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The Decline of Secured Debt

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ABSTRACT

The share of secured debt issued (as a fraction of total corporate debt) declined steadily in the United States over the twentieth century. This stems partly from financial development giving creditors greater confidence that high quality borrowers will respect their claims even if creditors do not obtain security up front. Consequently, such borrowers prefer retaining financial flexibility by not giving security up front. Instead, security is given contingently – when a firm approaches distress. This also explains why superimposed on the secular decline, the share of secured debt issued is countercyclical.

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We show that the issuance of secured debt by U.S. corporations declined dramatically over the twentieth century. Almost all debt issued in the early years 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 had declined to 66.0%. The use of secured debt continued to decline, and in the 1970s only half of bonds issued were secured. By the early 2000s, secured bond issuances were below 5% of total bonds issued, with highly rated firms accounting for much of the reduction in the issuance of secured bonds. In a similar vein, secured debt (including bank loans) as a fraction of overall corporate debt outstanding has also declined over the period we have data for. 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 picked up a bit 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. In the first part of this paper, we will focus on documenting the facts. We turn to possible explanations in the second part.

What role does collateral play in corporate borrowing? At one level, the answer is straightforward. Security or collateral consists of assets which are not subject to asymmetric valuations in markets, and which the borrower cannot alter easily. Lenders may have greater confidence in such assets than in uncertain, unverifiable, and mutable corporate cash flows. Moreover, the "perfection" of a security interest, whereby the link between a debt claim and a specific asset is formally registered, gives extra comfort to a lender. 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 specific collateral 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.

Also, debt secured by collateral has a clear priority with respect to both equity and other debt, which gives the lender a measure of bargaining power. Furthermore, the lender's confidence that their claim is protected allows them to act forcefully to deter strategic default by the borrower. Consequently, all else being equal, firms that pledge collateral find it easier to obtain credit and at a reduced interest rate.[1]

Of course, securing debt with collateral involves transaction costs, and may unduly limit the operational and financial flexibility of the borrower. While no single cause probably accounts for the decline in secured debt over the entire century, we will argue that the evidence is broadly consistent with financial development reducing the benefits of collateralizing debt over time, especially for high credit quality firms. So long as the costs of securing debt are sizeable, even if relatively unchanging over time, this would explain why higher quality corporations have

[1] See Benmelech and Bergman (2009), Berger Frame, and Ioannidou (2016), and Benmelech, Kumar, and Rajan (2021) and the references therein. The prominent theories include Baird and Jackson (1984), Besanko and Thakor (1987), Bolton and Scharfstein (1996), Boot, Thakor, and Udell (1991), DeMarzo (2019), Donaldson, Gromb, and Piacentino (2019 a and b), Hart and Moore (1994, 1998), Jackson and Kronman (1979), Kiyotaki and Moore (1997), Shleifer and Vishny (1992), Stulz and Johnson (1985), Rampini and Viswanathan (2010), Schwarcz (1997), Schwartz (1997), and Williamson (1985).

moved away from providing collateral when borrowing in the normal course. Instead, they now preserve collateral for difficult times when it is truly needed to access financing.

Let us be more specific. In the early 20th century, as industrialization expanded and corporations catered to nation-wide markets (see Chandler (1990)), even large firms were relatively young with large investment needs and modest and uncertain cash flows. Since 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 proved untrustworthy or incompetent. Furthermore, even when corporate bankruptcy legislation was initially passed, the priority of unsecured debt vis a vis equity was not fully respected, which enhanced collateral's attractiveness to creditors.

As accounting improved and gave lenders more confidence in the reliability of reported cash flows, and as stronger corporate governance protected firm cash flows and assets from being tunneled out to related parties, lenders did not feel the need to take collateral in the normal course from established borrowers. Moreover, developments in bankruptcy practice strengthened lenders' priority over the firm's assets vis a vis equity holders in bankruptcy, even without being secured.

The increasing ability to borrow without pledging collateral also allowed borrower concerns to come to the fore. 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 retaining *financial flexibility* by preserving collateral capacity. Unpledged collateral is a form of financial slack (as in Myers and Majluf (1984)) which can have high value in the future (as in Rampini and Viswanathan (2010)). Firms that can easily finance investment today would prefer to leave collateral unpledged so that it is available in the future when it is absolutely necessary to raise funds to make high return investments (like staving off bankruptcy).

Firms might also want to avoid issuing secured debt to maintain *operational flexibility*. By pledging collateral, a firm limits its flexibility to sell or redeploy assets to craft a better business operation (see Mello and Ruckles (2017)). While presumably secured creditors might be willing to permit value-enhancing redeployment of their collateral, the necessary contractual modifications might take time, and creditors will want to be paid for agreeing to them. As a result, firms for whom operational flexibility is important would prefer to borrow unsecured.

Of course, creditors would not want to stay unsecured in normal times if they believe other creditors might take security ahead of them. Legal developments such as negative pledge covenants (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 corporate borrowing, also gave creditors the confidence to stay unsecured until they sensed impending borrower distress.[2]

[2] See, for example, Bjerre (1999), Donaldson, Gromb, and Piacentino (2019 a and b), Schwarcz (1997), and Schwartz (1997).

With financial development, therefore, lenders could take collateral more selectively and more contingently – when a borrowing firm's business was risky or it neared distress and its franchise value collapsed. In such situations, collateral would also help prioritize the value of a lender's claims against other creditors in a possible bankruptcy. Thus the cyclicality of collateral use is a natural accompaniment to the reduction in its average use.

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 is therefore also related to the decline in asset tangibility. Importantly, though, 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. Consequently, 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 secular 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 benefits of pledging collateral in Section IV and the costs of doing so in section V. We test some implications in Section VI and conclude in Section VII.

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

To construct our series of secured debt issuance over time, we use five main data sources: Hickman (1960), the *Commercial and Financial Chronicle (CFC)*, Mergent, Compustat, and Moodys Industrial Manual (starting in 1926). We draw on supplementary sources to complement our analysis.

A. Hickman Data

Walter Hickman, the director of the Corporate Bond Research Project at the NBER, amassed a large amount of data on bond issuances in the first half of the twentieth century. Hickman (1960) classifies annual bond issuances from 1900 to 1944 into five categories based on security and seniority (where secured debt is defined as debt secured by mortgage, collateral, or both): (i) secured-senior, (ii) secured-intermediate, (iii) secured-junior, (iv) unsecured-senior, and (v) unsecured-junior. There is an additional small group for which information is lacking. 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 1, we plot the fraction of secured bond issuance by value from 1900 to 1943 using Hickman (1960), Table 85.

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. The share bounced back during the Depression to 78.7% in 1932 and 85% in 1935—reflecting the countercyclical nature of secured issuances that we will establish shortly in more detail (see Internet Appendix Figure A1 which plots the same data between 1928 and 1940 to make for easier viewing). 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:

$$\frac{secured\ debt}{total\ debt} = 0.876 - 0.006 * \mathrm{t} + \epsilon_t$$
$$(0.023)\quad (0.001)$$

The coefficient estimate indicates the ratio of secured bonds to total bonds issuance declined at an annual rate of 0.6 percentage points from 1900 to 1943. The R^2 of the regression is 0.404.

In Figure 2, we decompose the ratio of secured bonds to total bonds into (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. The steady decline in secured issues over this period does not seem to be explained by changes in overall bond issue volume.

Next, we supplement the analysis with information on bond issues *outstanding* on January 1 of each calendar year. Following Hickman, we report the share of secured bonds in outstanding bonds at a quadrennial frequency from 1900 to 1944 in Appendix Figure A2.[3] 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 3a), Railroads (Figure 3b), and Industrials (Figure 3c).[4] The trend decline in secured bond issuances is also observed, though more modestly, in utilities. 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

[3] The data used to construct Figure A2 are based on Hickman (1960), Table 17.
[4] 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.

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. Railroads were in distress through much of this period, which may account for this finding (see later for a theoretical rationale).

Finally, industrial firms experienced the largest decline in secured bond issuances 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 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 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 1947 because it is too soon after the war for capital structures to have stabilized (though see later when we describe Moody's data).

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 (words like *Secured*, *1st Lien*, *1st Lien and coll. tr.*, etc.) are classified as unsecured (e.g., U. S. Hoffman Machinery Corp. Debenture).

In Figure 4, 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 largely similar to Hickman's calculations for the period they overlap. 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 *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.

In Internet Appendix Figure A3, 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.

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 59,384 individual bond offerings from 1960 to 2019—out of which 9,941 bonds are classified as secured, accounting for 16.7% of the sample.

In Figure 5, we plot the total number of bond issues and the number of secured bonds issued every year from 1960 to 2019. Bond issuance increased dramatically during the 1990s. Nevertheless, as Figure 5 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 2019 secured bonds accounted for only 10.9% of the total bond issuance.

In Figure 6, we plot the share of the value of secured bond issuance from 1960 to 2019. This share also declines over time. In 1960, secured bonds represented 59.4% of the value of all bonds issued. By 2019, the share had declined to 9.4%. The linear trend at which the share of secured bonds (by value) declined from 1960 to 2019 (0.9 percentage points a year) was more rapid than the rate of decline between 1900 and 1944 (0.6 percentage points a year). Note also the perceptible increase in the share of secured bond issuance around recessions, including the early 1970s, 1980s, 1990s, 2000s and 2007 to 2009. In Figure 7, we combine the different datasets to show the dramatic decline of secured bond issuance from 1900 to 2019.

D. Trends in Firm-Level Secured Debt: Moody's Manual

Could the 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 (see, for example, Park

(2000) or Cerqueiro, Ongena, and Roszbach (2016)), 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. Of course, recent studies suggest that bonds and loans are often used by different firms, and are not perfect substitutes (see Becker and Benmelech (2021), Berg, Saunders and Steffen (2020)). Nevertheless, we analyze the evolution of secured debt on firms' balance sheets.

Compustat reports total secured debt on firm balance sheets, including both bonds and loans, starting only since 1981. We therefore hand-collected firm-level accounting and financial data from the Moody's Industrial Manuals for the earlier period. Our sample consists of 100 randomly selected industrial firms (SIC code 2000-5999) for each of the years 1926, 1936, 1946, 1956, 1966, and 1976. To ensure uniform sampling across firm sizes, we manually match firm names from the Moody's manuals to names in the Center for Research in Security Prices (CRSP) monthly stock files.[5] For each year, we divide this merged list of firms into ten deciles based on firm market capitalization. We then randomly pick ten firms from each of the ten deciles and repeat this procedure for each of the six years in our sample. This process gives us a total of 600 firm-year observations, and 509 unique firms.

For each firm in our sample, we collect income statement and balance sheet information. The Moody's Manuals also contain a detailed description of each debt contract issued by the firm. This information, however, is variable in its coverage—while it offers a comprehensive picture of each public bond, the quality of disclosure regarding privately placed debt, notes and mortgages held by banks and other institutions, and credit lines ranges from quite detailed to non-existent. Whenever disclosed, we note down the amount outstanding, the interest rate, whether the debt was secured, as well as its seniority and maturity. Consequently, while we have detailed information on each publicly traded bond issued by firms in our sample, our ability to classify the remaining debt on a firm's balance sheet into bank debt vs non-bank debt, as well as secured vs unsecured is limited.

We begin by analyzing the aggregate share of loans in total borrowings by our sample of firms. There is heterogeneity in loan types (credit lines, notes, private placements) as well as source (banks, insurance companies, and other institutions). Given the lack of consistent detail, we classify all non-public debt as loans. As reported in column (1) of Table I, the loan share of debt (all values aggregated across firms) increased from 10.0% in 1926 to 60.1% in 1966 before falling to 47.3% in 1976. This increase in share of loans was accompanied by a corresponding decrease in the share of loans that were secured. While 100% of loans in 1926 were secured, it fell to 34.5% in 1966 and 34.7% in 1976.[6] We report these shares in column (2).

We then examine the aggregate share of secured debt as a percentage of total debt outstanding. The usage of secured debt shows a monotonic decline from 80% in 1926 to 6.7% in 1976, as reported in column (3). To calculate these secured debt shares, we dropped borrowings where the firm did not disclose the debt's secured status. This

[5] While the Moody's Industrial Manuals are available as early as 1920, we use CRSP to randomly select firms. Since CRSP is available from 1926 we start our data collection in 1926.

[6] Secured status is known for 14.2%, 70.5%, 29.6%, 4.4%, 7.1%, and 22.4% of aggregate loans outstanding for the years 1926, 1936, 1946, 1956, 1966, and 1976, respectively.

potentially introduces bias in our measurement process, since bonds are more likely to report secured status. Instead of dropping loans with missing security status, we can use secured loan shares calculated each year in column (2) and apply the same share for loans with missing security status. We report the corresponding numbers in column (4). As an alternative, we use aggregate secured dollar denominated loan share reported by non-financial U.S. corporations in Capital IQ and Dealscan and apply those shares for loans with missing security status (columns (5) and (6), respectively).[7] Irrespective of the assumptions made, the overall trend for secured debt is one of decline between 1926 and 1976; secured share in column (4) falls from 81.7% in 1926 to 10.0% in 1976 whereas in column (5) the share falls from 80.4% in 1926 to 31.7% in 1976 and in column (6) the share falls from 78.5% in 1926 to 26.8% in 1976. The bottom line is that the secured share of overall debt fell in the pre-Compustat period, much as we have already shown the secured share of bonds fell.

E. Trends in Firm-Level Secured Debt: Compustat

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.[8] 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 1,016 firms with non-missing information on secured debt in 1981, 2,153 in 2000, and 1,616 in 2019. Table II presents summary statistics of different measures of secured debt. Mean secured debt divided by total debt is 0.330, with a median of 0.134. As the table shows, secured debt accounts, on average, for 10.6% of firms' total assets.

Figure 8a depicts the share of secured debt (aggregated over firms) to total debt outstanding (aggregated over firms) of non-financial Compustat firms. It shows the share declined from around 20% in the early 1980s to 12.7% in 1995. The secured debt share bounced between 13% and 15% until 2005 and rose considerably around the Global Financial Crisis. Most of the increase in secured debt in the post-GFC years is driven by increased leverage and borrowing of non-investment grade firms (see also Figure 14).

In Figure 8b, we plot median firm-level outstanding secured debt as a fraction of total outstanding debt from 1981 to 2019. Secured debt accounted for 24.7% of the total debt of the median firm in 1981, declined to around 10% in 2000, and started rising again around the Global Financial Crisis to 21.5% in 2019.[9] Once again, therefore, we see a steady decline in the share of the stock of secured debt till the last years of the 20th century, and then a pickup in recent years.

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[7] We thank an anonymous referee for suggesting this approach.

[8] 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."

[9] 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 Eisfeldt and Rampini (2009) or Rampini and Viswanathan (2013)). Additionally, we verify that capitalizing operating leases does not change the basic pattern of decline in secured debt documented here (results available from the authors).

F. Collateral and Small Businesses Finance

Finally, small firms rely on loans, in particular secured loans, rather than bonds (see, for example, Berger and Udell (1998)). They too experienced an overall decline in secured borrowing, albeit from a high level. To ascertain the overall use of secured debt by small businesses, we use data from the Survey of Small Business Finances (SSBF) conducted by the Federal Reserve Board.

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 III. 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 III 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 III 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 almost 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.

II. Cyclicality in Issuance of Secured Debt

Along with a secular decline in issuance of secured debt, we have noted a countercyclical pattern in the share of secured debt issuance (also see the recent evidence in Bradley and Roberts (2015) where they make the point that bond covenants follow such a pattern more generally). In this section, we establish this more carefully.[10]

We begin by examining secured bond issuance for the period 1960 to 2019 using Mergent's data at the quarterly frequency. We estimate the following regression specification:

$$secured\ bond\ issuance_t = \alpha + \beta Z_t + \varepsilon_t, \quad (1)$$

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).[11] We use three measures for the cycle: the Baa–Aaa credit spread – a commonly used measure of financial conditions, real gross domestic product (GDP) and recession indicator dummies based on data from the NBER's Business Cycle Dating Committee. We use the detrended measures (residuals from the HP filter) for the credit spread and GDP growth variable.

We report the results of this analysis in Table IV, 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)–(2) use Baa–Aaa credit spread as a measure of conditions in credit markets, columns (3)–(4) use log real GDP and column 5 uses the NBER recession dummy. Specifically, ΔBaa-Aaa spread is the deviation of Baa–Aaa credit spread from its Hodrick-Prescott trend line. Similarly, ΔGDP 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. 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 1.9 percentage points.

[10] External financing ought to be procyclical: as output expands, firms need more financing to support increased production and investment (the demand channel). However, both debt and equity issuance need not be procyclical 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.

[11] As is standard in the macro literature, we use a smoothing coefficient of 1600 for quarterly data and 100 for annual data.

Similarly, the coefficient estimate in column (2) suggests that the share of secured bond issuance is 4.4 percentage points higher when the detrended credit spread is positive. Moving on to the deviation in real log GDP as a measure of the business cycle, the point estimate in column (3) suggests that a one standard deviation fall in real log GDP increases the share of secured bond issuance by 1.7 percentage points. Similarly, the coefficient estimate in column (4) suggests that the share of secured bond issuance is 2.8 percentage points higher when detrended real log GDP is negative. Finally, the share of secured bond issuance is 3 percentage points higher during recessions. Overall, our analysis suggests that secured bond issuance was countercyclical during the last 60 years. In column (6) we run a "horse-race" between the three variables and find that the credit spread is the only explanatory variable that remains statistically significant in this multivariate test.

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 IV. 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.

Was the cyclical influence larger in earlier years? Since Table IV Panel A is at quarterly frequencies, we re-estimate it at annual frequencies to be able to compare with Panel B. For the 1960-2019 period, a one standard deviation increase in Baa–Aaa spread now increases the share of secured bond issuance by 1.5 percentage points. A one standard deviation fall in real log GDP increases the share of secured bond issuance by 1.2 percentage points. Comparing these with the estimates from Panel B, it appears that the secured share moved more with the cycle in the early years of the century than in the latter years, though the volatility of GDP was higher in the earlier years.

We are certainly 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. 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 (also see Azariadis, Kaas, and Wen (2016) and 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 show the share of secured bond issuance is countercyclical.

In sum, then, our primary new fact is that the share of secured debt has declined steadily over the twentieth century. That secured debt issuance has a strong countercyclical component is better known, though we show this to be the case in the first half of the twentieth century also. Ideally, there will be some common explanations, which we now turn to.

III. Theories of Secured Debt Usage

We outline the main theories of secured debt that may have bearing on our results. This section benefited greatly from discussions with Douglas Baird.

A. Assets vs Cash flows

Collateralizable assets are typically distinct assets, are easily valued, retain their value over time, and are easy to transfer or alienate. Their distinctiveness (for example, a demarcated plot of land or the serial number on a motor vehicle or a piece of machinery) makes them easy to track in case the borrower tries to sell them surreptitiously. Their liquid market makes them easy to price, and they will hold their value even if the borrower's business acumen is modest, he is untrustworthy, or he neglects maintenance. Therefore, they require little monitoring (see Jackson and Kronman (1979)).

Contrast this with a firm's cash flows, the primary source of debt repayment in the normal course, which may be uncertain, unverifiable, and mutable, especially in the case of young or risky firms. Clearly, cash flows will be affected by environmental, technological, and firm-specific shocks. The borrower, being closer to the action, may know far more about the firm's specific situation than the lender, creating a situation of information asymmetry. In contrast, a fungible asset's value embeds the values of cash flows over time, and across alternative production technologies and possible alternative users. It will arguably be less prone to valuation uncertainty, value fluctuation, or loss than the cash flow generated in the specific borrower's specific usage of the asset.

Also, firm-generated cash is very liquid, and easily hidden or tunneled out of the firm. Strong accounting and control systems are needed to make cash verifiable, and such systems may be inadequate to the task in some countries and within some firms. Assets, in contrast, being distinctive, may be hard to tunnel out even with accounting and control systems of very modest quality (see Myers and Rajan (1998)).

Finally, borrowers can affect cash flows, or threaten to affect them – in Hart and Moore (1994, 1998) simply by threatening to walk away from the enterprise (or, more generally, by shirking, underinvesting, or risk-shifting). The lender's ability to seize hard assets in case of default allows them to make credible threats that enable her to extract repayment even when cash flows are not verifiable.

B. The Benefits of Securing Debt

That a firm's borrowing is supported by the value of its assets does not necessarily mean its debt has to be secured by the assets – in a sense, 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. So long as a single lender faces the borrower, the lender's right to seize assets 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. So macro-finance theories have little to say on why debt is secured in the legal sense. To explain secured debt, we have to delve deeper.

B1. Preserving Assets and Priority Outside Bankruptcy

If a specific asset is not registered as collateral, it 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. 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").

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). The ability to secure a loan and improve recovery can be a reward to creditors that monitor (see Rajan and Winton (1995)). Creditors that are secured, knowing they will maintain priority in a bankruptcy vis a vis the borrower or other creditors, may be more confident of making credible threats that convince the borrower to repay (see Park (2000), Diamond, Hu, and Rajan (forthcoming)). Thus the ability to secure even a portion of the debt can have positive spillover effects for all creditors, and more generally, enhance the firm's ability to borrow.

These aspects of securing debt have more weight when accounting systems and debt enforcement structures are underdeveloped. They are less important, especially for established high quality borrowers, as institutions develop.

B2. Establishing Priority Between Creditors

Collateral also plays an important role in bankruptcy. 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. Regardless of the initial credit quality of the borrower, we would expect debt to become more secured as bankruptcy nears.

B3. Cash Flow Based Debt and Asset Based Debt

A growing literature draws a distinction between cash flow based debt and asset based debt (see Ivashina, Laeven, and Moral-Benito (2020), Kermani and Ma (2021), Lian and Ma (2021)). While asset based debt is debt secured by hard specific assets, cash flow based debt is either unsecured debt or debt secured by a blanket lien on "substantially all assets" of the firm. There seems to be a clear difference between the covenants in each of these forms of debt (see Lian and Ma (2021)) which suggests that they may have distinctive sources of repayment (cash flows versus asset liquidation) and different forms of resolution (Chapter 11 versus Chapter 7).

