)	(-1.81)	(2.44)
I(Bankruptcy)	3.171	3.934	3.061	-	
	(1.12)	(1.33)	(0.98)		
I(CCC)	1.507	1.587			
	(0.68)	(0.74)			
CLO holdings	0.979	1.267	10.659*	1.044	0.144***
	(1.18)	(1.48)	(1.71)	(1.04)	(3.33)
CLO N managers (log)	1.056	2.180	-4.093	3.292	0.807
	(0.47)	(0.90)	(-0.82)	(1.55)	(1.25)
CLO mean remaining maturity (log)	5.592**	4.927**	6.715*	5.531	-0.561
	(2.34)	(2.03)	(1.71)	(1.42)	(-0.80)

I(Missing equity returns)	-8.882***	-9.641***	-8.141**	-8.966**	0.320
	(-3.49)	(-3.75)	(-2.30)	(-2.47)	(0.53)
Equity returns (distress)	0.107**	0.107**	0.044	0.084	0.024
	(2.12)	(2.10)	(0.46)	(1.58)	(1.10)
Liquidation Value – Mid		-3.832	-6.656*	-4.936	-2.186**
		(-1.47)	(-1.83)	(-1.34)	(-2.02)
Observations	363	363	171	184	501
Adjusted R-squared	0.370	0.375	0.332	0.420	0.268
Industry FE, Year FE	YES	YES	YES	YES	YES

Panel B

VARIABLE	(1) Price average (distress)	(2) Price average (distress)	(3) Price average (distress)	(4) Price average (distress)
LVU	-13.086**	-18.943**	-39.329***	-44.980***
	(-2.17)	(-2.10)	(-4.46)	(-5.92)
Price average (-90 -15)	0.978***			
	(29.41)			
Price average (-180 -90)		0.727***		
		(8.78)		
Price average (-270 -180)			0.370***	
			(2.88)	
Price average (-360 -270)				0.288***
				(2.91)
Observations	339	320	293	279
Adjusted R-squared	0.824	0.573	0.420	0.412
Other controls included	YES	YES	YES	YES
Industry FE, Year FE	YES	YES	YES	YES

Panel C

VARIABLES	(1) Price change (distress vs -90 -15)	(2) Price change (distress vs -180 -90)	(3) Price change (distress vs -270 -180)	(4) Price change (distress vs -360 -270)
LVU	-11.748**	-11.346	-27.807***	-31.431***
	(-2.22)	(-1.21)	(-2.73)	(-3.11)
Observations	339	320	293	279
Adjusted R-squared	0.150	0.121	0.151	0.253
Other controls included	YES	YES	YES	YES
Industry FE, Year FE	YES	YES	YES	YES

Table 9: Secondary Loan Trading – CLO Holdings of Distressed Debt

This table investigates the role of LVU on the CLO holdings of distressed loans in the secondary market. We regress the average CLO holdings of a borrower's loans prior to a distress event on the borrowing firm's LVU, controlling for firm and CLO characteristics, contemporaneous equity returns, as well as issuer's 1-digit SIC industry fixed effects, and event year effects. The events include a borrower's bankruptcy, debt default, and downgrade to or below the CCC credit rating. The dependent variable in Column (1) is the average level of CLO holdings a borrower's loans in the month immediately before the event date, scaled by the borrower's total assets. In Columns (2) to (5), the dependent variable is the average level of CLO holdings of a borrower's loans by quarters before the event date, starting from immediately before ("Q-1") to four quarters prior to the event date ("Q-4"), scaled by the borrower's total assets. In Columns (6) to (9), the dependent variable is the ratio of the average CLO holdings of a borrower's loans at the month-end prior to the event date to the average CLO holdings of a borrower's loans in the one to four quarters before the event date, respectively. The unit of observation is a firm-distress event. Robust t-statistics using standard errors clustered at the industry-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix B.

