THE SECURED CREDIT PREMIUM AND THE ISSUANCE OF SECURED DEBT

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ABSTRACT

Credit spreads for secured debt issuances are lower than for unsecured debt issuances, especially when a firm's credit quality deteriorates, the economy slows, or average credit spreads widen. Yet healthy firms tend to be reluctant to issue secured debt when other forms of financing are available, as we demonstrate with an analysis of security issuance over time and in particular around the COVID-19 pandemic shock in the United States in early 2020. We find that for firms that are rated below-investment grade and that have few alternative sources of financing in difficult times, the likelihood of secured debt issuance is positively correlated with the premium associated with secured debt. It is uncorrelated for firms that are investment grade. This pattern of issue behavior is consistent with firms seeing unencumbered collateral as a form of insurance, to be used only in extremis.

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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] In this paper, we attempt to understand the use of secured debt better by analyzing both the pricing as well as the issuance of secured debt. By how much do borrowers lower their cost of debt financing if they use secured debt? What role do assets play in the pricing of secured debt? Under what circumstances and for what firms is securing debt especially valued? Do we see greater security issuance under those circumstances? By whom?

Estimating the effect of security in credit spreads has proven to be challenging. The difficulty derives from the circumstances under which secured debt is issued. Since riskier firms will offer security at riskier times, a comparison across firms of rates offered by secured debt issuances versus rates offered by unsecured debt issuances, or by the same firm over time, will tend to find higher rates for secured debt issuances (see the discussion in Berger and Udell (1990, 1995), John, Lynch, and Puri (2003)).[2] The way to deal with this selection problem is to compare yields on secured and unsecured debt issued at the same time by the same firm (see Berger, Frame, and Ioannidou (2016)). We use three different data sets and variations of this identification strategy to get at the true pricing of secured debt, stripped as best as possible of the selection problem.

Having estimated the *secured premium* (the difference at a point in time between the yield of unsecured debt issued by a firm and the yield of its secured debt) both across firms and over time for large dataset of bonds and loans issued by large U.S. firms, we attempt to understand its determinants, as well as use the measured secured premium to explain who issues secured debt, when, and why.

We show that, across firms, the secured premium is lower when the firm is large, has low leverage, and a substantial portion of its assets are tangible. The intuition seems straightforward: the lender will not give up much interest rate spread for protection through security in bankruptcy if she is confident bankruptcy is a low probability event or she will come out whole anyway because asset values will not get eroded. Relatedly, we find that for investment grade firms, creditors pay little for the added protection afforded by security, whereas for below-investment grade firms, they pay a lot. Yields on bonds issued by investment grade firms (those with an S&P rating of BBB− or better) are roughly 2 basis points lower when secured, whereas this secured premium jumps to 55 basis points for a firm having a below-investment grade rating. Similarly, implied yields from bond trades in the secondary market suggest that investors are willing to give up almost 129 basis points in spread for the added protection of security for below-investment grade

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[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).

[2] 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.

issuers, whereas securing debt lowers the traded spreads by insignificant amounts in the case of investment grade issuers.

Two recent papers take somewhat polar views of the role of security and assets. Lian and Ma (2021) differentiate between asset-based debt (where debt is secured by specific assets) and cash flow-based debt (where debt is unsecured, or secured by a blanket lien on assets). They argue that the former is debt where repayment is supported by the liquidation value of assets (and hence more asset-dependent), while the latter is debt sustained by the going concern value. Interestingly, we find the secured premium for both forms of secured debt (that is, the spread on asset-based secured vs unsecured, and the spread on cash flow-based secured vs unsecured) is positive and significant, with asset-based debt having 19 basis points higher secured premium than cash-flow based secured debt when both are issued in the same loan package. The protection provided by assets (either specific assets or a blanket lien) is thus important in both forms of debt, at least in supporting repayment.

Rampini and Viswanathan (2020) place more importance on assets in supporting repayment, but argue that securing debt with specific assets is less important if a firm has significant unencumbered tangible assets. We do find the secured premium is much lower when a firm has significant unencumbered tangible assets, highlighting the role of unencumbered assets in supporting unsecured debt. For example, among below-investment-grade firms, firms with above-median unencumbered tangibility (that is, net plant, property, and equipment –less secured debt scaled by total assets) have 99 basis points lower secured premium compared to firms with below-median unencumbered tangibility.

Moving from the cross-section to time-series variation, we find that as a firm's credit quality deteriorates, the secured premium increases. 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 bond (holding firm and other bond characteristics fixed). However, a transition from BBB to BB, from BB to B, and from B to CCC increases the secured premium by an *additional* 92 basis points, 21 basis points, and 131 basis points respectively, highlighting the contingent importance of security. We also find that the secured premium is higher when conditions in credit markets deteriorate (proxied by the Baa-Aaa spread). Moreover, most of the time-series variation in the secured premium is driven by the behavior of spreads of below-investment-grade firms.

Turning to debt issuance, we find that secured bond issuance by below-investment grade firms increases as credit market health (as reflected in the Baa–Aaa spread) deteriorates. A one standard deviation increase in Baa–Aaa spread increases the probability of issuance of secured bond by below-investment grade firms by an additional 5.2 percentage points. So creditors seem to value security more when offered by higher credit risk firms in situations of systemic financial stress. For investment grade firms, however, we do not find any increase in secured bond issuance when financial conditions deteriorate. More generally,

such firms issue very little secured debt: Benmelech et al. (2021) show that for each of the investment grade rating categories BBB- and above, the median firm issues no secured debt, and the mean is only 3 percent of debt for the lowest rating category, BBB-.

Finally, an increase in our monthly measure of secured premium is associated with an increase in the likelihood of secured debt issuance by below-investment grade firms, even after the inclusion of other measures of tightness in credit markets such as the Baa-Aaa spread. A hundred basis points increase in our monthly measure of secured premium is associated with a 3.2 percentage point increase in the chances that a bond issuance will be secured, which is a 11.9% increase from the unconditional probability of 0.27. On the other hand, secured debt issuance by investment grade firms is not correlated with the secured premium.

Why is the secured debt issuance of investment grade firms uncorrelated with the secured premium, and why, more generally, do such firms not issue secured bonds? In a world with agency problems, levered firms should positively want to issue secured debt to reduce agency problems (Stulz and Johnson (1985)) and even to dilute prior debt (Donaldson, Gromb and Piacentino (2019a)). In a world with asymmetric information, secured debt is higher on the Pecking Order than unsecured debt. If so, following Myers and Majluf (1984), firms should exhaust their secured debt capacity before turning to more junior claims. Why don't they?

As Acharya, Almeida, and Campello (2007), Bjerre (1999), Rampini and Viswanathan (2010, 2013), and Schwarcz (1997) suggest, the Myers and Majluf argument makes sense in a one shot static model of investment financing. In a more dynamic model, using up slack today may impede profitable investment tomorrow. Following Rampini and Viswanathan (2010, 2013), unused collateral is a form of slack or insurance that investment grade firms like to preserve if they can issue other forms of debt. Collateral will come in use when unexpected adverse shocks hit– for example, when a mature poorly-performing firm is trying to avert costly bankruptcy. Indeed Li, Whited, and Wu (2016) estimate a structural model based on this idea (of insuring against future quantity constraints) to suggest that the estimated benefits of a firm retaining flexibility in its ability to issue more debt (that is, stay a safe distance from the quantity constraint) is on par with the tax advantages associated with debt. Following this line of argument, investment grade firms may not issue much secured debt because of the high value they perceive to preserving collateral slack and the associated financial flexibility.

Such an explanation is consistent with the corporate and market responses to the unexpected pandemic shock, which hit US firms and financial markets in March 2020. Prior to the massive U.S. Federal Reserve intervention on March 23, 2020, all manner of risk spreads blew out. Investment grade firms, however, issued enormous amounts of unsecured bonds in March, April, and May, even though unsecured bond spreads had increased substantially. Only a relatively small portion of their issuances were secured bonds. Interestingly, the secured premium for investment grade bonds did not move much over this episode, while

it increased significantly in magnitude for below-investment grade firms during the period of extreme stress, and then declined slowly as financial conditions eased after the Fed intervention.

Below-investment grade firms issued very few bonds in March – in contrast to investment grade firms. They resumed issuance in April, but even so primarily issued secured bonds. As financial conditions eased in May and June, the fraction of secured bonds issued decreased. We find that firms that did issue secured debt over this period had significantly lower outstanding secured debt on their balance sheet than secured-debt-issuing firms in the past – their collateral slack did come in handy.

One example of a troubled firm that benefited from spare collateral is Carnival Corporation, which operates cruise lines. Carnival had an investment grade rating before the pandemic hit, but was bleeding $1 billion of cash a month as cruise bookings fell off a cliff. A downgrade was imminent as the pandemic's consequences became apparent, and indeed Carnival was downgraded in June 2020 below investment grade, and fell a few further notches subsequently. However, in April 2020, it managed a sale of $4 billion of bonds, backed by $28 billion of its ships. The Financial Times wrote, "Carnival had so much freedom to pledge its assets because its investment-grade rating meant it was previously able to borrow freely on an unsecured basis."[3] As we write in July 2021, Carnival has managed to avoid bankruptcy, in large part because of its collateral slack.

The natural conclusion from all this is that unsecured bond markets shut down for below-investment grade firms as the pandemic hit, so they had to resort to secured bond issuances in order to obtain funding. The ability to access such funding in times of stress was a lifeline, which enabled them to make high value-added investments -- such as avoiding costly bankruptcy. If unencumbered collateral is a lifeline in bad times for stressed firms, it would suggest why investment grade firms prefer to keep collateral unimpaired by issuing unsecured debt so long as they have access. In other words, untapped collateral is slack.

Finally, it is interesting to understand the low secured spread for investment grade firms. One argument is that it is low because their probability of bankruptcy is low. Yet when the probability of financial stress shot up even for investment grade firms in the early days of the pandemic, as reflected in the significant run up in the yield of their unsecured bonds, their secured spread barely budged. The reason is that, roughly speaking, the secured spread is proportional to the product of the probability of default and the difference between the loss given default of today's unsecured bond and the loss given default of today's secured bond (we make this more precise later). For an investment grade firm today, with plenty of unencumbered assets, today's unsecured bond can demand and get collateral as adverse contingencies arise. So the prospective loss given default between today's unsecured bond and today's secured bond is small,

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[3] "Why Cruise Ship Backed Bonds Drew $ 17 billion of demand", Financial Times, April 7, 2020, https://www.ft.com/content/d85cf0bc-1c6b-4680-bee3-b32eb9c598f9

which may explain the low secured premium even as the probability of default moves up. In contrast, for a lower rated firm that has already encumbered much of its collateral, today's unsecured bond will find it much harder to become secured as adverse contingencies pile up, which may explain both the high secured premium, as well as the difficulty of issuing anything but secured debt if the secured premium rises.

There is a large literature attempting to explain the value of collateral. Most directly related, Berger, Frame, and Ioannidou (2016) use Bolivian banking data, and include firm $\times$ bank $\times$ time fixed effects to isolate the effects of securing a loan (so they identify off a borrower obtaining secured and unsecured loans from the same bank in a month). They find a positive secured premium of 60 basis points, which is similar in order of magnitude to the secured premium we find. Interestingly, their sample of Bolivian loans does not seem to suffer from the selection problem that is central to the U.S. loan and bond datasets we study and which our empirical methodology addresses—the unconditional correlation between loan spread and collateral in Berger, Frame, and Ioannidou's sample is negative and the baseline regression result that does not attempt to address the selection problem leads to a similar estimate of the secured premium as the fully saturated model that includes firm $\times$ bank $\times$ time fixed effects. In contrast, for the broad sample of loans and bonds in the U.S. that we study, we show that controlling for selection is important.

Cerquiera, Ongenga, and Roszbach (2016) identify the value of securing debt from a natural experiment in Sweden in 2004, where the authorities introduced legal changes that reduced the value of floating liens – so identification is from changes over time around the exogenous legal change. Faced with less effective collateral, the lenders increased interest rates, and monitored less frequently (consistent with a loss of lender enforcement power when the lender has less collateral). In response, borrowers seemed to become more lax, missing payments to tax authorities and other lenders more frequently.

Schwert (2020) and Luck and Santos (2021) use a similar identification method to Berger et al. (2016), as we do, but have a different focus. Schwert's objective is to isolate the premium in bank lending, relative to the bond-implied credit spread. He finds it is higher than would be suggested by a competitive bank loan market. Like us, Schwert also estimates the secured premium for bonds, though the focus of his paper is not on the determinants of the secured premium and its link with secured debt issuance. Luck and Santos (2021) estimate the secured premium for bank loans in the United States, focusing on the spread associated with different types of collateral – marketable securities have a higher secured premium than accounts receivable or inventory, which in turn trumps real estate. They too find little or no spread for large, publicly listed firms. Our primary contribution relative to all these papers is to use the measured secured premium both across firms and over time to explain who issues secured debt, when, and why.

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. We add to this literature as well by documenting the behavior of secured debt and show that security is also priced in public debt issuances. We also offer an explanation for the reluctance of highly rated firms to issue secured debt.

The paper is organized as follows. Section I outlines our identification strategy and describes the data sets used. Section II reports estimates of the secured premium. Section III investigates how the secured premium varies with firms' characteristics and risk. Section IV investigates the role that the nature of collateral and assets play in determining the secured premium, thus taking recent theories to data. Section V examines the behavior of the secured premium and issuance over the business cycle, and analyzes the correlations of issuances with the secured premium. In Section VI we discuss theoretical explanations for why secured debt is used so sparingly by investment grade firms, and provide supportive evidence from pandemic issuances. We conclude in Section VII.

I.   Data and Empirical Strategy to Measure Secured Premium

Let us start by describing the identification strategy for measuring the secured premium, and show that with the appropriate identification strategy, it is indeed positive, both for bank loans and for bonds.

A. Identification Strategy

The difficulty in identifying the effects of security on debt yields stems from the circumstances under which it is offered – that riskier firms will offer security at riskier times (see, for example, Berger and Udell (1990)). This introduces a selection problem that makes it difficult to measure the effect of security on 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 credit spreads and whether debt is secured, despite attempting to control for issuer quality (see the extensive discussion in Berger, et al. (2016)).

To address the selection problem, our identification strategy attempts to compare spreads on secured and unsecured credit of the *same firm* and at the *same point in time*. We estimate the following regression specification:

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

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. Our primary interest is in $-\beta$, which we term the *secured premium*, or the extent to which securing credit reduces the yield spread. 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. 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.

Clearly, we are not the first to address the selection problem in measuring the secured premium. Cerquiero et al. (2016) examine how spreads charged by a bank to existing borrowers change when loans are repriced following a change in laws governing collateral's use – in a sense they use the time variation in spreads following an exogenous change in the laws to estimate the value of securing a loan. Berger et al. (2016) is an early paper using the technique we use – of examining the spread between secured and unsecured debt of the same borrower at the same point in time. As indicated in the introduction, though, our focus is on using the measured secured premium both across firms and over time to explain who issues secured debt, when, and why.

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 1994-2018 time period.[4] The basic unit of observation in DealScan is a loan facility. Multiple loan facilities are often part of a single deal (or package).[5] The data contain information on the different attributes of a loan facility, such as the amount, promised yield, maturity, security, and seniority. What is important here is that the same loan deal may contain both a secured facility and an unsecured facility.

We apply three filters to the DealScan data. First, we restrict our analysis to dollar-denominated loans granted to nonfinancial U.S. firms.[6] 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.[7] 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-

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[4] Chava and Roberts (2008) also restrict their analysis to the time period beginning 1994.

[5] According to Sufi (2007): "… 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".

[6] We drop financial firms (SIC codes 6000–6999) and government agencies (SIC codes 9000–9999).

[7] This ensures that the 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.

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 bonds. Although the Mergent data set also includes bonds issued before the 1980s, comprehensive coverage for our purposes starts around 1980. 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 "1st."

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 the bond maturity to be available. Spread is calculated as the yield spread at issuance over the maturity-matched treasury bond (see Gurkaynak, Sack and Wright (2007)). 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 all the secured bonds), 67% are callable, and 40% have one or more covenants protecting bondholder interest.

We have issuer rating information for 22,541 bond issues. Below-IG is a dummy that takes the value of one if the issuing firm had a below-investment-grade rating (BB+ or lower) from S&P at the time of bond issuance. At the time of issuance, 24% had a below-investment-grade issuer rating.

D. TRACE Data

We supplement the issuance data with information on secondary bond trades from the TRACE database.[8] 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 the maturity-matched treasury. The mean (median) spread in our sample is 212 (142) basis points. Around 8% of observations are for secured bonds, 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. Below-IG is a dummy that takes the value of one if the issuing firm had a below-investment-grade rating (BB+ or lower) from S&P at the time of the secondary trade. We have issuer rating information for 2,777,603 observations. Of these, 21% are for bonds that had a below-investment-grade issuer rating. We augment trade data with information on firm characteristics from Compustat. Size is measured as the logarithm of the total value of the firm's assets in millions of dollars, Age is number of years since the firm's first entry in Compustat, ROA is calculated as operating income scaled by total assets, Leverage is total debt scaled by total assets, and Tangibility is net plant, property and equipment scaled by total assets.

II. Secured Debt Premium

We analyze the three data sets in turn, with each data set offering a slightly different view of the same issue – what effect security has on debt spreads.

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

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[8] Trade Reporting and Compliance Engine was introduced by FINRA in July 2002. All broker-dealers who are FINRA member firms have an obligation to report transactions in corporate bonds to TRACE under an SEC-approved set of rules.

unsecured loans by year of origination.[9] 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 increasing during the Great Recession. 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.[10] Starting with the main variable of interest, the coefficient on *Secured* suggests that the credit spread on 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 (Berger and Udell (1990), 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.

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 – more fully by estimating the differential effect of security on loan spread after 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. In total, there are 285 observations where the same loan package contains at least one secured and one

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[9] 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.

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

unsecured loan facility. 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.[11] 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 premium (of 72 basis points) is larger 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 mean 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 is associated with a 7 basis point lower spread.

B. Mergent Bond Issuance

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, we turn to examine the secured credit spread in the corporate bond market, which should complement our analysis of secured credit spread in bank loans. Moreover, the Mergent sample 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.

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[11] 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.

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). 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 final 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 secured premium is, on average, 35.2 basis points. This is 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 48.7 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, on average, is not strongly correlated with

changes in firm quality over time. Later, we will argue that the picture is different when we focus only on below-investment grade firms.

The coefficient on *Maturity* in column (1) suggests that a one standard deviation increase in a bond's maturity is associated with a 34 basis points lower spread. 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 suggesting 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 is associated with a 16 basis points higher spread. 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 non-callable 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 is associated with a 1.6 basis points increase in spread.

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 the spread reduction associated with them in Table III, column (3) is insignifcant.

C. TRACE Secondary Market Bond Trades

One concern with the analysis so far is that only a small number of firms issue both secured and unsecured debt at the same time. To check whether the estimates obtained from this small sample are representative of the secured premium, 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 firms 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.

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

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 bonds that were 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, on average, 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 all subsequent analysis of TRACE data, we will use the model correcting for firm × time fixed effects. The important take away is that the secured premium, as measured from a larger data set of traded bonds, is on average similar to the secured premium as measured from bond issuance data and loan issuance data.

III. Firm Characteristics and Secured Premium

What are the determinants of the secured premium? There is a vast literature, which we do not have the space to go into, explaining why the secured premium may be higher for riskier firms (see, for example, Berger et al. (2016), Benmelech et al. (2021), or Mann (1997) for overviews). For instance, security may establish a debt claim's priority in bankruptcy, avoiding debt holder conflicts – especially if there are limited hard assets to back debt (see Rampini and Viswanathan (2020)). It may allow the lender to focus their monitoring on the collateral. It may also give the lender more power over the borrower given the lender has some claims on the asset, especially if the borrower finds it hard to refinance elsewhere and pay off the interfering lender (see Mann (1997) or Diamond et al. (forthcoming)).

In this section, we begin by focusing on firm characteristics that might potentially be associated with credit risk, and thus with the secured premium. Then we examine the association between direct measures of a firm's credit risk and the secured premium. In the next section, we explore two recent theories of debt and examine what light the secured premium can shed on them.

A. Firm Characteristics and the Secured Premium

We estimate the following regression specification using TRACE data on secondary market prices for bonds:

$$spread_{i,j,t} = \alpha * secured_{i,j,t} + \beta * secured_{i,j,t} * Z_{j,t-1} + \theta X_{i,j,t} + \delta_{j,t} + \varepsilon_{i,j,t}, \qquad (2)$$

where $spread_{i,j,t}$ is the spread for bond i of firm j at time t. The variable $secured_{i,j,t}$ is a dummy that equals one if bond i is secured, and zero otherwise. $Z_{j,t-1}$ is a vector of firm characteristics measured during the quarter before a trade. The variable $X_{i,j,t}$ controls for bond characteristics, while $\delta_{j,t}$ represents firm $\times$ year $\times$ month fixed effects. Note that the direct effect of firm characteristics gets absorbed in firm $\times$ year $\times$ month fixed effects. The key coefficient of interest is β that measures the (-ve) change in the secured premium for a unit change in firm characteristics.

We report the results of this analysis in Table V, where in columns (1)-(5) we interact one firm characteristics at a time; firm size, firm age, profitability, leverage, and tangibility, while in column (6) we include all the interactions together. Recollect *size* is measured as the log of the total value of firm assets in millions of dollars, *age* is number of years since the firm's first entry in Compustat, *ROA* is calculated as operating income divided by total assets, *leverage* is total book debt divided by total assets, and *tangibility* is the proportion of property, plant, and equipment to total assets.[12]

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[12] We winsorize these variables at the 1st and 99th percentiles.

For brevity, we will only discuss the estimates in column (6). The coefficient on *size* interacted with *secured* is positive and statistically significant, suggesting that the benefit from pledging security is decreasing in firm size (the baseline coefficient on *secured* is negative). A one standard deviation increase in firm *size* is associated with a reduction in the spread gap between unsecured and secured bond of 50 bps. The coefficients on the interaction term of *secured* with firm *age* is negative – perhaps the varying age of assets in older firms enhances the value of being secured by a specific asset. The interaction with *ROA* is not statistically significant. The negative coefficient estimate on the interaction term between *secured* and *leverage* suggests that a one standard deviation increase in firm leverage is associated with a 43 basis points higher secured premium; security is particularly valuable for highly levered firms, where the probability of financial distress and the possibility of inter-creditor conflicts is higher. The coefficient on the *tangibility* interaction is positive, suggesting that firms with a greater proportion of tangible assets likely have a greater proportion of asset value preserved in bankruptcy, so creditors benefit less from being secured by specific assets – a one standard deviation increase in *tangibility* is associated with a 136 basis points lower spread gap. We will return to the result on tangibility in the next section.

Finally, we have included an indicator in all the regression specifications for whether a bond is senior. The missing category is therefore whether the bond is subordinate and unsecured. Senior bonds enjoy a 42 basis point lower spread than subordinate unsecured bonds.[13]

In sum, in firms that seem to have a lower probability of financial distress and that have assets that retain value in distress, creditors seem to place a lower valuation on securing their debt. Since these are all inputs into the credit ratings issued by rating agencies, we turn to those next.

B. Firm Credit Quality and Secured Debt Premium

We obtain issuer ratings from S&P Capital IQ and supplement them with senior unsecured ratings from Mergent. 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 premium at issuance for bonds issued by investment grade (S&P rating of BBB− or better) and below-investment-grade firms. We report the results of this analysis in Table VI, 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 and not statistically significant – suggesting that investment grade issuers do not find that securing debt reduces rates. On the other hand, the coefficient of *Secured* in the below-investment-grade subsample suggests that

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[13] Interestingly, the effect of seniority does not vary much with firm characteristics except leverage, unlike security (estimates available from the authors).

below-investment-grade issuers reduce their cost of debt by a statistically significant 55.3 basis points.[14] Similarly, columns (3) and (4) examine secured premium for investment grade and below-investment-grade issuers using TRACE, and they suggest a similar conclusion, with the coefficient for investment grade bonds small and insignificant, whereas the coefficient for below-investment-grade bonds is −129 basis points and significant at the 1% level.

Next, we exploit the richness of TRACE secondary trade data to further examine secured premium 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 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:

$$spread_{i,j,t} = \sum_{k=1}^{5} \beta_k * secured_{i,j,t} * rating\_group\_k_{j,t} + \theta X_{i,j,t} + \delta_{j,t} + \varepsilon_{i,j,t}, \quad (3)$$

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 3A, we plot the *negative* of the coefficients on the five secured dummies (β_k), representing secured premia for firms belonging to each of the rating categories.[15] As can be seen from the figure, collateralizing a bond does not seem to affect its credit spread until firm quality is BB+ and below. Spreads on secured bonds are 89 basis points lower than spreads on unsecured bonds for firms in the BB+ to BB− rating range. For firms in the lower quality ranges, the secured premium is higher still. In particular, spreads on secured bonds are almost 270 basis points lower than spreads on unsecured bonds for firms in the CCC+ to CCC− ratings range. In terms of statistical significance, the secured premium estimates for the first two ratings ranges are statistically indistinguishable from zero, whereas the estimates for the BB+ to BB−, B+ to B−, and the CCC+ to CCC− rating ranges are all statistically significant at the 1% level.

Next, we compare the secured premium 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,

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[14] Is it possible that firms that issue both secured and unsecured bonds within a short time span are different in quality from other secured issuers in our sample? After all, although 15% of bonds in our sample are secured, our tight identification of secured premium comes from the 706 observations in which the same firm issued both secured and unsecured bond in the same year. We look at the distribution of secured plus unsecured issuers (from whom our spread is identified) against the remaining secured issuers across rating buckets. The Pearson's chi-squared test cannot reject the null hypothesis that the distribution of firms in each of the two categories (only secured vs both secured and unsecured) was drawn from the same underlying data generating process.

[15] We define *secured premium* as the difference between the yield on an unsecured bond and the yield on a secured bond, and hence equals -β_k.

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:

$$spread_{i,j,t} = \alpha * secured_{i,j,t} + \beta * secured_{i,j,t} * worse\_rating\_group_{j,t} + \theta X_{i,j,t} + \delta_{j,t}$$
$$+ \varepsilon_{i,j,t}, \tag{4}$$

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, $-\alpha$ measures the secured premium for the higher rating group, whereas $-\beta$ measures the incremental secured premium 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 3B. The results suggest that as firms move from a BBB rating to a BB rating, the spread on secured bonds falls by an *additional* 92 basis points relative to the spread on unsecured bonds. The coefficient is statistically significant at the 1% level. Similarly, as firms move from a BB rating to a B rating in Figure 3B, the spread on secured bonds falls by an *additional* 21 basis points relative to the spread on unsecured bonds. Finally, as firms move from a B rating to a CCC rating, the spread on secured bonds falls by an *additional* 131 basis points relative to the spread on unsecured bonds. The coefficient is statistically significant at the 5% level. In contrast, the secured premium does not change incrementally as firm rating deteriorates from A to BBB.

C. Credit Quality and Secured Debt

The increase in secured premium with a deterioration in credit quality also seems associated with greater use of security. Benmelech, Kumar, and Rajan (2021) show that the ratio of secured debt to assets for firms in Compustat increases with default probability and for lower credit ratings—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 the result of Benmelech, Kumar, and Rajan (2021) in Figure 4, 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 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 a similar vein, Benmelech et al. (2021) show that for each of the rating categories BBB- and above, the median firm issues no secured

debt, and the mean is only 3 percent of debt for the lowest rating category, BBB-. We return to the question of why highly rated firms issue so little secured debt in section VI.

IV. The Secured Premium and Recent Theories of Secured Debt

Our measure of the secured premium offers us a tool to examine recent theories of debt and collateral, which we now do. We examine the reclassification of debt into cash flow-based debt and asset-based debt proposed by Lian and Ma (2021). We also examine the separation of assets into explicit collateral and implicit collateral proposed by Rampini and Viswanathan (2020).

A. Asset-based vs Cash Flow-based Secured premium

In a recent paper Lian and Ma (2021) distinguish between debt secured by specific assets (asset-based) and debt contracts that are based on cash flows (cash flow-based) – in their view, the key difference (also see Kermani and Ma (2020) and Ivashina, Laeven, and Moral-Benito (2020)) is how the debt is resolved in bankruptcy (as also its ability to enforce repayment in the normal course). Cash-flow-based debt is likely to be restructured in a Chapter-11 bankruptcy, while asset-based debt is likely to be resolved in a Chapter-7 liquidation, where the liquidation value of the assets matter. The authors provide substantial evidence that the quantum of cash flow-based debt firms take on is unrelated to asset liquidation values, while there is a strong positive correlation between asset-based debt issued and asset values.

We have shown thus far that investment grade firms issue very little secured debt, and the secured premium is small for them. This certainly is consistent with Lian and Ma's classification of their debt as cash flow based. More interesting for our analysis, is that Lian and Ma classify some secured debt as cash-flow-based debt. This allows us to measure and contrast secured premia for each type of debt.

For this part of the analysis, we use the Dealscan data which is detailed enough to facilitate the classification of debt into asset-backed and cash-flow-based (the Mergent bond issuance dataset does not contain a description of the security backing a secured bond). We follow Lian and Ma (2021) and classify cash flow-based secured loans as those that are secured by "substantially all assets" or have a "blanket lien". Similar to Lian and Ma (2021) we classify loans that are secured by specific assets as asset-based secured debt. Asset-based secured debt has a higher priority claim up to the liquidation value of the specific assets pledged as collateral to it. If the liquidation value falls short of the debt claim, the debt has an unsecured general claim (also called *deficiency claim*) on the firm for the remaining portion of the debt (see Gilson (2010), Lian and Ma (2021)).[16] Cash flow-based secured debt has priority over the restructured value of the firm (minus the liquidation value of specific assets pledged to asset-based debt). Given neither has effective priority over the other when the liquidation value of specific assets is insufficient to repay the asset-based

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[16] The liquidation value is estimated in Chapter 11 when the firm does not actually liquidate.

secured debt, which of these two has a higher secured premium is an open empirical question. We initially estimate the following regression specification:

$$spread_{i,j} = \beta * secured_{i,j} + \gamma * assetbased\ secured_{i,j} + \theta X_{i,j} + \delta_j + \varepsilon_{i,j}, \quad (5)$$

where $spread_{i,j}$ is the spread at issuance for loan facility i of package j. The variable $secured_{i,j}$ is a dummy that equals one if loan facility i is secured, and zero otherwise. The variable $asset\ based\ secured_{i,j}$ is a dummy variable that equals one if loan facility i is asset-based secured, and zero otherwise. The variable $X_{i,j}$ controls for facility characteristics, while δ_j represents package fixed effects. In this regression, $-\beta$ measures the secured premium for cash flow-based secured debt, whereas the coefficient $-\gamma$ measures the incremental secured premium for asset-based secured debt compared to cash flow-based secured debt. We report the results of this analysis in Table VII.

The coefficient on *secured* in column (1) is -55.5 and is statistically significant at the 1% confidence level. So a cash flow-based secured loan has a 55.5 bps secured premium relative to an otherwise similar unsecured loan. The coefficient estimate on *asset-based secured* suggest that an asset-based secured loan has an additional 25.4 bps premium over the cash flow-based secured loan (the estimate is statistically significant at the 1% confidence level).

Of course, there is selection in who issues what form of debt. The secured premium for cash flow-based debt in column (1) is estimated from loan packages that contain both an unsecured facility and a cash flow-based secured facility, while the secured premium for asset-based debt is estimated from loan packages that contain both an unsecured facility and an asset-based secured facility. To the extent that asset-based issuers are different from cash flow-based issuers, and if the two types of secured debt are issued at different times, the direct comparison of the two secured premiums potentially suffers from a selection problem.

Fortunately for our estimation, there are cases where both cash flow-based secured debt as well as asset-based secured debt are issued at the same time by the same firm. To control for the potential selection we repeat our analysis for a subsample of loan packages that contain both asset-based and cash flow-based secured facilities in the *same* package and report the results in column (2). We drop unsecured facilities in this analysis. The coefficient on asset-based secured suggests such loans have a secured premium that is 18.9 bps higher than an otherwise similar cash flow-based secured loan, and this estimate is statistically significant at the 1% confidence level. This suggests that in a given firm, asset-based secured debt has effectively higher priority in repayment than cash flow based secured debt.

If the security description is not available or is not clear enough, Lian and Ma (2021) classify all secured lines of credit as asset-based while all secured term loans are cash flow-based. To check this does not drive our results, we repeat the analysis of column (2) for a subset of facilities where the description of the security can clearly identify a secured loan as either asset-based or cash flow-based. We report the results in column

(3). Once again, the secured premium for asset-based secured facilities is 37.7 bps higher than the premium for cash flow-based secured facilities *within the same* loan package.

Finally, and conscious of potential selection problems, we estimate the secured premium of cash flow-based secured debt in packages that do not have asset-based secured debt, and the secured premium of asset-based secured debt in packages that do not contain cash flow-based secured debt. Intriguingly, the premium in the former case is 55 basis points and in the latter it is 48 basis points (see Table A.2 in the online appendix). So comparing cases where the secured debt issued is "pure" and not contaminated by other debt that may have effectively higher priority, the secured premia are nearly equal, with the secured premium for cash flow based debt, if anything, slightly higher.

The bottom line is that the secured premium is significant regardless of the type of debt issued (cash flow-based or asset-based) – at the minimum, the value of assets establishes debt's higher priority. Asset-based debt seems to have higher value from security when both forms of debt are issued simultaneously, though cash-flow-based debt also benefits from being secured by assets. When issued separately, both seem to benefit approximately equally by being secured. The implications for the theories of asset-based versus cash-flow--based debt are left to future research.

B. Asset Tangibility and the Secured premium

Rampini and Viswanathan (2020) argue for distinguishing underlying asset value or collateral from whether debt is secured by specific assets. While secured debt is explicitly linked to specific collateral, unsecured debt is a claim against unencumbered assets and hence implicitly collateralized. They argue that explicit collateralization of secured debt enables firms to increase their leverage (for some of the reasons discussed earlier in explaining the secured premium), however the quantum of the firm's collateralizable assets determines the amount of unsecured debt it can support as well. In a sense, Rampini and Viswanathan (2020) place much greater emphasis on the importance of assets in supporting debt relative to Lian and Ma (2021).

One implication of Rampini and Viswanathan (2020) is that the *secured premium* will depend on the amount of tangible assets – and in particular *unencumbered* tangible assets that the firm has. Such assets will raise recovery rates on unsecured debt and reduce the secured premium. In Table VIII, we report the results from estimating regressions similar to those in Table VI using TRACE data on secondary market prices for bonds. The dependent variable is the spread for bond i of firm j at time t. The explanatory variables include a dummy that equals one if bond i is secured, and zero otherwise, and a vector of bond characteristics which include: seniority, maturity, whether the bond is callable, bond issuance amount and presence of one or more covenants designed to protect bondholders.

Given the results documented in Table VI we begin our analysis by splitting the sample between investment grade and below-investment grade issuers. Next, within each group we further split based on tangibility - net plant, property and equipment divided by total assets. We classify firms as *low tangibility* if their ratio of net plant, property and equipment to total assets is below the median of 26.7% for investment grade issuers and the median of 43.3% for below-investment grade issuers. They are *high tangibility* if their tangibility is above the median. As columns (1) and (2) of Panel A of Table VIII show, and consistent with the results in Table VI, the *secured* dummy is insignificant both economically and statistically for firms that are rated as investment grade; security does not lower the cost of debt, regardless of the share of tangible assets in their balance-sheets. In columns (3) and (4) we focus on bonds issued by below-investment grade firms. As column (3) suggests, the secured premium is a huge 259.1 for firms below the median tangibility, compared to 59.5 for firms of above median tangibility (both coefficients are statistically significant at the 1 percent level).

In columns (5) and (6) we test whether the differential effects of security of low and high tangibility firms are statistically different from each other. We split the sample based on investment-grade and interact *secured* with *high tangibility* – a dummy variable that takes the value of one for firms with above median tangibility, and zero otherwise. Note that the direct effect of a firm belonging to the high tangibility group is absorbed by firm × year × month fixed effects. The results in columns (5) and (6) confirm that *implicit collateral* – or tangible assets play an important role in the pricing of unsecured debt of below-investment grade firms. The higher they are, the lower the secured premium. We do not see a similar effect for investment grade firms.

As a sharper test of Rampini and Viswanathan (2020), we repeat the analysis in Panel B after replacing *tangibility* with *unpledged tangibility* which we define as (net PPE – secured debt)/ total assets. That is, our measure of *unpledged tangibility* captures the unencumbered tangible assets as a fraction of total assets and hence are effectively *implicit collateral* for unsecured debt. The median value of unpledged tangibility is 23.1% for investment grade issuers and 28.8% for below-investment grade issuers. Columns (1) through (6) of Panel B repeat the analysis in the six columns of Panel A and suggest a very similar pattern – unpledged tangibility serves as *implicit collateral* for unsecured debt, and lowers the secured premium for below-investment grade firms, as suggested by Rampini and Viswanathan (2020). We will use the insights we have just obtained into the secured premium shortly.

V. Secured Debt and the Business Cycle

We have seen the secured premium increases as a firm's credit quality declines. We now examine the behavior of the secured premium over the business cycle, and relatedly, the issuance of secured debt

over the cycle. We would expect more issuance as economic and financing conditions deteriorate, especially by below-investment-grade firms. We would also expect issuance to be correlated with the secured premium, which we will check.

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

We use Mergent's bond issuance data as well as TRACE secondary bond trade data to examine how the secured premium changes over the business cycle. We estimate the following regression specification separately for investment grade and below-investment grade firms:

$$spread_{i,j,t} = \alpha * secured_{i,j,t} + \beta * secured_{i,j,t} * business\_conditions_t + \theta X_{i,j,t} + \delta_{j,t}$$
$$+ \varepsilon_{i,j,t}, \tag{6}$$

where $spread_{i,j,t}$ is the spread for bond i of firm j at time t. The results of this analysis are presented in Panel A of Table IX. The first two columns report results from analyzing Mergent bond issuance data. In column (1), we examine how secured bond premium varies with the Baa–Aaa credit spread for investment grade firms. Note that the direct effect of monthly credit spread on bond premium gets absorbed by year × month fixed effects. The key variable of interest is the interaction term *Secured × Baa–Aaa spread*. The coefficient on the interaction term is small and statistically indistinguishable from zero, suggesting that market conditions do not affect the secured premium for investment grade firms.

In column (2), we examine how secured bond premium varies with the Baa–Aaa credit spread for below-investment grade firms. The coefficient on the interaction 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 increases the secured premium by an additional 23 basis points.

We find similar results using secondary trade data from TRACE in columns (3) and (4). For investment grade firms, the coefficient on the interaction term in column (3) is small and statistically insignificant, whereas for below investment grade firms the coefficient on the interaction term in column (4) suggests that secured premium increases by an additional 27 basis points for a one standard deviation increase in the Baa–Aaa spread.

B. Secured Debt Issuance and the Business Cycle

We next examine cyclical pattern in the issuance of secured debt. Using the Mergent bond issuance data, we estimate the following regression for the period 1980 to 2018:

$$secured\ issuance_{i,j,t} = \beta * business\_conditions_t + \gamma * NonIG_{j,t} * business\_conditions_t$$
$$+ \theta X_{j,t} + \delta_j + \varepsilon_{i,j,t}, \tag{7}$$

where $secured\ issuance_{i,j,t}$ is an indicator variable that equals one if bond i of firm j issued at time t is secured, and zero otherwise. Business condition is proxied by the Baa–Aaa credit spread – a commonly used measure of financial conditions. $NonIG_{j,t}$ is a dummy that equals one if the firm has a below-investment-grade ratings, and zero otherwise. The variable $X_{j,t}$ controls for time-varying firm characteristics such as credit rating. Finally, δ_j represents firm fixed effects to account for time-invariant firm heterogeneity.

We report the results of this analysis in Panel B of Table IX. The coefficient on Baa-Aaa spread in column (1) is small and statistically insignificant, suggesting that investment grade firms do not base their choice of secured vs unsecured issuance on market conditions. The coefficient on the interaction term, Below-IG × Baa-Aaa spread, is 0.148 and statistically significant at the 1% level. The coefficient suggests that one standard deviation increase in Baa-Aaa spread increases the probability of secured issuance by a below-investment grade firm by an additional 5.2 percentage points (compared to investment grade issuers) – a 23.7% increase from the unconditional probability of 0.219.

In column (2), the dependent variable is the dollar share of secured bond in aggregate monthly bond issuances, calculated separately for investment and below-investment grade issuers each month. The result paints a similar picture. The coefficient on the interaction term in column (2) suggests that one standard deviation increase in Baa-Aaa spread increases the secured share for below-investment grade firms by an additional 3.6 percentage points (compared to investment grade issuers) – a 14.4% increase from its unconditional mean of 0.253. Overall, our analysis suggests that secured bond issuance is countercyclical for below-investment grade firms. Interestingly, investment grade firms' issuance choices do not seem to be influenced by business conditions. We will suggest an explanation of all this in the next section. The main takeaway from this analysis is that collateral becomes more valuable as business conditions deteriorate – low rated 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.

C.   The Issuance Decision and the Secured Premium

Finally, in Table X we verify the obvious next step: whether secured issuances are correlated with the magnitude of the secured premium. We estimate the following regression specification:

$$secured\ issuance_{i,j,t} = \beta * secured\ spread_t + \gamma Z_{j,t} + \delta_j + \varepsilon_{i,j,t}, \tag{8}$$

where $secured\ issuance_{i,j,t}$ is an indicator variable that equals one if bond i of firm j issued at time t is secured, and zero otherwise. The variable $secured\ spread_t$ represents the monthly estimates of secured premium, obtained by running regression Eq. (1) using the TRACE bond trading data. To avoid simultaneity bias, we drop bonds issued in a month in the estimation of that month's secured premium. The

variable $Z_{j,t}$ controls for time-varying firm characteristics such as credit rating. Finally, δ_j represents firm fixed effects to account for time-invariant firm heterogeneity.

In Panel A, we look at the secured issuances of the sample of firms that are below-IG. The coefficient on secured premium in column (1) is positive and statistically significant at the 1% confidence level. The coefficient suggests that a 100 basis points increase in secured premium is associated with a 4.3 percentage point increase in the chances that a bond issuance will be secured – a 15.9% increase from the unconditional probability of 0.27. The inclusion of ratings fixed effects in column (2) yields similar results, suggesting that holding a firm's fundamentals constant, an increase in secured premiums is associated with a firm tapping its secured debt capacity and issuing a secured bond.

While we view our secured premium measure as specifically measuring market's preference for security as financial conditions change over time, it is possible that the variation in secured premium has no additional information beyond simple measures of credit conditions such as the Baa-Aaa credit spread. In column (3), we include the Baa-Aaa credit spread measure as an additional control and continue to find an economically strong and statistically significant effect of secured premium on secured bond issuance choice. Similarly, in column (4), we use information from Senior Loan Officer Opinion Survey to control for tightening standards for commercial and industrial loans to large and middle-market firms. We continue to find a strong effect of our secured premium measure in influencing firm's choice of secured vs unsecured bond issuance. Finally, we include real GDP growth rate in column (5) to control of underlying economic conditions and continue to find that secured premium can independently explain speculative grade firms' choice of secured vs unsecured bond issuances.

In Panel B, we repeat the same analysis for investment grade issuers. The coefficients on secured premium in all five specifications are small and statistically indistinguishable from zero, suggesting that investment grade borrowers do not base their issuance decision on the secured premium in the market.

VI. Why Do Investment Grade Firms Use Secured Debt Sparingly?

We have documented that the magnitude of the secured premium is larger for riskier firms, grows as firms get closer to distress, and increases in business cycle downturns. We also find that firms tend to issue secured debt when they have low ratings and in business cycle downturns – that is, when the economy is doing badly. So firms issue secured debt when the secured premium increases following a rise in the probability of default. Perhaps the low probability of default explains why investment grade firms do not issue secured debt and why their issuance decision seems relatively impervious to the secured premium.

But if backing a bond with collateral reduces bond spreads appropriately, there is no obvious reason why secured bonds should be issued only when the probability of default rises. In a Modigliani Miller

world, firms should be indifferent as to when they issue secured debt. In a world with agency problems, levered firms should positively want to issue secured debt to reduce agency problems (Stulz and Johnson (1985)) and even to dilute prior debt (Donaldson, Gromb and Piacentino (2019a)). In a world with asymmetric information, secured debt is higher on the Pecking Order than unsecured debt. If so, following Myers and Majluf (1984), firms should exhaust their secured debt capacity before turning to more junior claims. Why don't they? What is the countervailing cost that makes them reluctant to issue?

Recall first that the secured premium for investment grade bonds is small on average (see Table VI). Perhaps investment grade issuers find the fixed costs of issuing secured debt exceeds the small saving in spread. While there may indeed be costs of appraising or registering collateral, it is small relative to the size of bond issues, especially for investment grade firms (see Mann (1997)). It is hard to imagine that it would be sufficient to deter firms from choosing a cheaper form of finance.

In sum, dominant theoretical arguments based on static models of agency and asymmetric information find it hard to explain why investment grade firms issue so little secured debt – secured debt in such models reduces agency problems and asymmetric information problems. Can we point to a more substantial cost, and provide some supporting empirical evidence, that might explain why they prefer the corner solution of no secured debt issuance (which is the choice of the median firm in each investment grade rating bucket, as we noted earlier)?

A. The Theoretical Costs of Issuing Secured Debt

As Acharya, Almeida, and Campello (2007), Bjerre (1999), Rampini and Viswanathan (2010, 2013), and Schwarcz (1997) suggest, the Myers and Majluf argument makes sense in a one shot static model of investment financing. In a more dynamic model, using up slack today may impede profitable investment tomorrow. Following Rampini and Viswanathan (2010, 2013), unused collateral is a form of slack or insurance that firms like to preserve if they can issue other forms of debt. They use collateralized debt only when new funds are desperately needed and other avenues to raise capital, including unsecured debt, do not exist or have shut down – for example, when a mature poorly-performing firm is trying to avert costly bankruptcy. The very high marginal value of any funds at such a juncture, may explain why firms have incentives to preserve their collateral in normal times despite the pricing advantage of secured debt. Put differently, it is not pricing but the prospect of quantity constraints that makes highly rated firms sparing in their use of secured debt. Of course, for low rated firms, periods when secured premiums are high may also

be when quantity constraints are most binding, so that is when they issue secured debt, as we show in section V.B. [17]

Indeed Li, Whited, and Wu (2016) estimate a structural model based on this idea (of insuring against quantity constraints) to suggest that the estimated benefits of retaining flexibility in the ability to issue more debt (that is, stay a safe distance from the quantity constraint) is on par with the tax advantages associated with debt. This, they argue, sets up a plausible tradeoff between flexibility and tax benefits that limits debt issuances to observed levels.

There could be additional reasons why investment grade firms are reluctant to secure any debt at all when they can issue unsecured. When no assets are encumbered, lenders are confident there is plenty for them to secure with if adverse contingencies arise and protective covenants are triggered. Quite often, a borrowing firm inserts negative pledge clauses into its unsecured debt contracts, whereby it commits to not issue any secured debt. This allow lenders to remain unsecured provided they can trust the borrower not to violate the pledge or provided they can easily detect any violation of the negative pledge, declare covenant default, accelerate their claims, and then renegotiate to obtain protective security themselves. Such negative pledge clauses may be easier to enforce against investment grade firms issuing no secured debt (see Schwartz (1997) for an argument based on trust, and Glaeser and Shleifer (2001) for an argument based on monitoring). Some lenders may even be happy lending unsecured, without an option to become secured. Such lenders provide financing without encumbering future collateral at all.[18] This may well be the equilibrium investment grade firms are in. However, as more assets are encumbered, the secured premium rises because fewer assets are left unencumbered, making it more attractive for any new lender to demand to be secured. Equally, the borrower finds more advantage now to securing debt (the secured premium is high), and finds it harder to commit to not do so. It may well be then that the corner solution of issuing no secured debt is the best way to conserve collateral slack for bad times, with intermediate levels more prone to a "collateral rat race" (see Donaldson, Gromb, and Piacentino (2019 a and b)).

The above argument also has implications for our estimates of secured premium. The estimated secured premium may understate the value of security in bankruptcy for a firm with substantial unencumbered security. Here is why: assuming the loss given default for secured debt relative to unsecured debt is constant over time for a particular firm, it is easily shown (see appendix B) that

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[17] Mello and Ruckes (2017) argue there is a cost to securing lenders with key assets – the lender obtains significant bargaining power that can increase lender hold-up and impede effective investment. For large investment grade firms, this is less likely to be an important concern since they can issue new debt to take out the annoying lender. The problem is likely to be greater for firms that have few financing opportunities.

[18] Importantly, if all existing debt became collateralized in bad times, all collateral would be effectively encumbered. The firm therefore benefits most by issuing unsecured debt that does not have covenants allowing it to claim collateral in bad times, or that is willing to accept a slightly higher interest rate in return for waiving such covenants.

$$\text{Secured Premium} = p(LGD_{Unsecured} - LGD_{Secured}) \qquad (9)$$

where *p* is the one-year-look-ahead probability of default for that rating category and LGD is the loss given default. For firms that have already encumbered a substantial portion of their assets – typically below-investment–grade firms – and have little collateral left to give, this is indeed a reasonable depiction of the secured premium.

However, if the firm has not encumbered any of its assets (think investment grade firms), some of the bonds that are unsecured today but contain protective covenants may well demand and obtain security as the firm's condition deteriorates. The secured premium then captures the recovery difference between bonds secured today, and unsecured bonds that have high probability of becoming secured closer to bankruptcy, not unsecured bonds in bankruptcy. If so, for firms with substantial unencumbered collateral, the term within parentheses on the right hand side is not $LGD_{Unsecured} - LGD_{Secured}$ but closer to $LGD_{Secured\ later} - LGD_{Secured\ now}$, and the associated measured secured premium is likely to be small, as we saw in Table VI, no matter the probability of default. We will offer some evidence of this shortly, when we examine secured premium during the COVID-19 pandemic. Importantly, $LGD_{Unsecured} - LGD_{Secured}$ may still be large.

The bottom line is that investment grade firms may see high costs in terms of foregone financial flexibility in issuing large amounts of secured debt, and may find it easier to issue none than only some. In this environment, they may prefer to issue unsecured debt if the unsecured market is open to them (which it invariably is). In what follows, we will explore what happened in March 2020 when the US markets started recognizing the impending consequences of the Covid pandemic, and how it affected the ability of riskier firms to issue debt. We will argue that episodes like this may explain why healthy firms prefer issuing unsecured bonds, leaving collateral unencumbered for tough times.

B. The Pandemic Sudden Stop.

Before the Federal Reserve stepped in on March 23 2020 with a wide range of measures intended to calm financial markets, all manner of risk premia increased as the widespread impact of the coronavirus pandemic in the United States became better understood. The Moody's BAA Corporate Bond spread over 10 year Treasuries went up from 210 basis points in early February to peak at 431 on March 23rd.[19] For B rated bonds, the spike was even more dramatic, with the spread going from 402 to 1189.[20] After March 23rd, and as the Federal Reserve continued fine-tuning these measures over April and May, risk spreads

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[19] https://fred.stlouisfed.org/series/BAA10Y

[20] https://fred.stlouisfed.org/series/BAMLH0A2HYB

came down. The BAA-Treasury spread was down to 260 basis points by end July. For B rated bonds, it fell to 539. Clearly, default probabilities went up and then came down for all manner of corporate debt, including investment grade debt. [21]

We estimate the secured premium over this period, separately for investment grade and below-investment grade firms in Figure 5. Secured premiums on investment grade firms continued to be close to zero during this period, despite the rise in default probabilities. This implies, as we suggested earlier, that the low secured spread for investment grade firms is not driven solely by the low probability of default but also by the abundant unpledged collateral that drives the value of secured debt and currently unsecured debt closer together. In contrast, for below-investment grade firms, secured premiums increased from 40 basis points in January to 165 basis points in April before falling to 107 basis points by June.

Furthermore, markets were open to unsecured investment grade bond issuances. In Figure 6, we display the value of aggregate bond issuances at the monthly frequency from Jan 2019 to June 2020. The issuance of corporate bonds by investment grade firms during March, April, May and June of 2020 was 406%, 184%, 63% and 226% higher, respectively, compared to the same months of 2019, and they were predominantly unsecured.

On the other hand, corporate bond issuance by below-investment grade firms declined in March of 2020 relative to the previous year, highlighting the difficulties riskier firms face in raising financing during bad times, especially if they want to issue unsecured debt. Indeed, given the low issuance of unsecured bonds relative to the norm (and assuming a normal clientele exists for below-investment grade bonds), it is likely that fears of default and the shutdown of access to the unsecured bond market fed on each other to increase spreads. The higher secured premium in traded bonds for this class of firms made secured bond issuance the most attractive, and indeed perhaps the only way to raise financing for many low rated firms in April.

Perhaps as a result, even though we see corporate bond issuance by below-investment grade firms rebounded in April after the Fed's intervention, and continued to be strong during May and June, it was almost entirely secured in April and secured bonds still formed the majority of issuance in May and June as financial conditions eased. Secured issuance by below-investment grade firms in April was more than double the amount issued in any month in the past year. On the other hand, the fraction of unsecured bond issuance was relatively low, suggesting this source of financing was difficult and costly to access.

Who were the firms that could issue when the unsecured debt market largely shut down for the below-investment grade firms? In Table XI, we report the secured debt share (as a proportion of total debt)

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[21] Of course, the loss given default could also have increased though it is less obvious why the onset of the pandemic would have raised it significantly. That the secured spread did not increase significantly for investment grade firms also suggests the loss given default for unsecured debt did not increase.

on the balance sheet of below-investment grade firms issuing secured debt both during the 4 month pandemic shut down (March-June 2020) and immediately before (Nov 2019-Feb 2020), as well as a year before (March-June 2019) to account for possible seasonality in issuance. As this exercise requires availability of balance sheet secured debt information, this analysis is restricted to the subsample of bond issuers for whom we could obtain this information from Compustat. The secured debt to total debt ratio in the most recent fiscal year for the 26 issuers in March-June 2020 for whom we have ratings and Compustat data is 0.32.[22] This is significantly lower than the 0.62 for the 9 secured issuers in the Nov 2019-Feb 2020 period (p value=0.015). Similarly, it is significantly lower than the 0.67 for the 10 secured issuers in the March-June 2019 period (p value=0.004). So the below-investment grade firms that could make use of the still-open window to issue secured debt in March-June 2020 were typically firms that did not have high amounts of secured debt outstanding – that had collateral slack in other words.

Our pandemic study suggests that the variations in the secured premium are small for investment grade firms, despite variations in the probability of bond default, primarily because they have plenty of unencumbered collateral. Moreover, they have access to unsecured bond markets and have little desire to use up valuable collateral when not needed. Matters are different for below-investment grade firms. For them, a rise in the secured premium reflects both a rise in the probability of default and difficulty in accessing unsecured bond markets, and thus the attractiveness of issuing secured. Consequently, variations in the secured premium should be more strongly correlated with their issuance decisions, which is what we saw in the previous section. Importantly, firms that have spare collateral are more able to issue when the window shuts for unsecured issues, which is why investment grade firms are reluctant to give up the insurance afforded by collateral slack.

VII. Conclusion

We find that corporate borrowers are reluctant to issue secured debt to lenders in the United States when they are far from distress or the economy is healthy. As a firm nears distress or the economy deteriorates, access to unsecured debt markets becomes more difficult and costly. Firms then use the lifeline provided by available collateral to issue debt and access funding. It is precisely to have a source of ready funding in bad times that they avoid the temptations of issuing secured debt in good times or when they are highly rated.

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 (2021) suggest was true in the United States in the early years of the twentieth century, or as is still true in

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[22] Information about secured debt is reported in 10K, but not in 10Q.

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 (2021) show, Japan still emphasizes asset-based lending.

However, with financial development, borrowers would like to retain full control over assets in the normal course, and to retain the option of using collateral "slack" only when needed. At the same time, even risk-averse lenders are willing to rely on structures that give them more protection and control only on a contingent basis (Aghion and Bolton (1992)). Financial development may make such contingent issuance of collateral possible, for example through the effective enforcement of negative pledge clauses.

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 (see the arguments in Lian and Ma (2021))? How much does a firm's collateral use vary by industry and how much does it vary over time as credit quality varies? 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 (forthcoming)), a factor in the value creditors see in protecting themselves with collateral? There is ample scope for additional research.

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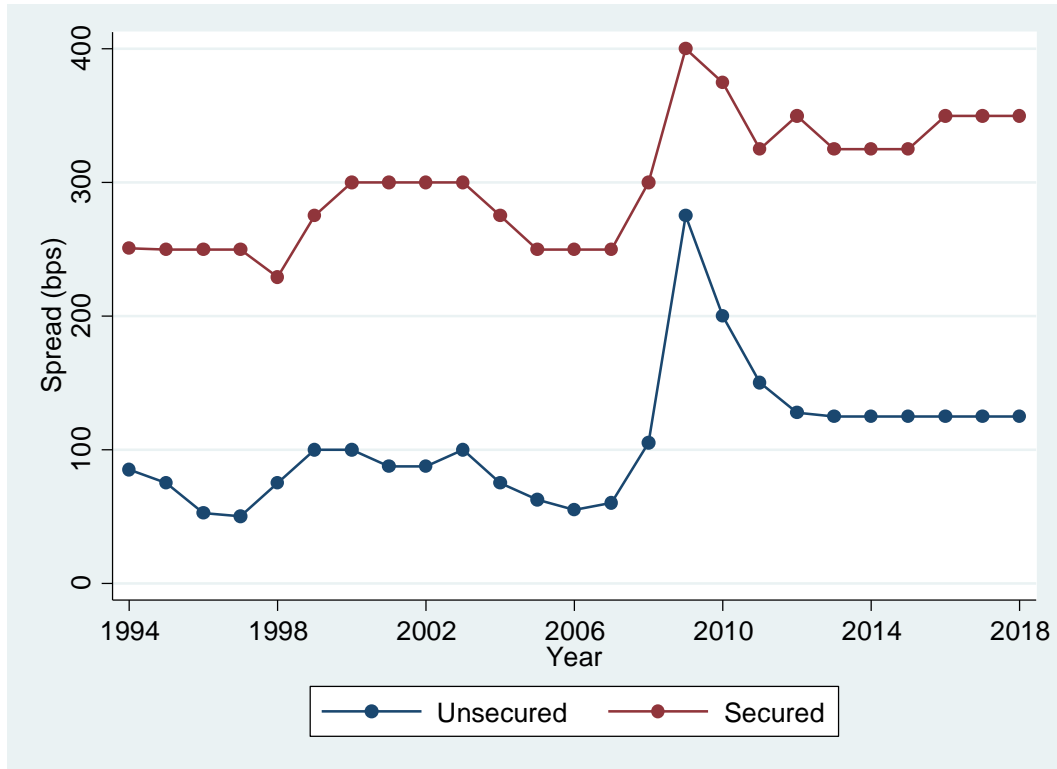
Figure 1. Loan spread – secured versus unsecured. This figure displays the median spread over LIBOR at issuance for secured and unsecured loans by year of issuance. Source: DealScan.
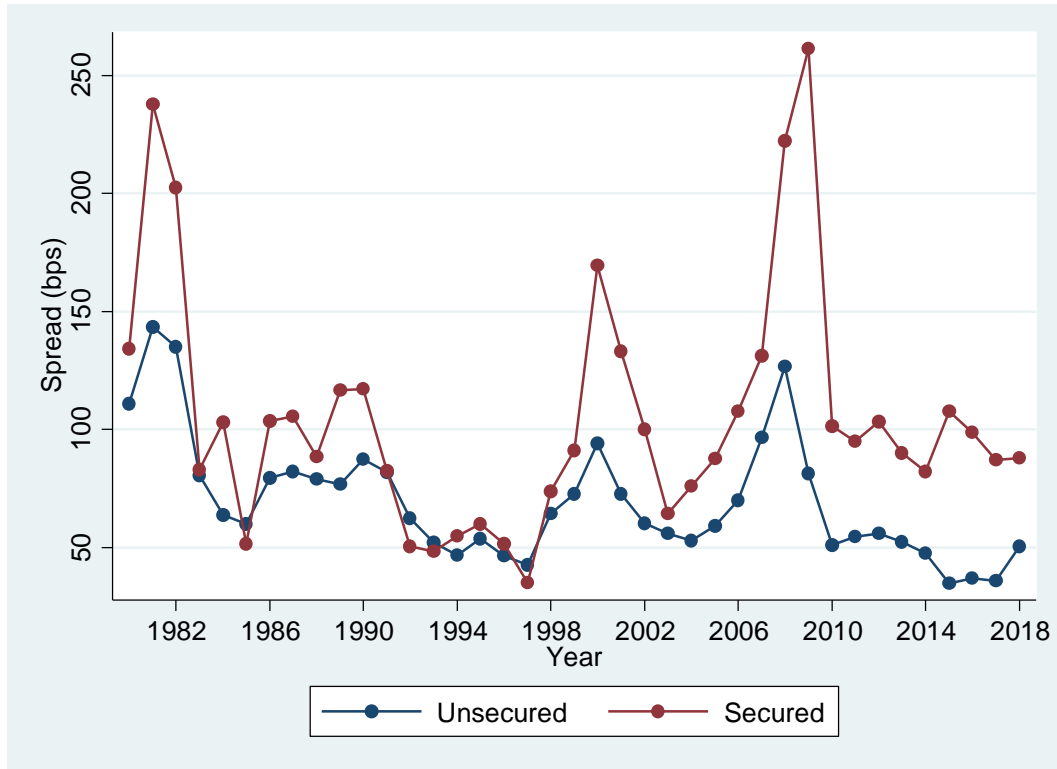
Figure 2. Yield spread – secured versus unsecured bond. This figure displays the median yield spread at issuance over maturity-matched treasury for secured and unsecured bonds by year of issuance. Source: Mergent.
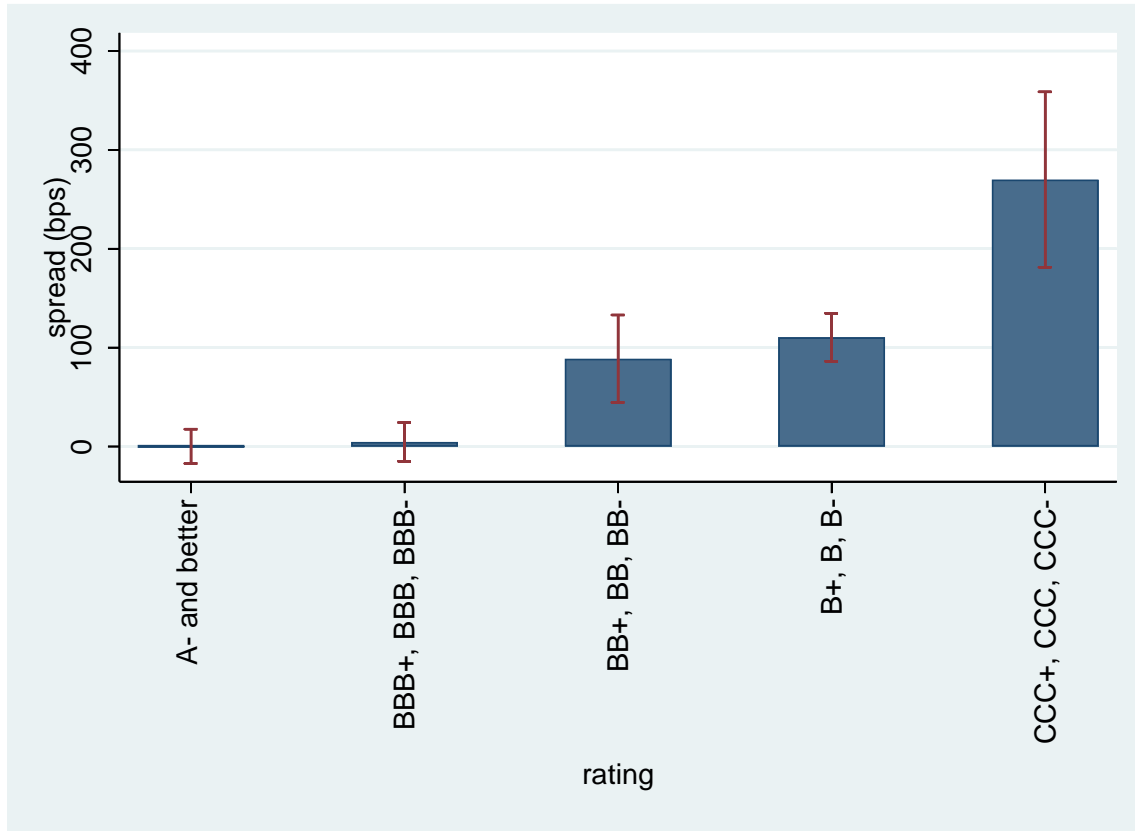
Figure 3A. Implied secured premium by issuer rating categories. This figure reports results from the following regression:

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

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 the secured premium for each rating category, i.e., the negative of coefficients on the secured dummy interacted with the issuer's S&P rating group dummy $(-\beta_k)$. The vertical lines denote 95% confidence intervals. 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.
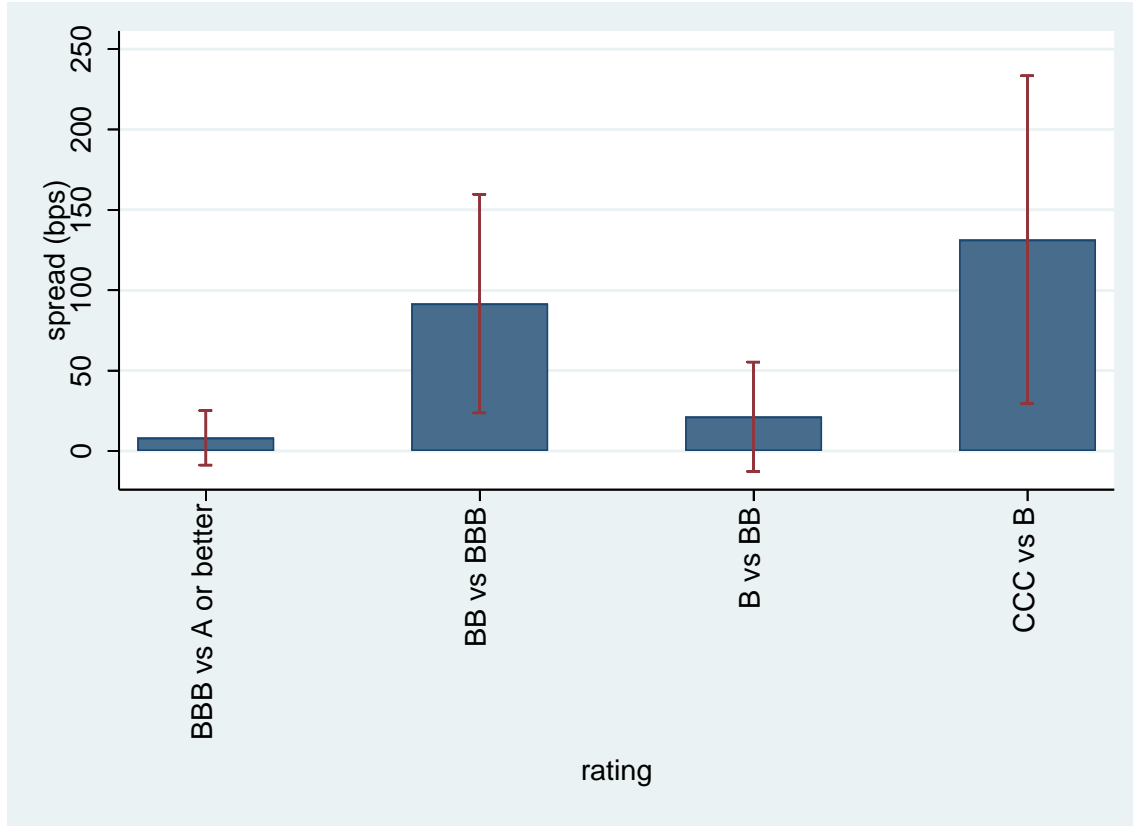
Figure 3B. Incremental implied secured premium between adjacent issuer rating categories. This graph reports results from the following regression:

$$spread_{i,j,t} = \alpha * secured_{i,j,t} + \beta * secured_{i,j,t} * worse\_rating\_group_{j,t} + \theta X_{i,j,t} + \delta_{j,t} + \varepsilon_{i,j,t} ,$$

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 the change in secured premium by moving to the worse of two adjacent issuer rating categories, i.e., the negative of coefficient on secured dummy interacted with a dummy for worse issuer S&P rating group $(-\beta)$. The vertical lines denote 95% confidence intervals. 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.
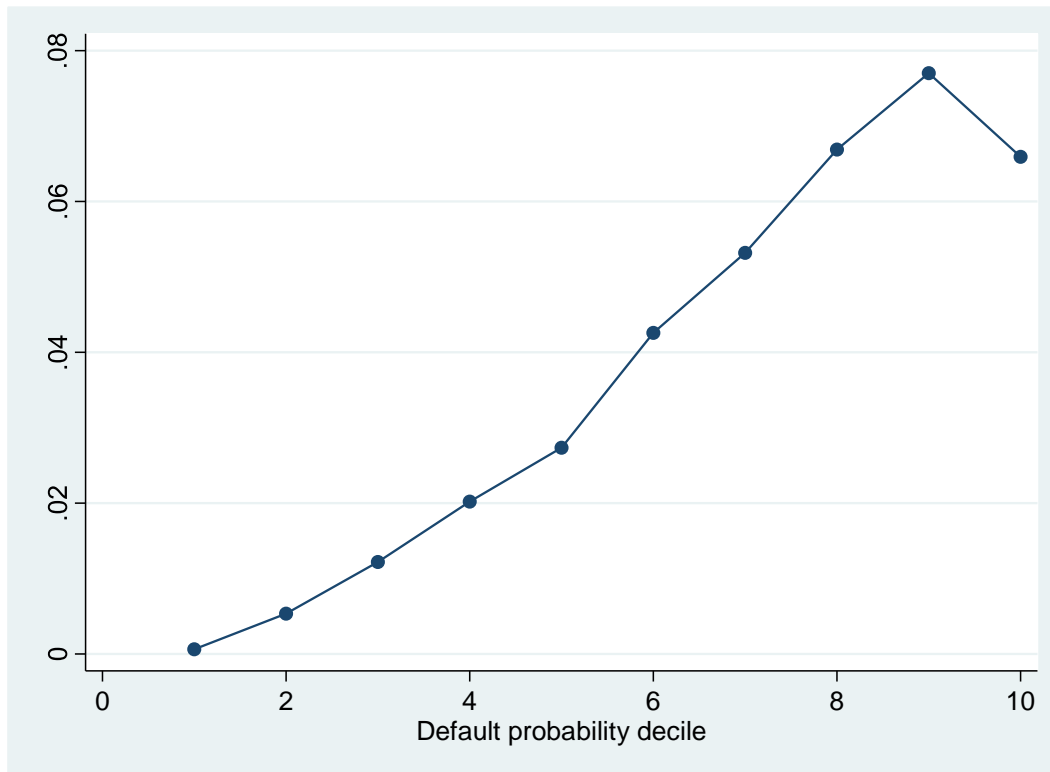
Figure 4. Secured debt and firm quality. This figure plots the median share of secured debt to total book value of assets for firm-year observations in Compustat from 1981 to 2017 for different one-year default probability deciles. One-year default probability is calculated using the Merton distance 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.
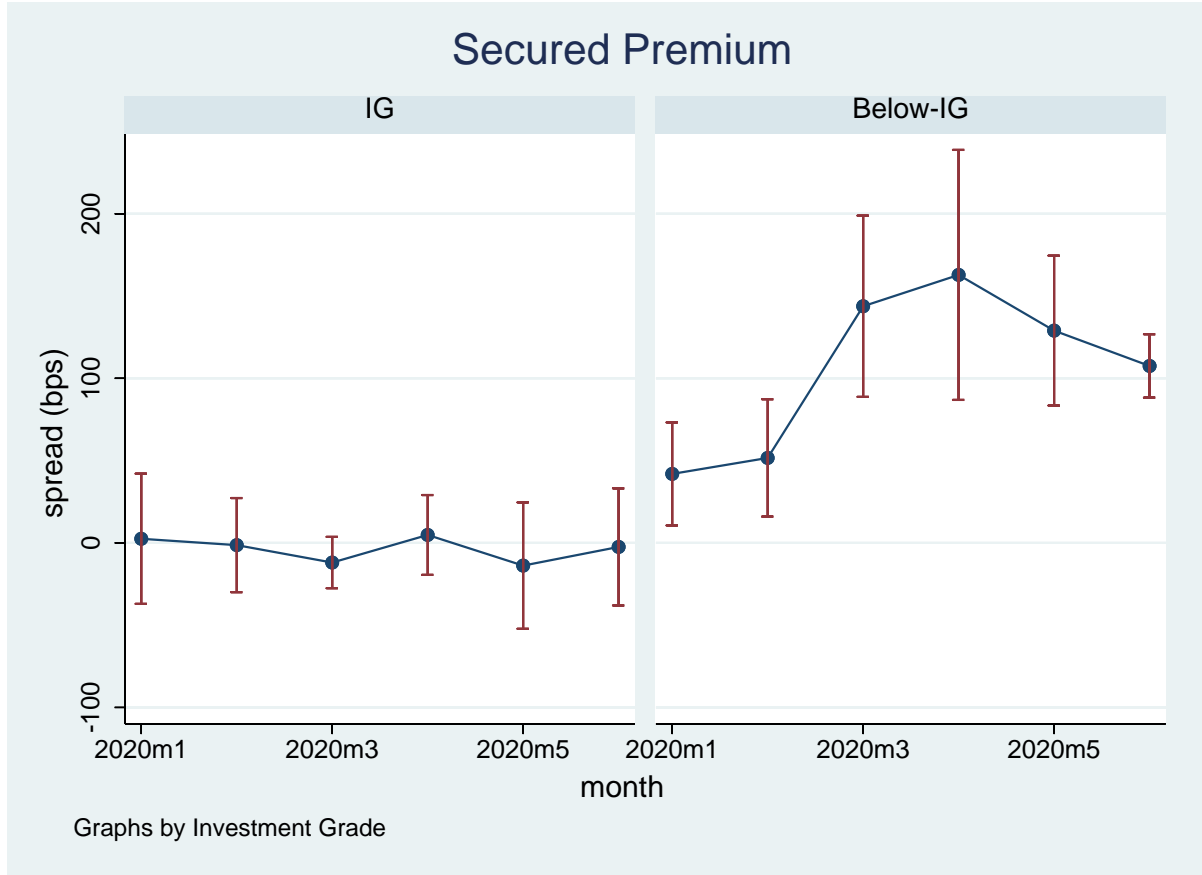
Figure 5. Secured Premium Estimates. This figure displays monthly estimates of secured premium obtained from the following regression run at the monthly frequency:

$$spread_{i,j} = \beta * secured_{i,j} + \theta X_{i,j} + \delta_j + \varepsilon_{i,j},$$

where $spread_{i,j}$ is the spread for bond i of firm j. The variable $secured_{i,j}$ is a dummy that equals one if bond i is secured, and zero otherwise. The variable $X_{i,j}$ controls for bond characteristics, while δ_j represents firm fixed effects. The negative of the estimate of β is plotted. Vertical lines denote 95% confidence intervals.

Figure 6. Bond Issuance (2019m1-2020m6). This figure displays the aggregate dollar amount of corporate bonds issued every month from Jan 2019 to June 2020 using data from Mergent FISD database. The panel on the left displays issuance by investment grade issuers while the panel on the right displays issuance by below-investment grade firms.
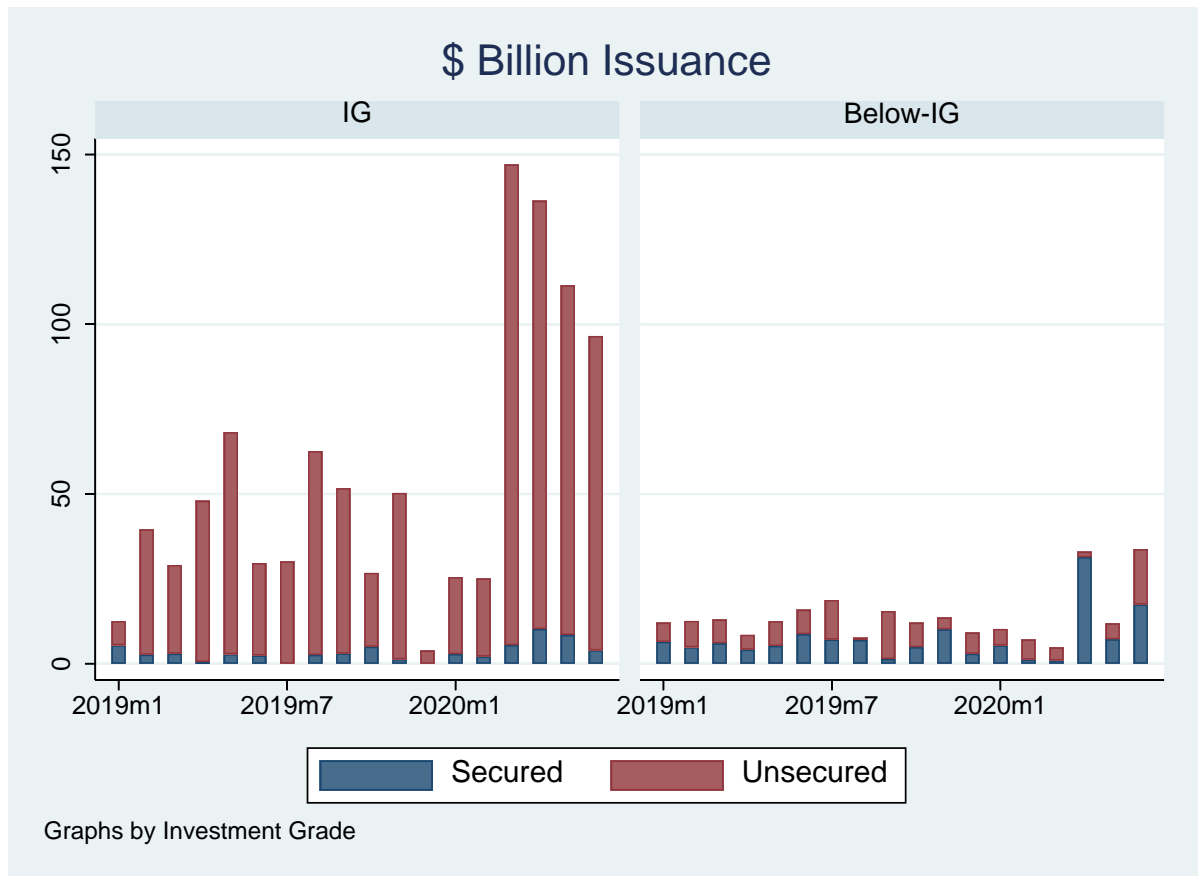
Table I

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. Below-IG is a dummy that equals one if the borrowing firm's S&P rating is BB+ or worse, and zero otherwise. Size is measured as the logarithm of total value of assets in millions of dollars, Age is number of years since the firm's first entry in Compustat, ROA is calculated as operating income scaled by total assets, Leverage is total debt scaled by total assets, and Tangibility is net plant, property and equipment scaled by total assets.

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
Below-IG	0.24	0.43	0.00	0.00	1.00	22,541
Secured × Below-IG	0.04	0.20	0.00	0.00	0.00	22,541

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
Below-IG	0.21	0.41	0.00	0.00	0.00	2,777,603
Secured × Below-IG	0.04	0.19	0.00	0.00	0.00	2,777,603
Size (log $ mil.)	10.34	1.22	9.55	10.40	11.16	2,466,484
Age (years)	40.27	19.24	23.50	41.50	58.50	2,466,484
Leverage	0.34	0.15	0.23	0.31	0.43	2,466,484
ROA (%)	14.15	6.54	9.76	13.45	17.56	2,384,090
Tangibility (%)	34.88	25.25	12.04	29.35	56.05	2,463,537

Table II

Secured Premium 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 Premium 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 Premium 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 Premium and Firm Characteristics

This table reports the results of OLS regressions relating the spread gap between unsecured and secured bonds to firm characteristics. The dependent variable is a measure of spread over maturity-matched treasury. Secured is a dummy that takes the value of one if a bond is secured, and zero otherwise. Senior is a dummy that takes the value of one if a bond is senior, and zero otherwise. Size is logarithm of total value of assets in millions of dollars, Age is number of years since the firm's first entry in Compustat, ROA is calculated as operating income scaled by total assets, Leverage is total debt scaled by total assets, and Tangibility is net plant, property, and equipment scaled by total assets. Firm characteristics are measured at the end of the quarter before bond trades. The regressions also control for 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)	(4)	(5)	(6)
Secured	-554.108*	-115.967	-236.088**	115.898***	-260.517***	-378.569***
	(-1.77)	(-1.21)	(-2.29)	(3.35)	(-2.98)	(-2.60)
Secured × Size	41.810					40.882***
	(1.28)					(2.61)
Secured × Age		-0.851				-7.188***
		(-0.35)				(-3.22)
Secured × ROA			7.967			9.882*
			(1.25)			(1.90)
Secured × Leverage				-478.494***		-288.485***
				(-8.99)		(-3.82)
Secured × Tangibility					3.022*	5.411***
					(1.66)	(4.45)
Senior	-42.429***	-47.700***	-46.930***	-39.743***	-42.051***	-41.980***
	(-2.89)	(-3.16)	(-2.87)	(-2.74)	(-3.00)	(-2.70)
FE	firm × year × month	firm × year × month	firm × year × month	firm × year × month	firm × year × month	firm × year × month
Controls for bond characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,460,744	2,460,744	2,378,655	2,460,744	2,457,806	2,376,191
Adj. R-squared	0.948	0.948	0.948	0.948	0.948	0.949

Table VI

Secured Premium 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 below-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 bond is secured, and zero otherwise. Below-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 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. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

	Mergent		Trace	
	IG	Below-IG	IG	Below-IG
	(1)	(2)	(3)	(4)
Secured	-1.587	-55.280**	-2.618	-128.921***
	(-0.33)	(-2.08)	(-0.46)	(-3.73)
Senior	-22.353	-46.284**	-12.514*	-63.141**
	(-1.49)	(-2.45)	(-1.65)	(-2.22)
Maturity	2.023***	2.755***	2.862***	4.621***
	(33.78)	(3.41)	(38.73)	(5.36)
Callable	-0.012	33.041***	-6.969***	26.889
	(-0.01)	(4.44)	(-4.15)	(1.63)
Amount	2.021***	4.709	0.570	0.304
	(3.43)	(1.48)	(0.69)	(0.05)
Covenant	-5.728	0.998	-1.072	30.120*
	(-1.30)	(0.04)	(-0.84)	(1.70)
FE	year × month, firm × year	year × month, firm × year	firm × year × month	firm × year × month
Observations	13,455	2,408	2,194,123	573,308
Adj. R-squared	0.901	0.942	0.924	0.921

Table VII

Asset-based vs Cash Flow-based Secured Premium

This table reports the results of OLS regressions relating loan spreads to the presence of asset-based or cash flow-based 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. Asset-based Secured is a dummy that takes the value of one if a loan facility is classified as asset-based secured, and zero otherwise. The regressions also control for seniority, maturity, issuance amount, and the presence of a covenant. Column (3) restricts the sample to secured loans that could clearly be classified as asset-based or cash flow-based from the security file without the need for any additional assumption. 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.

	All Facilities	Secured Facilities	
	(1)	(2)	(3)
Secured	-55.547***		
	(-3.44)		
Asset-based Secured	-25.445***	-18.868***	-37.691**
	(-8.54)	(-6.33)	(-1.99)
Senior	-152.515***		
	(-3.22)		
Maturity	35.990***	56.704***	7.481
	(8.75)	(9.02)	(1.00)
Amount	-11.073***	-11.820***	-11.764***
	(-12.65)	(-12.65)	(-7.49)
Fixed Effects	Package, facility type	Package, facility type	Package, facility type
Observations	30,905	28,391	6,582
Adj. R-squared	0.691	0.645	0.685

Table VIII

Secured Premium and Firm Tangibility

This table reports the results of OLS regressions relating the spread gap between unsecured and secured bonds to firm tangibility. The dependent variable is a measure of spread over maturity-matched treasury. Secured is a dummy that takes the value of one if a bond is secured, and zero otherwise. IG firms have an S&P rating of BBB- or better, whereas Below-IG firms have an S&P rating of BB+ or worse. Tangibility is net plant, property, and equipment scaled by total assets. IG and Below-IG firms are split into low and high tangibility groups based on the median tangibility for IG and Below-IG firms, respectively. In Panel B, we repeat the analysis after replacing tangibility with unpledged tangibility, which is defined as (net plant, property and equipment minus secured debt) divided by total assets. 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. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Panel A: Tangibility

| | IG | | Below-IG | | IG | Below-IG |
| | low | high | low | high | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Secured	6.169	-11.770	-259.127***	-59.472***	6.244	-256.678***
	(0.29)	(-0.91)	(-7.81)	(-3.05)	(0.29)	(-7.55)
Secured × high tangibility					-17.032	191.221***
					(-0.68)	(6.53)
Senior	-24.686**	-2.222	-58.751	-68.686*	-10.479	-66.599**
	(-2.07)	(-0.41)	(-1.52)	(-1.78)	(-1.42)	(-2.15)
Maturity	3.084***	2.999***	6.267***	4.234***	3.041***	5.066***
	(32.62)	(22.67)	(3.26)	(3.26)	(36.86)	(4.44)
Callable	-10.534***	-6.694*	32.025**	56.439***	-8.821***	36.714***
	(-4.84)	(-1.80)	(2.05)	(3.07)	(-4.06)	(3.22)
Amount	2.922**	3.184*	8.345	4.889	2.982***	4.908
	(2.51)	(1.95)	(0.78)	(0.41)	(2.95)	(0.61)
Covenant	-0.564	-2.455	-5.690	23.062	-1.524	13.273
	(-0.24)	(-1.23)	(-0.29)	(0.89)	(-0.99)	(0.73)
FE	firm × year × month	firm × year × month	firm × year × month	firm × year × month	firm × year × month	firm × year × month
Observations	761,154	764,261	157,492	157,410	1,525,415	314,902
Adj. R-squared	0.912	0.928	0.911	0.916	0.924	0.913

Panel B: Unpledged Tangibility

	IG		Below-IG		IG	Below-IG
	low	high	low	high		
	(1)	(2)	(3)	(4)	(5)	(6)
Secured	6.062	-41.002	-227.620***	-125.094***	6.095	-223.704***
	(0.29)	(-0.93)	(-4.28)	(-47.76)	(0.29)	(-4.56)
Secured × high tangibility					-45.937	99.493**
					(-0.53)	(2.00)
Senior	-33.357*	-10.191***	-62.027	-70.767**	-20.852**	-70.018**
	(-1.84)	(-7.13)	(-1.10)	(-2.07)	(-1.97)	(-2.23)
Maturity	3.236***	2.982***	5.156***	5.154***	3.102***	5.158***
	(28.28)	(21.73)	(3.19)	(3.24)	(34.79)	(4.44)
Callable	-10.593***	-9.693**	22.914	41.820***	-10.132***	28.723**
	(-4.50)	(-2.06)	(1.35)	(2.89)	(-3.53)	(2.31)
Amount	3.374***	2.240	9.302	9.271	2.725**	8.398
	(2.61)	(1.20)	(1.10)	(0.61)	(2.41)	(0.94)
Covenant	-2.329	-2.462	-0.041	29.861	-2.311	12.812
	(-1.06)	(-1.29)	(-0.00)	(1.09)	(-1.54)	(0.64)
FE	firm × year × month	firm × year × month	firm × year × month	firm × year × month	firm × year × month	firm × year × month
Observations	586,191	586,235	133,745	133,900	1,172,426	267,645
Adj. R-squared	0.916	0.931	0.917	0.905	0.926	0.911

Table IX

Cyclicality in Secured Premium and Issuance

This table reports results from the analysis of cyclicality in secured premium and issuance for investment grade and below-investment grade firms. In Panel A, we examine secured premium using Mergent bond issuance data in columns (1) and (2), and using TRACE bond trading data in columns (3) and (4). The dependent variable is a measure of spread over maturity-matched treasury. Secured is a dummy that takes the value of one if a bond is secured, and zero otherwise. Baa-Aaa spread is the difference between Moody's Seasoned Corporate Bond Yield on Baa and Aaa rated bonds. Below-IG firms have an S&P rating of BB+ or worse. The regressions also control for maturity, callability, issuance amount, and the presence of a covenant in the bond contract. The regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm. In Panel B, we examine cyclicality in secured bond issuance using data from Mergent. The dependent variable in column (1) is a dummy that takes the value of one if the bond issued is secured, and zero otherwise, whereas the dependent variable in column (2) is the dollar share of secured bond in total monthly bond issuance. Regression in column (1) is estimated with heteroscedasticity robust standard errors that are clustered by year × month and firm, and t-statistics are reported below the coefficients in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Panel A: Secured Premium

	Mergent		Trace	
	IG	Below-IG	IG	Below-IG
	(1)	(2)	(3)	(4)
Secured	5.424	8.645	0.562	-41.573
	(0.24)	(0.22)	(0.07)	(-1.11)
Secured × Baa–Aaa spread	-6.688	-33.498**	-2.344	-37.527*
	(-0.66)	(-2.02)	(-0.54)	(-1.68)
Maturity	2.037***	2.250***	2.861***	4.661***
	(34.39)	(4.75)	(38.68)	(5.38)
Callable	-0.087	33.927***	-6.996***	26.435***
	(-0.04)	(4.36)	(-4.14)	(2.64)
Amount	1.978***	2.689	0.623	1.577
	(3.34)	(1.21)	(0.75)	(0.25)
Covenant	-5.350	-1.381	-1.123	28.231
	(-1.26)	(-0.15)	(-0.88)	(1.63)
FE	year × month, firm × year	year × month, firm × year	firm × year × month	firm × year × month
Observations	13,252	2,107	2,191,900	561,806
Adj. R-squared	0.902	0.952	0.924	0.922

Panel B: Secured Issuance

	Secured Bond Dummy (1)	$ Share of Secured Issuance (2)
Baa-Aaa spread (%)	-0.018	-0.007
	(-1.12)	(-0.29)
Below-IG × Baa-Aaa spread (%)	0.148***	0.093***
	(5.44)	(2.84)
Below-IG		0.090***
		(2.66)
Fixed Effects	rating, firm	-
Observations	25,556	706
Adj. R-squared	0.759	0.225

Table X

Secured Issuance and Secured Premium

This table reports the results of OLS regressions relating the choice of secured vs unsecured bond issuance to estimated secured premium during the 2003 to 2020 time period. The dependent variable is a dummy that takes the value of one if the bond issued is secured, and zero otherwise. Secured premium is estimated by running regression Eq. (1) at the monthly frequency using TRACE bond trading data. Baa-Aaa spread is the difference between Moody's Seasoned Corporate Bond Yield on Baa and Aaa rated bonds, while GDP growth is calculated as the quarterly growth rate in real GDP. Lending tightness is a measure of tightening standards for commercial and industrial loans to large and middle-market firms obtained from the Senior Loan Officer Opinion Survey. Panel A presents results for the below-investment grade sample whereas Panel B presents results for the investment grade sample. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by year $\times$ month and firm, and t-statistics are reported below the coefficients in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Panel A. Below-IG Sample

	Below-IG Sample				
	(1)	(2)	(3)	(4)	(5)
Secured premium (%)	0.043***	0.043***	0.032***	0.035***	0.038***
	(3.28)	(3.36)	(2.70)	(2.88)	(2.96)
Baa-Aaa spread (%)			0.095***		
			(4.98)		
Lending tightness				0.201***	
				(3.74)	
GDP growth					-2.792***
					(-3.33)
Fixed Effects	firm	rating, firm	rating, firm	rating, firm	rating, firm
Observations	5,640	5,640	5,640	5,640	5,640
Adj. R-squared	0.598	0.606	0.611	0.612	0.612

Panel B. IG Sample

	IG Sample				
	(1)	(2)	(3)	(4)	(5)
Secured premium (%)	0.010	0.012	0.009	0.014	0.016
	(0.81)	(0.94)	(0.70)	(1.07)	(1.21)
Baa-Aaa spread (%)			0.005		
			(1.51)		
Lending tightness				0.010	
				(1.41)	
GDP growth					-0.187
					(-1.37)
Fixed Effects	firm	rating, firm	rating, firm	rating, firm	rating, firm
Observations	10,039	10,039	10,039	10,039	10,039
Adj. R-squared	0.891	0.891	0.891	0.891	0.891

Table XI

Secured Issuance and Secured Debt on Balance Sheet

This table reports results from the analysis of secured debt issuance by below-investment grade firms during the COVID-19 pandemic. The variable of interest is the ratio of secured debt to total debt on the balance sheet of issuing firms (S*ecured debt share*). We compare this ratio for below-investment grade firms issuing secured debt during the 4-month pandemic shut down (March-June 2020) and immediately before (Nov 2019-Feb 2020), as well as a year before (March-June 2019). The table reports the mean value for this ratio for issuers during each of the three periods. It also reports the difference in mean and the associated t-statistics and p-value.

	Pre-Covid (Nov 2019-Feb 2020)	Covid (March-June, 2020)	difference	t-test	p-val
Secured debt share	0.622	0.324	0.298**	2.578	0.015
#Observations	9	26			

	Pre-Covid (March 2019-June 2019)	Covid (March-June, 2020)	difference	t-test	p-val
Secured debt share	0.674	0.324	0.350***	3.102	0.004
#Observations	10	26			

Table A.1

Secured Premium 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

Table A.2

Asset-based vs Cash Flow-based Secured Premium – Restricted Sample

This table reports the results of OLS regressions relating loan spreads to the presence of asset-based or cash flow-based 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. Column (1) drops loan packages containing asset-based secured facilities while column (2) drops loan packages containing cash flow-based secured facilities. The regressions also control for seniority, maturity, issuance amount, and the presence of a covenant. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm, and t-statistics are reported below the coefficients in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

	Cash-flow-based secured	Asset-based secured
	(1)	(2)
Secured	-55.860**	-48.213**
	(-2.38)	(-2.28)
Senior	-196.738***	-74.099*
	(-3.12)	(-1.86)
Maturity	22.341***	0.813
	(6.29)	(0.53)
Amount	-9.851***	-13.925***
	(-7.72)	(-8.21)
Fixed Effects	Package, facility type	Package, facility type
Observations	9,634	4,530
Adj. R-squared	0.765	0.866

To show $Secured\ Premium = p(LGD_{Unsecured} - LGD_{Secured})$

Let us assume a firm's one year probability of default is constant over time at p and the common discount rate for the firm's corporate bonds is r. Let us assume the firm has a secured and an unsecured bond outstanding, both with maturity n years from now, and the yield to maturity on the bonds are r^S and r^U respectively. Assuming that default, if it occurs, happens at the end of the year, let the loss given default per unit of principal and interest due be L^S and L^U respectively. Then we know that for the unsecured bond

$$1 = \frac{p(1+r^U)(1-L^U)}{(1+r)} + \frac{(1-p)}{1+r}\left[r^U + \frac{p(1+r^U)(1-L^U)}{(1+r)} + \frac{(1-p)}{1+r}\left[r^U + ...for\ n\ periods\right]\right]$$

A similar expression can be written for the secured bond. Subtracting it on both sides from the expression for the unsecured bond, we get

$$0 = \frac{p}{1+r}\left[\underbrace{(1+r^U)(1-L^U) - (1+r^S)(1-L^S)}_{X}\right]$$

$$+ \frac{1-p}{1+r}\left[(r^U - r^S) + \frac{p}{1+r}[X]\right]$$

$$+ \frac{(1-p)^2}{(1+r)^2}\left[(r^U - r^S) + \frac{p}{1+r}[X]\right]$$

$$+ ...$$

$$+ \frac{(1-p)^n}{(1+r)^n}\left[(r^U - r^S)\right]$$

Collecting terms, we have

$$0 = \frac{p}{1+r}\left[1 + \frac{1-p}{1-r} + ... + \frac{(1-p)^{n-1}}{(1+r)^{n-1}}\right]X + \frac{1-p}{1+r}\left[1 + \frac{1-p}{1-r} + ... + \frac{(1-p)^{n-1}}{(1+r)^{n-1}}\right](r^U - r^S)$$

So $pX + (1-p)(r^U - r^S) = 0$. Substituting for X from above and simplifying, we get

$r^U - r^S = p\left[(1+r^U)L^U - (1+r^S)L^S\right]$ where the term on the lhs is the secured premium while the term in square brackets on the rhs is simply the difference in the loss given default between the two bonds.