Yet all loans are typically taken with the intent of repaying them with cash flows, failing which assets form a second line of protection for creditors. The need to secure debt with assets (whether specific or not) increases as cash flows are uncertain to begin with (small firms) or become riskier (distressed firms). Benmelech, Kumar, and Rajan (2021) show that the secured spread (the reduction in yield) associated with collateral posted for "cash flow secured" and "asset based secured" is similar in magnitude. Furthermore, firms often issue both cash flow based debt and asset based debt at the same time, suggesting that the entire difference between these two forms of debt is unlikely to be the way in which the firm is resolved. At any rate, throughout our study, secured bonds are almost always secured by specific assets, and are "asset based" according to this literature, while unsecured bonds are "cash flow" based. Bank debt can be secured by blanket liens, so some secured bank debt could be termed "cash flow" based according to this literature. Our data on bank loans typically is not detailed enough to specify the type of collateral backing the loan.

C. The Costs of Securing Debt

The ability to secure debt adds an additional facet to contractibility, which should increase the availability of debt. This raises an immediate question. What are the offsetting costs that explain why debt might remain unsecured, despite the availability of underlying collateralizable assets? There are clearly transaction costs for securing debt (of registering or perfecting the security at the collateral registry). These are sizeable if the debt is small, but other costs may loom larger for large firms.

C1. The Loss of Financial Flexibility

If the ability to secure 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 in financing investments, firms should first use internally generated cash, then 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. In other words, firms will tend to use up their cheapest sources of financing, that is, financial slack, first.

Rampini and Viswanathan (2010) suggest a more dynamic model that alters these predictions. 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 as in Myers and Majluf. It will issue secured debt to obtain

maximum financing for its projects. However, firms that currently have easier access 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 or insurance 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 cash or secured debt 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.

C2. Operational Flexibility and Creditor Bargaining Power

The costs of lost real flexibility as the firm gives up its ability to restructure or dispose of assets freely may also be important. The borrower has to ask the secured creditor's 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, a default could allow the secured 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)).

The clear alternative to secured debt is to issue debt with covenants (see Schwartz (1997) and Smith and Warner (1979)). Rather than issuing secured debt and giving up both financial and real flexibility, 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). 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.[12]

[12] 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.

D. Making Sense of the Data

In what follows, we will attempt to make sense of the patterns in the data, guided by the theoretical discussion. A reasonable hypothesis is that in the early years of the twentieth century, lenders simply did not trust even established quality borrowers, no matter how distant the borrower was from bankruptcy. So even though bonds were issued by the best credits, almost all of them were secured. Financial development lead to the greater contractibility of cash flows, and the better enforcement of the priority of unsecured debt contracts as well as negative pledge clauses. This allowed more firms, starting with highly rated ones, greater choice between borrowing secured or unsecured. With ample borrowing capacity relative to investment needs (in the Rampini and Viswanathan (2010) sense), the concerns of highly rated firms about the opportunity costs of pledging collateral up front could now come to the fore. So long as the costs of securing debt, such as lost flexibility, are sizeable, even if relatively unchanging over time, we would expect such firms to move away from providing collateral when borrowing in the normal course. In contrast, low credit quality firms might be more constrained even taking into account financial development, and would want to use their secured debt capacity even in the normal course.

If high credit quality firms fell in credit quality and lost creditor confidence in a downturn, they could use the collateral slack they had built up to keep funding channels open. As their creditworthiness improved in a recovery, borrowing would once again shift toward being more unsecured, building up collateral slack. Thus the cyclicality we document may be driven, in the microcosm, by similar forces to the ones that explain the secular decline.

With financial development resulting in an expansion in debt availability at the extensive margin, we would expect an increase in borrowing over time by lower credit quality firms, including through bond issuances. While some of these firms would have to offer security to borrow, the reduction in secured debt on the intensive margin must outweigh any expansion on the extensive margin to account for the facts we see. Across firms, we would expect secured debt to be issued by riskier firms, or firms close to bankruptcy.

The nature of firms also changed in recent years, with firms using proportionately fewer tangible assets in real activity. Intangible assets are harder to use as security, at least given the legacy structures for establishing and perfecting collateral, and this should further reduce the need/ability to secure debt.

It would be too much to say we are testing the theories in what follows. There are many moving parts over a century that could collectively explain the phenomenon. Instead, we attempt to create a meta-narrative. We will follow this up in section VI with a more pointed examination of the data supporting specifics of the narrative, ending with a broad-brush attempt to verify the determinants across the century.

IV. What Led to the Decline of Secured Debt: The Benefits

We now examine evidence suggesting the benefits of securing debt may have fallen over the twentieth century, primarily as a result of improvements in cash flow and debt contractibility. We start in this section by examining

improvements in accounting. We then turn to changes in bankruptcy law. Next we examine how the nature of firms has changed, starting with cash flows relative to leverage and then asset tangibility.

A. Better Accounting Quality

Developments in accounting and reporting have made corporate financial reports more transparent and informative. As financial reporting became more reliable and cash flows effectively verifiable, lenders may have become more willing to lend on the strength of cash flows and less reliant on assets.

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.[13]

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 9 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 89.6% in 1940 to 1943. 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."

To bridge the gap between when Hickman ends and Compustat coverage begins, we use the data from Moody's Industrials. The share of firms with non-missing information to calculate interest coverage ratio was 0.63, 0.87, 0.93, 0.87, 0.91, and 0.91, respectively, for the years 1926, 1936, 1946, 1956, 1966, and 1976. Finally, we calculate the data for Compustat firms starting in 1970. From 1970 to 2019 more than 90% of firms had sufficient information to calculate an interest coverage ratio (typically, interest expense is missing for the rest), and there is

[13] 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.

little variation in this ratio over time (see Appendix Figure A4). Therefore, taking our various datasets together, they suggest that 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 (for instance, 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 monitored in real time. Firm revenues can be predicted using customer credit card purchases. It may be that in the last few decades, these sources of information on assets and cash flows, rather than more transparent accounting, have made lending safer and easier. Indeed, Petersen and Rajan (2002) and Granja, Leuz, and Rajan (2021) 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 corporate information at arm's length, even for firms that are not generally required to make stringent public disclosures.

In summary, cash flows became significantly more contractible, especially in the first half of the twentieth century with the substantial improvements in accounting and corporate governance. This likely 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 clarity about priority structure could have given unsecured creditors greater confidence that they would not be unfairly pushed back in line, making them more willing to eschew security.

Late 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 buy the assets being liquidated 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."

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)). However, because debtors lost control in bankruptcy, the number of reorganizations fell dramatically (Skeel (2001)). 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 1). 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.

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. 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. Once again, it is not clear that it had any effect on the secular decline in the proportion of secured debt (see Figure 6).

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. 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.

Federal bankruptcy legislation is augmented by state law. 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; (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 non-judicial 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.

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 7 and Figure 8 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 in the early years of the twenty-first century.

This historical excursus suggests that changes in bankruptcy law that clarified the priority of unsecured debt over equity, or more recently, that made it easier to register and enforce security interests, were associated with changes in the use of secured debt. At the same time, important reforms like the Bankruptcy Acts of 1938 and 1978

are not associated with significant changes in the trend, even though the first was ostensibly more creditor friendly and the second more debtor friendly. More research is clearly needed here.

C. Changes in the Nature of the Firm

C.1 Greater Borrower Ability to Pay and Greater Willingness to Lend

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, healthy, profitable firms with stable businesses. Of course, with financial development of the kind we have described, creditors would also be willing to lend more, even to firms they would have denied credit in the past. The evolution of secured debt mirrors both factors.

Figures 10a and 10b report corporate interest coverage over time, using information from Hickman (1960). As Figure 10a 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 10b, 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, firms developed a greater ability to service the debt they had taken.

Of course, the quantum of debt is a choice variable. Using Compustat data, we show in Figure 10c that the proportion of firms with an interest coverage ratio of less than one fluctuated between 2.9% and 9.1% 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 2001, 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%. Since then, there has been a decline in the share of firms with high coverage, with a sharp dip from 1998 to 2001 and a flattening thereafter (see Figure 10d). Interestingly, though, the share of firms with interest coverage over 3 in the period 1970-2019 has almost always been higher than the highest such share in the period 1900-1943 (Figure 10b).

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) for a 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 11 we plot the share of firms with one-year default probabilities greater than 75%, and in the Internet Appendix Figure A5 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 2000.

All this is consistent with financial development; if lenders have greater confidence in their ability to assess and monitor firm health, and to control behavior such as tunneling or risk shifting, they will increase their lending, including to riskier firms. Since ratings at the time of issue are an approximate measure of default risk, in the Internet Appendix Figure A6a we plot the share of bonds rated investment grade for the Moody's sample of firms (1926-1976) and in Figure A6b for the Mergent sample of issuances (1970-2019). The share of bonds rated investment grade was 97% in 1926, suggesting only unimpeachable credits could borrow. The share declined steadily but stayed in the high 80% until the early 1980s when the share fell sharply – with the flourishing of the junk bond market. So there is indeed a shift in the extensive margin towards riskier borrowers.

From around 1980, we have comprehensive Moody's data on issuances, defaults, and recoveries of bonds they rate.[14] We compute the default rate in a window of five years from issuance and plot it in the Internet Appendix Figure A7a. For unsecured investment grade bonds, the default rate falls from about 2% in 1980 to below 1% in 2015, falling about 4 basis points a year. For unsecured below-investment grade bonds, the default rate also falls, from around 20% in 1980 to below 5 percent in 2015, with an estimated trend decline of about 50 basis points a year. There is no statistically significant trend in default rates for secured below-investment grade bonds, or in recovery rates conditional on default (see Internet Appendix Figure A7b), which Moody's measures as the quoted price of the bond one month after default. While the decline in expected loss given default may be a consequence of the unexpectedly benign macroeconomic environment of steadily falling interest rates over this period, the data suggest that conditioning on broad ex ante rating, expected bond repayment, if anything, has improved, consistent with financial development.

Finally, for our sample of firms in Moody's Industrial Manuals, the share of the value of investment grade bonds that are secured is 83 percent in 1926 and 75 % in 1936 and continues falling steadily thereafter. In Internet Appendix Figure A8, we plot the share of the value of investment grade bonds that are secured, using the Mergent sample, which is more comprehensive starting in the early 1970s. Once again we see a decline from the 35%-60% range in the 1970s to the single digits from the mid 1990s. While we have far fewer below-investment-grade bonds before the early 1980s, the share that is secured falls in the Moody's sample from 1936, and generally declines in the Mergent sample till the late 1980s after which it fluctuates around 20 percent till today. When coupled with the fact that investment grade bonds account for the majority of the issuance till the late 1980s, the fall in the share of secured bonds through much of the twentieth century is therefore largely a fall in the share of investment grade bonds that are secured.

Given that default rates in the investment grade category have been low over the time we have reliable records from Moody's, it does not seem that the steady but small (in magnitude) decline in default rates entirely explains the sharp decline in the fraction of secured investment grade bond issues. Instead, it may well be that the bulk of

[14] This is from the Moody's Default & Recovery Database (DRD).

the decline in secured debt for highly rated firms is consistent with lenders believing they do not need to take security to protect against corporate malfeasance in the normal course, and that security will be available if the risk of default increases (see the discussion of NPCs later).

C.2. Asset Tangibility

Interestingly, the share of the value of tangible assets such as property, plant, and equipment as a fraction of firm value has also 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.

In Figure 12, we plot the evolution of aggregate asset tangibility—the proportion of net property, plant, and equipment to total assets using data from Graham, Leary and Roberts (2015)—from 1925 to 2019. The figure shows that aggregate tangibility declined from 49% in 1957 to 31% by 2019. Note a sharp decline in tangibility during the Second World War followed by a rapid recovery. The reason is interesting: firm balance sheets were inflated during and in the immediate aftermath of the war due to a large amount of war related short term assets -- receivables and cash from government -- which artificially and temporarily lowered tangibility. However, after recovering, tangibility resumed its steady decline. We will shortly explore some further implications.

All this suggests one further question. We have documented an increase in debt issuance over time as well as a decline in secured debt share. Is the latter merely a reflection of the former: are we picking up an increase in unsecured debt or an actual decrease in the use of collateral? It is likely to be both, but to establish that the use of secured debt is decreasing relative to the available collateralizable assets, we plot the ratio of secured bonds and secured debt outstanding (using the formulation in column (4) of Table I) to the firm's property plant and equipment in the Moody's data in the Internet Appendix Figure A9a and Figure A9b. Both ratios clearly decline, suggesting secured debt has fallen as a fraction of available collateral, despite the decline in tangibility we have just documented.[15]

D. Summary

Through the early years of the twentieth century, cash flows became more verifiable because of better accounting, and the priority of unsecured debt became clearer through developments in bankruptcy law and practice. Moreover, conditioning on rating, average default rates, if anything, fell for the period we have data for, and the issuance of low rated bonds increased. Interestingly, the fraction secured fell most sharply for investment grade

[15] Using Hickman data, we earlier documented a downward trend in the use of secured debt by utilities—an industry that continues to maintain high asset tangibility. In Internet Appendix Figure A10, we use bond issuance data from Mergent and show that secured debt usage by utilities continued to fall in modern times.

bond issuances (also see Section VI.C) where default rates were already small, suggesting that a combination of greater lender confidence that highly rated borrowers would not misbehave in the normal course and that they could obtain collateral if matters deteriorated led them to eschew collateral at issuance. At the same time, tangible assets – assets that were traditionally the basis for collateral – fell, especially sharply in the last quarter of the century. Cumulatively, the benefits associated with secured debt – in supporting borrowing with pledged hard assets when cash flows are uncertain, relatively low, and hard to contract on – likely fell over this period, especially for established quality firms.

V. What Led to the Decline of Secured Debt: The Costs

Why might borrowers wish to leave their debt unsecured up front – would they not want to lower interest rates up front by offering lenders all the security they have?

A. Loss of Financial Flexibility

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 decision to pledge most of its assets as collateral for its secured credit line in 2006 – which we will examine in greater detail shortly – aimed "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." [16]

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 (2018.p 14): "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." Consistent with our evidence that the decline in secured debt is driven by the decline in issuance by investment grade firms, we will show in section VI that financially unconstrained firms preserve collateral, using it to secure debt during periods of stress.

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. Ayotte and Morrison (2009) find that Chapter 11

[16] "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.

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, Ma, Tong, and Wang find 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. 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. 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. Financial Innovation: Covenants and Structure

If there are costs to securing 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), Roberts and Sufi (2009), Roberts (2015), Smith and Warner (1979)). One example, as Lian and Ma (2021) 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 (Demiroglu and James (2010), and Rajan and Winton (1995)).

Since collateral offers a superior way of establishing priority among debt claimants (see, e.g., Badoer, Dudley, and James (2019)), 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) (see the theory in Donaldson, Gromb, and Piacentino (2019 b)).

NPCs have been used in unsecured debt offerings since the early 1900s. However, data on their use is sparse -- the absence of reporting on a covenant may imply the covenant does not exist in bond documents, or more problematic for the researcher, that the data were not collected. In our Moodys data, keeping this caveat in mind, we find that 48.3% of all unsecured bonds and 39.4% of all bonds between 1926 and 1976 contain NPCs. It is hard to discern a clear trend over the period, though the share of bonds with NPCs rose in the early years between 1926 and 1946.

We use Mergent to collect information on the prevalence of NPC in bonds issued in recent years. Non-missing information on NPC – whether a bond has NPC or not – is available for a subset of the bonds in Mergent. Interestingly, data availability rises over time – suggestive that data users might have found the information more valuable and pushed for its collection. In 1985 NPC information is available for 44.5% of the bonds in Mergent, by 2016 73% of the bonds have non-missing information about NPC.

For unsecured bonds that report, the frequency of NPCs in Mergent was 69.7%, 64.6%, and 58.6% in 1990s, 2000s, and 2010s, respectively. The frequency of NPC in all bonds in Mergent was 59.2%, 60.1%, and 53.8% during those decades. So while there seems somewhat higher use of NPCs in the 1990-2010s decades relative to 1926-1946, consistent with greater contractibility allowing lenders to remain unsecured, it is hard to tell how much of this is because of changes in the reporting of the data. This is an area for future research, given the significant theoretical arguments that have been made about it.

An alternative to using covenants to maintain the priority of unsecured debt is to use corporate structure to create an effective priority structure (see Hansmann and Kraakman (2000)). Even though different assets and debts of a firm may be in different legal entities, the firm may not be as operationally constrained as if it secured the debt with specific assets to create a priority structure. For instance, debt against a parent is effectively subordinated to debt against a wholly owned operating subsidiary, but both the subsidiary and the parent have flexibility over the assets they operate. The extent to which judges respect structure-induced priority in bankruptcy is still contested, however. In particular, 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.

The bottom line is that there have been a variety of efforts to substitute for secured debt in an attempt to get some of its benefits without the accompanying costs. While they may have made a dent in the usage of secured debt, clearly they have not displaced it. Nevertheless, these attempts suggest that securing debt has costs that firms have tried to circumvent by designing appropriate contracts and corporate structures.

D. Summary

As financial markets in the United States have developed, firms have probably obtained more access to unsecured finance. Given a certain optimal investment rate, firms, especially highly rated unconstrained ones, have a greater incentive to preserve collateral so as to retain financial and operational flexibility. What is important for our argument is that the costs of giving up flexibility be sizeable. So long as the benefits associated with secured debt have fallen, while the costs have not fallen as fast or even risen, we can account for the decline in secured debt. In the next section, we will examine some more detailed implications.

VI. Some Implications and Tests

Our discussion suggests that in the cross-section, we should see that firms that are closer to financial distress tend to issue secured debt (also see Rauh and Sufi (2010) and Colla et al. (2013) for similar findings). Such a pattern would also explain the counter-cyclical issuance of secured debt. Turning to financial and operational flexibility, Rampini and Viswanathan (2010) argue that in contrast to unconstrained firms that have the luxury of preserving collateral as a reserve to draw on only when needed, financially constrained firms will tend to use all the collateral they have, since their marginal returns to investment is high. We will test whether there is a difference in the use of secured debt between constrained and unconstrained firms, both in the cross-section, and over time.

If the share of tangible assets is shrinking, we should see compensatory changes. We have documented the steady decline in tangible assets in firms, and described legal changes that allow assets like brand names and patents to be used as collateral. If so, we should see the association between tangibility and the issuance of secured debt weaken in recent years. Finally, we examine the evidence over the century to see what explanations have weight.

A. Firm Health and Secured Debt Use

We start by establishing the cross-sectional relationship between firm financial health and the use of secured debt, mirroring what we have shown in the time series. 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 1981 and extends through 2019.

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. The mean ratio of secured debt to total debt of firms that are rated investment grade (BBB- or better) lie between 0.063 and 0.135. 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 0.268 for firms rated BB+ and 0.453 for firms rated B-. Interestingly, secured debt ratios for firms that are rated CCC or lower—that is, firms near or in default—are lower, perhaps because they have run out of pledgeable collateral.

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

$$secured_{i,t} = \alpha + \beta_1 \times Size_{i,t-1} + \beta_2 \times Q_{i,t-1} + \beta_3 \times ROA_{i,t-1} + \beta_4 \times Tang_{i,t-1} + \beta_5 \times Cash_{i,t-1} + \gamma_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

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), asset tangibility, and cash holdings as well as vectors of year fixed effects (δ_t) and either industry, industry-by-year or firm fixed effects (γ_i).

In column (1) of Table VI, we report estimates of the regression that includes year and industry 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 0.117 in the secured debt ratio, representing a decrease of 35.3% compared to the unconditional mean. The negative relation between firm size and secured debt is consistent with the idea that collateral is offered by riskier, less mature firms.[17] 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 and operational flexibility), that more profitable firms have more secured debt in their capital structure, that firms with more tangible assets are more likely to use secured debt, and that firms that hold more cash have more secured debt in their capital structure.[18] Adding industry-by-year 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. In column (4) we present the results from our most stringent specification which includes both industry-by-year and firm fixed-effects.

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

[17] An obvious question is whether the fall in the secured debt ratio is because of an increase in average firm size over the century. We split the 600 firm-year observations from Moody's dataset into ten inflation-adjusted firm-size deciles. Each size decile contains observations from all the vintages (1926-1976). Within each size decile, we find that the share of secured bond falls over time. More generally, one could ask whether changing firm characteristics account for the overall decline in secured debt ratio. We regress firm-level share of secured bond on year dummies and a set of firm characteristics. We find that the coefficients on year dummies fall over time. We repeat this exercise for our Compustat sample, where we also include firm fixed-effects, and find that the time trend shows a similar pattern to the one without any controls.

[18] The positive correlation between profitability and share of secured debt is coming from small unrated firms, especially the subsample with negative operating profits (for large and rated firms, the relationship is steadily negative, and even for small and unrated firms for most deciles except the most unprofitable). What is going on in this sub sample is that debt is increasing substantially as a firm gets distressed. Given the firm has maxed out on pledging collateral, lenders typically shorten the maturity of debt considerably even while making additional loans. For such distressed firms, secured debt to total debt is low.

secured debt—the composition of the firm debt structure—it might also be capturing the amount of leverage that the firm has. In column (5) we attempt to address this concern by adding the lagged leverage ratio to the regression. Controlling for past leverage does not affect the point estimates and significance of our main explanatory variables. In column (6) we use a censored Tobit regression model and obtain similar results.

In columns (7)–(10) we add S&P firm-level credit rating as an explanatory variable to the regressions (higher values of the variable credit rating imply a lower rating -- we assign a value of 1 to AAA, 2 to AA+, 3 to AA, etc.). Since we include only firms with credit ratings, and given that the coverage of the data begins only in 1985, the number of observations is considerably smaller in these regressions compared to those in columns (1)–(6). 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-by-year fixed effects (column (7)): a change of 5 notches in ratings (say, from BBB+ to BB−) is associated with an increase of 14 percentage points in the ratio of secured debt to total debt, representing an increase of 42% relative to the unconditional mean. In column (8) 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 column (7) but is still considerable—a downgrade of 2 notches is associated with a 3.8 percentage points rise in secured debt, or a 11.5% rise relative to the mean. Of the four other explanatory variables, only size and tangibility (albeit at 10% significance) remain statistically significant, and the coefficients on explanatory variables 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 (9) suggests an increase in secured debt of 72.1% relative to the unconditional mean. When we include firm fixed-effects (column (10)), the effect is smaller but still sizeable (an increase of 42.4% 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. Furthermore, as firms' credit risk rises, secured debt increases.

B. Financial Constraints and the Use of Secured Debt

If securing debt reduces financial and operational flexibility, following Rampini and Viswanathan (2010) financially unconstrained firms should use less of it while financially constrained firms will tend to use all the collateral they have, since their marginal utility of investment is high.

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) in using a firm's dividend payout ratio to measure (the

lack of) financial constraints, noting the concerns in Kaplan and Zingales (1997). We compute payout ratio as the ratio of total distributions (dividends and repurchases) to operating income. We divide our Compustat sample into three non-overlapping time periods: 1986-1995, 1996-2005, and 2006-2019. We assign firms into constrained or unconstrained category based on whether their payout ratio in the year before (i.e. using 1985 for the 1986-1995 period and so on) is below or above the median. We then separately plot for both groups in Figure 13 the mean secured debt to total debt ratio based on the distance to default decile they fall in. If firms desire 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.

As the theory would predict, financially constrained firms secure above 30 percent of their debt, rising to above 40 percent of their debt in the deciles closest to default. They do not have the luxury of conserving collateral, so they use substantial amounts. In contrast, financially unconstrained firms secure far less of their debt when far from default (around 15 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 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).

C. Credit Quality and the Decline of Secured Debt

The theory suggests that the decline in secured debt should be more pronounced in higher credit quality firms – as the benefits of securing debt decline, those are the firms that have the greatest ability to conserve collateral. We have already shown a dramatic decline in the share of secured bonds issued by investment grade firms. Of course, not all firms issue bonds and have ratings. To remedy this, we divide firm-year observations in the Compustat sample into *High credit quality* firms (top 30 percentile based on Merton distance-to-default measure) and *Low credit quality* firms (bottom 30 percentile based on Merton distance-to-default measure). To ensure that our results are not influenced by firms already in distress and preparing for bankruptcy, we drop observations in the bottom 5 percentile of the distance-to-default distribution before forming the two groups.

The cutoffs used to place firm-year observations in the two groups are fixed across time. Consequently, there will be relatively more observations in *Low credit quality* group during bad times and relatively more observations in *High credit quality* group during good times. Once firm-year observations are placed in these two mutually exclusive groups, we separately plot the time series of the median ratio of secured debt to total debt for

firm-year observations in the two groups in Figure 14. Median secured share for high credit quality firms fell from 10.1% in 1981 to 0.5% by 2001, whereas the median secured share for low credit quality firms moved from 18.9% in 1981 to 18.7% in 2001. Secured share for both groups trended upwards in the 21st century. We can also estimate a linear trend model of the share of secured debt on a time index variable for both groups over the 1981-2001 time period. The estimated slope turns out to be -1.3% per year (t-stat -9.38) for *High credit quality* group while the slope equals -0.12% per year (t-stat -0.63) for *Low credit quality* group.

D. The Decline in Tangibility and the Rise of Alternative Security

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), we have also argued the expansion in intangible assets probably spurred legal innovation such as the changes to the UCC's Article 9 and 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 Appendix Table A1. 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 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.[19] To test this conjecture, we re-estimate our baseline regression in Table VI column (1), allowing the coefficient on tangibility to vary by year. Figure 15 displays the marginal effect of asset tangibility on secured debt from 1981 to 2019. As the figure clearly shows, the marginal effect of tangibility declined from around 0.35 in the early 1980s to below 0.25 in the second half of the 1990s and remained around 0.25 thereafter.[20] Interestingly, the effect of tangibility becomes stronger during the Global Financial Crisis and doubles in size before dropping to its pre-crisis 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 Appendix Figure A11 and presents an almost mirror image to the effect of property, plant, and equipment.

The declining association of tangibility jointly with the increasing association 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, including intangibles, as collateral 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. However, we do find that secured debt usage has increased both for firms with low and with high share of intangibles on their balance sheet (see Appendix Figure A12a), although high-intangible firms have picked up relatively more secured debt post 2000. Even firms that did not have any intangibles on their balance sheet saw a significant uptick in the usage of secured debt (see Appendix Figure A12b). Hence, the increase in secured debt usage this century seems to be driven not just by the rise of intangibles as collateral, but also by other forces that have encouraged/allowed firms in general to issue more secured debt.

E. Putting it All Together

We have argued that changes in both the institutional environment and nature of firms have contributed to the decline in secured debt usage over the twentieth century. Before concluding, we attempt the (heroic) task of using proxies for the macro-economic and institutional environment and aggregate firm characteristics to explain the usage of secured debt over time at the annual frequency. We obtain many of these aggregate measures from Graham, Leary, and Roberts (2015) and are grateful to the authors for sharing their data. Our regression closely follows their methodology as well. Table VII presents OLS regression results estimated from the following equation:

$$secured\ share_t = \alpha + \beta_1 \times X_t + \beta_2 \times IQ_t + \beta_3 \times Z_t + \gamma \times t + \varepsilon_{i,t} \quad (3)$$

The dependent variable is the aggregate yearly share of secured bond issuance from Hickman (1960) and Mergent FISD. *X* is a vector of aggregate firm characteristics, IQ is a vector of institutional quality proxies, and Z

[19] 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 we confirmed in Table VI.

[20] We obtain a similar pattern when we use a Tobit regression model instead of OLS.

is a vector of macro-economic variables. We include a time trend, *t*, to capture trends in our aggregate measures. We have data on explanatory variables going as far back as 1925. Hence, this analysis covers the period of 1925-2019 with a gap between the end of Hickman data (1943) and the beginning of Mergent data (1960). Given the gap in the time-series data and the concern about serial correlation, we report Newey-West (1987) standard errors in Column 5 in addition to robust standard errors (Columns 1-4).

We begin by analyzing the effect of aggregate firm characteristics in column (1). The two key characteristics we use are the share of tangible assets in total assets and debt to capital ratio. The results show that secured debt issuance is positively associated with higher tangibility. One standard deviation increase in aggregate tangibility is associated with a 5.3 percentage point increase in secured debt share. Interestingly, the coefficient on debt to capital ratio is negative and statistically significant, even after accounting for time trend. We note that firms simultaneously make leverage and security decisions and hence the negative association suggests that the macro-economic, institutional and firm-level forces that make it attractive for firms to take on more debt also make it easier to borrow on an unsecured basis.

With regards to institutional development, we focus our analysis on measures of importance of financial intermediaries in the economy. Intermediary share of debt is calculated as the holdings of corporate and foreign bonds (US Flow of Funds, Table L.213) by the domestic financial sector scaled by aggregate holdings of corporate and foreign bonds by all sectors in the US. Intermediary share of equity is calculated as the holdings of corporate equities (US Flow of Funds, Table L.223) by the domestic financial sector scaled by aggregate holdings of corporate equities by all sectors in the US (see Graham, Leary, and Roberts (2015)). Output of Finance is the business credit and equity component of the financial sector's output (Philippon, 2012). Column (2) reports results of this analysis. All three measures show a strong negative association between the importance of financial sector in the economy and share of secured debt. For instance, one standard deviation increase in Output of Finance is associated with a 3.9 percentage point reduction in secured share. This is consistent with the important role of financial intermediaries (and, more generally, financial development) in mitigating information asymmetry and agency costs, which should reduce reliance on collateral.