VARIABLES	(1) CLO holdings (before distress)	(2) CLO holdings (Q-1)	(3) CLO holdings (Q-2)	(4) CLO holdings (Q-3)	(5) CLO holdings (Q-4)	(6) Ratio of CLO holdings before distress to Q-1 (1) / (2)	(7) Ratio of CLO holdings before distress to Q-2 (1) / (3)	(8) Ratio of CLO holdings before distress to Q-3 (1) / (4)	(9) Ratio of CLO holdings before distress to Q-4 (1) / (5)
LVU	-1.133*	-1.104*	-1.070*	-1.057*	-0.961*	-0.614***	-0.274	0.007	-0.010
	(-1.86)	(-1.83)	(-1.92)	(-1.90)	(-1.84)	(-2.86)	(-0.42)	(0.01)	(-0.01)
Size (log of sales)	-0.308***	-0.322***	-0.316***	-0.309***	-0.292***	0.021	0.106	0.145	0.174
	(-3.48)	(-3.61)	(-3.73)	(-3.72)	(-3.86)	(0.97)	(1.48)	(1.43)	(1.24)
Leverage ratio	0.122	0.143	0.124	0.111	0.106	-0.074	0.094	0.012	-0.248
	(1.08)	(1.26)	(1.15)	(1.03)	(1.07)	(-1.02)	(0.74)	(0.08)	(-1.27)
Tangibility ratio	0.846***	0.840***	0.863***	0.861***	0.832***	0.195**	0.175	0.324	0.733
	(3.01)	(3.00)	(3.24)	(3.29)	(3.41)	(2.10)	(0.83)	(1.28)	(1.37)
Profitability ratio	0.022	0.014	0.003	0.055	0.058	-0.005	-0.075	-0.114	-0.073
	(0.23)	(0.14)	(0.03)	(0.78)	(0.90)	(-0.13)	(-0.88)	(-0.91)	(-0.43)
Current ratio	-0.087*	-0.087*	-0.089*	-0.082*	-0.077*	0.038	0.124**	0.103	0.080
	(-1.74)	(-1.76)	(-1.83)	(-1.73)	(-1.73)	(1.40)	(2.27)	(1.60)	(1.01)
I(Bankruptcy)	-0.040	-0.020	-0.004	0.011	-0.004	-0.102**	-0.256**	-0.320**	-0.251
	(-0.62)	(-0.31)	(-0.07)	(0.21)	(-0.08)	(-2.24)	(-2.38)	(-2.20)	(-0.97)

I(CCC)	0.069	0.094	0.094	0.085	0.076	0.054	0.079	0.154	0.294*
	(0.84)	(1.15)	(1.23)	(1.15)	(1.08)	(0.94)	(0.75)	(1.02)	(1.87)
CLO N managers (log)	0.392***	0.405***	0.420***	0.426***	0.403***	0.001	-0.185	-0.139	-0.104
	(3.78)	(3.85)	(3.87)	(3.98)	(4.17)	(0.02)	(-1.22)	(-0.90)	(-0.46)
CLO mean remaining maturity (log)	0.134	0.126	0.122	0.127	0.120	0.113***	0.360***	0.135	-0.128
	(1.46)	(1.39)	(1.42)	(1.47)	(1.43)	(2.70)	(4.61)	(0.75)	(-0.53)
I(Missing equity returns)	-0.055	-0.043	-0.016	-0.010	-0.009	0.056	0.090	0.087	0.129
	(-0.51)	(-0.40)	(-0.15)	(-0.10)	(-0.09)	(0.92)	(0.84)	(0.64)	(0.66)
Equity returns (distress)	0.003*	0.002	0.002	0.002	0.002*	-0.001	-0.003	-0.003	0.001
	(1.92)	(1.58)	(1.58)	(1.49)	(1.72)	(-1.02)	(-1.33)	(-1.17)	(0.20)
Liquidation Value – Mid	0.319**	0.300*	0.295**	0.325**	0.301**	0.041	0.132	0.066	0.001
	(2.08)	(1.98)	(2.04)	(2.25)	(2.24)	(0.57)	(1.07)	(0.44)	(0.00)
Observations	355	349	344	335	329	349	344	335	329
Adjusted R-squared	0.289	0.295	0.316	0.328	0.335	0.184	0.224	0.350	0.371
Industry FE, Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES