The Decline of Secured Debt

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ABSTRACT
We document a steady decline in the share of secured debt issued (as a fraction of total corporate debt) in the United States over the twentieth century, with some pickup in this century. Superimposed on this secular trend, the share of secured debt issued is countercyclical. The secular decline in the issuance of collateralized debt seems to result from creditors acquiring greater confidence over time that the priority of their debt claims will be respected even if they do not obtain security up front. Borrowers also do not seem to want to lose financial and operational flexibility by giving security up front. Instead, security is given on a contingent basis – when a firm approaches distress. Similar arguments explain why debt is more likely to be secured in the down phase of a cycle than in the up phase, thus accounting for the cyclicality of secured debt share.

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What role does securing debt play in corporate borrowing? At one level, the answer is straightforward. Security or collateral consists of hard assets, which are not subject to asymmetric valuations in markets, and which the borrower cannot alter easily. Collateral gives comfort to a lender that even if she does little to monitor the borrower’s activity, and even if a borrower’s cash flows prove inadequate to service the debt, the lender’s claim is protected by underlying value. In particular, the creditor’s ability to seize collateral when a borrower defaults on a promised payment allows the lender to realize repayment, at least in part. And at the corporate level, all else being equal, firms that pledge collateral find it easier to obtain credit and at a reduced interest rate.\(^2\)

Given the presumed virtues of secured debt, in the first part of this paper we study secured debt issuance by U.S. corporations over more than a century—from 1900 to 2017. Using data on bond issuance and on corporate balance sheets from a variety of overlapping datasets, we show that the issuance of secured debt has declined dramatically. Almost all debt issued during the early twentieth century was backed by collateral. For example, secured bonds accounted for 98.5% of total bond issuance in 1900. By 1943, the share of secured bonds declined to 66.0%. The use of secured debt continued to decline, and in the 1970s only half of bonds issued were secured. In 2017, secured bond issuances were down to 8.8% of total bonds issued. In a similar vein, secured debt as a fraction of overall debt (including bank loans) outstanding has also declined over the period we have data for, with the median firm’s secured debt to total debt falling from around 25 percent in the early 1980s to below 10 percent in the first decade of this century.

Superimposed on this trend, we find a strong countercyclical component to the issuance of secured debt, with corporations more willing or compelled to issue it in the trough rather than peak of a cycle. The issuance of secured debt has increased slightly in recent years, but it is too early to tell how much of this is a reversal of the previous trend and how much of it is cyclical. What has led to the decline in the use of secured debt by U.S. corporations, despite its seeming theoretical merits?

In the second part of the paper, we go deeper into the theoretical rationales for (and against) the use of secured debt, and draw from these, as well as the evidence, to provide explanations. We use the plural form, explanations, because it is unlikely that a single answer or a well-identified single explanation can account

for either the decline in secured debt over the entire century or its countercyclical movement. If there is a consistent thread, it is that financial development has allowed higher credit quality corporations to move away from having to provide security when borrowing in the normal course. Instead, they now conserve security for when it is truly needed. A variety of developments have made this possible.

We organize our explanations along two dimensions: (i) creditors’ declining demand for security and (ii) debtors’ increasing unwillingness or inability to supply collateral. Creditors’ declining demand for security relates to the increasing tolerance of creditors to leaving their claims unsecured. Put differently, the additional volume of credit they might supply, or the reduced interest rate they might offer, might be less responsive to obtaining collateral today than in the past. Similarly, debtors’ might see costs associated with pledging assets, and these may have become more salient over time. Of course, both demand and supply are important for determining the equilibrium quantity of secured debt.

Let us be more specific, starting with creditors’ declining demand for security. We argue that early in the 20th century, when most firms in a number of industries were new entrants with large investments and modest cash flows, and when corporate accounting as well as bankruptcy procedures were underdeveloped, lenders demanded collateral – this was to protect themselves against the risks that borrower actions such as tunneling out corporate cash flows or selling assets to related parties would leave them with little means of recovery if the borrower defaulted. Furthermore, even when corporate bankruptcy legislation was initially passed, the priority of unsecured debt vis a vis equity was not fully respected, which enhanced the attractiveness of collateral for creditors.

As accounting improved and gave lenders more confidence in the reliability of reported cash flows, as stronger corporate governance protected firm cash flows and assets from being tunneled out to related parties, and as more effective bankruptcy legislation gave lenders more confidence that the priority of debt versus equity would largely be respected, lenders were no longer so dependent on collateral to protect their claims against management or equity – the assets would be there in bankruptcy to support their claims, and they typically would have priority over those assets vis a vis equity holders even without collateral.

Financial development may therefore have reduced the need for lenders to take collateral in the normal course from established borrowers. Instead, collateral’s main function may have changed to prioritizing the value of a secured lender’s claims against other creditors in bankruptcy. This also meant that the creditors’ demand for collateral became significant only as a firm neared distress. With collateral now performing a
more modest function in normal times, other issues probably came to the fore to continue the decline of the use of secured financing.

From the borrower’s side, pledging assets up front is costly, both in terms of transactions costs and opportunity costs. Instead, borrowers may be interested in having more financial flexibility by preserving collateral capacity. Unpledged collateral is a form of financial slack (as in Myers and Majluf (1984)) or insurance (as in Rampini and Vishwanathan (2010)). Firms would pledge it only when it is absolutely necessary to raise funds to make high return investments (like staving off bankruptcy).³

In addition to preserving unpledged collateral to maintain financial flexibility, firms might want to avoid issuing secured debt to maintain operational flexibility. By pledging collateral, a firm is limiting its flexibility to sell or redeploy assets to craft a better business operation (see Mello and Ruckles (2017)). While presumably creditors might be willing to accept contractual modifications to permit value-enhancing redeployment, the process of making such modifications might take time, and creditors may extract rents from the borrower in return for flexibility. As a result, firms for which operational flexibility is important would prefer to borrow unsecured.

With healthy firms incurring costs in pledging collateral, and with collateral helping lenders only closer to financial distress, borrowers preferred issuing unsecured debt in the normal course. Legal developments such as negative pledge clauses (whereby the borrower commits to a lender that it will not issue secured debt to any other lender, failing which the debt payment will be accelerated), coupled with better information about firm borrowing, would have given creditors the confidence to stay unsecured until they sensed impending borrower distress.⁴ Such developments might explain both the continuing secular decline in the issuance of secured debt through the century, even after accounting improved and bankruptcy legislation developed, as well as its greater use as a firm’s risk of financial distress increased, or in business cycle downturns.

In short, we argue that the development of U.S. capital markets, as well as the institutions that support such markets, have enabled modern U.S. firms to offer collateral on a more contingent basis—as they near financial distress—thus allowing firms to retain financial and operational flexibility in normal times while

³ Also see, for example, Acharya, Almeida, and Campello (2007), Bjerre (1999), Li, Whited, and Wu (2016), and Schwarcz (1997).
⁴ See, for example, Bjerre (1999), DeMarzo (2019), Donaldson, Gromb, and Piacentino (2019 a and b), Schwarcz (1997), and Schwartz (1997).
reassuring creditors their priority will be respected. In outlining this narrative based on the evidence, we also explain what theories our evidence supports and which ones it is less supportive of.

Finally, it is not just the business environment that has changed, firms have also changed. Assets traditionally used to collateralize debt such as property, plant, and equipment have declined as a fraction of the value of firm assets, while more “intangible” assets, normally thought of as hard to use as collateral, such as brand names and patents have increased. The decline in secured debt issuance towards the end of the last century probably is related to the decline in asset tangibility. However, contractual innovations in this century now allow firms to secure a greater variety of assets, including intellectual property, more easily, and have reduced the transactions costs associated with pledging intangible assets. Although it is too early to tell whether secured debt is being resurrected with these new assets serving as collateral, we cannot rule out this possibility. This paper should certainly not be construed as an obituary.

The rest of the paper is organized as follows. In Section I, we describe the long-term decline in secured debt through the twentieth century, with some revival in this century. In Section II, we present evidence on the cyclicality of secured debt. We discuss theories in Section III. Potential explanations for the decline of secured debt are discussed next, with the focus on creditor demand for collateral in Section IV and debtor incentives to supply collateral in section V. Section VI concludes.

I. Trends in Secured Debt: A Long-Term Decline

To construct our series of secured debt issuance over time, we use four main data sources: Hickman (1960), the Commercial and Financial Chronicle (CFC), Mergent, and Compustat. We draw on supplementary sources to complement our analysis.

A. Hickman Data

Walter Braddock Hickman, who became president of the Federal Reserve Bank of Cleveland in 1963, was the director of the Corporate Bond Research Project at the NBER. In his work on the bond market, he amassed a large amount of data on bond issuances in the first half of the twentieth century and published books on such topics as the volume of corporate bond financing, credit rating and credit risk, and bond performance and characteristics. Hickman (1960) tabulates corporate bond issuance and bond characteristics from 1900 to 1944 by the lien position of the bond.

Hickman (1960) classifies annual bond issuances into five categories based on security and seniority: (i) secured-senior, (ii) secured-intermediate, (iii) secured-junior, (iv) unsecured-senior, and (v) unsecured-
junior. We define the share of secured bonds in total bond issuance as the ratio of the amount of secured-senior, secured-intermediate, and secured-junior bond issuances to total issuances. In Figure 1a, we plot the fraction of secured bond issuance by value from 1900 to 1943. In 1900—the first year for which Hickman collects bond issuance data—$682.9 million in secured bonds were issued, accounting for 98.5% of total bond issuance that year. The share of secured bonds declined to 79.2% in 1904 and fluctuated between 73.0% and 85.5% from 1905 to 1914. The share of secured bonds to total bonds continued to decline gradually and averaged 67.6% during the 1920s, with a low of 40.5% in 1929. As plotted in Figure 1b (which plots the same data between 1928 and 1940 to make for easier viewing), the share of secured bonds in total bonds issuance bounced back during the Depression to 78.7% in 1932 and 85% in 1935—reflecting the countercyclical nature of secured issuances that we will shortly establish in more detail. By 1943—the last year in the Hickman (1960) sample—the share of secured bonds declined to 66.0%. We also estimate a linear trend model of the share of secured bonds on a time index variable (defined as $t$=years since 1900). The fitted linear trend model is given by:

$$\frac{secured\ debt}{total\ debt} = 0.876 - 0.006 \times t + \epsilon_t$$

(0.023)   (0.001)

$R^2 = 0.404$

In words, the ratio of secured bonds to total bonds issuance declined at an annual rate of 0.6 percentage points from 1900 to 1943.

In Figure 2, we decompose the ratio of secured bonds to total bonds into its two components: (i) issuance of secured bonds and (ii) total bond issuance. As the figure illustrates, total bond issuance increased from $693 million in 1900 to $1,489 million in 1901 and remained above $1 billion until 1918. During this period, secured bonds accounted on average for 83.7% of total bond issuance. Total bond issuance increased dramatically during the 1920s, peaking at $3,856.8 million in 1927, and declined sharply during the Great Depression (Benmelech and Bergman (2017)) – from $2,978.3 million in 1930 to $444.3 million in 1933 before recovering to $3,666.1 million in 1936. Bond issuance declined again during the recession of 1937 to 1938 and gradually increased in 1939 and 1940 before decreasing again during World War II.

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5 A sixth category, “information lacking,” concerns only a small fraction of the bonds.
6 The data used to construct Figures 1a, 1b, and 2 are based on Hickman (1960), Table 85.
Next, we supplement the analysis with information on outstanding bond issues during the same years.7 Hickman (1960) classified the par amount outstanding of bond issues by their lien position quadrennially from 1900 to 1944.8 In Figure 3, we report the share of secured bonds in outstanding bonds at a quadrennial frequency from 1900 to 1944. Similar to the pattern seen in Figure 1, the share of outstanding secured bonds (by value) declines steadily during this period. Because outstanding bonds include bonds issued in previous years, the decline in the share of secured bonds outstanding is not as sharp as that observed in the issuance data.

We next present secured bond issuance separately for the three major industries studied by Hickman: Utilities (Figure 4a), Railroads (Figure 4b), and Industrials (Figure 4c).9 The trend decline in secured bond issuances is also observed, though more modestly, in utilities. The share of secured bonds of utilities was 100% in 1900 and 1901 and averaged 74% and 81% in 1942 and 1943, respectively.10 The share of secured utility bonds fell, on average, at a statistically significant 0.5 percentage points a year.

By contrast, the overall trend in the share of secured bonds in the railroad sector is, if anything, mildly positive, and the data are noisier. The secured share of railroad bonds declined from 97% in 1900 to 61% in 1907, but then it rose to 99% in 1916 and remained between 85% and 96% until 1929, when it declined to 48%. During the late 1930s, the share of secured bonds in railroads bond issuance increased again, reaching almost 100% in 1943. The R-squared of a linear trend model of the share of secured bonds in railroads bonds is only 0.04, and the time trend is insignificantly different from zero.

Industrial firms experienced the largest decline in secured bonds among the three major sectors studied by Hickman (1960). Secured bonds accounted for all the bonds issued by industrial firms in 1900, was between 53% and 58% between 1911 and 1913, and averaged 49% during the 1920s. It was 13% in 1943. The share of secured bonds issued by industrials declined by an annual rate of 1.4 percentage points from 1900 to 1943, almost three times the rate of the decline for utilities. Indeed, according to Hickman (1960, p. 392): “Largely because of the growth of unsecured financing for industrial corporations during the period

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7 Hickman classified bonds outstanding based on their status on January 1 on each of the calendar years.
8 The data used to construct Figures 3, 5a, and 5b are based on Hickman (1960), Table 17. The data are reported for the years 1900, 1904, 1908, 1912, 1916, 1920, 1924, 1928, 1932, 1936, 1940, and 1944.
9 Railroads include passenger, freight, and service railroads. Utilities include electric, gas, communication, street railways, and miscellaneous utilities. Industrials include agriculture, construction, trade, services, and manufacturing companies.
10 Secured debt share jumped to 95% in 1943, a likely outlier similar to the 98% share in 1935.
analyzed and the declining importance of the rails, there was a long-term downward drift in the proportion of secured offerings in the par-amount total of all offerings.”

B. Commercial and Financial Chronicle Data

Our second data source is the *Commercial and Financial Chronicle*, a financial newspaper founded by William Dana and published from 1865 to 1987. Our goal in collecting these data is to confirm the information in Hickman (1960) and to extend the data into the 1950s and 1960s. In March 1921, the *CFC* began publishing monthly compilations of new capital flotations in the United States (i.e., corporate, municipal, and government financing via new stock and bond issues). We collect the data at a semi-decadal frequency for the years 1922, 1927, 1932, and 1937 and then at a decadal frequency for the postwar years 1957 and 1967. We skip the year 1942 because it is during World War II and the year 1947 because it is too soon after the war for capital structures to have stabilized.

We use the issue description provided in the *CFC* to identify secured bonds. We classify bonds as secured if the issue description suggests that the bond is backed by a mortgage (e.g., Hart Coal Corp. 1st Mtge.), backed by equipment (e.g., Baltimore & Ohio RR. Equipment Tr.), or contains text associated with a secured bond (e.g., Defiance Gas & Electric Co. 1st Lien & Ref.). Bonds with descriptions that do not contain text related to mortgage or equipment or that do not mention security (such as secured, 1st Lien, 1st Lien and coll. tr., etc.) are classified as unsecured (e.g., U. S. Hoffman Machinery Corp. Debenture).

In Figure 5a, we plot the number of secured bond issues as a fraction of the total number of bond issues for each of the years 1922, 1927, 1932, 1937, 1957, and 1967. As the figure shows, the share of secured bond issues declined from 89% in 1922 to 35% by 1967. In Figure 5b, we chart the value of secured bond issues as a fraction of the total dollar value of bond issuance. The share of secured bonds out of the total value of bond issuance declined from 79% in 1922 to 32% in 1967. The share of secured bonds by value in the *CFC* data is similar to Hickman’s calculations. For example, according to both the *CFC* data and Hickman (1960), the share of secured bonds in 1922 was 79%. By 1937, the shares of secured bonds according to the *CFC* and Hickman (1960) were 63% and 65%, respectively. The only data point in which there is a double-digit percentage point difference between the *CFC* and Hickman is 1927, in which according to the *CFC* the share of secured bonds was 60% whereas according to Hickman (1960) the share was 70%.
The CFC data suggest that the share of secured bonds continued to decline in the 1950s and 1960s. The share of secured bonds as a fraction of total value of bond issuance was 41% in 1957 and declined to 32% by 1967, a decrease of 66.5 percentage points from its level of 98.5% in 1900.

C. The Mergent Data

We now turn to the Mergent Fixed Income Securities Database (FISD). It is a comprehensive database of publicly offered U.S. bonds, containing detailed information on more than 140,000 debt securities, with comprehensive coverage starting around 1960. 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 and municipal agencies and entities. This results in a sample of 54,714 individual bond offerings from 1960 to 2017—out of which 9,540 bonds are classified as secured, accounting for 17.4% of the sample.

In Figure 6, we plot the number of total bond issues and the number of secured bonds issued every year from 1960 to 2017. Bond issuance increased dramatically during the 1990s. As Figure 6 shows, secured bonds accounted for a larger share of total bond issuance in the 1960s and 1970s. For example, of the 242 bonds issued in 1970, 136 (56.2%) were secured. By 1985, only 102 of the 505 (20.2%) bonds issued were secured. The year 1993 was the local peak of secured bond issuance (909 of 2,347, or 38.7%), but by 2000, only 114 bonds (7.5%) were secured. The fraction of secured bonds increased during the Global Financial Crisis from 10.6% in 2008 to 16.2% in 2010 and 16.7% in 2011. The fraction started dipping once again, and by 2017 secured bonds accounted for only 8.8% of the total bond issuance.

In Figure 7, we plot the share of the value of secured bond issuance from 1960 to 2017. This share also declines over time. In 1960, secured bonds represented 59.4% of the value of all bonds issued. By 2017, the share had declined to 6.0%. The linear trend at which the share of secured bonds (by value) declined from 1960 to 2017 (0.9 percentage points a year) was more rapid than the rate of decline between 1900 and 1944 (0.6 percentage points a year). In Figure 8, we combine the different datasets to show the dramatic decline of secured bond issuance from 1900 to 2017.
D. Trends in Firm-Level Secured Debt

We now turn to analyze the evolution of secured debt on firms’ balance sheets. The main advantage of analyzing firms’ balance sheets rather than just bond issues is that it includes other forms of secured debt—most importantly, bank loans. Compustat reports the item “debt mortgages and other secured debt” for publicly traded U.S. firms starting in 1981. We define the share of secured debt in an individual firm as secured debt divided by total debt.11 Our definition of secured debt is similar to Azariadis, Kaas, and Wen (2016) and Giambona, Golec, and Lopez-de-Silanes (2012). We focus on industrial firms with SIC codes between 2000 and 5999. We require that firms have information on assets, profitability, and share prices. We winsorize the data at the 1 and 99 percentiles. There are 988 firms with non-missing information on secured debt in 1981, 1,616 in 2000, and 1,083 in 2015. Table I presents summary statistics of different measures of secured debt. Mean secured debt divided by total debt is 0.334, with a median of 0.150. As the table shows, secured debt accounts, on average, for 10% of firms’ total assets.

In Figure 9, we plot median firm-level outstanding secured debt as a fraction of total outstanding debt from 1981 to 2017. Secured debt accounted for 25% of the total debt of the median firm in 1981, declined to 20.8% in 1990, and reached its lowest level of 7.7% in 2003. It rose to around 10% just before the Global Financial Crisis and increased further after the crisis to 19.9% in 2017.12

E. Changes in Composition between Banks and Bond Issuances

Although we have documented that the share of secured debt outstanding declined on U.S. firm balance sheets in the last two decades of the twentieth century, we lack prior reliable balance sheet data. Could earlier declines in secured bond issuances be explained by shifts in composition between bonds and loans issuance? After all, if loans (typically from banks) are more likely to be secured than bonds, then a shift in composition of debt issuance from bonds to loans may not result in a lower share of debt being secured, even if fewer secured bonds are being issued.

11 The secured debt ratio is defined using the following Compustat items: DM/(DLC+DLTT). DM is “debt mortgages and other secured debt,” DLC is “debt in current liabilities,” and DLTT is “long-term debt.”
12 Compustat’s item “debt mortgages and other secured debt” includes capital leases. Leases are super-secure claims and hence should be included in the calculations of the amount of secured debt that firms are using (see Eisdeldt and Rampini (2009) or Rampini and Vishwanathan (2013)). Additionally, we verify that operating leases did not go up during the time period when secured debt declined, and that capitalizing operating leases does not change the basic pattern of decline in secured debt documented here (results available from the authors).
To examine this, we turn to the National Flow of Funds data from the Financial Accounts of the United States released by the Federal Reserve every quarter. The data include information on transactions and levels of financial assets and liabilities, by sector and financial instrument, as well as full balance sheets for nonfinancial corporate businesses. We use these data from 1945 to 2018 at the annual frequency. In Figure 10, we plot the outstanding amounts of loans and bond debt reported by U.S. nonfinancial corporations from 1945, and in Figure 11, we plot the ratio of loans to total debt. Although the ratio was relatively flat until the early 1960s, it rose by about 5 percentage points in the early 1960s, only to plummet by over 20 percentage points in the two and a half decades following the early 1990s (with a temporary blip up before the Global Financial Crisis). So the broad picture is of a decline in the share of loans, not an increase.

During some subperiods, however, there was an increase. Take, for example, the rise in loans in Figure 11 by about 5 percentage points between 1960 and 1980. Over this period, the secured share of bonds issued fell from 60% to about 30% (see Figure 7). A crude calculation suggests that even if the incremental loans were fully secured, composition effects would increase the secured share of debt by only about 5 percentage points, whereas the reduction in secured share for bonds (which accounted for half of overall debt) would reduce the secured share of debt by 15 percentage points. The net effect would be a reduction in secured share by 10 percentage points. Thus, even with the most aggressive assumptions, it is hard to argue that the decline in the issuance of secured bonds was offset by a rise in the issuance of secured loans.

Of course, it could be that all loans were being secured to a greater extent over this time. We have two suggestive pieces of evidence against that conjecture. First, the Flow of Funds data indicate the share of corporate loans made against land (commercial mortgages). This shows a decline from about 40% of loans in 1945 to about 17% in 2018, again with a temporary upward blip before the Global Financial Crisis (see Figure 12). So, loans against the most common form of security, land, declined steadily. The share of other forms of secured loans should have gone up significantly if they were to offset this decline.

F. Collateral and Small Businesses Finance

We now turn to an archetypical issuer of loans—small firms—to show that they too experienced an overall decline in secured borrowing, albeit from a high level. Small businesses rely on loans, in particular secured loans, rather than bonds (Berger and Udell (1995, 1998)). To ascertain the overall use of secured debt by small businesses, we use data from the Survey of Small Business Finances (SSBF) conducted by

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13 Also see Bradley and Roberts (2015) and Lian and Ma (2019) who suggest that smaller firms tend to use secured lending more.
the Federal Reserve Board to estimate the share of secured debt in small business finances in the United States.

We use SSBF surveys for the years 1987, 1993, 1998, and 2003 (the survey was discontinued after 2003). The SSBF collected information on small businesses (fewer than 500 employees). Small businesses report their balances in six debt categories: credit cards, lines of credit, mortgages, motor vehicle loans, equipment loans, and other loans. These calculations are based on many firms, ranging in number from 3,062,592 in 1987 to 4,998,358 in 2003, and are reported in Table II. We first calculate each debt category’s share in total debt outstanding at the firm level and then report the mean shares across firms for each survey year. As Table II shows, lines of credit and motor vehicle loans are the primary sources of debt for small business, followed by mortgages. Interestingly, unsecured credit card debt, which seemed to be negligible in the 1987 survey, grew substantially to about 17% of a firm’s total outstanding loan in the 2003 survey, whereas equipment loans and mortgages (typically collateralized) shrank in share from 14% to 8% of loans.

For each loan on their balance sheet, the surveys report whether collateral is or is not required. Although credit card loans are always marked as unsecured, loans in the other categories could be reported as secured or unsecured. For each category of loan outstanding at firm level, we calculate the share of secured loans (by value). For each loan category, we then calculate the mean share of secured loans across firms for each survey year. For instance, 57% of lines of credit were reported as secured in the first survey in 1987, but only 46% in 2003. Because the reporting is uneven across surveys, we report the secured debt share in Table II assuming that all mortgages, motor vehicle loans, and equipment loans are secured. As the table illustrates, the share of secured debt has decreased steadily over time—from 81% in 1987 to 65% in 2003.

In sum, then, for a group of businesses that rely entirely on loans rather than bonds, we again see that the share of secured debt has fallen steadily, and this is both because of composition effects (loans that are traditionally secured have fallen in share or remained about the same, while loans that are traditionally unsecured have increased in share) and because loans that might be of either type are more likely to remain unsecured in recent surveys (e.g., lines of credit). This suggests that the phenomenon we see with bonds carries over to loans, certainly over the period for which we have data.

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Firms report up to three loans of each category. Hence, within each category of loan for a given firm, a portion could be secured and the remaining unsecured.
II. Cyclicality in Issuance of Secured Debt

Along with a secular decline in issuance of secured debt, we find a countercyclical pattern in the share of secured debt issuance (also see recent evidence in Bradley and Roberts (2015) where they make the point that bond covenants follow such a pattern more generally). For example, we noted that the secured bond share showed a perceptible rise during the Great Depression of 1929 to 1933 (Figure 1a). Similarly, there is a perceptible increase in the share of secured bond issuance during the past two recessions of 2001 to 2002 and 2007 to 2009 (Figure 7). In this section, we examine empirically whether the share of secured bond issuance exhibits a distinct countercyclical pattern over the period 1900 to 2017.15 It does16

We begin by examining secured bond issuance for the period 1960 to 2017 using Mergent’s data at the quarterly frequency. We estimate the following regression specification:

\[ secured \text{ bond issuance}_t = \alpha + \beta Z_t + \epsilon_t, \]

where secured bond issuance$_t$ measures the cyclical component of the dollar share of secured debt in total debt issuance at the quarterly frequency and $Z_t$ represents a business cycle proxy. To ensure that the results are not driven by trends in secured bond issuance and economic activity, we detrend both variables using a Hodrick-Prescott (HP) filter. Specifically, we first adjust the quarterly secured bond issuance share for seasonality and then compute the detrended share, secured bond issuance$_t$, using an HP filter (i.e., we extract the residuals from the HP filter).17 We use two measures for the cycle: the Baa–Aaa credit spread – a commonly used measure of financial conditions and real gross domestic product (GDP). We use the detrended measures (residuals from the HP filter) as proxies.

15 We do not have reliable data on the share of secured debt in loans, or when that debt was issued, hence this part of the analysis will focus on bonds.
16 External financing ought to be procyclical: as output expands, firms need more financing to support increased production and investment (the demand channel). However, either debt or equity issuance could be countercyclical because of substitution between these two forms of financing. Covas and Haan (2011) find that both debt and equity issuance are procyclical. Korajczyk and Levy (2003) find that target leverage is countercyclical for unconstrained firms but procyclical for financially constrained firms. Credit supply can independently explain cyclicality in firm leverage (see, e.g., Bernanke and Gertler (1989), Holmstrom and Tirole (1997), and Kiyotaki and Moore (1997)). Kashyap, Stein, and Wilcox (1993) find that tighter monetary policy leads to shift in firms’ mix of debt financing: commercial paper issuance rises while bank loans fall. Overall, while the literature agrees on procyclicality of firm financing, it is not obvious how each component of the mix (equity, secured bonds, unsecured bonds, bank debt, etc.) varies over the business cycle.
17 As is standard in the macro literature, we use a smoothing coefficient of 1600 for quarterly data and 100 for annual data.
We report the results of this analysis in Table III, regressing the secured share in year $t+1$ against the business cycle proxy in year $t$ (i.e., a lag of four quarters). Results are equally strong for a lag of three quarters but become weaker for fewer or no lags—consistent with the view that lenders may not react immediately because covenants take time to trip, old unsecured loans take time to mature and new secured loans take time to arrange, and it takes time to see that the business environment has clearly deteriorated.

Panel A, columns (1)–(3) use Baa–Aaa credit spread as a measure of conditions in credit markets, whereas columns (4)–(6) use log real GDP as a measure of underlying economic conditions. Specifically, $\Delta$Baa-Aaa spread is the deviation of Baa–Aaa credit spread from its Hodrick-Prescott trend line. Similarly, $\Delta$GDP growth is the deviation of logarithm of real GDP from its Hodrick-Prescott trend line. The regression coefficients suggest a strong countercyclical pattern in the share of secured bond issuance. The coefficients in all the columns are statistically significant at the 5% level or better. In terms of economic magnitude, the coefficient estimate in column (1) suggests that a one standard deviation increase in Baa–Aaa spread increases the share of secured bond issuance by 2.2 percentage points. Similarly, the coefficient estimate in column (2) suggests that the share of secured bond issuance is approximately 5 percentage points higher when the detrended credit spread is positive, while the coefficient estimate in column (3) indicates that it is 5.2 percentage points higher when the detrended credit spread is above the median detrended credit spread. Moving on to the deviation in real log GDP as a measure of the business cycle, the point estimate in column (4) suggests that a one standard deviation fall in real log GDP increases the share of secured bond issuance by 1.8 percentage points. Similarly, the coefficient estimate in column (5) suggests that the share of secured bond issuance is approximately 3 percentage points higher when detrended real log GDP is negative. Overall, our analysis suggests that secured bond issuance was countercyclical during the last 58 years.

Next, we examine whether a similar countercyclical pattern existed during the earlier period 1900 to 1943 using Hickman (1960) data. We obtain annual GDP data for the years 1898 to 1945 from Historical Statistics of the United States Millennial Edition Online (see http://hsus.cambridge.org/). Data on Baa–Aaa credit spread exists from 1919 onward. We perform an analysis similar to the one in Panel A using secured bond issuance share (by value) at the annual frequency and report the results in Panel B of Table III. Specifically, we regress the secured share in year $t+1$ against the business cycle proxy in year $t$ (i.e., a lag of one year). While our analysis using GDP covers the entire 1900 to 1943 time period, the analysis using credit spread is restricted to the years 1919 to 1943. Again, the coefficients are all statistically significant at 5% level or better, and support the hypothesis that the share of secured bond issuance follows a
countercyclical pattern. The coefficient estimate in column (1) suggests that a one standard deviation increase in detrended credit spread leads to an increase in secured bond issuance of 5 percentage points, whereas the coefficient estimate in column (4) suggests that one standard deviation fall in detrended real log GDP leads to a 4.1 percentage point increase in the share of secured bond issuance. Overall, our analysis of bond issuance over the past century strongly supports the notion that the share of secured bond issuance follows a countercyclical pattern.

We are not the first to note a possible countercyclical component to secured debt. Although they do not focus on countercyclicality, Nini, Smith, and Sufi (2012) show that lenders demand collateral when a debtor violates covenants, and to the extent that covenants violations are countercyclical, this would create countercyclicality in the level of outstanding secured debt (as well as issuances if new secured debt is issued to replace the old unsecured debt). Luk and Zheng (2018) develop a macroeconomic model with debt heterogeneity that generates procyclical unsecured debt. Using firm-level data from Compustat for the period 1981 to 2017, they find that the amount of unsecured debt on a firm’s balance sheet is positively correlated with GDP growth. Azariadis, Kaas, and Wen (2016) obtain similar results for the period 1981 to 2012 using the same dataset, as do Bradley and Roberts (2015) using loan data from Dealscan. In contrast to these studies, we use bond issuance data over a longer time period to examine whether the share of secured bond issuance follows a countercyclical pattern.

In sum, then, we have two broad sets of facts to explain. First, the share of secured debt has declined steadily. Second, secured bond issuance shows a strong countercyclical component over time. Ideally, there will be some common explanations of these facts. Moreover, there will be other implications of the explanations that we can also check.

III. Theories of Secured Debt Usage

There are many theories of why security or collateral matters. Sometimes they differ only in details. We outline the main theories here that may have bearing on our results, while also acknowledging that this is not a survey and we cannot include all material contributions.18

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18 This section benefited greatly from a discussion with Douglas Baird.
A. Assets as Alienable and Immutable

Collateral typically consists of distinct, alienable, relatively immutable assets, while a firm’s cash flows, the primary source of debt repayment in the normal course, may be more variable and less reliable. A hard asset will retain its value even if the borrower’s business acumen is modest, he is untrustworthy, or he neglects maintenance, so it will require little monitoring (see Jackson and Kronman (1979)). Furthermore, as Hart and Moore (1994, 1998) argue, the ability to seize hard assets in case of default allows a lender to make credible threats that enable her to extract repayment even when cash flows are not verifiable and the borrower’s human capital is inalienable (that is, the borrower cannot commit it to generating cash flows). Of course, this threat is credible only when the asset is valuable in other hands, but the presence of others from the industry who can manage the asset ensures that (Shleifer and Vishny (1992)). The need for valuable assets to support borrowing, also known as the collateral constraint, is central to a large number of papers in the macro-finance literature, including Geanakoplos (2010), Kehoe and Levine (1993), and Kiyotaki and Moore (1997). Finally, the value of an asset, especially one with a large liquid market, may be easier to establish than the prospective value of cash flows, especially if accounting is not reliable.

That a firm’s borrowing is limited by the value of its alienable assets does not necessarily mean its debt has to be secured by the assets. So long as a single lender faces the borrower, the right to seize assets in case of default is sufficient – this just requires the enforcement of absolute priority. In the macro-finance literature, so long as the assets stay within the firm, it is as if the debt issued by the firm is fully secured by the assets, without an explicit process of registering the security interest.19 So macro-finance theories have little to say on why debt is secured in the legal sense. For that we either have to have the possibility that assets and cash flows might be tunneled outside the firm, the likelihood that absolute priority will be violated, or the presence of multiple creditors. That leads us to the next, related, set of explanations.

B. Preserving Value

Assets can be sold for cash and the cash spirited out of the firm through transfer pricing to related parties, expense padding, or plain theft. So unless the lender has an explicit claim against the asset, she will have little control over its disposal. Similarly, in situations of distress, debt’s priority can be violated,

19 All debt is implicitly secured by the assets. For the debt to be explicitly secured, its security interest has to be “perfected” or registered in a public collateral registry.
especially vis a vis equity. When debt is secured by specific assets, however, the creditor effectively has some say over whether the assets can be sold, and she has the legal ability to reach the assets if they are sold (her state-law “priority right”). Her ability to attach the asset also protects her against the accounting manipulation of cash flows.

If the bankruptcy process is slow and unpredictable, the creditor does not have to go to court to reach the asset if she can take possession of it (her “repossessory right”) without a breach of the peace or if she has ownership (as with a lease). And in bankruptcy systems that are speedy and can be trusted to respect absolute priority, secured debt’s value is further protected by the value of the assets backing it – even if the bankruptcy code stays the secured creditor from seizing the collateral. This is especially valuable when priorities among creditors is fuzzy.

C. Establishing Priority Between Creditors

When a firm has multiple creditors, with different maturities, seniority, and monitoring capabilities complicating relative priority, debt secured with specific collateral has higher priority relative to other creditors. Jackson and Kronman (1979) argue that this may be efficient if lenders with a high cost of monitoring obtain a security interest. Protected by collateral, they will not need to monitor frequently or carefully, while unsecured creditors will take on the burden of monitoring, and will get compensated for it. Bolton and Scharfstein (1996) go further in arguing that a borrower may want to differentiate among ex-ante similar creditors by securing some and not others. Essentially, the optimal priority structure will make it costly for the borrower to threaten strategic default while keeping the expected costs of bankruptcy low. In Bolton and Scharfstein, firms that have a large distance to default should have diverse creditors with a variety of priorities, while firms that have a higher probability of default should have few, and more similar creditors, with little distinction in priority.

D. Security as Insurance or Financial Slack

If the ability to collateralize debt allows the borrower to create a safe, senior claim, then the borrower may want to use this ability judiciously. Myers and Majluf (1984) argue that firms should first

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20 There are parallels between this argument and the argument by Dang, Gorton, and Holmstrom (2012) who find it efficient for a corporation (they focus on banks) to issue near riskless claims to investors who have high monitoring costs. Welch (1997) reaches a somewhat different conclusion – to reduce dissipative conflict, he shows the most deep-pocketed creditors should have seniority/collateral.
issue claims that are not subject to asymmetric information such as senior secured debt, and then, after exhausting such claims, issue more junior claims like subordinate debt and equity. Rampini and Vishwanath (2010) note that this depends on the productivity of investments a borrowing firm has access to, both currently and over time, as well as its access to funds. A firm with very productive current investment opportunities, little expectation they will get much better, and facing tight funds constraints, will tend to use up all its financial slack (see Myers and Majluf (1984). It will issue secured debt to obtain maximum financing for its projects.

However, firms that have easier access currently to financing, current projects with lower productivity, and some prospect that the productivity of projects will improve (or that some calamity will require an infusion of funds to stave off much worse outcomes as in Holmstrom and Tirole (1997)) will preserve the ability to issue secured debt for a rainy day. Unpledged collateral (or cash) then is a form of financial slack that can be used in a state-contingent way, preserving borrowing capacity for states where it is truly needed rather than giving it up ex ante.

Other papers that see super-senior claims such as secured debt or cash as a form of insurance, to be conserved and used in times of need, include Acharya, Almeida, and Campello (2007), Bjerre (1999), Li, Whited, and Wu (2016), and Schwarcz (1997). In a related vein, Stulz and Johnson (1985) point to secured debt’s beneficial role in resolving equity’s reluctance to invest when facing high debt (as in Myers (1977)), precisely because secured debt has priority over unsecured claims and thus leads to less of the NPV of new investments being shared with existing claims.

E. Costly Contracting Models

Costly contracting models (e.g., Williamson (1985)) focus on the varying costs of different forms of contract as also their benefits in curbing opportunism and problems associated with information asymmetries. The optimal choice of contract reflects this trade-off. At a high level, the content in such a theory is only that decisions are based on rationally assessing trade-offs. It is only when costs pertaining to a specific contract and its alternatives are clearly specified that such a theory has explanatory bite.

In backing debt with security, there are clearly transaction costs (of registering or perfecting the security at the collateral registry). Perhaps more important are the costs of lost real flexibility as the firm gives up its ability to restructure or dispose of assets freely, and has to ask the creditor permission whenever such disposal is necessary for its business strategy (see, for example, Mello and Ruckes (2017)). While the
creditor has no reason to refuse if the action enhances firm value, she could extract a rent for agreeing to waive her rights in the security. More generally, greater creditor power over the borrower could be an important cost of offering security (see, e.g., Baird and Rasmussen (2010)).

The clear alternative to secured debt is to issue debt with covenants (see Schwartz (1997) and Smith and Warner (1979)). For instance, collateral is an effective way of protecting debt against subsequent dilution by the debtor (see, e.g., DeMarzo (2019), Donaldson, Gromb, and Piacentino (2019 a and b)). Rather than issuing secured debt and giving up both financial and real flexibility, however, the borrower could issue debt with a negative pledge clause (NPC). These assure unsecured creditors that other creditors will not be offered the security that they themselves have not taken (a worry that Bebchuk and Fried (1996) emphasize).

Of course, as Ayotte and Bolton (2011) argue, the creditor who is protected by a secured claim has a property right which allows him to proceed not just against the borrower but also against any other lender who infringes on his claim. With a covenant, however, he only has a contractual claim, which gives him the right to proceed only against the borrower. Schwartz (1997) argues that more reputable established borrowers will prefer the contractual route because they can be trusted to not take advantage of the creditor, while new, less established borrowers or borrowers close to bankruptcy will have to offer security to bind themselves firmly against misbehavior.²¹

F. Making Sense of the Data

In what follows, we will attempt to use the theory to make sense of the data. It would be too much to say we are testing the theories – indeed many of the theories are not mutually exclusive, or differ in ways that are hard to tell apart. Moreover, there are many moving parts that could explain a phenomenon that occurs over a century. Instead, we attempt to create a meta-narrative, accompanied by additional evidence, that itself can be subject to more careful tests in subsequent work.

²¹ A lot, however, depends on what the specific costs are. For instance, in costly signaling models like Besanko and Thakor (1987), borrowers who issue secured debt lose substantially from the lender’s augmented claims in bankruptcy. So borrowers who know they are healthy will signal they are so by offering secured claims, knowing they have a low probability of paying the cost.
IV. What Led to the Decline of Secured Debt: The Creditor Side

We focus on two sets of explanations for the decline in secured debt over the twentieth century. The first set relate to the greater tolerance of credit suppliers to leaving credit unsecured. Think of this as creditor demand for security or collateral, whereby the additional volume of credit they might supply, or the reduced interest rate they might offer, might be less responsive to additional collateral than in the past. In the next section, we will turn to a second set of explanations relating to costs borrowers see in pledging collateral.

We start in this section by examining improvements in accounting. We then turn to changes in bankruptcy law, after which we will examine how aspects of both influence financial contracting. We then turn to changes in the nature of the firm, starting with the falling tangibility of firm assets and continuing to the changing profitability of firms relative to leverage.

A. Better Accounting Quality

Developments in accounting and financial reporting have made corporate financial reports more transparent and informative for lenders. When accounting standards were not developed sufficiently, investors relied more on asset-based lending rather than cash flow–based lending, but as financial reporting became more reliable and cash flows effectively verifiable, lenders may have become more willing to lend unsecured (see, e.g., Diamond, et al. (2020), Lian and Ma (2019), and Townsend (1979)).

Wootton and Wolk (1992) point to four major developments that led to a more careful accounting for, and disclosure of, firm operations. First, in 1909, Congress passed a franchise tax—essentially an income tax—on corporations. To know how much they had to pay, corporations had to set up more careful accounting systems to determine revenues and expenses. Second, an “Excess Profit Tax” on business passed in 1917 during World War I, necessitated yet more careful accounting, including for capital invested and capital charges incurred. Third, as accounting practices grew, the courts became more active in the 1920s in finding accounting firms liable for gross negligence vis-à-vis third parties who relied on their services. Finally, a flurry of legislation during the Depression, including the Securities Act of 1933 and the Securities Exchange Act of 1934, required audits for listing companies and imposed auditor liability for omissions or misstatements in the prospectus and filing statements. These changes may have improved both the quality and the reliability of disclosure.22

22 But see Leuz and Wysocki (2016) for a detailed and insightful survey on the difficulty of drawing strong conclusions on the impact of legislative changes on the usefulness of accounting disclosures to outsiders.
Consistent with the notion that financial reporting improved during the first half of the twentieth century, Hickman (1960) reports the proportion of firms (in four-year intervals) for which data on both earnings and fixed interest charges were available between 1900 and 1943. He finds a steady increase in the proportion of firms with sufficient data to calculate interest coverage ratios. As Figure 13a shows, from 1900 to 1903 only 10.8% of the firms had sufficient information to calculate a coverage ratio, but the proportion of firms with sufficient information increased to 45.1% by 1912 to 1915, and reached 86.1% and 89.6% in 1936 to 1939 and 1940 to 1943, respectively. According to Hickman (1960, pp. 394, 398): “By all odds the most popular measure of earnings coverage is the time-charges-earned ratio, or the number of times that interest charges were earned by the obligor over some specified period preceding the offering. . . . A pronounced improvement in coverage between 1900 and 1943 is evident, reflecting the larger volume of reliable financial information available for the latter part of the period.”

We extend Hickman’s data on earnings coverage using Compustat. We calculate the proportion of firms with sufficient information on interest expenses and earnings and report the proportion of firms with nonmissing information in Figure 13b. As the figure shows, year by year from 1970 to 2017 more than 90% of firms had sufficient information to calculate an interest coverage ratio (typically, interest expense is missing for those that do not allow a calculation), and there is little variation in this ratio over time. Therefore, by the early 1940s, most public firms disclosed key variables like earnings and interest expenses.

While clearly the volume of data disclosed continues to grow—major changes in legislation governing accounting include the 1964 Securities Act Amendments, the 2000 Regulation FD, and the 2002 Sarbanes Oxley Act—it is less clear that accounting disclosures have become more informative about broader firm health in recent decades (see, e.g., Dichev and Tang (2008) and Leuz and Wysocki (2016)). The accounting literature in fact finds earnings quality has declined over the past 40 years or so (see Collins et al. (1997)). Some argue that this has less to do with a deterioration in the quality of accounting than with the entry of new firms that invest more in intangibles (which have less predictable cash-flow streams) and that have higher earnings volatility (see, e.g., Srivastava (2014)).

At the same time, however, the information and communications technology revolution has made it much more feasible for investors to gather information from other sources and process it quickly and cheaply. Assets that would otherwise be registered and perfected as collateral can be tracked and monitored.

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23 We restrict the sample to firms in SIC 2000–5999. The proportion of firms with available information on coverage ratio is conditional on firms with nonzero-interest-bearing debt.
in real time. Data on likely quarterly firm revenues can be obtained by analyzing customer credit card purchases. It may be that in the last few decades, these sources of information, rather than more transparent accounting, have made lending safer and easier. While we have primarily anecdotal evidence of this, Petersen and Rajan (2002) and Granja, Leuz, and Rajan (2019) document that the average distance between small firm borrowers and their banks has increased steadily over recent decades, which is consistent with lenders getting more reliable information at arm’s length, even for firms that are not generally required to make stringent public disclosures.

In summary, cash flows became steadily more contractible, especially in the first half of the twentieth century with the substantial improvements in accounting and corporate governance. There is little consensus, however, in the literature that accounting has become more informative in recent years, though it may well be the case that investors have obtained more information about corporations from other sources. What is probably fair to say is that these developments played an important role in the early decline in lenders demanding security.

B. Fairer, Predictable Bankruptcy

An important aspect of financial development is improvements in corporate bankruptcy. Developments in bankruptcy law, a more effective functioning of the bankruptcy court, and greater respect for absolute priority could have given unsecured creditors greater confidence that they would not be unfairly pushed back in line, making them more willing to eschew security.

Earlier in the nineteenth century, corporate bankruptcy focused primarily on liquidating assets. Clearly, in such an environment, security protected the value of the creditor’s claim against other unsecured claimants, and may have been a carry-over from mortgage lending. Furthermore, a lien holder may have been more able to bid on the liquidating assets if she could “credit bid” – that is, pay by partly offsetting her existing claim against the bid price. However, as corporations became larger, piecemeal liquidation was increasingly seen as inefficient: How would a large railroad, where different creditors had claims to different stretches of the rail lines, be sold piecemeal? Since the capital markets in the late nineteenth and early twentieth centuries were not deep enough to absorb the sale of such an entity (a sale would have allowed existing capital holders to be paid off and a new capital structure to be put in place), it made much more sense to reorganize the distressed railroad as a going concern (see Baird and Rasmussen (2002)).
Indeed, railroad equity receiverships developed many of the elements of corporate reorganization before their formalization in the bankruptcy legislation of the 1930s (Skeel (2001)).

Equity receiverships were essentially reorganizations effected by investment banks and their lawyers for firms whose securities they had underwritten. Initially, the reorganizations favored secured bond holders and equity, excluding unsecured debt holders. In *Boyd v. Northern Pacific* in 1913, the Supreme Court ruled that reorganizations could not ignore unsecured creditors while giving equity holders value—essentially pushing for a recognition of the absolute priority rule. According to Skeel (2001), *Boyd* “seriously complicated corporate reorganization” because more than two parties now had to be satisfied. Nevertheless, it also started establishing the priority of debt claims over equity, even if the former were unsecured. Unsecured debt claims benefited from this clarification of their value, which probably made them more useful as a means of raising funds.

The next landmark in legislation governing corporate bankruptcy was the Bankruptcy Act of 1938 (also called the Chandler Act), which introduced Chapter X dealing with corporate reorganizations. According to Skeel (2001, pp. 119–120), “Unlike the world the reorganizers had known, where firms’ existing managers had continued to run the business while their bankers ran the reorganization, the Chandler Act turned both of these responsibilities over to the trustee. The act gave the trustee explicit authority to take over the business activities of the bankrupt firm; and the new law took the power to formulate a reorganization plan out of the hands of the creditors and vested it in the trustee. Creditors and other parties could, in theory, make suggestions to the trustee; but the trustee, and the trustee alone, was the one who would develop the terms of any reorganization.”

The act strengthened the rights of secured creditors, including allowing them to push the debtor into involuntary bankruptcy (Gerdes (1938)). The Supreme Court, through *Los Angeles Lumber Products* and *Consolidated Rock Products* also reaffirmed a strict priority rule, so that no junior creditors could be paid until senior creditor claims had been fully satisfied (Columbia Law Review Association (1952)). Because debtors lost control in bankruptcy, the number of reorganizations fell dramatically (Skeel (2001)). It was not that creditors gained significantly in value either—the investment banks that had looked after their interests were also taken out of the reorganization process. Arguably, by coming in the way of effective restructuring by the incumbent, the 1938 act pushed up the costs to debtors of an inflexible capital structure. It is hard, however, to see any change in the pattern of the secular decline of the share of secured debt around the Act (see Figure 1a). It is also hard to see any immediate change in corporate leverage as a result
of the Act—the debt to capital ratio for US corporations, as tracked in Graham, Leary, and Roberts (2015), remained fairly steady from the Act until the end of World War II, though this may have been a consequence of the war. After the war, Graham et al. document a steady rise in measures of corporate leverage for unregulated firms till the early 1970s.

Did the increase in leverage (and the continuing decline in secured debt) result from the strengthening of creditor rights in the 1938 Act, including the reaffirmation of absolute priority? Interestingly, the Bankruptcy Act of 1978 went in the opposite direction but had similar effects on leverage. The Act put the distressed firm’s managers back in control during reorganizations, doing away with the trustee except in special circumstances. Furthermore, it relaxed the strict interpretation of absolute priority that courts had espoused by allowing classes of impaired creditors to vote for the reorganization plan and impose it on all creditors in that class if a majority agreed. Franks and Torous (1989) and Weiss (1990) document significant departures from absolute priority in the 1980s, primarily with unsecured creditors not being paid in full before equity got paid (but far fewer violations of the priority of secured creditors). The Act also strengthened the automatic stay on creditors. It made bankruptcy administration easier by establishing bankruptcy courts in each judicial district and allowing firms to file in any district where they had business dealings. Essentially, the Act moved in a debtor-friendly direction, reducing the costs of an inflexible capital structure. However, this was followed once again by a rise in corporate debt in the 1980s till the mid 1990s. Furthermore, once again, it is not clear that it had any effect on the secular decline in the proportion of secured debt (see Figure 7).

Finally, in this century, bankruptcy practice may have moved to becoming creditor friendly again, with senior secured creditors exercising virtually full control over the debtor’s access to new cash (see Baird and Rasmussen (2002)). As a result, bankruptcy may have become simply a process led by secured creditors to sell the firm, repay claimants, and refresh its capital structure, unlike the extended negotiations between management and creditors of the past. Consistent with this view, Bharath, Panchapagesan, and Werner (2014) suggest that innovations in the bankruptcy process, including the reliance on debtor-in-possession financing and the adoption of key employee retention plans that give management an incentive to speed bankruptcy, have made Chapter 11 outcomes more creditor friendly in recent years. Violations of absolute priority have come down significantly from the 1990s onwards.

Before concluding this sub-section, we should note that in addition to federal bankruptcy legislation, the nature of the collateral that can be secured, the details of how security is perfected, and the relative
priority of the claims of secured creditors are specified in Article 9 of the Uniform Commercial Code (UCC), which is enacted with minor modifications into state law. The UCC was first promulgated in 1952, and its Article 9 was updated significantly in 2001 so as to (i) better deal with security interests in the growing volume of intangible assets (see later); (ii) use new technology to simplify the process for a secured creditor to register a security interest and specify where such an interest ought to be registered to simplify search by creditors; and (iii) ease the way for secured creditors to foreclose on the underlying property in case of default (also termed nonjudicial foreclosure). Mann (2018) further points to a series of federal court decisions between 2002 and 2009 that clarified the applicability of federal and state laws (stemming from Article 9) on patents and thereby enhanced the use of patents and other intellectual property as collateral. The updated UCC also expanded the use of such innovative structures as patent collateral pools.

Arguably, the reform of the UCC in 2001, enacted into state law on July 1, 2002, enhanced the range of available security to firms, lowered the transaction costs of securing loans, and eased the enforcement of security interest. It had benefits for both debtors and creditors in securing debt and should have resulted in a greater use of secured debt. Indeed, as Figure 8 and Figure 9 show, the secular decline in both secured bond issuances as a fraction of total bonds and secured debt issuance as fraction of total debt over the twentieth century seemed to stabilize and reverse itself somewhat in the early years of the twenty-first century. It is, however, hard to tell at this time how much of this reversal is secular (and thus potentially tied to changes in the UCC) and how much is cyclical.

This historical excursus suggests that while significant changes in bankruptcy legislation and practice occurred through the century, much of the change was again in the first half of the twentieth century when bankruptcy law became an effective way to protect creditor rights while preventing inefficient liquidation. Since then, however, bankruptcy has moved back and forth between being creditor friendly and debtor friendly, without having had a clear effect on the quantum of corporate debt issued or the extent to which debt has been secured. In this century, the transactions costs of registering and monitoring collateral have fallen. More kinds of assets can now be collateralized. This may have increased the preference for using secured debt, since a lowering of transactions costs helps both debtors and creditors.

Li, Whited, and Wu (2016) suggest that for a period in the early 2000s, some states passed anti-recharacterization laws that required collateral transfers to special purpose vehicles (SPVs) to be treated as true sales if they were labeled as such. These laws strengthened the rights of creditors that had lent to the SPVs by enabling the swift seizure of collateral (seizure of such collateral was not stayed in the bankruptcy of the transferor, for example). However, a federal court judgment in 2003 led to uncertainty about these laws.
C. Covenants and Collateral

We argued that the accounting variables that creditors need to contract on, such as cash flows and earnings, have become more reliable and hence verifiable in the economic sense. When coupled with other sources of information that allow creditors to monitor the health of borrowers, and the greater effectiveness of bankruptcy courts in protecting creditor rights, it may partly explain the continuing decline of secured debt. Creditors may have become increasingly willing in recent years to use covenants rather than upfront collateral to strengthen their creditor rights and control over borrowers (Bradley and Roberts (2015), Chava and Roberts (2008), Nini, Smith, and Sufi (2009), Roberts and Sufi (2009), Roberts (2015), Smith and Warner (1979)). One example, as Lian and Ma (2019) argue, is that creditors of large U.S. firms today seem to use cash flow–based covenants such as “earnings-based borrowing constraints” to control excessive firm borrowing. Lenders may also have become more willing to use covenants as trip wires, giving them the option to take collateral under the right contingencies rather than up front (Demiroglou and James (2010), Dewatripont and Tirole (1994), and Rajan and Winton (1995)).

Collateral offers a superior way of establishing priority among debt claimants (see, e.g., Badoer, Dudley, and James (2019)). Hence, some researchers have argued that firms will experience a race for collateral as creditors try and secure themselves (see, e.g., Donaldson, Gromb, and Piacentino (2019 a)). Such theory seems to be in contradiction to our evidence that firms are securing a decreasing proportion of their debt. One explanation for the decline in secured debt despite the potential for a collateral run is the increasing effectiveness of contractual remedies such as negative pledge clauses (NPCs). The NPC is the most common covenant found in unsecured debentures (McDaniel (1983)).

NPCs have been used in unsecured debt offerings since the early 1900s. However, an exhaustive study conducted by the SEC (1936) cited prominent bankruptcy cases from the Depression that illustrated defects in the functioning of negative pledge clauses. Following this, Congress adopted the Trust Indenture Act in 1939, requiring that all bonds over a certain size contain an indenture (a formal written agreement between bond issuer and bondholders that fully disclosed the particulars of the bond issue). The trustee was meant to ensure that borrowers did not violate the indenture, including any NPC, and that potential future secured creditors were made aware of the existence of any NPCs.

Negative pledges in the post-Depression era are frequently accompanied with an affirmative covenant (Coogan, Kripke, and Weiss (1965)). The affirmative clause grants an equal right to the pledge holder if the debtor enters into a security arrangement with a third party. There is, however, a puzzle associated with
such clauses (see, for example, the discussion in Bjerre (1999)). If indeed a borrower violates a negative
pledge clause by issuing secured debt to a new lender against an asset, existing creditors stand behind the
new lender for claims against the asset – essentially they are faced with a fait accomplis. If so, what teeth
does a negative pledge/affirmative covenant have?

Firstly, the new lender’s priority can be denied by a court if it finds that the lender knew about the
existence of the negative pledge clause. With more and more information available today (and the indenture
trustee required to supply information), it is harder for a substantial lender to claim ignorance. Importantly,
however, existing lenders are also not without recourse. They can accelerate their claims because of the
covenant violation, and as Donaldson, Gromb, and Piacentino (2019b) argue, this may allow them to punish
a violation of the NPC unless they are consulted and agree. Put differently, the borrower benefits from
collateralizing new debt if it helps her stay out of bankruptcy or avoid costs of financial distress (Schwarcz
(1997)). Given this, the borrower is unlikely to issue secured debt if existing creditors are alert and do not
consent, for that would surely allow them to push the firm into bankruptcy. That secured issuance happens
voluntarily is consistent with Rauh and Sufi’s (2010) finding that there is a decline in negative pledge
clauses in bond indentures as firms move from investment grade to speculative grade.

In sum, contractual features like the NPC alleviate lenders’ concerns regarding the safety of their
claims while also leaving borrowers in control of their collateral. Unsecured debt with an NPC can therefore
be envisioned as contingent secured debt, where lenders are willing to lend unsecured in good times, during
which time the borrower retains financial and operational flexibility over the collateral. In bad times, the
lender’s claim becomes secured the moment the borrower is forced to obtain additional financing by
pledging collateral. We will see shortly why such a structure may be useful.

D. Changes in the Nature of the Firm

The share of the value of tangible assets such as property, plant, and equipment as a fraction of firm
value has been trending down, thus reducing the availability of traditional hard collateral (Crouzet and
Eberly (2018)). For example, according to Kahle and Stulz (2017), when compared to similar firms during
the 1970s, 1980s, and 1990s, the twenty-first-century U.S. public corporation invests more in R&D than in
capital expenditure. According to Falato, Kadyrzhanova, and Sim (2013), intangible capital accounted on
average for 10% of net assets in 1970 and increased to over 50% by 2010. Figure 14 displays the evolution
of asset tangibility—the proportion of property, plant, and equipment to total assets—from 1965 to 2017. The figure shows that mean (median) tangibility declined from 47% (40%) in 1965 to 28% (17%) by 2017.25

Although the decline in asset tangibility is a compelling explanation for the decline in secured debt over the second half of the twentieth century (recall that the SSBF indicates that the share of equipment loans declined for small firms and the Flow of Funds data show that the share of mortgages also declined), we have also argued the expansion in intangible assets probably spurred legal innovation such as the changes to the UCC’s Article 9 just described led to a variety of court rulings, which together enhanced the pledgeability of a variety of intangible assets, including intellectual property, and financial and legal claims.

Consider Ford’s decision, amid its financial difficulties, to mortgage and pledge most of its unencumbered assets in 2006 to raise an $18 billion credit line. Ford’s Form 10-K (FS26–27) for the year 2006 provides the following description of the assets pledged for its secured credit facility: “Collateral. The borrowing of the Company, the subsidiary borrowers and the guarantors under the Credit Agreement, are secured by a substantial portion of our domestic automotive assets (excluding cash). The Collateral includes a majority of our principal domestic manufacturing facilities, excluding facilities to be closed, subject to limitations set forth in existing public indentures and other unsecured credit agreements; domestic account receivable; domestic inventory; up to $4 billion of marketable securities or cash proceeds therefrom; 100% of the stock of our principal domestic subsidiaries, including Ford credit . . . certain intercompany notes of Ford VHC AB, a holding company for Volvo Car Corporation . . . 66%–100% of the stock of all major first tier foreign subsidiaries (including Volvo); and certain domestic intellectual property, including trademarks.”

Ford’s Form 10-K also provides a detailed account of the various categories of collateral, its eligible value, and the borrowing base against each of the collateral categories, which we report in Table IV. As the table demonstrates, although Ford’s collateralized credit line had a borrowing base of $22.5 billion, traditional property, plant, and equipment—or tangible assets—accounted for only $5.0 billion, or 22% of the total borrowing base. Ford was able to borrow against its inventories, intercompany notes, equity in its subsidiaries, and intellectual property and trademarks. Ford’s collateralized credit line illustrates that modern corporations have a variety of assets that can be pledged as collateral—and that these assets are not

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25 Interestingly, though, Compustat firms seemed to use more such hard assets to generate sales till about the early 1980s – the ratio of sales to property plant and equipment went down from about 12 in 1950 to 8 in the mid 1980s. Since then it has shot up to about 15 in 2015.
only tangible but also include financial assets as well as intangibles. Collateral today is certainly not your parents’ collateral!

We conjecture that over time, and as a result of legal changes such as the alterations to the UCC in 2001, firms were able to use assets as collateral that are not necessarily tangible. In tandem, the importance of property, plant, and equipment for securing debt may have declined over time. To test this conjecture, using data from Compustat, we regress the ratio of secured debt to the firm’s total debt on lagged firm-level characteristics that include the typical variables the literature associates with debt—firm size, Tobin’s Q, Return on Assets (ROA), and tangibility—the ratio of property, plant, and equipment to total assets. In order to assess the effect of tangibility on secured debt, we also interact tangibility with year fixed effects:

\[
\text{secured}_{i,t} = \alpha + \beta_1 \times \text{Size}_{i,t-1} + \beta_2 \times Q_{i,t-1} + \beta_3 \times \text{ROA}_{i,t-1} + \beta_4 \times \text{Tang}_{i,t-1} + \beta_5 \times \text{Tang}_{i,t-1} \times \text{Year}_t + \sum_{t=1981}^{2017} \gamma_t \times \text{Year}_t + \epsilon_{i,t}
\]

We will postpone a discussion of the main effects in this regression to the next section. Figure 15a displays the marginal effect of asset tangibility on secured debt from 1981 to 2017. As the figure clearly shows, the marginal effect of tangibility declined from around 0.30 in the early 1980s to below 0.10 in the second half of the 1990s and remained around 0.10 thereafter. Interestingly, the effect of tangibility becomes stronger during the Global Financial Crisis and doubles in size before dropping to its precrisis level in 2013.

We repeat the analysis above using intangibles—the ratio of intangible assets to total assets—and interact intangibles with year fixed effects. The time-varying marginal effect of intangibles is plotted in Figure 15b and presents an almost mirror image to the effect of property, plant, and equipment. From 1982 to 2000 there is either a negative or almost zero association between intangibles and secured debt. However, starting in 2001 the marginal effect of intangibles on secured debt is positive and hovers around 10%.

The declining effect of tangibility jointly with the increasing effect of intangibles on the use of secured debt is consistent with the notion that as the share of tangible assets, and traditional ways of backing debt, declined, the legal environment was altered to enable firms to pledge a greater variety of assets as collateral.

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26 We are not arguing that tangible assets do not make good collateral. In fact, in the cross-section, a firm with more tangible assets should be able to issue more secured debt—a result that we confirm later.

27 We measure the marginal effect of tangibility for each year as the sum of \( \beta_4 \) (the direct effect of tangibility) and the corresponding \( \gamma_t \).

for their debt. This may partly explain why after a steady decline in secured debt share over the twentieth century, there are tentative signs that it is reviving once again.\footnote{We must also not ignore the possibility that corporate structure can be used to generate priority structures among debt holders (see Baird and Casey (2013)) and this may also have helped firms use intangible assets as security, even if legally not pledgeable. For instance, if a firm places assets in a subsidiary or wholly owned special purpose vehicle (SPV), and borrows both through the SPV and at the holding company, the debt at the holding company is effectively subordinated to the debt against the SPV assets (also see Li, Whited, and Wu (2016) for the use of SPVs). However, the use of corporate structure to establish priority (in lieu of collateralization) would tend to reduce, not increase, the share of secured debt. Most recently, of course, we see the opposite.}

\textit{E. Greater Borrower Ability to Pay}

It is possible that creditors required less security over the twentieth century because borrowers became healthier, and consequently, borrowers too held collateral back as a form of reserve or insurance (Rampini and Vishwanathan (2010)). Although this may have been a factor explaining the decline in secured debt in the early decades of the twentieth century, we will see that it cannot, prima facie, explain the trend in the ending decades.

\textit{E.1. Interest Coverage}

The early 1900s was a period when the United States was industrializing rapidly. The early years of economic development may also have resulted in many more mature firms with stable businesses. Figures 16a and 16b report corporate interest coverage over time, using information from Hickman (1960). As Figure 16a shows, the proportion of firms with interest coverage ratio of less than one declined from 31.3\% from 1900 to 1903 to 14.8\% from 1924 to 1927 and eventually to 3.6\% from 1940 to 1943. In Figure 16b, the proportion of firms with a coverage ratio of more than three—the highest category reported by Hickman (1960)—increased dramatically from 1.3\% in 1900 to 1903 to 20.8\% in 1924 to 1927 and 50.2\% in 1940 to 1943. Thus, in the early years of the twentieth century, not only does accounting seem to have become more informative but firms themselves seemed to be more able to handle debt repayment. This may explain the decline in secured debt issuances in those first few decades.

Once again, the evidence is less clear in recent data. Using Compustat data, we show in Figure 16c that the proportion of firms with interest coverage ratio of less than one fluctuated between 2.0\% and 8.1\% during the 1970s. However, it increased gradually during the 1980s and 1990s. The proportion of firms with interest coverage ratio of less than one peaked in 2002, increased again during the Great Recession and fell after it, but has increased again recently. More generally, the proportion of firms that could have
difficulty repaying interest has climbed since the early 1980s, in part because leverage has increased (see Graham, Leary, and Roberts (2015)). Likewise, by the early 1970s, the proportion of firms with a coverage ratio of more than three increased to more than 85% (interestingly, leverage had a local peak in the early 1970s according to Graham, Leary, and Roberts (2015), suggesting that cash flows must have also been high relative to interest payments to account for the high interest coverage). Since then, there has been a decline in the share of firms with high coverage, with a sharp dip from 1999 to 2002 and a flattening thereafter (see Figure 16d). Interestingly, though, the share of firms with interest coverage over 3 in the period 1970-2017 has almost always been higher than the highest such share in the period 1900-1943 (Figure 16b).

E.2. Distance to Default

Interest coverage is, of course, a crude measure of a firm’s ability to service its debt. Perhaps more useful than coverage is to measure a firm’s default probability directly using the Merton distance to default model (see Vassalou and Xing (2004) and Bharath and Shumway (2008) for detailed description of the methodology); this default probability reflects both the volatility of a firm’s underlying cash flows as well as the level of its debt. Using Compustat data, in Figure 17a we plot the share of firms with one-year default probabilities greater than 75%, and in Figure 17b we plot default probabilities for firms at the 85th percentile of the distance to default (higher percentiles are closer to default). Both plots suggest that default probabilities peak during recessions (except, curiously, during the double-dip recession in the early 1980s, when perhaps high inflation eroded debt value). In more normal times, probabilities increased steadily between the early 1970s and the early 2000s, fell after that, spiked during the Great Recession, and seem to have picked up in the most recent data. So the pattern for default probabilities does seem to correspond strongly to increases in corporate leverage.

Although the initial decades of the twentieth century were characterized by a rising level of cash flows relative to interest due, the reverse has been true more recently, especially since the 1970s. We cannot therefore argue that the continuing decline in secured debt from the 1970s until the early part of this century is because firms moved farther from distress over the period. Nevertheless, it is interesting to ask whether the share of secured debt issued by a firm is related to its distance to default, and whether that relationship has been changing over time.
Using Compustat data, we regress the ratio of a firm’s secured debt to its total debt on lagged firm-level characteristics that include not only firm size, Tobin’s Q, Return on Assets (ROA), and tangibility but also the probability of default. Because we are interested in the changing marginal effect of distance to default on secured debt over time, we also interact default probability with year fixed effects:

\[ secured_{it,t} = \alpha + \beta_1 \times Size_{i,t-1} + \beta_2 \times Q_{i,t-1} + \beta_3 \times ROA_{i,t-1} \]

\[ + \beta_4 \times Tang_{i,t-1} + \sum_{t=1981}^{t=2017} \gamma_t \times year_t \times DefPr_{i,t-1} + \delta_t + \epsilon_{i,t} \]

In Figure 18, we plot the marginal effect of default probability on secured debt from 1981 to 2017 (i.e., the coefficients \( \gamma_t \)). As the figure shows, the marginal effect of default probability on secured debt has declined from around 0.15 in 1981 to about −0.07 by 2017, with spikes in sensitivity around the recessions in 1980 to 1981 and 1990 to 1991 and right after the Global Financial Crisis. This suggests that the sensitivity of a firm’s share of secured debt to its distance to default is particularly high around business cycle downturns, but has otherwise been declining.

The negative sensitivity of secured debt share to default risk during many non-downturn years of the twenty-first century needs further explanation, for it runs counter to our intuition (that the share of secured debt should be positively correlated with risk). In Figure 19a, we plot median firm leverage (measured as the book debt to assets ratio) for the Compustat sample (1981 to 2018) for different default probability deciles. As might be expected, firm leverage increases steadily with default probability. In Figure 19b, we plot the median secured debt share for the different default probability deciles. Here again, secured debt share increases except for the highest two default probability deciles, when it falls. One explanation, then, is that since these are also the deciles with the highest debt, many firms run out of pledgeable collateral—indeed, when we plot median secured debt to assets in Figure 19c, the ratio increases until the decile closest to default, and then it dips slightly. Since this decile is closest to bankruptcy, it may also be that lenders protect themselves in other ways once collateral is scarce—for instance, by shortening the maturity of debt. In support of this last point, we plot the debt in current liabilities as a share of total debt for the different default probability deciles in Figure 19d. We see a sharp increase as default probabilities increase.\(^{29}\)

\(^{29}\) It may also be that secured lenders are in control closer to bankruptcy, and can force the firm to stop repaying unsecured short term debt. This too would cause a rise in short term debt, and a fall in the share of secured debt. We thank Douglas Baird for this suggestion.
In sum, then, the negative sensitivity of secured debt share to default risk during the twenty-first century in Figure 18, outside of periods of generalized distress like the Great Recession, could be explained by the fall in the share of secured debt when firms are on the brink of default, coupled with the lower sensitivity of secured debt share to default risk in normal times -- as the sensitivity of secured share to default risk flattened during this period, the negative relationship in the tail potentially dominated the overall relationship.

**E.3. Security and Ratings**

The distance to default measure from a Merton model does not capture possible competitive risks from within the industry or from possible competitor innovations that could cause a firm to default. Moreover, it does not capture the loss given default—lenders look to collateral to mitigate this loss. For a subset of borrowers, typically larger and financially healthier firms, we have S&P credit rating data from Capital IQ’s current and historical credit ratings database. S&P describes its rating as reflecting “the obligor’s capacity and willingness to meet its financial commitments as they come due, and this opinion may assess terms, such as collateral security and subordination, which could affect ultimate payment in the event of default.” We now examine the relationship between credit ratings and security to complete our assessment of the effects of credit risk on security.

We match S&P’s firm-level issuer credit rating data from Capital IQ with data on firm characteristics from Compustat. Our sample includes all firms in Compustat that operate in industries with SIC codes that are between 2000 and 5999. The sample period begins in 1985 and extends through 2015.

In Table V, we report summary statistics of secured debt (measured as a fraction of total debt) stratified by S&P firm-level credit rating. A clear and striking pattern emerges from the table: secured debt is issued mostly by low-rated firms (also see Rauh and Sufi (2010) and Colla et al. (2013) for similar findings). The mean ratios of secured debt to total debt of firms that are rated AAA, AA+, and AA are 0.0116, 0.0044, and 0.0072, respectively. Firms that are rated between A− and A+ have secured debt ratios that are between 0.0238 and 0.0296, and firms rated between BBB− and BBB+ have similar ratios. Firms that are rated below investment grade (BB+ and below) use much more secured debt in their financing. For example, the mean ratio of secured debt to total debt is 0.0877 for firms rated BB+, 0.1243 for BB rated firms, and 0.1481 for firms with a rating of BB−. Secured debt accounts for 19% of the total debt of firms rated B+, 24.3% for B− rated firms, and 30% for firms rated CCC. Interestingly, secured debt ratios for firms that are rated lower than CCC—that is, firms near or in default—are lower. We have already suggested an explanation
for the lower secured debt ratio for firms near or in bankruptcy.

In Table VI, we present estimates of our workhorse regression of secured debt on firm characteristics.

\[
\text{secured}_{i,t} = \alpha + \beta_1 \times \text{Size}_{i,t-1} + \beta_2 \times Q_{i,t-1} + \beta_3 \times \text{ROA}_{i,t-1} + \beta_4 \times \text{Tang}_{i,t-1} + \gamma_i + \delta_t + \epsilon_{i,t}
\]

As before, the dependent variable is the ratio of secured debt to the firm’s total debt and the explanatory variables include firm size, Tobin’s Q, Return on Assets (ROA), and asset tangibility as well as vectors of year fixed effects (\(\delta_t\)) and either industry or firm fixed effects (\(\gamma_i\)).

In column (1) of Table VI, we report estimates of the regression that includes year fixed effects. As the coefficient on log (assets) shows, larger firms are less likely to use secured debt. The negative correlation between firm size and the use of secured debt is sizable—for example, a one standard deviation increase in firm size is associated with a reduction of 0.123 in the secured debt ratio, representing a decrease of 37.1% compared to the unconditional mean. The negative relation between firm size and secured debt is consistent with the idea that creditors demand collateral in riskier, less mature firms. We also find that the relationship between Tobin’s Q and secured debt is negative (consistent with the idea that firms with more growth options require more financial flexibility, something we will return to shortly), that more profitable firms have more secured debt in their capital structure, and that firms with more tangible assets are more likely to use secured debt. Adding industry fixed effects (column (2)) or firm fixed effects (column (3)) does not change the results qualitatively, although the point estimates are understandably considerably smaller when firm fixed effects are included.

Leverage and the use of secured debt may be correlated since lenders are more likely to demand collateral in the presence of high preexisting leverage. Although our dependent variable focuses on the intensive margin of secured debt—the composition of the firm debt structure—it might also be capturing the amount of leverage that the firm has. In column (4) we attempt to address this concern by adding the lagged leverage ratio to the regression. Even though secured debt and leverage are positively correlated, controlling for past leverage does not affect the point estimates and significance of our main explanatory variables.

In columns (5)–(7) we add S&P firm-level credit rating as an explanatory variable to the regressions.\(^{30}\) Since we include only firms with credit ratings, and given that the coverage of the data begins only in 1985,

\(^{30}\) Higher values of the variable credit rating imply a lower rating. For example, we assign a value of 1 to AAA, 2 to AA+, 3 to AA, etc.
the number of observations is considerably smaller in these regressions compared to those in columns (1)–(4). Nevertheless, as the table demonstrates, and consistent with the results presented in Table V, lower-rated firms tend to have higher ratios of secured debt to total debt. The effect of credit rating on secured debt is considerably larger when we include industry fixed effects (column (6)): a change of 5 notches in ratings (say, from BBB+ to BB−) is associated with an increase of 9 percentage points in the ratio of secured debt to total debt, representing an increase of 27% relative to the unconditional mean. In column (7) we add firm fixed effects to the regressions and hence identify from variation in credit rating over time. The coefficient on rating in the firm fixed effects specification is smaller compared to those in columns (5) and (6) but is still considerable—a downgrade of 2 notches is associated with a 2 percentage points rise in secured debt, or a 6% rise relative to the mean. Of the four other explanatory variables, only size and tangibility remain statistically significant, and their coefficients are much smaller than those reported in columns (1)–(4). In the last two columns of the table we replace the S&P firm-level credit rating variable with a dummy variable that takes the value of one if the firm has below investment grade credit rating (BB+ or below). The idea behind this specification is to capture the non-linearity in the relation between secured debt and credit rating observed in Table V. The coefficient on the non-investment grade dummy in column (8) suggests an increase in secured debt of 32.6% relative to the mean. When we include firm fixed-effects (column (9)), the effect is smaller but still sizeable (an increase of 16.8% relative to the unconditional mean).

In sum, we see that large, highly rated firms with considerable distance to default tend not to offer collateral to back their debt, while small, risky firms with a high probability of default back more of their debt with security.\footnote{Could the secular decline in creditor demand for security be because of the satiation of the demand for safer debt securities through other alternatives? For instance, if government bonds satisfy the need of a certain clientele for having safe financial assets, there may be less value for corporations in providing them by securing its debt. This explanation runs counter, prima facie, to the facts we have just presented – it is not the most highly rated firms that secure their debt in order to provide the public with super safe assets. Instead, it is risky firms that try and enhance the creditworthiness of their claims by collateralizing them. Furthermore, it is hard to see much relationship between outstanding government debt stock and the share of secured debt—U.S. gross federal debt peaked at 119 percent of GDP in 1946 after the buildup in war debt, hit a nadir in 1981 at 31 percent of GDP after the Great Inflation, and then has risen steadily (except for the period of surpluses in President Bill Clinton’s second term) to 105 percent of GDP in 2018. This U-shaped graph since the war bears little resemblance to the change in secured debt share.} Furthermore, as firms’ credit risk rises, lenders tend to get more security for their loans. The declining correlation between distance to default and the use of secured debt suggests that, over time,
creditors have become comfortable lending unsecured to riskier firms, taking collateral on a more contingent basis.

\textit{G. Overall Assessment}

Taken together, these explanations suggest that through the course of the twentieth century, corporate creditors in the United States may have settled for lower and lower fractions of their debt to be secured up front for three distinct sets of reasons. In the early years, more reliable accounting gave creditors more confidence about cash flows, the cash flows themselves grew significantly larger as firms matured, and bankruptcy legislation allowed debt to be restructured even while protecting the absolute priority of unsecured creditors to some extent. Security became less and less a means of protecting creditors against management or equity holders, and more a means of protecting the priority of some creditors against others.

This then led to the possibility that all creditors of a firm could remain unsecured in the normal course until the firm’s performance deteriorated or its leverage increased so much that it needed to offer security for new debt. Only at that time would existing creditors, empowered by negative pledge clauses, also demand security as protection. A movement to such contingent collateralization, made possible by greater experience with negative pledge clauses, as well as greater confidence among creditors that they had information to detect violations, would have accentuated the fall in the share of debt secured.

Finally, the decreasing tangibility of the firm’s assets and thus the falling share of traditional collateralizable assets from the mid 1960s (the earliest we can track firm balance sheets) is yet another reason for the secured debt share to have fallen. Of course, other forms of collateral such as intellectual property and brands have become more prominent in recent years, and legal means of securitizing such assets have been developed in this century. This may explain why there is tentative evidence that the secured share is edging up once again in this century.

\textbf{V. What Led to the Decline of Secured Debt: The Borrower Side}

We have argued thus far that with financial development, lenders might be willing to lend unsecured. But why might borrowers wish to leave their debt unsecured up front – would they not want to get the lowest interest rate up front by offering lenders all the security they had? As a number of theories have pointed out, there are, in fact, costs to the borrowing firm of offering collateral up front including the loss
of financial flexibility, the loss of operational flexibility, and the granting of excess bargaining power to creditors.

A. Loss of Financial Flexibility

Because unsecured finance is usually available when a firm is doing well, unpledged collateral is most likely to be useful when a firm has positive net present value (NPV) uses of funds in bad times—either new investment projects or, more likely, the desire to avoid a negative NPV bankruptcy or liquidation. Indeed, Ford Motor’s earlier described decision to pledge most of its assets as collateral for its secured credit line in 2006 was needed “to address near- and medium-term negative operating-related cash flow, to fund its restructuring, and to provide added liquidity to protect against a recession or other unanticipated events.”

Thus the availability of unpledged collateral allowed Ford to escape the fate of the other two auto majors, who had to be rescued by the government.

The notion that untapped collateral provides firms with financial flexibility is an important factor in some credit rating models. For example, according to Moody’s January 2018 “Proposed Update to the Global Rating Methodology for REITs and Other”: “The amount of a commercial real estate firm’s unencumbered assets relative to gross assets is important because properties that are free and clear of mortgages are sources of alternative liquidity via the issuance of property-specific mortgage debt, or even sales. The larger the ratio of unencumbered assets to gross assets, the more flexibility a given commercial real estate firm generally has in repaying its unsecured debt at maturity, and the more likely that a higher recovery can be realized in the event of default.”

In addition, as part of its analysis of leverage, Moody’s assigns a lower credit score to firms with higher ratios of secured debt to gross assets: “The ratio of secured debt to gross assets is an important indicator of financial flexibility. Companies with low levels of secured debt typically have greater financial flexibility. In periods of stress, the existence of a pool of unencumbered assets (particularly a pool of larger, more

32 “Ford Pledges Major Assets in Financing.” Indeed, highlighting the value of preserving financial flexibility, the highly indebted retailer J. Crew tunneled some assets out of the firm into a Cayman Islands entity, beyond the reach of its secured creditors. It then borrowed against those assets to make needed investments. Interestingly, the value of its outstanding secured bonds, which now had fewer assets backing them, rose, because J. Crew’s going-concern value had been enhanced.

33 Moody’s Investors Service, “Proposed Update to the Global Rating Methodology for REITs and Other Commercial Property Firms,” January 31, 2018, 14.
diverse and higher-quality assets) can help maintain market access, because the commercial real estate firm may be able to issue secured debt even if market conditions preclude the issuance of unsecured debt.\textsuperscript{34}

Can we provide more systematic evidence consistent with firms’ desire for financial flexibility? Rampini and Vishwanath (2010) argue that in contrast to unconstrained firms that have the luxury of preserving collateral as a reserve to draw on when needed, financially constrained firms will tend to use all the collateral they have, since their marginal utility of investment is high. This is a testable implication of the collateral as insurance or financial flexibility argument. We need a proxy for firms that are unconstrained – that have a low marginal value for the additional dollar they have. We follow Fazzari, Hubbard, and Petersen (1988), Fama and French (2002), and Acharya, Almeida, and Campello (2007) in using a firm’s dividend payout ratio to measure financial constraints, noting the concerns in Kaplan and Zingales (1997). In Figure 20, we divide firms into financially constrained firms and financially unconstrained firms based on their payout ratio. We compute payout ratio as the ratio of total distributions (dividends and repurchases) to operating income. Firms are assigned to the financially constrained (unconstrained) group based on whether their payout ratio is below (above) the median. We then examine how the share of secured debt changes with distance to default for constrained and unconstrained firms. If firms desire financial flexibility, unconstrained firms will delay giving up security until closer to distress, whereas constrained firm (by definition) would not have this luxury and would start off with a higher share of secured debt even far away from distress.

Specifically, we divide our sample into three non-overlapping time periods: 1986-1995, 1996-2005, and 2006-2015. We assign firms into constrained or unconstrained category based on their payout ratio in the year before (i.e. using 1985 for the 1986-1995 period and so on). We then separately plot for both groups the mean secured debt to asset ratio based on the distance to default decile they fall in. As the theory would predict, financially constrained firms secure about 40 percent of their debt, regardless of the distance to default decile they fall in. They do not have the luxury of conserving collateral. In contrast, financially unconstrained firms secure far less of their debt when far from default (around 20 percent) and secure about the same as constrained firms in the decile that is closest to default. In results available from the authors, we also run regressions of firm level secured debt share on lagged values of log asset size, profitability, Tobin’s Q, tangibility, and leverage along with a dummy for being financially constrained, a variable denoting the distance to default decile and the interaction between the two. We find, as suggested by the

\textsuperscript{34} Moody’s Investors Service, “Proposed Update,” 16.
figure, that coefficient of the financially constrained dummy is positive and significant as expected, and the slope of secured debt share with distance to default decile is statistically steeper for unconstrained firms. Finally, our results are qualitatively similar for both the figure and the regressions if we use firm size as a measure of financial constraint, with larger, typically mature, firms having relatively fewer investment opportunities and more access to finance than smaller, typically younger, firms (available from the authors).

B. Excessive Lender Power and Loss of Operational Flexibility

Firms will be wary of giving a lender substantial collateral if that strengthens the lender’s bargaining power and makes it more intransigent in bankruptcy negotiations (see Bolton and Scharfstein (1996)). In such cases, a default could allow the lender to extract substantial rents—for instance, having acquired all the collateral, the lender may control the debtor firm’s access to debtor-in-possession (DIP) financing. Since that financing is critical for the borrower to survive, the secured lender essentially has the firm by its proverbial jugular (see Baird and Jackson (1984), Baird and Rasmussen (2002, 2010), Jackson and Kronman (1979), Mann (1997), Skeel (2003), Tabb (2013), and Westbrook (2015)). Ayotte and Morrison (2009) find that Chapter 11 bankruptcies are more likely to end in sale or liquidation when secured creditors have strong bargaining power. Similarly, in a study of corporate reorganizations in Finland, Bergstrom, Eisenberg, and Sundgren (2002) find that secured creditors oppose reorganization and push for liquidation. To avoid such situations where the secured lender effectively takes control, firms will want to economize on granting collateral. Firms that have few hard collateralizable assets (so that key assets have to be pledged and other assets cannot be substituted for them) and substantial intangible sources of value are likely to find pledging collateral more onerous because their costs of holdup or liquidation are higher.

In an interesting study, Ma, Tong, and Wang (2019) examine patent sales in bankruptcy. They find that bankrupt firms are likely to sell their core patents rather than their peripheral patents. In contrast, non-distressed firms tend to sell peripheral patents. Moreover, they find that the selling of core patents is driven almost entirely by firms with above median secured debt—a collateralized patent is seven times more likely to be sold by a firm in bankruptcy than by a non-distressed firm, and core patents are more likely to be pledged as collateral. Interestingly, the pattern of firms selling core patents in Chapter 11 seems to be pronounced only after 2000, when Bharath, Panchapagesan, and Werner (2014) argue that bankruptcy laws became more creditor friendly. Taken together, these findings suggest that when creditors have control over key assets, they may prefer to liquidate them to make themselves whole rather than let them remain as part
of the going concern; moreover, the study finds such selling firms underperform when they emerge from bankruptcy.

Concerns about creditor power may thus deter borrowers from offering security unless in extremis. Borrowers may also be worried that the act of pledging collateral limits a firm’s operational flexibility—for example, the flexibility to sell or redeploy assets to craft a better business operation (see Mello and Ruckes (2017)). Although presumably creditors will be willing to accept contractual modifications at such times and will agree to alternative collateral if the asset that is pledged to them needs to be sold, they do have bargaining power, and the greater the value of redeployment, the greater the rents they can extract. In the cross-section, firms with yet-to-stabilize business plans and substantial growth opportunities are likely to value asset redeployment more and are therefore likely to find the cost of offering security more onerous—perhaps one reason we find a negative correlation between a firm’s use of secured debt and its market to book ratio in Table VI. Asset churn is also more likely in the growth phase of the business cycle (Eisfeldt and Rampini (2006)), which would enhance the cost of collateralizing debt at such times.

C. In Sum . . .

Let us summarize, outlining the forces that might best account for the secular decline of secured debt in the United States as well as its counter-cyclicality. We will also point to the theories that might be most consistent with the evidence. In the first half of the twentieth century, the primary forces seem to be improvements in creditor protection and clarification in creditor rights vis a vis the borrower—through better and more reliable accounting, through reforms of bankruptcy law, and through improvements in contracting such as an enforceable Negative Pledge clause. The effect of the first two was to allow creditors to rely in the normal course on repayment through cash flows, while the last allowed creditors to take unsecured positions in healthy firms, knowing that security would be available if firm performance deteriorated. The evidence from the first half of the twentieth century certainly supports theories that creditors require security when the borrower and cash flows are unreliable, in part because her claim on assets gives her more control than an unsecured creditor has. Arguably then, with greater creditor protection, the value of security shifted from protecting the lender in the normal course against the borrower to establishing the lender’s priority in distress against other claimants (see Baird and Jackson (1984)). Security’s role became more contingent, becoming more important closer to firm distress. Improvements in contracting allowed it to be given on a more contingent basis.
The profitability of firms also improved relative to their debt obligations in the second half of the twentieth century as compared to the first half (Figures 16 c and 16 d). A variety of theories (e.g., Schwartz (1997) invoking contracting costs and Rampini and Vishwanathan (2010) emphasizing the insurance motive) would suggest that such a trend should further reduce the amount of secured debt firms issue. Indeed, that firms issue unsecured debt even while they have the ability to secure it is, prima facie, contrary to the Pecking Order Theory proposed by Myers and Majluf (1984) (where senior securities are issued before junior securities). It can, however, be reconciled with the evidence when we recognize (and show) that financially constrained firms do respect the Pecking Order, while unconstrained firms do not.

Finally, the nature of firms also changed towards the last quarter of the twentieth century and into this one – intangible assets became more important, while tangible assets declined as a share of firm assets. While this naturally reduced the amount of traditional collateral firms could pledge, accounting for some of the decline in secured debt, we also find that legal and contractual developments in this century made it possible to secure intangible assets such as intellectual property. This may account for the recent rise in secured debt.

The costs of giving up security in the normal course, including the loss of financial and operational flexibility, may explain why secured debt ratios are countercyclical, falling in economic and financial booms and rising in downturns. The cost of foregone operational flexibility is probably larger in good times when there is a lot of asset churn (see Eisfeldt and Rampini (2006, 2008)). At the same time, as we show in Benmelech, Kumar, and Rajan (2020), the reduction in financing costs from offering creditors collateral is small for investment grade firms and in buoyant economic times – perhaps because creditors know the collateral will be available when they need it in bad times. These considerations suggest why firms would be unlikely to give up collateral in good times but would be more willing to do so in bad times.

Finally, what theories does our evidence not support? From a macro-finance perspective, it is less useful to think of large US firms as being subject to collateral constraints in the normal course (as suggested in Lian and Ma (2019)). However, the collateral constraint may be a more contingent one, and this may influence how much they can borrow in normal times. Our evidence also suggests that for financially

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35 The evidence in Figure 4b that railways increased their issuance of secured debt mildly over the period we document (they were limited by the upper bound of 100 percent secured debt) is consistent with the growing financial difficulties of the railways over this period.
unconstrained firms, the insurance motive may dominate “Pecking Order” considerations in determining the timing of issuance of super-senior secured debt. Our evidence also does not offer support for a crude interpretation of the signaling theories – healthy firms do not issue secured debt.36

VI. Conclusion

We document a steady decline in the share of secured debt in the capital structures of publicly traded U.S. firms over the twentieth century. The decline was likely driven by improvements in accounting, information, and legal protections that gave unsecured creditors greater confidence in their debt claims without the need for security up front. Improvements in contracting also allowed lenders to become more confident in a contingent acquisition of collateral to protect their claims – indeed, countercyclical variations in the quantum of secured debt is consistent with such contingent acquisition. The decline also suggests a dark side of secured debt—one that borrowers try to avoid whenever possible. This side of secured debt stems from secured lenders’ excess bargaining power as well as from the borrowers’ desire to maintain financial and operational flexibility. Financial development has allowed the US financial system to minimize this dark side.

We do not claim that secured debt will disappear. Secured debt still accounts for the lion’s share of credit to small to medium enterprises in many countries and is likely to remain an important source of funding in coming years. Nevertheless, our evidence on the decline of secured debt in large U.S. firms suggests that the decline may not be confined to the United States. Even in other countries, innovations such as big data and data analytics may assist lenders in obtaining financial and operational data on firms in real time. Combined with improvements in unsecured creditors’ rights, this may promote unsecured lending even in countries that currently tend to rely more heavily on collateralized lending.

At the same time, reductions in the transactions costs of perfecting and tracking collateral may make generalized collateral, especially of a kind that is not central to a firm’s operational flexibility, more useful in borrowing: financial firms today use high-quality financial collateral for repo transactions to shave basis points off their borrowing costs. Similar advances in pledging accounts receivables or inventories may increase, rather than decrease, secured borrowing. It is too early, therefore, to write the obituary on secured borrowing by nonfinancial corporations.

36 To be fair, signaling theories are about an observationally identical class of firms. Within that class, firms that issue secured debt are supposedly healthier. It is hard to test such a theory since no other publicly available concurrent data should allow us to tell firms in the class apart at the time of issuance.
References


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Lian, Chen, and Yueran Ma, 2019, Anatomy of corporate borrowing constraints, Working paper.

Ma, Song, Joy Tong, and Wei Wang, 2019, Selling innovation in bankruptcy, Working paper, Yale University.
Myers, Stewart C. and Nicholas S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187-221.
SEC, 1936, Report on the study and investigation of the work, activities, personnel and functions of Protective and Reorganization Committee, Part VI, Trustees under indentures.


Figure 1a: Secured debt as a fraction of total debt issuance, 1900-1943

This figure displays the fraction of secured bond issuance by value from 1900 until 1943. Source: Hickman (1960)

Figure 1b: Secured debt as a fraction of total debt issuance, 1928-1940

This figure displays the fraction of secured bond issuance by value from 1928 until 1940. Source: Hickman (1960).
Figure 2: Total and secured debt issuance, 1900-1943

This figure displays (1) secured bonds issuance; and (2) total bond issuance in millions of dollars from 1900 until 1943.

Source: Hickman (1960).
Figure 3: Secured debt as a fraction of total debt outstanding, 1900-1944

This figure displays the ratio of secured debt outstanding to total debt outstanding.  
Source: Hickman (1960).

Figure 4a: Secured debt as a fraction of total debt issuance: Utilities, 1900-1943

This figure displays the fraction of secured bond issuance by value by utilities from 1900 until 1943.  
Source: Hickman (1960).
This figure displays the fraction of secured bond issuance by value by railroads from 1900 until 1943. Source: Hickman (1960).

**Figure 4b:** Secured debt as a fraction of total debt issuance: Railroads, 1900-1943

This figure displays the fraction of secured bond issuance by value by industrials from 1900 until 1943. Source: Hickman (1960).

**Figure 4c:** Secured debt as a fraction of total debt issuance: Industrials, 1900-1943
**Figure 5a:** Secured debt as a fraction of the number of bond issuance, 1922-1967

This figure displays the fraction of secured bond issuance by number from 1922 until 1967. Source: Commercial and Financial Chronicles, various years.

**Figure 5b:** Secured debt as a fraction of the value of bond issuance, 1922-1967

This figure displays the fraction of secured bond issuance by value from 1922 until 1967. Source: Commercial and Financial Chronicles, various years.
**Figure 6:** Total and secured debt issuance, 1960-2017 (number of issues)

This figure displays (1) secured bonds issuance; and (2) total bond issuance (number of bonds) from 1960 until 2017.

Source: Mergent.

**Figure 7:** Secured debt as a fraction of the value of bond issuance, 1960-2017

This figure displays the fraction of secured bond issuance by value from 1960 until 2017.

Source: Mergent.
Figure 8: Secured debt as a fraction of total debt issuance, 1900-2017

This figure displays the fraction of secured bond issuance by value from 1900 until 2017. Each color represents a different data source: Hickman (1960) data are in blue, CFC data in red, and Mergent data in green.
Sources: Hickman (1960), Commercial and Financial Chronicles and Mergent.

Figure 9: Median firm-level secured debt as a fraction of total debt, 1981-2017

This figure displays median firm-level outstanding secured debt as a fraction of total outstanding debt from 1981 to 2017.
Source: Compustat.
**Figure 10:** Outstanding amount of corporate bonds and loans, 1945-2018

This figure displays the outstanding amounts of loans and bond debt (in billions of dollars) reported by U.S. nonfinancial corporations from 1945 to 2018.

Source: Flow of Funds accounts of the United States.

**Figure 11:** Loans as a share of total corporate debt, 1945-2018

This figure displays the ratio of outstanding loans to total debt (in billions of dollars) based on U.S. nonfinancial corporations from 1945 to 2018.

Source: Flow of Funds accounts of the United States.
Figure 12: Commercial mortgages as a share of total corporate loans, 1945-2018

This figure displays the ratio of the value of commercial mortgages of U.S. nonfinancial corporations to total value of corporate loans from 1945 to 2018.
Source: Flow of Funds accounts of the United States.

Figure 13a: Proportion of firms with nonmissing information on interest-coverage ratio, 1900-1943

This figure displays the proportion of firms with nonmissing information on both earning and interest expenses from 1900 to 1943.
Source: Hickman (1960).
Figure 13b: Proportion of firms with nonmissing information on interest-coverage ratio, 1970-2017

This figure displays the proportion of firms in SIC 2000-5999 with nonmissing information on both earning and interest expenses and that have nonzero-interest-bearing debt from 1970 to 2017. Source: Compustat.

Figure 14: Asset tangibility over time, 1965-2017

This figure plots mean and median asset tangibility – the ratio of property, plant and equipment to total assets – over time from 1965 to 2017. Source: Compustat.
**Figure 15a:** Marginal effect of asset tangibility on secured debt, 1981-2017

This figure plots the coefficients on a measure of asset tangibility interacted with year dummies in a regression of the ratio of secured debt to total debt on firm size, Tobin’s Q, Return on Assets (ROA), tangibility, and tangibility interacted with year fixed effects.

Source: Authors’ calculations using Compustat data.

**Figure 15b:** Marginal effect of intangible assets on secured debt, 1981-2017

This figure plots the coefficients on a measure of intangibles interacted with year dummies in a regression of the ratio of secured debt to total debt on firm size, Tobin’s Q, Return on Assets (ROA), intangibles and intangibles interacted with year fixed effects.

Source: Authors’ calculations using Compustat data.
**Figure 16a:** Proportion of firms with interest-coverage ratio of less than one, 1900-1943

This figure displays the proportion of firms with interest-coverage ratio of less than one from 1900 to 1943. Source: Hickman (1960).

**Figure 16b:** Proportion of firms with interest-coverage ratio of more than three, 1900-1943

This figure displays the proportion of firms with interest-coverage ratio of more than three: from 1900 to 1943. Source: Hickman (1960).
Figure 16c: Proportion of firms with interest-coverage ratio of less than one, 1970-2017

This figure displays the proportion of firms with interest-coverage ratio of less than one from 1970 to 2017.
Source: Compustat.

Figure 16d: Proportion of firms with interest-coverage ratio of more than three, 1970-2017

This figure displays the proportion of firms with interest-coverage ratio of more than one from 1970 to 2017.
Source: Compustat.
**Figure 17a:** The share of firms with one-year default probabilities greater than 75%, 1970-2017

This figure plots the share of firms over time (1970-2018) that have a one-year default probability greater than 0.75. 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 as well as the level of its debt. Source: Authors’ calculations using Compustat data.

**Figure 17b:** Default probabilities for firms at the 85th percentile of the distance to default, 1970-2017

This figure plots the 85th percentile value of one-year default probability for firms over time (1970-2018). 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 as well as the level of its debt. Source: Authors’ calculations using Compustat data.
**Figure 18:** Marginal effect of default probability on secured debt, 1981-2017

This figure plots the marginal effect of one-year default probability on the level of secured debt on a firm’s balance sheet over time (1981-2017). The marginal effect over time is calculated by regressing the ratio of secured debt to the firm’s total debt on lagged firm-level characteristics that include firm size, Tobin’s Q, Return on Assets (ROA), and tangibility. To estimate the marginal effect of distance to default on secured debt separately for each year, we interact default probability with year fixed effects. Along with plotting the estimated marginal effects, the graph also marks the coefficients that are statistically significant at the 1%, 5%, or 10% level.

Source: Authors’ calculations using Compustat data.

**Figure 19a:** Median leverage by one-year default probability deciles

This figure plots the median firm leverage (measured as the ratio of book debt to assets) for firm-year observations in the Compustat sample (1981-2017) 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 firm leverage is calculated for each group.

Source: Authors’ calculations using Compustat data.
**Figure 19b:** Median share of secured debt by one-year default probability deciles

![Graph showing median share of secured debt by default probability deciles](image)

This figure plots the median share of secured debt (measured as the ratio of secured debt to total debt) for firm-year observations in the Compustat sample (1981-2017) 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 is calculated for each group.

Source: Authors’ calculations using Compustat data.

**Figure 19c:** Median secured debt to assets by one-year default probability deciles

![Graph showing median secured debt to assets by default probability deciles](image)

This figure plots the median ratio of secured debt to total book value of assets for firm-year observations in the Compustat sample (1981-2017) 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.
This figure plots the median share of debt in current liabilities to total debt for firm-year observations in the Compustat sample (1981-2017) for different one-year default probability deciles. Debt in current liabilities includes short-term debt as well as current portion of long-term debt. 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 debt in current liabilities to total debt is calculated for each group.

Source: Authors’ calculations using Compustat data.
**Figure 20:** Financial flexibility and secured debt.

![Graph showing financial flexibility and secured debt](image)

This figure plots the mean share of secured debt to total debt for unconstrained and constrained firms for different one-year default probability deciles.

Source: Authors' calculations using Compustat data.

**Figure 21:** Operational flexibility and secured debt

![Graph showing operational flexibility and secured debt](image)

This figure plots the mean share of secured debt to total debt for firms with low and high asset churn for different one-year default probability deciles.

Source: Authors' calculations using Compustat data.
<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>25th Percentile</th>
<th>Median</th>
<th>75th Percentile</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secured debt/total debt</td>
<td>0.334</td>
<td>0.370</td>
<td>0.0</td>
<td>0.150</td>
<td>0.677</td>
<td>52,703</td>
</tr>
<tr>
<td>Secured debt/total assets</td>
<td>0.100</td>
<td>0.150</td>
<td>0.0</td>
<td>0.022</td>
<td>0.149</td>
<td>52,703</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.295</td>
<td>0.203</td>
<td>0.137</td>
<td>0.269</td>
<td>0.413</td>
<td>52,703</td>
</tr>
</tbody>
</table>

This table reports summary statistics for different measures of secured debt and leverage. Secured debt/total debt is defined using the following Compustat items: DM/(DLC+DLTT). Secured debt/total assets is defined as DM/AT. Leverage is defined as (DLC+DLTT)/AT.
Table II: Secured Debt Usage by Small Businesses

<table>
<thead>
<tr>
<th>Panel A: 2003</th>
<th>Share of total debt</th>
<th>Secured share within debt type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit cards</td>
<td>0.17</td>
<td>0.00</td>
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<tr>
<td>Lines of credit</td>
<td>0.24</td>
<td>0.46</td>
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<tr>
<td>Mortgages</td>
<td>0.17</td>
<td>1.00</td>
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<tr>
<td>Motor Vehicle loans</td>
<td>0.25</td>
<td>1.00</td>
</tr>
<tr>
<td>Equipment loans</td>
<td>0.08</td>
<td>1.00</td>
</tr>
<tr>
<td>Other loans</td>
<td>0.10</td>
<td>0.32</td>
</tr>
<tr>
<td>1.00</td>
<td>0.65</td>
<td></td>
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<table>
<thead>
<tr>
<th>Panel B: 1998</th>
<th>Share of total debt</th>
<th>Secured share within debt type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit cards</td>
<td>0.15</td>
<td>0.00</td>
</tr>
<tr>
<td>Lines of credit</td>
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<td>0.48</td>
</tr>
<tr>
<td>Mortgages</td>
<td>0.19</td>
<td>1.00</td>
</tr>
<tr>
<td>Motor Vehicle loans</td>
<td>0.24</td>
<td>1.00</td>
</tr>
<tr>
<td>Equipment loans</td>
<td>0.10</td>
<td>1.00</td>
</tr>
<tr>
<td>Other loans</td>
<td>0.11</td>
<td>0.42</td>
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<tr>
<td>1.00</td>
<td>0.69</td>
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<table>
<thead>
<tr>
<th>Panel C: 1993</th>
<th>Share of total debt</th>
<th>Secured share within debt type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit cards</td>
<td>0.10</td>
<td>0.00</td>
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<tr>
<td>Lines of credit</td>
<td>0.23</td>
<td>0.58</td>
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<td>Mortgages</td>
<td>0.10</td>
<td>1.00</td>
</tr>
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<td>Motor Vehicle loans</td>
<td>0.28</td>
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<tr>
<td>Equipment loans</td>
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<td>1.00</td>
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<tr>
<td>Other loans</td>
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</tr>
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<td>1.00</td>
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<table>
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<th>Panel D: 1987</th>
<th>Share of total debt</th>
<th>Secured share within debt type</th>
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<td>Credit cards</td>
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<td>N/A</td>
</tr>
<tr>
<td>Lines of credit</td>
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<td>Mortgages</td>
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<tr>
<td>Motor Vehicle loans</td>
<td>0.25</td>
<td>1.00</td>
</tr>
<tr>
<td>Equipment loans</td>
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<tr>
<td>Other loans</td>
<td>0.16</td>
<td>0.36</td>
</tr>
<tr>
<td>1.00</td>
<td>0.81</td>
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This table reports statistics on usage of different categories of debt by small businesses using data from the Survey of Small Business Finances (SSBF). Data from each survey year is analyzed in a separate panel. Each debt category’s share in total debt outstanding at the firm level is calculated by dividing the dollar amount outstanding in that debt category by the total amount of debt outstanding at the firm level. Share of total debt reports the mean share across firms for each survey year. For each category of debt at the firm level, the share of secured debt is calculated by dividing the amount of secured debt outstanding in that debt category by the total debt outstanding in that category. Secured share within debt type reports the mean share of secured debt across firms for each survey year and debt category. All mortgages, motor vehicle loans, and equipment loans are assumed to be secured. Credit card debt was not included as a debt category in the 1987 survey.
Table III: The Cyclicality of Secured Debt Issuance

Panel A: Secured Debt Share, Credit Spreads, and GDP Growth, 1960-2017

<table>
<thead>
<tr>
<th>Period</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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</thead>
<tbody>
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<td>∆Baa-Aaa spread</td>
<td>0.047***</td>
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<td></td>
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<tr>
<td>(0.012)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆Baa-Aaa spread&gt;0</td>
<td>0.049***</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(0.012)</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>∆Baa-Aaa spread&gt;</td>
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<td>0.052***</td>
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<td>(0.012)</td>
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<tr>
<td>∆GDP growth</td>
<td></td>
<td></td>
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<tr>
<td>(0.405)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆GDP growth&lt;0</td>
<td></td>
<td></td>
<td>0.031**</td>
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<td></td>
</tr>
<tr>
<td>(0.012)</td>
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<td></td>
<td></td>
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<tr>
<td>∆GDP growth&lt;</td>
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<td>0.032***</td>
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<tr>
<td>median(∆GDP growth)</td>
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<td></td>
<td></td>
<td>(0.012)</td>
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</tr>
<tr>
<td>Adjusted R²</td>
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<td>0.0678</td>
<td>0.0769</td>
<td>0.0345</td>
<td>0.0238</td>
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<tr>
<td>Observations</td>
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<td>232</td>
<td>232</td>
<td>232</td>
<td>232</td>
<td>232</td>
</tr>
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</table>

Panel B: Secured Debt Share, Credit Spreads, and GDP Growth, 1900-1943

<table>
<thead>
<tr>
<th>Period</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<tbody>
<tr>
<td>∆Baa-Aaa spread</td>
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<tr>
<td>(0.028)</td>
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<tr>
<td>∆Baa-Aaa spread&gt;0</td>
<td>0.112***</td>
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<td>(0.033)</td>
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<tr>
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<td>0.085**</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>median(∆Baa-Aaa spread)</td>
<td></td>
<td>(0.037)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>∆GDP growth</td>
<td></td>
<td></td>
<td>-0.344***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.094)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆GDP growth&lt;0</td>
<td></td>
<td></td>
<td>0.068***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.023)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆GDP growth&lt;</td>
<td></td>
<td></td>
<td></td>
<td>0.068***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>median(∆GDP growth)</td>
<td></td>
<td></td>
<td></td>
<td>(0.023)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.222</td>
<td>0.308</td>
<td>0.157</td>
<td>0.225</td>
<td>0.157</td>
<td>0.157</td>
</tr>
<tr>
<td>Observations</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>44</td>
<td>44</td>
</tr>
</tbody>
</table>

This table reports results from the analysis of cyclicality in secured debt issuance. Panel A reports results using bond issuance data from Mergent for the 1960-2017 time period, whereas Panel B reports results using bond issuance data from Hickman (1960) for the 1900-1943 time period. The dependent variable is the cyclical component of the dollar share of secured debt issuance in each quarter (Panel A) or year (Panel B). The cyclical component is calculated by extracting the residuals from a Hodrick-Prescott (HP) filter. We use two proxies for the cyclical stage of economic activity: ∆Baa-Aaa spread is the cyclical component of the Baa-Aaa credit spread calculated from the residuals from HP filter, whereas ∆GDP growth is the cyclical component of the logarithm of real gross domestic product (GDP) calculated from HP filter in a similar manner. Smoothing coefficients of 1600 and 100 are used for quarterly and annual data, respectively. GDP data for the 1900-1943 period are available at the annual frequency. Data on Baa-Aaa credit spread exists from 1919 onward. * p < 0.1, ** p < 0.05, *** p < 0.01.
**Table IV:** Ford Motor Co. Secured Credit Lines: Borrowing Base Values for Various Categories of Collateral

<table>
<thead>
<tr>
<th></th>
<th>Eligible value ($)</th>
<th>Advance rate</th>
<th>Borrowing base ($)</th>
</tr>
</thead>
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<tr>
<td>U.S. receivables</td>
<td>0.3</td>
<td>75%</td>
<td>0.3</td>
</tr>
<tr>
<td>U.S. inventory</td>
<td>3.4</td>
<td>60%</td>
<td>2.0</td>
</tr>
<tr>
<td>Pledge of intercompany notes</td>
<td>7.5</td>
<td>N/A</td>
<td>4.7</td>
</tr>
<tr>
<td>Pledge of equity</td>
<td>10.7</td>
<td>75%</td>
<td>8.0</td>
</tr>
<tr>
<td>U.S. property, plant and equipment</td>
<td>6.7</td>
<td>N/A</td>
<td>3.2</td>
</tr>
<tr>
<td>Other U.S. machinery and equipment</td>
<td>4.5</td>
<td>40%</td>
<td>1.8</td>
</tr>
<tr>
<td>Intellectual property and U.S. trademarks</td>
<td>7.9</td>
<td>N/A</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$41.0</strong></td>
<td></td>
<td><strong>$22.5</strong></td>
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</table>

Table V: Secured Debt by Credit Rating

<table>
<thead>
<tr>
<th>Credit Rating</th>
<th>Secured debt Mean</th>
<th>Secured debt Standard deviation</th>
<th>Secured debt 25th Percentile</th>
<th>Secured debt Median</th>
<th>Secured debt 75th Percentile</th>
<th>Tangibility Mean</th>
<th>Tangibility Median</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>0.0116</td>
<td>0.042</td>
<td>0.0</td>
<td>0.0009</td>
<td>0.0019</td>
<td>0.845</td>
<td>0.826</td>
<td>68</td>
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<tr>
<td>AA+</td>
<td>0.0044</td>
<td>0.007</td>
<td>0.0</td>
<td>0.0013</td>
<td>0.0062</td>
<td>0.524</td>
<td>0.544</td>
<td>78</td>
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<tr>
<td>AA</td>
<td>0.0072</td>
<td>0.0249</td>
<td>0.0</td>
<td>0.0001</td>
<td>0.0050</td>
<td>0.577</td>
<td>0.607</td>
<td>281</td>
</tr>
<tr>
<td>AA-</td>
<td>0.0294</td>
<td>0.0690</td>
<td>0.0</td>
<td>0.0014</td>
<td>0.0125</td>
<td>0.574</td>
<td>0.597</td>
<td>333</td>
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<tr>
<td>A+</td>
<td>0.0238</td>
<td>0.0660</td>
<td>0.0</td>
<td>0.0008</td>
<td>0.0136</td>
<td>0.532</td>
<td>0.505</td>
<td>618</td>
</tr>
<tr>
<td>A</td>
<td>0.0296</td>
<td>0.0949</td>
<td>0.0</td>
<td>0.0001</td>
<td>0.0083</td>
<td>0.524</td>
<td>0.514</td>
<td>1,127</td>
</tr>
<tr>
<td>A-</td>
<td>0.0281</td>
<td>0.0805</td>
<td>0.0</td>
<td>0.0003</td>
<td>0.0127</td>
<td>0.514</td>
<td>0.500</td>
<td>817</td>
</tr>
<tr>
<td>BBB+</td>
<td>0.0198</td>
<td>0.0524</td>
<td>0.0</td>
<td>0.0003</td>
<td>0.0089</td>
<td>0.529</td>
<td>0.511</td>
<td>1,003</td>
</tr>
<tr>
<td>BBB</td>
<td>0.0256</td>
<td>0.0643</td>
<td>0.0</td>
<td>0.0004</td>
<td>0.0149</td>
<td>0.533</td>
<td>0.526</td>
<td>1,516</td>
</tr>
<tr>
<td>BBB-</td>
<td>0.0326</td>
<td>0.0750</td>
<td>0.0</td>
<td>0.0008</td>
<td>0.0210</td>
<td>0.496</td>
<td>0.454</td>
<td>1,322</td>
</tr>
<tr>
<td>BB+</td>
<td>0.0877</td>
<td>0.1352</td>
<td>0.0</td>
<td>0.0159</td>
<td>0.1352</td>
<td>0.516</td>
<td>0.515</td>
<td>958</td>
</tr>
<tr>
<td>BB</td>
<td>0.1243</td>
<td>0.1633</td>
<td>0.001</td>
<td>0.0508</td>
<td>0.1980</td>
<td>0.468</td>
<td>0.421</td>
<td>1,602</td>
</tr>
<tr>
<td>BB-</td>
<td>0.1481</td>
<td>0.1742</td>
<td>0.001</td>
<td>0.0812</td>
<td>0.2494</td>
<td>0.464</td>
<td>0.415</td>
<td>2,140</td>
</tr>
<tr>
<td>B+</td>
<td>0.1903</td>
<td>0.2158</td>
<td>0.003</td>
<td>0.1076</td>
<td>0.3213</td>
<td>0.466</td>
<td>0.438</td>
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</tr>
<tr>
<td>B</td>
<td>0.2214</td>
<td>0.2413</td>
<td>0.006</td>
<td>0.1398</td>
<td>0.3631</td>
<td>0.452</td>
<td>0.417</td>
<td>1,661</td>
</tr>
<tr>
<td>B-</td>
<td>0.2426</td>
<td>0.2539</td>
<td>0.010</td>
<td>0.1698</td>
<td>0.4026</td>
<td>0.452</td>
<td>0.422</td>
<td>885</td>
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<tr>
<td>CCC+</td>
<td>0.2537</td>
<td>0.2631</td>
<td>0.009</td>
<td>0.1734</td>
<td>0.4183</td>
<td>0.459</td>
<td>0.410</td>
<td>1290</td>
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<tr>
<td>CCC</td>
<td>0.3015</td>
<td>0.2654</td>
<td>0.0798</td>
<td>0.2275</td>
<td>0.4390</td>
<td>0.514</td>
<td>0.488</td>
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<tr>
<td>CCC-</td>
<td>0.2016</td>
<td>0.1793</td>
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<td>0.3116</td>
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<tr>
<td>CC</td>
<td>0.2307</td>
<td>0.2371</td>
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<td>0.4041</td>
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<tr>
<td>C</td>
<td>0.1551</td>
<td>0.1877</td>
<td>0.0</td>
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<td>0.1806</td>
<td>0.425</td>
<td>0.421</td>
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This table reports summary statistics of secured debt/total debt stratified by S&P firm-level credit rating. Secured debt/total debt is defined using the following Compustat items: DM/(DLC+DLTT).
<table>
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<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
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<th>(9)</th>
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</thead>
<tbody>
<tr>
<td>Log(assets)_{t-1}</td>
<td>-0.054 ***</td>
<td>-0.053 ***</td>
<td>-0.039 ***</td>
<td>-0.053 ***</td>
<td>-0.002</td>
<td>-0.006 *</td>
<td>-0.012 **</td>
<td>-0.013 ***</td>
<td>-0.019 ***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.005)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.006)</td>
<td>(0.003)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Q_{t-1}</td>
<td>-0.031 ***</td>
<td>-0.034 ***</td>
<td>-0.009 **</td>
<td>-0.003 ***</td>
<td>0.003</td>
<td>0.007</td>
<td>-0.002</td>
<td>0.002</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.004)</td>
<td>(0.005)</td>
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</tr>
<tr>
<td>Profitability_{t-1}</td>
<td>0.118 ***</td>
<td>0.142 ***</td>
<td>0.079 ***</td>
<td>0.159 ***</td>
<td>0.003</td>
<td>0.003</td>
<td>0.002</td>
<td>0.004 *</td>
<td>0.002</td>
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<tr>
<td></td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.015)</td>
<td>(0.012)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.002)</td>
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<tr>
<td>Tangibility_{t-1}</td>
<td>0.286 ***</td>
<td>0.211 ***</td>
<td>0.131 ***</td>
<td>0.194 ***</td>
<td>0.044 ***</td>
<td>0.024 **</td>
<td>-0.0002</td>
<td>0.018</td>
<td>-0.002</td>
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<td></td>
<td>(0.018)</td>
<td>(0.022)</td>
<td>(0.029)</td>
<td>(0.023)</td>
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<td>(0.012)</td>
<td>(0.014)</td>
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<tr>
<td>Leverage_{t-1}</td>
<td>0.082 ***</td>
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<td>(0.019)</td>
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<tr>
<td>Rating_{t-1}</td>
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<td>0.018 ***</td>
<td>0.010 ***</td>
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<td>(0.001)</td>
<td>(0.002)</td>
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<tr>
<td>Non-IG_{t-1}</td>
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<td>0.056 ***</td>
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<td></td>
<td>(0.007)</td>
<td>(0.010)</td>
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<tr>
<td>Adjusted $R^2$</td>
<td>0.099</td>
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<td>0.161</td>
<td>0.184</td>
<td>0.327</td>
<td>0.641</td>
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<td>52,703</td>
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<td>52,703</td>
<td>12,639</td>
<td>12,639</td>
<td>12,639</td>
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</tr>
<tr>
<td>Number of firms</td>
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<td>6,931</td>
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<td>6,931</td>
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<td>1,418</td>
<td>1,418</td>
<td>1,418</td>
<td>1,418</td>
</tr>
</tbody>
</table>

**Table VI: Secured Debt and Firm Characteristics**

This table reports the results of OLS regressions relating secured debt to firm characteristics. The dependent variable is secured debt/total debt and is defined using the following Compustat items: DM/(DLC+DLTT). All regressions include lagged values of the natural logarithm of book assets, Tobin’s Q, profitability, and tangibility. Column (4) also controls for lagged firm leverage. Columns (5)-(7) control for S&P firm-level credit rating, and Columns (8) and (9) includes a dummy variable that equals one if the firm credit rating is below investment grade. All regressions include year fixed effects. Columns (2), (4), (6), and (8) include industry fixed effects and Columns (3), (7) and (9) include firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. 

**Fixed Effects**

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</tr>
</thead>
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<td>firm</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>year</td>
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<td>Yes</td>
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