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Secured Credit Spreads

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ABSTRACT

Lenders are unwilling to accept lower credit spreads for secured debt relative to unsecured debt when a firm is healthy. However, they accept significantly lower credit spreads for secured debt when a firm's credit quality deteriorates, the economy slows, or average credit spreads widen. This contingent valuation of collateral or security, coupled with the borrower perceiving a loss of operational and financial flexibility when issuing secured debt, may explain why firms issue secured debt on a contingent basis; they issue more when their credit quality deteriorates, the economy slows, and average credit spreads widen.

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A vast theoretical and empirical literature in corporate finance and law focuses on the role that collateral plays in corporate lending.[1] But is collateral at all valuable to creditors in corporate lending? If so, under what circumstances is it especially valued? Can this account in part for patterns of collateral use documented in Bradley and Roberts (2015), Benmelech, Kumar, and Rajan (2020), and Rauh and Sufi (2010)?

At one level, it is clear why collateral should be important for lenders: it consists of hard assets that are not subject to asymmetric valuations in markets and that the borrower cannot alter easily. Collateral gives comfort to a lender that, even if the lender does little to monitor the borrower's activity and the borrower's cash flows prove inadequate to service the debt, the lender's claim is protected by underlying value. In particular, the creditor's ability to seize and sell collateral when a borrower defaults on a promised payment allows the lender to realize repayment, at least in part. And at the corporate level, all else being equal, firms that pledge collateral find it easier not only to obtain credit but to obtain it at a reduced interest rate (Benmelech and Bergman (2009)).

Yet even if assets are important to lending, why does debt need to be secured by them? After all, in a bankruptcy filing the firm's assets will all be there to support the lender's claim. Why protect the lender further through claims on specific collateral? This question assumes importance following the finding in Benmelech, Kumar, and Rajan (2020) that the issuance of secured public debt declined steadily in the United States over the twentieth century. They argue that collateral has become less important for enforcing creditor rights in the normal course and suggest that developments in accounting, contract law, and bankruptcy law may explain these changes. In particular, when lenders had little institutional protection against borrower malfeasance – such as a borrower diverting cash flows, giving new lenders priority or security, or selling assets from under lenders – they obtained collateral against specific assets to assure themselves that their claim would be honored. However, as the U.S. financial infrastructure developed, the infrastructure itself protected lenders from borrower malfeasance in the normal course. Better-quality accounting backed by laws penalizing accounting fraud, negative pledge clauses whereby firms promised not to give new lenders collateral without securing existing lenders, and a broad respect for enforcing the absolute priority of claims in bankruptcy court may all have reduced the value of collateral to lenders.

[1] Aghion and Bolton (1992), Bolton and Scharfstein (1996), Boot, Thakor, and Udell (1991), Hart and Moore (1994, 1998), Hart (1995), Jackson and Kronman (1979), Stulz and Johnson (1985), and Williamson (1985).

Benmelech, Kumar, and Rajan (2020) find that firms have not stopped issuing secured debt entirely. Instead, they find that firms tend to issue more secured debt when their credit quality is low or at times when average credit spreads across firms are higher or economic growth is slower.[2] These are times when firms may find access to credit more difficult, creditors may fear greater stockholder-debtholder conflicts (as in Jensen and Meckling (1976), Myers (1984), and Smith and Warner (1979)), and borrowers may need to collateralize debt issuances in order to regain access to funding (see Stulz and Johnson (1985)). Moreover, with new lenders unwilling to lend without the comfort of collateral, existing lenders might rush to secure their claims so as not to be diluted. Indeed, Benmelech, Kumar, and Rajan (2020) and Donaldson, Gromb, and Piacentino (2019) argue that negative pledge clauses (whereby the borrower commits to a lender that it will not issue secured debt to any other lender, failing which the debt payment will be accelerated) allow creditors to large companies to stay unsecured until they sense a greater likelihood of borrower distress, at which point they will move to secure their claims. Rauh and Sufi (2010) show that firms tend to have fewer negative pledge clauses in their bond indentures as they approach distress, opening the way for the issuance of secured credit.

If collateral matters to creditors for the enforcement of debt claims, even in the case of large, mature companies but in a more contingent way, we should see it reflected in the pricing of secured claims vis-à-vis unsecured claims, especially in how that pricing moves with the state of the firm and the economy. Security should be of little value to lenders when a firm is far from distress or the economy is healthy, and it should become much more valuable (and hence secured debt should promise lower interest rates than unsecured debt) as a firm nears distress or the economy deteriorates.

The difficulty in identifying the effects of security on debt pricing derives from the circumstances under which it is offered. Since riskier firms will offer security at riskier times, a comparison of rates offered by secured debt issuances against rates offered by unsecured debt issuances across firms, or by the same firm over time, will tend to be biased toward suggesting higher rates for secured debt issuances (Berger and Udell (1990, 1995), John, Lynch, and Puri

[2] For prior evidence that firms issue collateral when distressed, see, for example, Badoer, Dudley, and James (2020) Colla, Ippolito, and Li (2013), Nini, Smith, and Sufi (2012), and Rauh and Sufi (2010).

(2003)). With notable exceptions (see, in particular, Luck and Santos (2019) and Schwert (forthcoming)), there is little research on this because of the paucity of data.[3]

In this paper, we use three different data sets, and four variations of the same identification strategy, to get at the true pricing of secured debt, stripped as best as possible of the selection bias. The selection problem with secured debt is that creditors will demand collateral from those borrowers who are risky – especially during times in which they become even riskier. For ceteris to remain paribus, we must look at the pricing of secured debt versus unsecured debt issued by the same firm at a specific point in time. Our identification strategy compares spreads on secured and unsecured credit of the *same firm* and at the *same point in time*. This is also the strategy followed by Luck and Santos (2019) and Schwert (forthcoming).

We implement these strategies using three data sets. First, we use the Thompson Reuters DealScan database, which contains detailed information about bank loans made to U.S. and foreign corporations. Multiple loan facilities are often part of a single deal (or package) governed by a master loan agreement, and some of these facilities may be secured while others are unsecured. We examine the spread difference between secured and unsecured debt within the same package to get a sense of the spread associated with security alone.

Second, we use the Mergent Fixed Income Securities Database (FISD), containing over 140,000 bond issuances, to examine the difference in spreads between secured and unsecured bonds issued by the same firm in the same quarter. Third, we also know a firm's S&P rating, as well as the rating of its secured and unsecured bond issuances. Once again, we can examine the rating spread between each bond and the firm rating and the difference in rating spread between secured and unsecured bond at issuance.

Fourth, we use secondary bond trades from the Trade Reporting and Compliance Engine (TRACE) database.[4] TRACE reports dates, implied yields, and prices at which bonds trade. We examine the differences in implied spreads between a firm's secured and unsecured bonds, as reflected in secondary market trades, at a point in time. This methodology allows us some relief

[3] Strahan (1999) shows that non-price terms of loans are systematically related to pricing; secured loans carry higher interest rates than unsecured loans, even after controlling for publicly available measures of risk, suggesting that there is an important selection problem. Benmelech and Bergman (2009) overcome the problem of selection in secured debt yields by analyzing the intensive, rather than the extensive, margin of collateral, using underlying collateral liquidity to estimate its effect on the cost of debt. Booth and Booth (2006) use a two-step procedure to account for selection and find that secured bonds have predicted spreads substantially lower than if they had been made on an unsecured basis.

[4] TRACE was introduced in July 2002.

from the requirement that both kinds of debt should be issued by the firm close together, which enables us to value security using a larger sample of bonds.

We conclude from all these ways of obtaining the value of security that the selection bias is important, and correcting for it suggests that security is valuable to creditors – creditors typically require a lower spread when their claim is secured. Most important, however, we show that creditors value security differently for different firms and at different times.

For highly rated firms, creditors pay almost nothing for the added protection afforded by security, whereas for low-rated firms, they pay a lot. Yields on bonds issued by investment grade firms (those with an S&P rating of BBB− or better) are 20 basis points lower when secured, whereas this yield differential (unsecured versus secured) jumps to 112 basis points for a firm having a non-investment grade rating. Similarly, implied yields from bond trades in secondary market suggest that investors are willing to give up almost 161 basis points in spread for the added protection of security for non-investment grade issuers, whereas they are not willing to reduce spread at all for the added protection of security in the case of investment grade issuers.

Equally important, as a firm's credit quality deteriorates, we see the valuation of secured claims improve relative to unsecured claims, suggesting that security becomes more valuable. Conditional on credit rating transitions for a given firm, we find that a transition from a broad rating category of A to a broad rating category of BBB does not economically or statistically change the yield differential between an unsecured and a secured debt (holding firm and other bond characteristics fixed). The same is true for issuer rating transitions from BBB to BB. However, a transition from a broad rating category of BB to a broad rating category of B results in a decline of an additional 117 basis points in the spread on secured bonds relative to the spread on unsecured bonds. Similarly, as firms move from a B rating to a CCC rating, the spread on secured bonds falls by an *additional* 338 basis points relative to the spread on unsecured bonds, highlighting the contingent valuation of security. [5]

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[5] What should the appropriate reduction in spread for collateralization be? Consider the following back of the envelope calculation: Assume the additional loss given default for an unsecured bond versus a secured bond is 50 percent and does not vary with initial rating (Moodys (2006a)). The five-year cumulative default probability for a Baa/BBB bond is around 2 percent, Ba/BB is 10 percent, and B is 29 percent (Moodys (2006b)). So a fall from BBB to BB implies a lower expected loss of 4 percentage points over 5 years for secured debt relative to unsecured debt, implying a relative annualized spread decrease of 80 basis points. Similarly, a fall from BB to B implies a relative annualized spread decrease of 190 basis points. The estimated effects of security on spread as a firm transitions between ratings therefore are smaller than these back of the envelope calculations.

We also find that secured spreads decline relative to unsecured spreads as the economy's health – as reflected in GDP growth or the economywide Baa–Aaa spread – deteriorates. A one standard deviation increase (reduction) in Baa–Aaa spread (GDP growth) reduces the spread on a secured loan facility by an additional 28 (17) basis points relative to the spread on an unsecured loan facility. Similarly, a one standard deviation increase (reduction) in Baa–Aaa spread (GDP growth) reduces the spread on secured bonds by an additional 13 (3) basis points relative to the spread on unsecured bonds. So creditors value security more in situations of systemic economic or financial stress.

Finally, turning to rating spreads, we find that there is a constant approximately one-notch improvement in rating for secured debt versus unsecured debt issued by the same firm, relative to the firm's ratings. Interestingly, this does not vary across firm rating categories, suggesting that this might be a rule of thumb norm used by the rating agencies. It does vary over the business cycle, though, with secured debt seeing an additional quarter-notch higher rating vis-à-vis unsecured debt in downturns.

The upshot is that collateral does not seem to matter for debt enforcement in normal times for a healthy firm, since debt linked to specific assets do not seem to enjoy better prices. Indeed, given the negligible pricing benefit, firms may want to avoid any loss in financial slack and operational flexibility at such times by not issuing secured debt (as documented by Benmelech, Kumar, and Rajan (2020)).[6] However, in tougher times, creditors do seem to value security, and firms do issue secured debt, either because creditors demand it or because of the better pricing.

It is important to note that even if security was valuable to lenders only in establishing priority in distress, lenders might still want it in normal times if it were hard to obtain as the firm descends into distress. That they do not take security in normal times must reflect in part their belief that collateral will be available when needed. Financial infrastructure such as negative pledge clauses, bond trustees, and active courts may be essential to ensure that collateral has not been promised away when existing lenders demand it (see Donaldson, Gromb, and Piacentino (2019)). Of course, this also suggests that assets do continue to play a role in debt enforcement –

[6] On the value of financial flexibility, see Acharya, Almeida, and Campello (2007), Bjerre (1999), Li, Whited, and Wu (2016), Mello and Ruckes (2017), Myers and Majluf (1984), Rampini and Viswanathan (2010, 2013), and Schwarz (1997). Of course, any cost to the borrower of issuing collateralized debt – including the transactions costs of perfecting collateral – could explain why the small pricing benefit is swamped in normal times. However, staying unsecured could also entail transactions costs, such as the costs of monitoring negative pledge clauses. This is why Benmelech, Kumar, and Rajan (2020) appeal to more significant costs to explain the phenomenon.

however, with improvements in financial infrastructure in the United States, it may be a contingent rather than continuous role in the case of large, mature firms. In contrast, in countries where financial infrastructure is less developed, it may play a more continuous role (see, for example, Lian and Ma's (2019) evidence on Japan).

We are obviously not the first to note that collateral is more important in distressed situations. A large literature explores the use of covenants in debt contracts and how they vary with the state of the firm and the cycle (see, e.g., Begley (1994), Bradley and Roberts (2015), and Malitz (1986)). In particular, Bradley and Roberts (2015) use DealScan data to examine the timing and pricing of covenants, including security. Although their method of correcting for selection is different, they find as we do that covenants are priced by lenders and are more likely to be used in business cycle troughs. Our contribution is to focus on collateral, use a more direct method of correcting for selection bias, and show that collateral is also priced in public debt issuances and that the pricing varies with firm quality and over the business cycle. Finally, our paper's methodology is closely related to Luck and Santos (2019), who use a comprehensive sample of loans by large banks to get at the pricing of collateral.[7] Although our conclusion that collateral is priced for riskier firms is similar to theirs, we also establish this for larger firms using bond data. Furthermore, we examine the evolution of pricing both over time for a firm and over the business cycle. Similarly, Schwert (forthcoming) investigates the relative pricing of bank loans relative to bonds using a similar approach with bonds and loans matched at the firm-level.

The paper is organized as follows. Section I outlines our identification strategy and describes the data sets used. Section II discusses baseline estimates of the effects of secured debt on credit spreads. Section III analyzes how the secured credit spread varies with a firm's credit quality. Section IV examines the behavior of the secured credit spread over the business cycle and discusses potential macro implications of the findings. Section V concludes.

I. Data and Empirical Strategy

A. Identification Strategy

The difficulty in identifying the effects of security on debt pricing derives from the circumstances under which it is offered. The selection effect, in which riskier firms will offer security at riskier times, makes it difficult to analyze the impact of security in credit spreads.

Indeed, in a comparison of rates offered by secured debt issuances against rates offered by unsecured debt issuances across firms, a number of studies have found a positive relation between security and credit spreads (Berger and Udell (1990, 1995), Strahan (1999), John, Lynch, and Puri (2003)).

Given that creditors will demand collateral from risky borrowers – especially during times in which they become even riskier – we exploit within firm-time variation in issuance of secured versus unsecured debt. Our identification strategy compares spreads on secured and unsecured credit of the *same firm* and at the *same point in time*. We facilitate this strategy by including three time-varying firm effects depending on the dataset: firm × year, firm × year × quarter, and firm × year × month fixed effects. To ensure that our results are not driven by other characteristics that might vary systematically between secured and unsecured debt, we control for such debt characteristics as seniority, maturity, loan amount, presence of covenants, and callability. We estimate the following regression specification:

$$spread_{i,j,t} = \beta * secured_{i,j,t} + \theta X_{i,j,t} + \delta_{j,t} + \varepsilon_{i,j,t}, \quad (1)$$

where $spread_{i,j,t}$ is the spread for debt i of firm j at time t. The variable $secured_{i,j,t}$ is a dummy that equals one if debt i is secured, and zero otherwise. The variable $X_{i,j,t}$ controls for debt characteristics, while $\delta_{j,t}$ represents firm × time fixed effects. We use three main data sets to estimate regression (1): DealScan, Mergent, and TRACE. We draw on supplementary sources to complement our analysis.

B. DealScan Loan Data

We obtain information on corporate loans from the Thompson Reuters DealScan database, which contains detailed information about bank loans made to U.S. and foreign corporations, with coverage starting in the mid-1980s. Because DealScan coverage is limited and information on contract characteristics is sporadic before 1994, we restrict our analysis to the 1994 to 2018 time period.[8] The basic unit of observation in DealScan is a loan facility. Multiple loan facilities are often part of a single deal (or package) governed by a master loan agreement.[9] The data contain

[8] Chava and Roberts (2008) also restrict their analysis to the time period beginning 1994.
[9] Sufi (2007) mentions "… the actual syndicated loan contract is drafted at the deal level, and covenants and all lenders are listed together on this contract, even if a lender loans only on one tranche. While the maturity and pricing of the loan tranches can vary within a syndicated loan deal, there is one contract, and all lenders are chosen on the tranches collectively, not independently".

information on the different attributes of a loan facility, such as amount, promised yield, maturity, security, and seniority. What is important here is that the same loan package may contain both a secured facility and an unsecured facility. We augment the DealScan data with S&P credit ratings for the borrowing firm from Capital IQ.

We apply three filters to the DealScan data. First, we restrict our analysis to dollar-denominated loans granted to nonfinancial U.S. firms.[10] Second, since we focus on measuring the cost of secured debt, we require the all-in-drawn spread and secured status for loans to be available. Finally, given that our identification strategy for the DealScan data relies on within-package variation, we exclude loan facilities originated more than a month after the first facility in a package is originated.[11] Our final data set contains 50,614 facilities from 32,420 loan packages. Panel A of Table I provides summary statistics on key variables from DealScan used in our analysis. Spread is measured as the promised yield minus the maturity-matched LIBOR at issuance. The mean (median) spread in our sample is 285 (255) basis points. About 85% of facilities are secured, and the mean (median) maturity of a loan facility is 3.9 (4.1) years. A negligible number of facilities (55 of 50,614) are subordinated or junior loans. Covenant is a dummy that equals one if the loan contract contains one or more financial covenants, and zero otherwise. One or more financial covenants were contained in 53% of loan facilities.

C. Mergent Bond Data

We obtain information on bond issuances from the Mergent Fixed Income Securities Database – a comprehensive database of publicly offered U.S. bonds. The FISD contains detailed information on more than 140,000 debt securities. Although the Mergent data set also includes bonds issued before the 1960s, its more comprehensive coverage starts around 1960.[12] Mergent uses seven broad categories to classify the security level of bonds: (i) junior, (ii) junior subordinate, (iii) senior, (iv) senior subordinate, (v) subordinate, (vi) senior secured, and (vii) none. We classify bonds as secured if Mergent assigns them to the senior secured category. We supplement Mergent's classification of secured bonds with a textual analysis of bond names, searching for the following strings: "EQUIP," "MTG," "BACKED," "COLL," and "1[st.]"

[10] We drop financial firms (SIC codes 6000–6999) and government agencies (SIC codes 9000–9999).
[11] This ensures that issuing firm's fundamentals do not change between the issuance of multiple facilities. The results are not sensitive to this restriction as only a small percentage of facilities are originated with significant delay.
[12] See Benmelech, Kumar and Rajan (2020).

We omit bonds issued by financial firms and government agencies. We drop convertible bonds and bonds with floating rates. We further require the offer-yield at issuance and maturity to be present. Spread is calculated as the yield spread at issuance over maturity-matched treasury. We drop bonds with maturity greater than 30 years because we cannot match them with similar-maturity treasury securities. This results in a sample of 30,041 individual bond offerings from 1980 to 2018. Panel B of Table I provides summary statistics on key variables from Mergent used in our analysis. The mean (median) spread in our sample is 208 (124) basis points. About 15% of bonds are secured, and the mean (median) maturity of a bond is 11 (10) years. A bond is classified as senior if Mergent assigns it to the senior or senior secured categories. Of the bonds, 91% are senior, including the secured bonds, 67% are callable, and 40% have one or more covenants protecting bondholder interest. Non-IG is a dummy that takes the value of one if the issuing firm had a non-investment grade rating (BB+ or worse) from S&P at the time of bond issuance. We have issuer rating information for 11,444 bond issues. At the time of issuance, 25% had a non-investment grade issuer rating. Rating difference is the numerical difference between the issue (bond) rating and issuer (firm) rating at the time of bond issuance. For this calculation, AAA rating is assigned a numerical value of 1, AA+ is assigned a value of 2, and so on, down to the lowest category, D, which is assigned a value of 22.

D. TRACE Data

We supplement the issuance data with information on secondary bond trades from the TRACE database.[13] TRACE reports dates, implied yields, and prices at which bonds trade. We follow Bessembinder, Kahle, Maxwell, and Xu (2009) and Dick-Nielsen (2009) in cleaning the data. In particular, we exclude trades that are canceled or corrected, and we discard all but one transaction when multiple similar trades occur very closely in time. For a given bond, we calculate trade-volume weighted implied yield at the daily frequency using all transactions for the bond taking place each day. We augment the data with information on bond characteristics (security, seniority, and so on) from Mergent. Our cleaned and merged TRACE data set contains 3,675,393 observations at the bond-date level. Panel C of Table I provides summary statistics on key variables from TRACE used in our analysis. Spread is calculated as the difference between implied yield from secondary trade prices and the yield on maturity-matched treasury. The mean (median) spread in our sample is 212 (142) basis points. Around 8% of observations are for secured bonds,

[13] TRACE was introduced July 2002.

and the mean (median) remaining maturity of a bond at the time of trade is 8.9 (6) years. A bond is classified as senior if Mergent assigns it to either the senior or senior secured categories. Senior bonds comprise 99% of observations, while 93% of observations are for bonds that are callable and 90% are of bonds that have one or more covenants protecting bondholder interest. Non-IG is a dummy that takes the value of one if the issuing firm had a non-investment grade rating (BB+ or worse) from S&P at the time of secondary trade. We have issuer rating information for 2,446,851 observations. Of these, 15% are for bonds that had non-investment grade issuer rating at the time of secondary trade.

II. Secured Debt Spread

We analyze the three data sets in turn: (i) DealScan, to estimate the effect of security on credit spreads of bank loans; (ii) Mergent, to examine the credit spreads of secured corporate bonds at the time of issuance; and (iii) TRACE, to study the effect of security on credit spreads in the secondary bond market.

A. DealScan Bank Loans

We begin our analysis by demonstrating the difficulty in empirically estimating the effect of security on credit spreads. Figure 1 displays the median spread over LIBOR at origination for secured and unsecured loans by year of origination.[14] As Figure 1 demonstrates, the credit spread of secured loans are between 150 and 200 basis points higher than those of unsecured loans, with the secured-unsecured spread declining during the Great Recession. As we have just argued, the observed higher credit spread of secured debt is driven by selection across and within firms, which we address next in our empirical analysis.

In column (1) of Table II, we report the results from estimating Regression (1) using the DealScan loan data. The regression includes year × month fixed effects to control for time-varying effects, and facility-type fixed effects to control for differences across loan facility types.[15] Starting with the main variable of interest, the coefficient on *Secured* suggests that the credit spread on

[14] In addition to the all-in-drawn-spread used in this paper to measure cost of borrowing, bank loan contracts can contain one or more fees. Berg, Saunders, and Steffen (2016) argue that fees are compensation to lenders for providing valuable drawdown options to borrowers, which are typically exercised when firm quality deteriorates. Banks should arguably demand a larger fee for this option when a firm draws down on an unsecured basis. Consequently, ours is a conservative estimate of the pricing benefit of offering security.

[15] Dealscan broadly groups facilities into credit lines, bank term loans, institutional term loans, and others.

secured loans is higher by 100 basis points compared to an unsecured loan. The positive coefficient on the secured dummy illustrates the selection problem of secured debt: creditors will demand collateral precisely from those borrowers who are riskier (Benmelech and Bergman (2009) and Strahan (1999)). The addition of firm fixed effects in column (2) does reduce the coefficient from 100.8 to 57.9, suggesting that some of the selection problem is indeed cross-sectional in nature and driven potentially by differences in risk across firms. However, though the coefficient on *Secured* is smaller when firm fixed effects are added to the regression, it is still positive and statistically significant, suggesting that there is also within-firm selection in the timing of secured debt issuance. Indeed, borrowers are likely to be more inclined to issue collateralized debt, or equivalently, lenders are more likely to demand collateral, when the borrower is experiencing difficult circumstances such as financial distress.

We address the joint selection problem – that the firms that issue collateralized debt are possibly riskier and that they also issue collateral under adverse financial circumstances – by estimating the differential effect of security on loan spread including firm × year fixed effects. The inclusion of firm × year in addition to year × month fixed effects enables us to compare loan facilities issued by the *same* firm *within* a year, correcting for overall conditions in the month of issuance. In total, there are 938 observations where the same firm obtained at least one secured and one unsecured loan facility in the same year. Indeed, as column (3) of Table II shows, once we include firm × year fixed effects, the coefficient on *Secured* is negative and statistically significant. The point estimate suggests that the credit spread on secured loans is, on average, 40.6 basis points lower than that on unsecured loans controlling for loan characteristics.

In column (4) we estimate our most exhaustive specification that includes package fixed effects. Here, we essentially compare spreads on secured and unsecured loan facilities that are part of the same loan deal and governed by the same master loan contract. In total, there are 285 observations where the same loan package contains at least one secured and one unsecured loan facility. This specification provides two additional benefits compared to the earlier specifications. First, we are able to control for unobservable loan contract terms such as tightness of covenants that govern all facilities of a given deal but can vary across deals for the same firm and hence are not controlled for in column (3). Second, since the price of all facilities of the loan are negotiated and finalized at almost same time, we ensure that spread difference across facilities is not driven by changing firm quality.[16] Similar to the results in column (3), the coefficient on *Secured* is negative and statistically significant. The point estimate on the secured dummy suggests that the spread on a secured loan is 72 basis points lower compared to unsecured loans within the same credit facility. The fact that the secured spread is larger (in absolute value) in this specification compared to column (3) suggests that even within a firm-year, there is selection in the timing of secured debt issuance.

Turning to the other explanatory variables in column (4), the coefficient on *Senior* suggests that the credit spread on senior loans is lower by 150 basis points compared to the spread on (the very few) junior or subordinated loans. Note that for a senior secured loan, both *Secured* and *Senior* dummies equal one, implying that the spread on a senior secured loan is 222 basis points lower than that on a junior unsecured loan. The coefficient on *Maturity* suggests that a one standard deviation increase in a loan facility's maturity increases the spread by 19 basis points. Notice that the sign on this coefficient is negative in columns (1) and (2), which is probably also due to selection, as better borrowers are likely to be able to borrow for longer maturities, while a deterioration in borrower health is likely to shorten maturities (Helwege and Turner (1999)). Consistent with this intuition, the sign of this coefficient changes from negative to positive once we control for time-varying firm characteristics in columns (3) and (4), which is consistent with lenders perceiving greater risk in lending for a longer term to a borrower. Finally, the coefficient on *Amount* suggests that doubling the loan amount reduces the spread by 7 basis points.

B. Mergent Bond Issuance

Next, we estimate the secured credit spread of corporate bonds at origination. Unlike bank loans, which are an important source of credit for younger firms, corporate bonds are typically issued by more established firms with a longer credit history (Diamond (1991)). Kashyap, Stein, and Wilcox (1993) and Becker and Ivashina (2014) show that firms that have access to both bank loans and public debt markets switch from loans to bonds when there is a contraction in bank-credit supply. Hence, our examination of secured credit spread in the corporate bond market should complement our analysis of secured credit spread in bank loans. Moreover, the Mergent sample

[16] We require all facilities of a package to have been originated within a one-month time period. If we do not impose this restriction, there would be 301 observations (as against 285) where the same loan package contains at least one secured and one unsecured loan facility.

goes back to 1980, compared to the DealScan sample, which begins in 1994. It thus enables us to study the evolution of secured credit spreads over a longer time-series.

In Figure 2, we plot the median spread at issuance of bonds over maturity-matched treasury from 1980 to 2018. As Figure 2 demonstrates, and similar to what we document in Figure 1 for syndicated loans, the credit spread of secured bonds is, on average, 35 basis points higher than that of unsecured bonds. The secured-unsecured difference widens during times of economic contraction, such as during the NBER defined recessions of 1981 to 1982 (80 basis points), 2001 (57 basis points), and the Great Recession of 2008 to 2009 (136 basis points). As we argue above, the observed higher credit spread of secured debt is driven by selection both *across* firms and *within* a firm: we now turn to empirically analyze the secured debt spread in the bond market.

We estimate regressions based on Equation (1) using the bond maturity-matched credit spread as a dependent variable and report the results in Table III. There are 30,041 individual bond offerings from 1980 to 2018 in our sample. The regression in column (1) includes year × month fixed effects to control for time-varying effects, as well as bond characteristics such as seniority, maturity, callability, the amount issued, and whether covenants are attached to the bond.

Similar to column (1) of Table II, the coefficient on *Secured* in column (1) of Table III is positive and statistically significant suggesting that the credit spread on secured bonds is higher by 60 basis points compared to an unsecured loan. Again, as in Table II, adding firm fixed effects slightly reduces the coefficient, but the positive and significant coefficient still remains (column (2)). As before, our identification strategy hinges on the inclusion of firm × year fixed effects, which enables us to compare secured and unsecured bonds issued by the *same* firm *within* a year. Column (3) of Table III confirms our empirical strategy: once we include firm × year fixed effects, the point estimate on *Secured* suggests that the credit spread on secured bonds is, on average, 35.2 basis points lower than that on unsecured bonds and similar in magnitude to the 40.6 basis points spread we found for DealScan loans (column (3) of Table II).

While there are more than 30,000 individual bond offerings in the data, we achieve identification from a much smaller subset of the sample: the 706 observations in which the same firm issued at least one secured and one unsecured bond in the same year. In robustness tests reported in Appendix Table A.I we use an even tighter set of firm × year × quarter (instead of firm × year) fixed effects and find that the credit spread of secured bonds is 48.6 basis points lower than unsecured bonds. However, the number of observations with both secured and unsecured bonds issued by the same firm within the same year-quarter declines to 284.

The coefficient on *Senior* in column (1) suggests that the credit spread on senior bonds is lower by 104 basis points compared to the spread on junior bonds. Once again, there seems to be selection in this estimate. Higher credit-quality firms issue senior unsecured bonds, so when we include firm fixed effects in column (2), the magnitude of the *Senior* coefficient estimate falls to almost a third of its earlier estimated magnitude. The addition of firm × year fixed effects does not change this, suggesting that while higher credit-quality firms issue senior unsecured bonds, this issuance is not strongly correlated with changes in firm quality over time.

The coefficient on *Maturity* in column (1) suggests that a one standard deviation increase in a bond's maturity reduces the spread by 34 basis points. However, the sign as well as the magnitude of this coefficient changes once we control for time-varying firm characteristics in column (3), once again indicating that firms have to pay for pushing out the maturity of their debt and thus obtaining insurance against illiquidity. The coefficient on *Maturity* in column (3) implies that a one standard deviation increase in a bond's maturity increases the spread by 16 basis points. The magnitude of the coefficient is much smaller than in Table II, column (4). The coefficient on *Callable* in column (1) suggests that callable bonds have spreads that are 79 basis points higher than noncallable bonds, but there is selection again here. In column (3), the coefficient is small and statistically indistinguishable from zero. Similarly, with the presence of covenants in the bond contract, the coefficient in column (3) is small and statistically indistinguishable from zero. Finally, the coefficient on *Amount* is statistically not different from zero in column (1), but the coefficient in column (3) is positive and suggests that doubling the issuance amount increases the spread by 1.6 basis points.

The difference in coefficient estimates on maturity and covenants between Tables II and III is interesting. For bank debt (Table II), longer-maturity loans imply significantly less lender control (the average maturity is 3.91 years, so an additional year is a significant extension) and perhaps therefore require higher spreads. For bonds (Table III), maturities are long anyway, and as suggested by Diamond (1991), little control is exercised by bondholders. So the cost of an additional year of maturity in spread terms is small. A similar narrative is suggested by covenants. Banks value covenants because of the control they exert, and there is a significant spread reduction associated with them in Table II, column (3), while bondholders do not, and there is an insignificant spread reduction associated with them in Table III, column (3).

C. TRACE Secondary Market Bond Trades

We supplement our results for loan originations and bond issuances with an analysis of trades of corporate bonds in the secondary market. Secondary market trades in corporate bonds allow us to examine a broader sample of bonds while still identifying from within-firm-within-time variation.

Although the median firm in the Mergent bond issuance sample issues only one bond in a given year (and hence gets dropped in the firm × year fixed effects specification), the median firm had 67 bond observations in TRACE in a given year, providing secondary market prices for bonds issued by the firm in the past. Essentially, as long as a firm has at least one secured bond and one unsecured bond outstanding, the availability of secondary market prices allows us to examine the effect of security on spreads using bond trades of the same firm at the same point in time. Given the richness of the TRACE data, we can further restrict a comparison of secured versus unsecured bonds to same firm × year × month instead of same firm × year. In total, there are 152,265 observations where secondary market trades for at least one secured and one unsecured bond issued in the past by the same firm occur in a given year and month. In contrast, in the Mergent bond issuance data set there are only 706 observations where the same firm issued at least one secured and one unsecured bond in the same year.

Similar to the analysis of loan origination and bond issuance, we run regressions based on equation (1). However, with the TRACE data we can also control for firm × year × month fixed effects. We report the results in Table IV. The dependent variable in these regressions is the difference between the implied yield from secondary trade prices and a maturity-matched treasury.

In column (1), we include year × month fixed effects in addition to bond characteristics. Similar to the results documented in Tables II and III, the coefficient on *Secured* is positive (91.4 basis points) and statistically significant. The addition of firm fixed effects in column (2) flips the sign of the coefficient on *Secured* from positive to negative. The spread on secured bonds is now 45.2 basis points lower compared to unsecured bonds. Interestingly, we find this significant negative effect even before we include firm × time fixed effects. This is because the selection problem over time in this setting is mitigated since we are likely to have yields for both secured and unsecured bonds at relatively close points in time. In other words, even if a firm issues secured bonds when its conditions are bad, those bonds could trade in good times as well. There also will be secondary trades in its unsecured bond that was issued in the past. Take, for example, an extreme case of a firm that always has one secured and one unsecured bond outstanding. To the extent that there is selection in the timing of secured versus unsecured *issuance* but no such selection in secondary *trades* of secured versus unsecured bonds, a simple comparison of spreads implied by trades of all secured and unsecured bonds of the firm should suffer from less serious selection problems.

We correct for any residual effects of issuance timing in column (3), where we include firm × year × month fixed effects to compare implied yields from secondary trades in a given month on bonds that were issued by the same firm in the past. As might be expected, the coefficient estimate on *Secured* is both economically larger in magnitude and statistically more significant than the estimate in column (2). The point estimate suggests that spreads on secured bonds are 62.6 basis points lower than those of unsecured bonds. There is little that is qualitatively different and noteworthy about the coefficients on other variables, relative to what we saw in Table III, and we will skip the discussion in the interests of space. In what follows, we will use the model correcting for firm × time fixed effects.[17]

III. Firm Credit Quality and Secured Debt Spread

In this section, we examine how the cost of secured debt varies with firm credit quality. In earlier work (Benmelech, Kumar, and Rajan (2020)), we show that the ratio of secured debt to assets for firms in Compustat increases with default probability—suggesting that firms issue more secured debt as their financial conditions deteriorate (also see Badoer, Dudley, and James (2020) Colla, Ippolito, and Li (2013), Nini, Smith, and Sufi (2012), and Rauh and Sufi (2010)). We reproduce this result in Figure 3, where we measure a firm's default probability using the Merton distance to default model (see Vassalou and Xing (2004) and Bharath and Shumway (2008) for a detailed description of the methodology); this default probability reflects both the volatility of a firm's underlying cash flows and the level of its debt. Firms are placed into deciles based on their one-year default probabilities, with firms in decile one having the lowest default probabilities and

[17] Are firms that issue multiple types of bonds different in any way from the rest? They may well be, but our concern is to correct for firm credit quality while estimating the benefit of offering collateral, which our methodology does. There could well be reasons unrelated to underlying business why firms issue multiple kinds of debt, such as targeting different clienteles in the DealScan data or issuing at different points in time in the Mergent data.

firms in decile ten having the highest default probabilities. The figure suggests that the median ratio of secured debt to assets increases up to the decile closest to default, and then it dips slightly.

In that paper, we conjecture that costs such as transactions costs, the loss of operational flexibility, and the loss of financial slack deter a firm from issuing secured debt in the normal course of its business. To overcome their natural hesitance, firms will have to be compensated by a substantial reduction in borrowing costs for giving collateral to lenders. If we assume that the costs associated with giving up collateral do not change with credit quality (or, at the very least, are not sharply decreasing with a decline in credit quality), we should see the reduction in borrowing costs associated with issuing secured debt increasing as credit quality falls, to account for the pattern in Figure 3. Put differently, we should see little value to giving security (as measured by a reduction in credit spreads) for highly rated firms and a much larger effect for low-rated firms.

To examine the effect of firm quality on secured debt spread, we estimate Regression (1) separately for investment grade and non-investment grade firms. We obtain issuer ratings from S&P Capital IQ. Since many firms that rely on the syndicated loan market do not have issuer credit ratings, we focus in this section on bond issuers, using data from Mergent and TRACE.

We begin by analyzing secured spread at issuance for bonds issued by investment grade and non-investment grade firms.[18] We report the results of this analysis in Table V, including firm × year fixed effects, as in column (3) of Table III. As reported in column (1), the coefficient of *Secured* in the subsample of investment grade bonds in the Mergent data set is small (but statistically significant at the 1% level) – suggesting that investment grade issuers do not find that securing debt reduces rates much. On the other hand, the coefficient of *Secured* in the non-investment grade subsample suggests that non-investment grade issuers reduce their cost of debt by a statistically significant 112.2 basis points. Similarly, columns (3) and (4) examine secured spread for investment grade and non-investment grade issuers using TRACE, and they suggest a similar conclusion, with the coefficient for investment grade bonds small and, this time, insignificant, whereas the coefficient for non-investment grade bonds is −161 basis points and significant at the 1% level.

Next, we exploit the richness of TRACE secondary trade data to further examine secured spread across firm quality in a more granular manner. We split our TRACE sample into five mutually exclusive groups based on the issuer's S&P credit rating at the time of trade: (i) AAA to

[18] Firms with an S&P rating of BBB− or better are considered investment grade.

A−, (ii) BBB+ to BBB−, (iii) BB+ to BB−, (iv) B+ to B−, and (v) CCC+ to CCC−. We then estimate the following regression specification:

$$spread_{i,j,t} = \sum_{k=1}^{5} \beta_k * secured_{i,j,t} * rating\_group\_k_{j,t} + \theta X_{i,j,t} + \delta_{j,t} + \varepsilon_{i,j,t}, \qquad (2)$$

where $rating\_group\_k_{j,t}$ (k=1, 2…5) are a set of dummies that equal one when firm j at time t belongs to rating group k, and zero otherwise. All other variables are defined as before. The direct effect of the ratings dummy gets absorbed by firm × year × month fixed effects ($\delta_{j,t}$). In Figure 4A, we plot the coefficients on the five secured dummies (β_k) that represent secured spreads for firms belonging to each of the rating categories. As can be seen from the figure, collateralizing a bond does not seem to affect its credit spread until firm quality is B+ and below. Spreads on secured bonds are 212 basis points lower than spreads on unsecured bonds for firms in the B+ to B− rating range. For firms of lower quality – CCC+ or worse – the value attached to having a bond with security, as measured in the secondary market for bonds, seems to increase further. In particular, spreads on secured bonds are almost 600 basis points lower than spreads on unsecured bonds for firms in the CCC+ to CCC− ratings range. In terms of statistical significance, the estimates for the first three ratings ranges are statistically indistinguishable from zero, whereas the estimates for the B+ to B− and the CCC+ to CCC− rating ranges are statistically significant at the 1% level.

While the above analysis suggests that the value of secured debt is especially high for low-rated firms, it is not clear yet whether a low rating originates from the deterioration in credit rating for a firm or from firms that were always rated low. To examine directly whether a firm's secured debt gets valued relatively more than its unsecured debt as the firm approaches distress, we compare the secured spread for firms that move between two adjacent rating groups during our sample period (we allow the firm to transition to other rating groups during the sample period, in addition to the two adjacent groups in focus). The idea is to estimate the secured credit spread conditional on credit rating transitions. Specifically, we estimate the following regression specification:

$$spread_{i,j,t} = \alpha * secured_{i,j,t} + \beta * secured_{i,j,t} * worse_{rating_{group}\,j,t} + \theta X_{i,j,t} + \delta_{j,t} + \varepsilon_{i,j,t}, \qquad (3)$$

where $worse\_rating\_group_{j,t}$ is a dummy that equals one if firm j at time *t* belongs to the worse of two adjacent rating groups. To estimate this, we keep only firms that transited between both rating groups over the sample period (including those that fell and those that rose). We have secondary prices for both secured and unsecured bonds in each of the two adjacent rating groups. Therefore, α measures the secured spread for the higher rating group, whereas β measures the incremental secured spread when the same firm falls to the lower rating group. The coefficients on $secured_{i,j,t} * worse\_rating\_group_{j,t}$ are plotted in Figure 4B. The results suggest that as firms move from a BB rating to a B rating, the spread on secured bonds falls by an *additional* 117 basis points relative to the spread on unsecured bonds. The coefficient is statistically significant at the 1% level. The estimates from Figure 4A indicate that as compared to BB rated bonds, the spread on B rated secured bonds relative to the spread on unsecured bonds is lower by approximately an *additional* 225 basis points. The comparison between the two estimates suggests that firms falling from BB to B are better quality, on average, than firms that have always been rated B. Similarly, as firms move from a B rating to a CCC rating in Figure 4B, the spread on secured bonds falls by an *additional* 338 basis points relative to the spread on unsecured bonds (as compared to the 386 basis point difference seen in Figure 4A). The coefficient is statistically significant at the 5% level. There does not seem to be any incremental effect of security on spread as firm rating deteriorates from A to BBB, or from BBB to BB, suggesting once again that collateral is not priced when firms are highly rated.[19]

What should the appropriate reduction in spread for collateralization be? Consider the following back of the envelope calculation: Assume the additional loss given default for an unsecured bond versus a secured bond is 50 percent and does not vary with initial rating (Moodys (2006a)). The five year cumulative default probability for a Baa/BBB bond is around 2 percent, Ba/BB is 10 percent, and B is 29 percent (Moodys (2006b)). So a fall from BBB to BB implies a lower expected loss of 4 percentage points over 5 years for secured debt relative to unsecured debt, implying a relative annualized spread decrease of 80 basis points. Similarly, a fall from BB to B implies a relative annualized spread decrease of 190 basis points.

The estimated effects of security on spread as a firm transitions between ratings in Figure 4B therefore are smaller than these back of the envelope calculations, but of the same order of

[19] Schwert (forthcoming) estimates unsecured to secured bond spreads, grouping bond pairs by the secured bond rating, and finds an unconditional mean of 1.4. He argues this is consistent with measured recovery rates.

magnitude. This suggests that collateral does afford protection, but is priced only when the probability of distress becomes high. More interesting, borrowers tend to wait till it is valuable to the lender before they contract on it, suggesting giving collateral is not costless. Conversely, lenders do not demand it before it is priced, suggesting they are confident it will be available when needed – contractual features like negative pledge clauses may ensure an orderly process of allocating collateral.

IV. Secured Debt and the Business Cycle

We have seen the impact of security on the spread increases as a firm's credit quality declines. We now examine the behavior of the secured credit spread over the business cycle; we would expect the magnitude to grow as economic activity slips or as credit gets more stressed.

A. Secured Debt Issuance and the Business Cycle

We begin by examining cyclical pattern in the issuance of secured debt. Using the Mergent bond issuance data, we follow Benmelech, Kumar, and Rajan (2020) closely and estimate the following regression for the period 1980 to 2018[20]:

$$secured\ bond\ issuance_t = \alpha + \beta Z_t + \varepsilon_t, \tag{4}$$

where $secured\ bond\ issuance_t$ measures the cyclical component of the dollar share of secured debt in total debt issuance at the quarterly frequency and Z_t represents a business cycle proxy. To ensure that the results are not driven by trends in secured bond issuance and economic activity, we detrend both variables using a Hodrick-Prescott (HP) filter. Specifically, we first adjust the quarterly secured bond issuance share for seasonality and then compute the detrended share, $secured\ bond\ issuance_t$, using an HP filter (i.e., we extract the residuals from the HP filter).[21] As we detrend the share of secured bond issuance, the mean value of the detrended share nears zero. The standard deviation of the detrended share is 0.057. We use two measures for the cycle: the Baa–Aaa credit spread – a commonly used measure of financial conditions – and real

[20] We extend their sample slightly, but this is essentially a reproduction of their table. Our intent is to ensure comparability with our results on seniority, which are our incremental contribution here.
[21] As is standard in the macro literature, we use a smoothing coefficient of 1600 for quarterly data.

gross domestic product (GDP). We use the detrended measures (residuals from the HP filter) as proxies.

We report the results of this analysis in Table VI. Columns (1)–(3) use the Baa–Aaa credit spread as a measure of conditions in credit markets, and columns (4)–(6) use log real GDP as a measure of underlying economic conditions. Specifically, ΔBaa–Aaa spread is the deviation of the Baa–Aaa credit spread from its HP trend line. Similarly, ΔGDP growth is the deviation of the logarithm of real GDP from its HP trend line. The regression coefficients suggest a strong countercyclical pattern in the share of secured bond issuance. The coefficients in all the columns are statistically significant at least at the 5% level. In terms of economic magnitude, the point estimate in column (1) suggests that a one standard deviation increase in detrended Baa–Aaa spread increases the share of secured bond issuance by 1.9 percentage points (equivalent to one third of the standard deviation of detrended secured share). Similarly, the estimate in column (2) suggests that the share of secured bond issuance is approximately 2.9 percentage points higher when the detrended credit spread is positive, while the coefficient estimate in column (3) indicates that it is 2.8 percentage points higher when the detrended credit spread is above the median detrended credit spread.

Moving on to the deviation in real log GDP as a measure of the business cycle, the point estimate in column (4) suggests that a one standard deviation fall in real log GDP increases the share of secured bond issuance by 1.7 percentage points (equivalent to three-tenths of the standard deviation of detrended secured share). Similarly, the coefficient estimate in column (5) suggests that the share of secured bond issuance is 2.4 percentage points higher when the detrended real log GDP is negative, while the coefficient estimate in column (6) indicates that it is 2.5 percentage points higher when the detrended log GDP is below the median detrended log GDP. Overall, our analysis suggests that secured bond issuance is countercyclical, as evident from an analysis of the period 1980 to 2018.

To ensure that the cyclicality in secured issuance documented here is associated with collateral and not just a preference for seniority during bad times (since security could be interpreted as making a bond super-senior), we repeat the analysis using the share of *senior unsecured* debt in total debt issuance as our dependent variable. As in the previous analysis, we detrend the dependent variable and the two measures of business conditions (Baa–Aaa credit spread and real GDP) using an HP filter to extract the cyclical component. The raw share of senior unsecured debt in total debt issuance has a mean value of 0.72. The detrended share has a mean value close to zero and a standard deviation of 0.09. The results of this analysis are reported in Table VII.

Columns (1)–(3) use the detrended Baa–Aaa credit spread as a measure of conditions in credit markets, whereas columns (4)–(6) use the detrended log real GDP as a measure of underlying economic conditions. The coefficients in all the columns are statistically significant at the 1% level. In terms of economic magnitude, the point estimate in column (1) suggests that a one standard deviation increase in the detrended Baa–Aaa spread reduces the share of senior unsecured bond issuance by 2.9 percentage points (equivalent to one third of the standard deviation of the detrended senior unsecured share). Similarly, the estimate in column (2) suggests that the share of senior unsecured bond issuance is approximately 4.5 percentage points lower when the detrended spread is positive, while the coefficient estimate in column (3) indicates that it is 4.0 percentage points lower when the detrended credit spread is above the median detrended credit spread.

Moving on to the deviation in real log GDP as a measure of the business cycle, the point estimate in column (4) suggests that a one standard deviation increase in the detrended real log GDP increases the share of senior unsecured bond issuance by 3.2 percentage points (equivalent to a little more than one third of the standard deviation of the detrended senior unsecured share). Similarly, the coefficient estimate in column (5) suggests that the share of senior unsecured bond issuance is 4.4 percentage points lower when the detrended real log GDP is negative, while the coefficient estimate in column (6) indicates that it is 4.5 percentage points lower when the detrended log GDP is below the median detrended log GDP. Clearly, senior unsecured debt issuance is strongly procyclical—suggesting that the finding in Table VI that secured debt issues are countercyclical is purely a secured debt issuance phenomenon and not a consequence of preference for seniority. This is consistent with Badoer, Dudley, and James (2020) and Rauh and Sufi (2010) who suggest that priority spreading (the issuance of secured as well as subordinate unsecured debt) may be more pronounced in stressed times.

B. The Cost of Secured Debt Issuance and the Business Cycle

Having established that the issuance of secured debt is countercyclical, we next use DealScan's loan origination and Mergent's bond issuance data to examine how the cost of secured debt changes over the business cycle.[22] We estimate the following regression specification:

[22] Mergent data are available from 1980 on; TRACE began partial coverage only in 2002.

$$spread_{i,j,t} = \alpha * secured_{i,j,t} + \beta * secured_{i,j,t} * business_{conditions_t} + \theta X_{i,j,t} + \delta_{j,t} + \varepsilon_{i,j,t}, \quad (5)$$

where $spread_{i,j,t}$ is the spread for either loan or bond *i* of firm *j* at time *t*. The results of this analysis are presented in Table VIII. Columns (1) and (3) analyze spreads on bank loans, whereas columns (2) and (4) analyze spreads on bonds. In column (1), we examine how secured loan spread varies with the Baa–Aaa credit spread. Note that the direct effect of monthly credit spread on loan spread gets absorbed by package fixed effects. The key variable of interest is the interaction term *Secured* × *Baa–Aaa spread*. The coefficient on this term is negative and statistically significant at the 5% confidence level. In terms of economic magnitude, the coefficient suggests that a one standard deviation increase in the Baa–Aaa spread reduces the spread on a secured loan facility by an additional 28 basis points relative to the spread on an unsecured loan facility belonging to the same package. Similarly, the coefficient on column (3) suggests that a one standard deviation fall in real GDP growth reduces the spread on a secured loan facility by an additional 17 basis points relative to the spread on an unsecured loan facility belonging to the same package.

Moving on to cyclicality in secured bond spreads, we analyze Mergent bond issuance data in columns (2) and (4). The coefficient on the interaction term *Secured* × *Baa–Aaa spread* in column (2) is negative and statistically significant at the 5% confidence level. In terms of economic magnitude, the coefficient suggests that a one standard deviation increase in the Baa–Aaa spread reduces the spread on secured bonds by an additional 13 basis points relative to the spread on unsecured bonds issued by the same firm in the same year. Similarly, the coefficient in column (4) suggests that a one standard deviation fall in real GDP growth reduces the spread on secured bonds by an additional 3 basis points relative to the spread on unsecured bonds issued by the same firm in the same year (although the estimate is not statistically significant). Note that all four columns include an interaction term between the senior indicator and the business cycle proxy: *Senior* × *Baa–Aaa spread* in columns (1) and (2), and *Senior* × *GDP growth* in columns (3) and (4). Interestingly, the coefficient on this interaction term in each of the four columns is statistically indistinguishable from zero, suggesting that there is no cyclicality in the pricing of seniority.

Overall, the analysis in this section suggests that collateral becomes more valuable as business conditions deteriorate – firms are more likely to use secured borrowing during an economic downturn, and such borrowing seems to provide a significantly lower cost of debt under adverse economic conditions compared to unsecured borrowing. The greater seeming importance of cyclical financing conditions over business conditions is worth exploring in future work.

C. Bond Rating: Secured versus Unsecured

If indeed security improves the creditor's recovery on a bond, this should reflect in the bond's improved credit rating. Using the Mergent data set we compare S&P bond ratings to the overall firm-level S&P issuer ratings at the time of bond issuance. To estimate the rating improvement due to security, we use the following regression specification:

$$rating\_diff_{i,j,t} = \beta * secured_{i,j,t} + \theta X_{i,j,t} + \lambda_j + \delta_t + \varepsilon_{i,j,t}, \quad (6)$$

where $rating\_diff_{i,j,t}$ is the difference between the S&P's issue rating for bond *i* and the S&P issuer rating for firm *j* at the time of bond issuance *t*. As discussed earlier, a AAA rating is assigned a numerical value of 1, AA+ is assigned a value of 2, and so on, down to the lowest category, D, which is assigned a value of 22. Given that the dependent variable is based on the firm's rating at a given time as reference, we have corrected for firm × time fixed effects. Therefore, we include only firm and time fixed effects. We report the results of this analysis in Table IX.

The coefficient on *Secured* in column (1) is negative and statistically significant at the 1% confidence level. The coefficient suggests that pledging collateral improves the bond rating by about 0.8 of a notch. The coefficient on *Senior* suggests that bond rating improves by almost half a notch for a senior bond. Since the coefficient on *Secured* represents the incremental effect, holding seniority fixed, this implies that a senior secured bond's rating is almost 1.3 notches above the rating of a junior unsecured bond. The coefficients on *Maturity, Callable,* and *Covenant* are small and statistically indistinguishable from zero. Finally, the coefficient on *Amount* suggests that doubling the issuance amount lowers the bond rating by 0.22 notch.

Columns (2) and (3) separately analyze ratings improvement for secured bonds for investment grade and non-investment grade issuers. Ratings improvement seems to be equally large for both investment grade and non-investment grade issuers – about 0.8 of a notch. We must be careful in drawing strong conclusions here, though; we have only 387 observations in the non-investment grade sample. Column (4) performs the same analysis using an interaction term and leads to similar conclusions. Finally, in column (5) we analyze whether ratings improvements for secured bonds are cyclical. We add an interaction term between the secured dummy and the Baa–Aaa spread – *Secured* × *Baa–Aaa spread* – to the analysis and find that it is negative and statistically significant at the 1% confidence level. The estimate suggests that a one standard deviation increase in the Baa–Aaa spread enhances secured issue ratings by approximately an additional quarter of a notch compared to ratings for unsecured bonds. This specification also includes an interaction term between senior dummy and the Baa–Aaa spread – *Senior* × *Baa–Aaa spread*. Interestingly, the coefficient on this interaction term is small and statistically indistinguishable from zero, suggesting again that spread cyclicality is unique to secured bonds.

V. Conclusion

We find that security has little value to lenders in the United States when a firm is far from distress or the economy is healthy and that it becomes much more valuable (and hence secured debt should promise lower interest rates than unsecured debt) as a firm nears distress or the economy deteriorates. There is a broader point here. A firm's assets may be important in reassuring lenders that they can collect repayment when financial infrastructure is underdeveloped – as Benmelech, Kumar, and Rajan (2020) suggest was true in the United States in the early years of the twentieth century, or as is still true in a number of countries across the world today. Collateral will be "priced" then even in the normal course, and loan documents will emphasize the importance of assets. As Lian and Ma (2019) show, Japan still emphasizes asset based lending.

However, giving lenders power over assets comes at a cost (see, for example, Mello and Ruckes (2017)). As a result, with financial development, borrowers would like to retain full control over assets in the normal course, while lenders are willing to rely on structures that give them control on a contingent basis (Aghion and Bolton (1992)). Asset-related covenants may then be less prominent in loans or bonds issued by healthy firms, given that lenders have the ability to take collateral when truly needed. Indeed, our results suggest that collateral is not valued much in normal times – in part because the probability of distress is low but also in part because lenders believe they can take collateral when needed. So what might seem insouciance on the part of lenders (and borrowers) vis-à-vis claims on assets may instead be a more contingent attitude, one in which assets play a more important role in assuring lenders of debt recovery closer to distress, even in the present day.

A number of avenues are worth exploring. Does the pricing of collateral differ between industries in which reorganization is the norm in bankruptcy and industries in which liquidation is the norm? Also, is liquidity (alternatively, creditor risk tolerance or optimism) as reflected in the stage of the financial cycle (see Borio (2014) and Diamond, Hu, and Rajan (2020)), a factor in the value creditors see in protecting themselves with collateral? There is ample scope for additional research.

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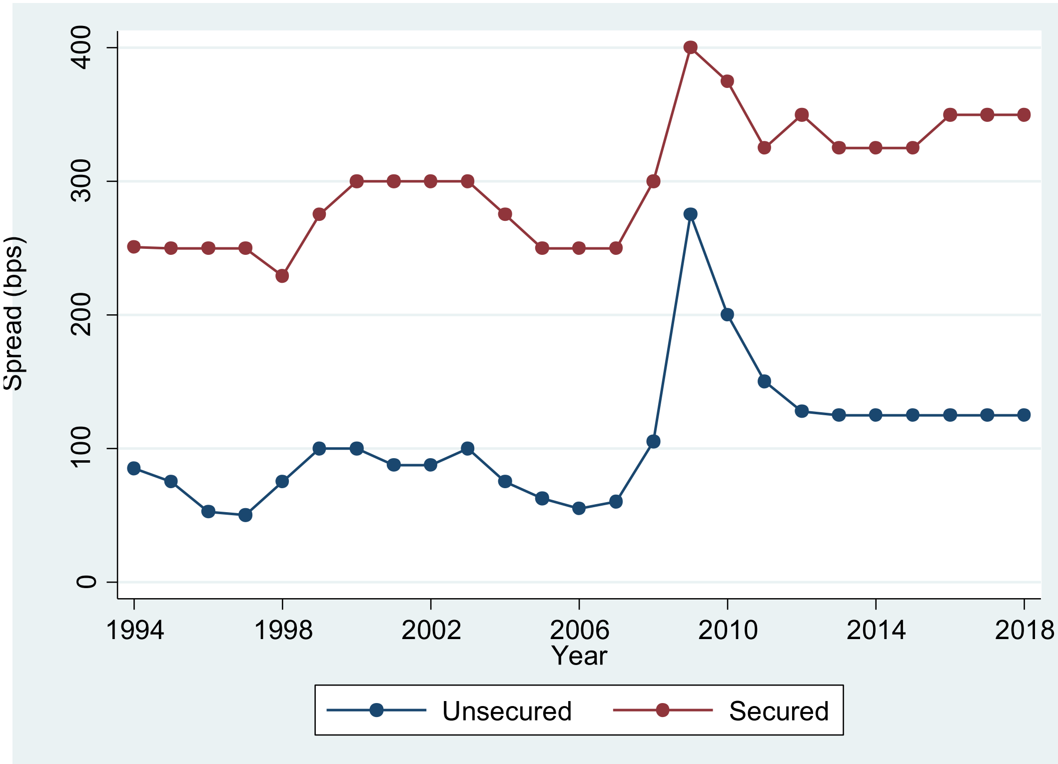

Figure 1. Loan spread – secured versus unsecured. This figure displays the median spread over LIBOR at issuance for secured and unsecured loans by year of issuance. Source: DealScan.

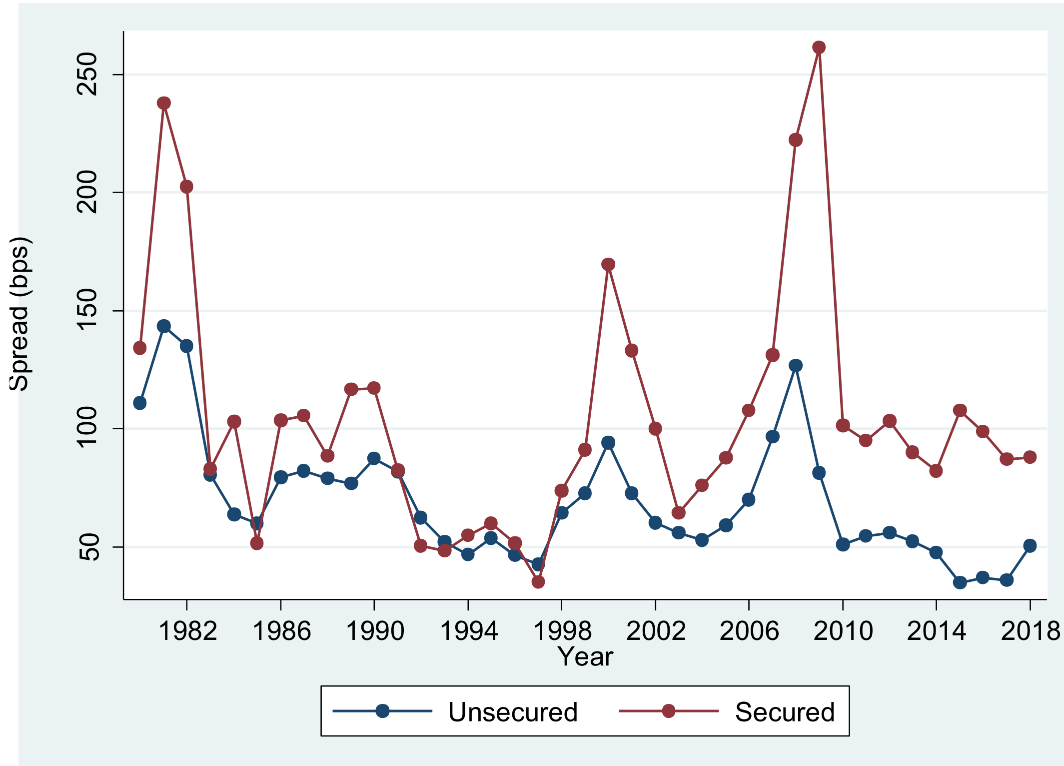

Figure 2. Yield spread – secured versus unsecured bond. This figure displays the median yield spread at issuance over maturity-matched treasury for secured and unsecured bonds by year of issuance. Source: Mergent.

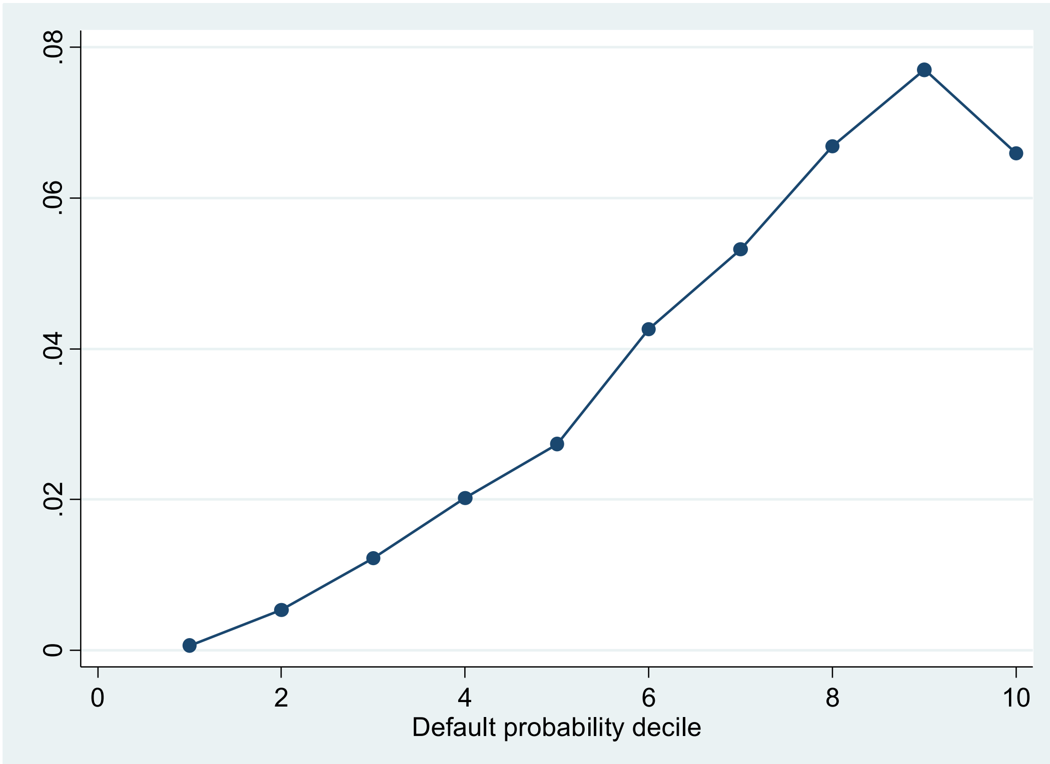

Figure 3. Secured debt and firm quality. This figure plots the median share of secured debt to total book value of assets for firm-year observations in Compustat from 1981 to 2017 for different one-year default probability deciles. One-year default probability is calculated using the Merton distance to default model. The default probability incorporates both the volatility of a firm's asset value and the level of its debt. Firms are grouped into ten deciles based on their default probability, and the median share of secured debt to assets is calculated for each group. Source: authors' calculations using Compustat data.

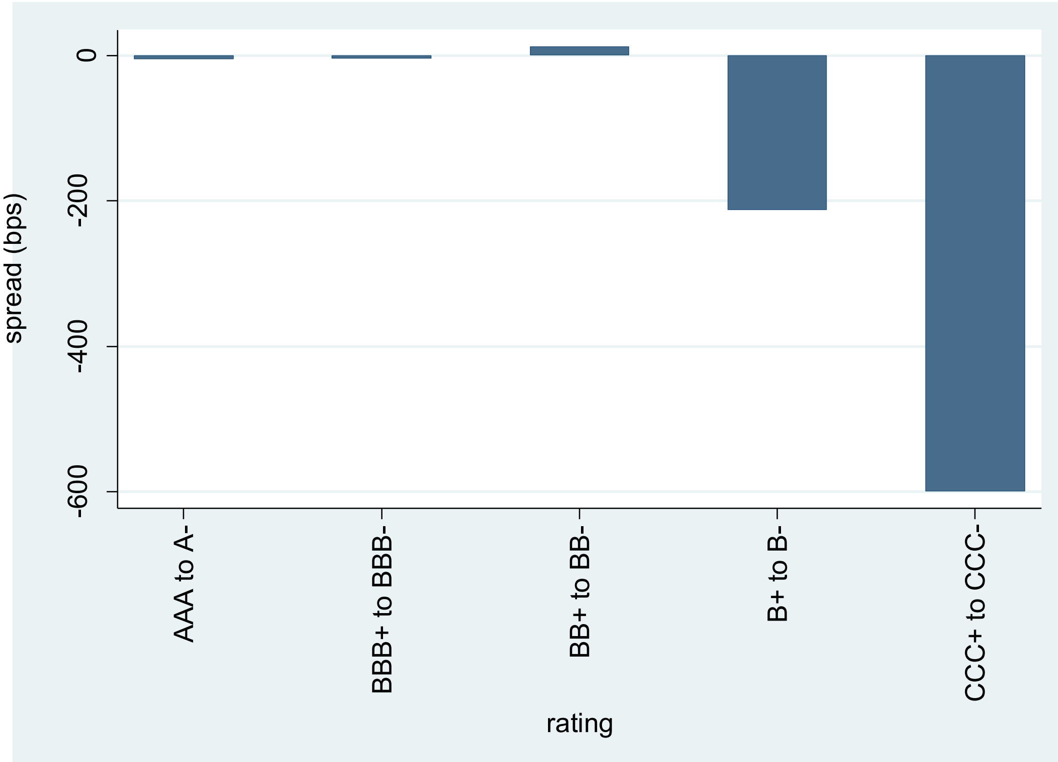

Figure 4A. Implied secured yield spread by issuer rating categories. This figure reports results from the following regression:

$spread_{i,j,t} = \sum_{k=1}^{5} \beta_k * secured_{i,j,t} * rating\_group\_k_{j,t} + \theta X_{i,j,t} + \delta_{j,t} + \varepsilon_{i,j,t}$,

where $rating\_group\_k_{j,t}$ (k=1, 2…5) is a set of dummies that equal one when firm *j* at time *t* belongs to rating group k, and zero otherwise. The figure displays coefficients on the secured dummy interacted with the issuer's S&P rating group dummy. Spread is measured as the difference between the implied yield from the secondary trade price and a maturity-matched treasury. The regression controls for seniority, maturity, callability, loan amount, and presence of covenant. Note that the direct effect of issuer rating gets absorbed by firm × month fixed effects. Source: TRACE.

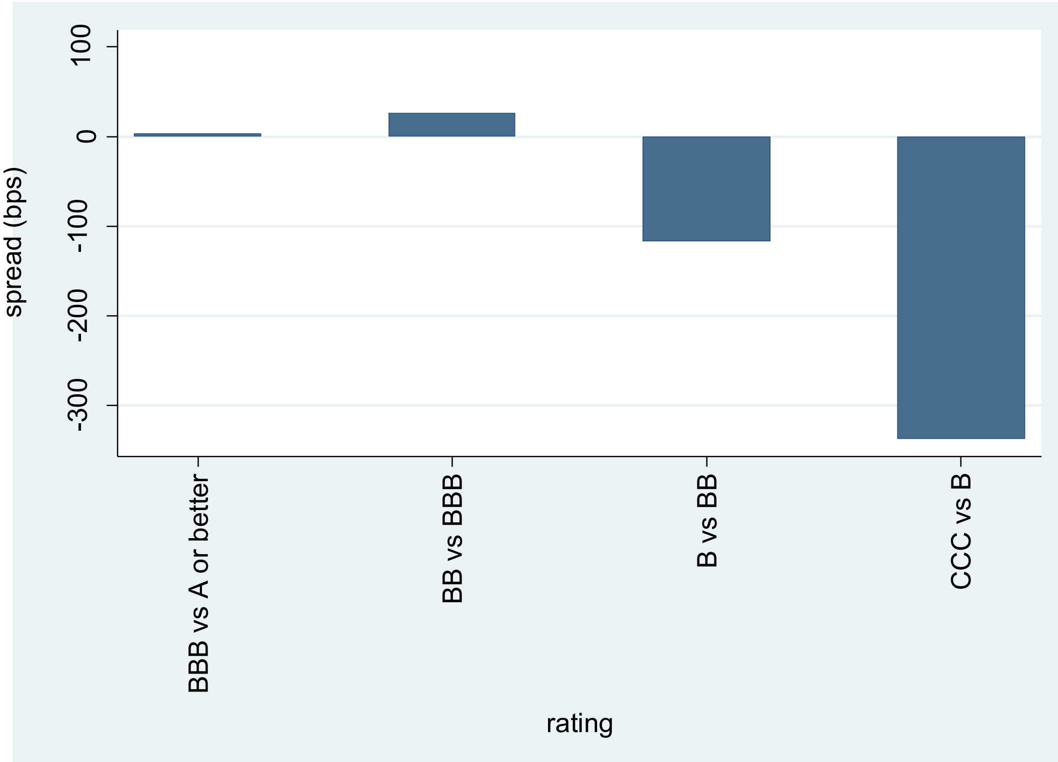

Figure 4B. Incremental implied secured yield spread between adjacent issuer rating categories. This graph reports results from the following regression:

$$spread_{i,j,t} = \alpha * secured_{i,j,t} + \beta * secured_{i,j,t} * worse_{rating_{group}}{}_{j,t} + \theta X_{i,j,t} + \delta_{j,t} \quad + \varepsilon_{i,j,t} \ ,$$

where $worse\_rating\_group_{j,t}$ is a dummy that equals one if firm j belongs to the worse of two adjacent rating groups at time t. The figure displays coefficients on secured dummy interacted with a dummy for worse issuer S&P rating group. Spread is measured as the difference between implied yield from secondary trade price and a maturity-matched treasury. The regression controls for seniority, maturity, callability, loan amount, and presence of covenant. We run a separate regression for each pair of adjacent broad rating groups. For each regression, we restrict the sample to firms that have secondary trade prices for both secured and unsecured bonds in both rating groups. Note that the direct effect of issuer rating gets absorbed by firm × month fixed effects. Source: TRACE.

Table I

Summary Statistics

This table reports summary statistics for variables used in our analysis. Panel A uses data from DealScan, panel B uses data from Mergent, and panel C uses data from TRACE. Panels A and B tabulate statistics at the debt issuance level, whereas panel C tabulates statistics at the bond trade level. Spread is measured as spread over LIBOR at issuance in panel A, as yield spread at issuance over maturity-matched treasury in panel B, and as the difference between the implied yield from secondary trade prices and the yield on maturity-matched treasury in panel C. Secured is a dummy that takes the value of one if the debt is secured, and zero otherwise. Senior is a dummy that takes the value of one if the debt is senior, and zero otherwise. Maturity is the maturity at issuance in panels A and B and the remaining maturity at the time of trade in panel C. Callable is a dummy that takes the value of one if the bond is callable, and zero otherwise. Amount is the logarithm of the dollar principal amount outstanding at issuance. Covenant is a dummy that takes the value of one if the debt has a covenant, and zero otherwise. Baa–Aaa spread is the monthly credit spread between Baa and Aaa corporate bonds, while GDP growth is calculated as the quarterly growth rate in real GDP. Non-IG is a dummy that equals one if the borrowing firm's S&P rating is BB+ or worse, and zero otherwise.

Panel A. DealScan Data

	Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Observations
Spread (bps)	284.80	160.35	175.00	255.00	355.00	50,614
Secured	0.85	0.36	1.00	1.00	1.00	50,614
Senior	1.00	0.03	1.00	1.00	1.00	50,614
Maturity (years)	3.91	0.53	3.61	4.09	4.28	50,614
Amount (log dollar value)	18.42	1.65	17.27	18.52	19.58	50,614
Covenant	0.53	0.50	0.00	1.00	1.00	50,614
Secured × Baa–Aaa spread	1.93	1.01	1.59	2.01	2.64	50,614
Secured × GDP growth	0.56	0.55	0.13	0.58	0.89	50,614
Baa–Aaa spread (%)	2.29	0.65	1.71	2.20	2.75	50,614
GDP growth (%)	0.66	0.54	0.43	0.71	0.93	50,614

Panel B. Mergent Data

	Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Observations
Spread (bps)	208.32	207.11	66.26	124.47	287.95	30,041
Secured	0.15	0.36	0.00	0.00	0.00	30,041
Senior	0.91	0.29	1.00	1.00	1.00	30,041
Maturity (years)	11.01	7.96	6.00	10.00	10.00	30,041
Callable	0.67	0.47	0.00	1.00	1.00	30,041
Amount (log dollar value)	11.34	2.34	10.13	12.10	12.90	30,041
Covenant	0.40	0.49	0.00	0.00	1.00	30,041
Secured × Baa–Aaa spread	0.34	0.86	0.00	0.00	0.00	30,041
Secured × GDP growth	0.11	0.33	0.00	0.00	0.00	30,041
Senior × Baa–Aaa spread	2.12	0.95	1.67	2.12	2.72	30,041
Senior × GDP growth	0.61	0.55	0.27	0.63	0.95	30,041
Baa–Aaa spread (%)	2.30	0.70	1.73	2.18	2.77	30,041
GDP growth (%)	0.69	0.54	0.45	0.74	0.99	30,041
Non-IG	0.25	0.43	0.00	0.00	1.00	11,444
Secured × Non-IG	0.04	0.19	0.00	0.00	0.00	11,444
Rating difference	-0.02	1.24	0.00	0.00	0.00	7,910

Panel C: TRACE Data

	Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Observations
Spread (bps)	211.99	206.05	84.04	141.81	257.72	3,675,393
Secured	0.08	0.28	0.00	0.00	0.00	3,675,393
Senior	0.99	0.11	1.00	1.00	1.00	3,675,393
Maturity (years)	8.92	8.27	3.00	6.00	10.00	3,675,393
Callable	0.93	0.26	1.00	1.00	1.00	3,675,393
Amount (log dollar value)	13.35	0.73	12.90	13.30	13.82	3,675,393
Covenant	0.90	0.30	1.00	1.00	1.00	3,675,393
Non-IG	0.15	0.36	0.00	0.00	0.00	2,446,851
Secured × Non-IG	0.02	0.13	0.00	0.00	0.00	2,446,851

Table II

Secured Spread Using DealScan Loan Sample

This table reports the results of OLS regressions relating loan spreads to the presence of secured interest in the loan over the 1994 to 2018 time period. The dependent variable is the spread over LIBOR paid at issuance of a loan facility. Secured is a dummy that takes the value of one if a loan facility is secured, and zero otherwise. The regressions also control for seniority, maturity, issuance amount, and the presence of a covenant. Column (4) uses package fixed effects and hence absorbs all variations across packages. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm, and t-statistics are reported below the coefficients in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)	(4)
Secured	100.764***	57.892***	-40.556***	-72.239***
	(41.44)	(18.14)	(-4.31)	(-4.44)
Senior	-201.672***	-194.091***	-198.106***	-150.266***
	(-7.21)	(-6.74)	(-7.22)	(-3.19)
Maturity	-4.748**	-3.232	25.662***	36.182***
	(-2.40)	(-1.55)	(11.34)	(8.74)
Amount	-26.231***	-15.121***	-10.206***	-10.441***
	(-35.34)	(-19.28)	(-12.48)	(-11.99)
Covenant	-38.103***	-24.894***	-15.544***	
	(-18.80)	(-10.83)	(-2.87)	
Fixed Effects	year × month, facility type	year × month, firm, facility type	year × month, firm × year, facility type	Package, facility type
Observations	50,614	48,187	34,700	30,905
Adj. R-squared	0.469	0.628	0.671	0.689

Table III

Secured Spread Using Mergent FISD Bond Sample

This table reports the results of OLS regressions relating bond spreads at issuance to presence of secured interest in the bond over the 1980 to 2018 time period. The dependent variable is the yield difference at issuance between a bond and a maturity-matched treasury. Secured is a dummy that takes the value of one if a bond is secured, and zero otherwise. The regressions also control for seniority status, maturity, callability, issuance amount, and the presence of a covenant in the bond contract. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm, and t-statistics are reported below the coefficients in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)
Secured	59.969***	55.885***	-35.194***
	(7.24)	(8.21)	(-3.81)
Senior	-104.477***	-37.680***	-43.965***
	(-7.52)	(-4.38)	(-4.31)
Maturity	-4.278***	1.005***	1.993***
	(-16.16)	(10.14)	(22.66)
Callable	79.413***	12.083***	11.184
	(10.21)	(2.76)	(1.31)
Amount	1.535	2.373***	2.262***
	(0.78)	(3.48)	(3.40)
Covenant	-133.949***	-23.252***	-3.412
	(-24.63)	(-6.75)	(-0.70)
Fixed Effects	year × month	year × month, firm	year × month, firm × year
Observations	30,041	27,229	19,187
Adj. R-squared	0.400	0.828	0.940

Table IV

Secured Spread Using TRACE Trading Data

This table reports the results of OLS regressions relating bond yields to the presence of secured interest in the bond over the 1980 to 2018 time period. The dependent variable is the difference between the implied yield from secondary trade prices and maturity-matched treasury. Secured is a dummy that takes the value of one if a bond is secured, and zero otherwise. The regressions also control for seniority status, maturity, callability, issuance amount, and the presence of a covenant in the bond contract. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm, and t-statistics are reported below the coefficients in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)
Secured	91.415***	-45.156*	-62.583***
	(4.64)	(-1.76)	(-2.66)
Senior	-182.815***	-55.520***	-60.505***
	(-9.40)	(-3.50)	(-3.68)
Maturity	-2.151***	2.386***	2.990***
	(-5.68)	(20.78)	(33.45)
Callable	-21.607	-8.606	11.590***
	(-1.24)	(-1.60)	(2.89)
Amount	-33.802***	-2.596	0.907
	(-6.14)	(-0.86)	(0.58)
Covenant	9.904	4.229	2.525
	(0.93)	(0.93)	(0.88)
FE	year × month	firm, year × month	firm × year × month
Observations	3,675,393	3,675,328	3,658,889
Adj. R-squared	0.173	0.727	0.952

Table V

Secured Spread and Firm Quality

This table reports the results of OLS regressions relating spreads on debt securities to the presence of secured interest in the debt for investment grade and non-investment grade firms separately. Columns (1) and (2) use Mergent bond issuance data, whereas columns (3) and (4) use TRACE bond trading data. The dependent variable is a measure of spread over maturity-matched treasury. Secured is a dummy that takes the value of one if a debt security is secured, and zero otherwise. Non-IG firms have an S&P rating of BB+ or worse. The regressions also control for seniority status, maturity, callability, issuance amount, and the presence of a covenant in the debt contract. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm, and t-statistics are reported below the coefficients in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

	Mergent		Trace	
	IG	Non-IG	IG	Non-IG
	(1)	(2)	(3)	(4)
Secured	-19.755***	-112.176***	-4.435	-161.174***
	(-3.38)	(-2.96)	(-0.61)	(-3.48)
Senior	-39.473***	-69.891***	-11.182*	-118.110***
	(-4.01)	(-3.76)	(-1.76)	(-4.61)
Maturity	2.216***	1.229	2.984***	5.306***
	(37.32)	(1.34)	(34.79)	(3.36)
Callable	0.308	-10.183	-8.716***	23.310
	(0.17)	(-0.88)	(-3.74)	(1.61)
Amount	1.363***	-2.967	1.515*	2.510
	(7.36)	(-0.29)	(1.76)	(0.28)
Covenant	-5.531**	22.142	-1.596	26.520
	(-2.15)	(0.78)	(-1.21)	(1.45)
FE	year × month, firm × year	year × month, firm × year	firm × year × month	firm × year × month
Observations	5,803	624	2,070,517	370,275
Adj. R-squared	0.920	0.876	0.918	0.919

Table VI

Secured Debt Issuance over Business Cycle

This table reports results from the analysis of cyclicality in secured debt issuance using data from Mergent for the 1980 to 2018 time period. The dependent variable is the cyclical component of the dollar share of secured debt issuance in each quarter. The cyclical component is calculated by extracting the residuals from a Hodrick-Prescott (HP) filter. We use two proxies for the cyclical stage of economic activity: *ΔBaa–Aaa* spread is the cyclical component of the Baa–Aaa credit spread calculated from the residuals from the HP filter, whereas *ΔGDP growth* is the cyclical component of the logarithm of real GDP calculated from the HP filter in a similar manner. * p < 0:1, ** p < 0:05, *** p < 0:01.

	(1)	(2)	(3)	(4)	(5)	(6)
ΔBaa–Aaa spread	0.037***					
	(4.32)					
ΔBaa–Aaa spread>0		0.029***				
		(3.25)				
ΔBaa–Aaa spread>			0.028***			
median(ΔBaa–Aaa spread)			(3.17)			
ΔGDP growth				-1.340***		
				(-3.97)		
ΔGDP growth<0					0.024***	
					(2.71)	
ΔGDP growth<						0.025***
median(ΔGDP growth)						(2.82)
Observations	156	156	156	156	156	156
Adj. R-squared	0.102	0.058	0.055	0.087	0.039	0.043

Table VII

Senior Unsecured Debt Issuance over Business Cycle

This table reports results from the analysis of cyclicality in senior unsecured debt issuance using Mergent data for the 1980 to 2018 time period. The dependent variable is the cyclical component of the dollar share of senior unsecured debt issuance in each quarter. The cyclical component is calculated by extracting the residuals from a Hodrick-Prescott (HP) filter. We use two proxies for the cyclical stage of economic activity: *ΔBaa–Aaa* spread is the cyclical component of the Baa–Aaa credit spread calculated from the residuals from the HP filter, whereas *ΔGDP growth* is the cyclical component of the logarithm of real GDP calculated from the HP filter in a similar manner. * p < 0:1, ** p < 0:05, *** p < 0:01.

	(1)	(2)	(3)	(4)	(5)	(6)
ΔBaa–Aaa spread	-0.058***					
	(-4.34)					
ΔBaa–Aaa spread>0		-0.045***				
		(-3.19)				
ΔBaa–Aaa spread> median(ΔBaa–Aaa spread)			-0.040***			
			(-2.86)			
ΔGDP growth				2.546***		
				(4.94)		
ΔGDP growth<0					-0.044***	
					(-3.15)	
ΔGDP growth< median(ΔGDP growth)						-0.045***
						(-3.22)
Observations	156	156	156	156	156	156
Adj. R-squared	0.103	0.056	0.044	0.131	0.055	0.057

Table VIII

Secured Spread over Business Cycles

This table reports the results of OLS regressions relating spreads on debt securities to the presence of secured interest in the debt and to measures of business conditions. The dependent variable is a measure of spread over maturity-matched treasury. Columns (1) and (3) use the DealScan loan sample, whereas columns (2) and (4) use the Mergent bond issuance sample. Secured is a dummy that takes the value of one if a debt security is secured, and zero otherwise. Baa–Aaa spread is the monthly credit spread between Baa and Aaa corporate bonds, while GDP growth is calculated as the quarterly growth rate in real GDP. The regressions also control for seniority status, maturity, callability, issuance amount, and the presence of a covenant in the debt contract. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm, and t-statistics are reported below the coefficients in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)	(4)
Secured	27.032	8.799	-90.836***	-39.148***
	(0.64)	(0.44)	(-4.98)	(-3.55)
Secured × Baa–Aaa spread	-43.360**	-18.519**		
	(-2.42)	(-2.03)		
Secured × GDP growth			30.862*	5.371
			(1.87)	(0.94)
Senior	-257.782**	-48.037	-149.257*	-49.380***
	(-2.23)	(-1.49)	(-1.80)	(-3.77)
Senior × Baa–Aaa spread	45.132	1.639		
	(1.22)	(0.11)		
Senior × GDP growth			-1.437	7.129
			(-0.02)	(0.84)
Maturity	36.435***	1.991***	36.387***	1.991***
	(8.79)	(22.64)	(8.79)	(22.57)
Callable		11.182		11.310
		(1.31)		(1.32)
Amount	-10.457***	2.273***	-10.464***	2.268***
	(-12.00)	(3.42)	(-12.01)	(3.41)
Covenant		-3.362		-3.271
		(-0.70)		(-0.67)
FE	Package, facility type	year × month, firm × year	Package, facility type	year × month, firm × year
Observations	30,905	19,187	30,905	19,218
Adj. R-squared	0.689	0.940	0.689	0.913

Table IX

Difference Between Bond Rating and Firm Rating Using Mergent FISD Bond Sample

This table reports the results of OLS regressions relating bond ratings to the presence of secured interest in the bond over the 1980 to 2018 time period. The dependent variable is the difference between the S&P bond rating and the firm rating at the time of the bond issuance. A AAA rating is assigned a numerical value of 1, while D is assigned a value of 22. Secured is a dummy that takes the value of one if a bond is secured, and zero otherwise. Non-IG is a dummy that takes the value of one if a firm has an investment grade rating. High Baa–Aaa spread takes a value of one if the Baa–Aaa credit spread during the month of a bond issuance was greater than the median spread over the sample period. The regressions also control for seniority status, maturity, callability, issuance amount, and the presence of a covenant in the bond contract. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm, and t-statistics are reported below the coefficients in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

	Full Sample	IG	Non-IG		
	(1)	(2)	(3)	(4)	(5)
Secured	-0.826***	-0.801***	-0.842*	-0.741***	-0.071
	(-5.55)	(-5.12)	(-1.80)	(-4.86)	(-0.43)
Non-IG				0.013	
				(0.04)	
Secured × non-IG				-0.467	
				(-1.42)	
Secured × Baa–Aaa spread					-0.330***
					(-5.36)
Senior	-0.472***	-0.131	-1.615***	-0.213	-0.540
	(-3.12)	(-0.53)	(-8.10)	(-0.87)	(-1.14)
Senior × non-IG				-0.674**	
				(-2.36)	
Senior × Baa–Aaa spread					0.025
					(0.12)
Maturity	-0.002	-0.003**	-0.001	-0.003**	-0.002
	(-1.41)	(-2.40)	(-0.07)	(-2.21)	(-1.28)
Callable	0.076	0.121**	-0.495**	0.087*	0.061
	(1.60)	(2.56)	(-2.23)	(1.88)	(1.32)
Amount	0.320***	0.338***	-0.024	0.324***	0.323***
	(11.14)	(12.39)	(-0.30)	(11.34)	(11.33)
Covenant	0.010	0.046	-0.162	0.009	0.014
	(0.16)	(0.75)	(-0.42)	(0.14)	(0.21)
FE	year × month, firm	year × month, firm	year × month, firm	year × month, firm	year × month, firm
Observations	7,574	6,993	387	7,574	7,574

Adj. R-squared	0.637	0.670	0.788	0.645	0.640

Appendix

Table A.1

Secured Spread Using Mergent FISD Bond Sample: Robustness (year × qtr)

This table reports the results of OLS regressions relating bond spreads to the presence of secured interest in the bond over the 1980 to 2018 time period. The dependent variable is the yield difference at issuance between a bond and maturity-matched treasury. Secured is a dummy that takes the value of one if a bond is secured, and zero otherwise. The regressions also control for seniority status, maturity, callability, issuance amount, and the presence of a covenant in the bond contract. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm, and t-statistics are reported below the coefficients in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)
Secured	59.969***	55.885***	-48.664***
	(7.24)	(8.21)	(-3.53)
Senior	-104.477***	-37.680***	-65.986***
	(-7.52)	(-4.38)	(-4.97)
Maturity	-4.278***	1.005***	2.137***
	(-16.16)	(10.14)	(21.86)
Callable	79.413***	12.083***	13.556
	(10.21)	(2.76)	(1.32)
Amount	1.535	2.373***	2.123***
	(0.78)	(3.48)	(3.57)
Covenant	-133.949***	-23.252***	-8.210
	(-24.63)	(-6.75)	(-1.36)
Fixed Effects	year × month	year × month, firm	year × month, firm × year × qtr
Observations	30,041	27,229	16,087
Adj. R-squared	0.400	0.828	0.953