In column (3), we analyze the effect of macro-economic variables. We use Equity Risk Premium as a measure of economic uncertainty (using excess CAPE yield, obtained from Robert Shiller's website, as a proxy). Real per capita GDP growth is used to capture economic conditions, whereas three-month treasury rate captures the prevailing interest rate in the economy. We find a positive association between Equity Risk Premium and secured debt share, suggestive that secured debt is used in more uncertain times. One standard deviation increase in equity risk premium is associated with a 2 percentage point increase in secured debt share.

Finally, we include all variables in column (4) and continue to find a strong association of secured debt share with tangibility, leverage, financial sector development, and economic uncertainty. It is worth noting that GDP growth, which is key to explaining the short-run cyclicality in secured debt share, does not have any explanatory

power when it comes to the long run share of secured debt issuance. On the other hand, we identify several changes in the institutional and economic environment and in nature of firms that may explain the decline in usage of secured debt over a century.[21]

VII. Conclusion

We document a steady decline in the share of secured debt in the capital structures of U.S. firms over the twentieth century. The trend is punctuated by countercyclical cycles in secured debt issuance. In the first half of the twentieth century, the primary forces seem to be improvements in cash flow contractibility and the clarification of creditor rights vis a vis the borrower – through better and more reliable accounting, and through reforms of bankruptcy law.

The nature of firms also changed over time – intangible assets became more important, while tangible assets declined as a share of firm assets. This naturally reduced the amount of traditional collateral firms could pledge, accounting for some of the decline in secured debt in the latter half of the twentieth century. Legal and contractual developments in this century have made it possible to secure intangible assets such as intellectual property, suggesting we have not seen the total demise of 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. At the same time, as we show in Benmelech, Kumar, and Rajan (2021), 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.

Is what we document simply relabeling – debt that was explicitly secured in the past is now implicitly secured by assets? We do not believe so since there are continuing differences across firms as to which firms give security. Moreover, as we show in Benmelech, Kumar, and Rajan (2021), the security interest is priced, especially for lower credit quality firms.[22] We do not think security has become irrelevant across the board, the costs simply outweigh the benefits for high quality firms.

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[21] Given the small number of observations, we cannot overburden the model with the task of estimating too many coefficients. Nevertheless, given that the effect of tangibility varies over time, we re-estimate this regression in the Internet Appendix Table A2 with the different coefficients for tangibility for the different periods. The coefficient for tangibility falls steadily as expected, with the other coefficients retaining their expected signs.

[22] We identify what we term as the "secured spread" by comparing yields on secured and unsecured bonds that are either issued by the same firm at the same time or based on their traded market prices at the same time. In Benmelech, Kumar, and Rajan (2021), we use TRACE and Mergent to identify the spread. Unfortunately, when we looked into the historical data we couldn't find sufficient data on firms issuing both secured and unsecured debt at the same time, since firms issued mostly secured debt at the beginning of our sample.

Secured debt still accounts for the lion's share of credit to small to medium enterprises in the United States, and is important in many countries. Nevertheless, our explanation for the decline of secured issuance in large U.S. firms suggests the decline may spread with financial development. 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.

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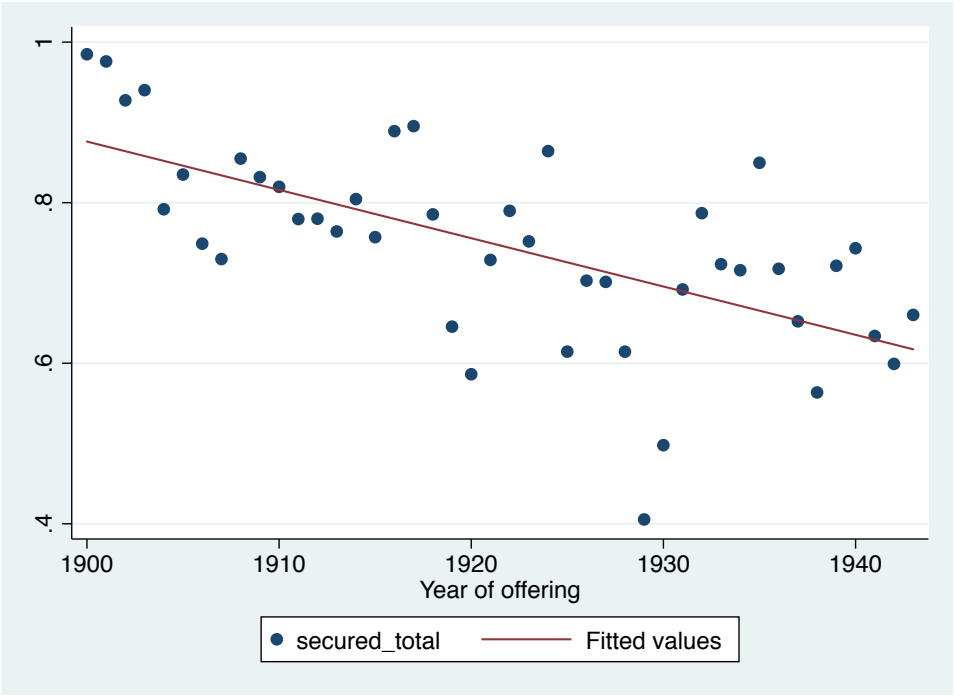
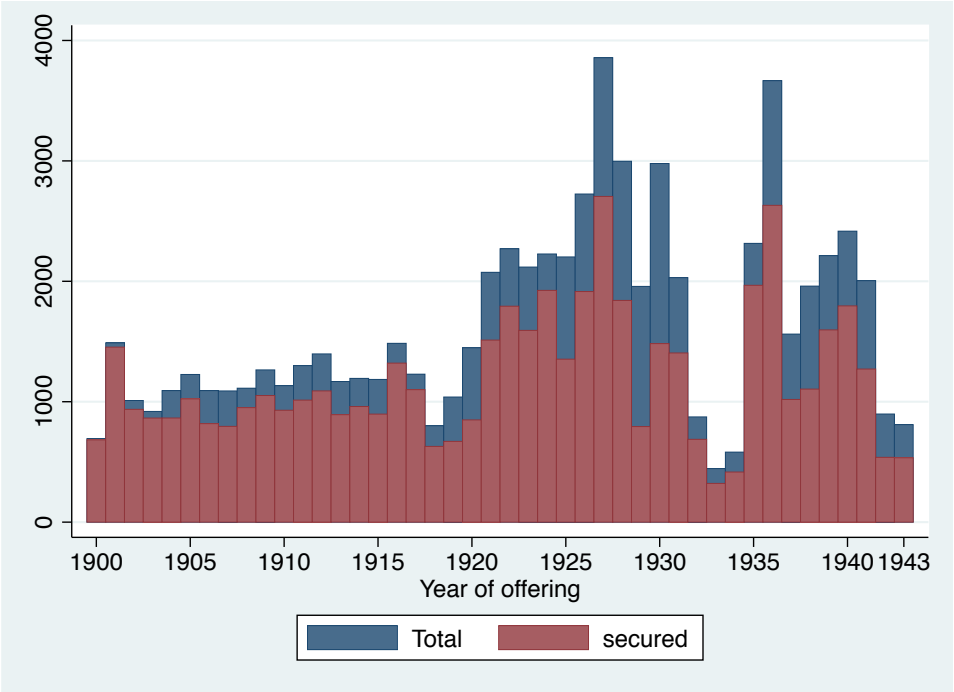
Figure 1: Secured debt as a fraction of total debt issuance, 1900-1943



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

Figure 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 3a: Secured debt as a fraction of total debt issuance: Utilities, 1900-1943

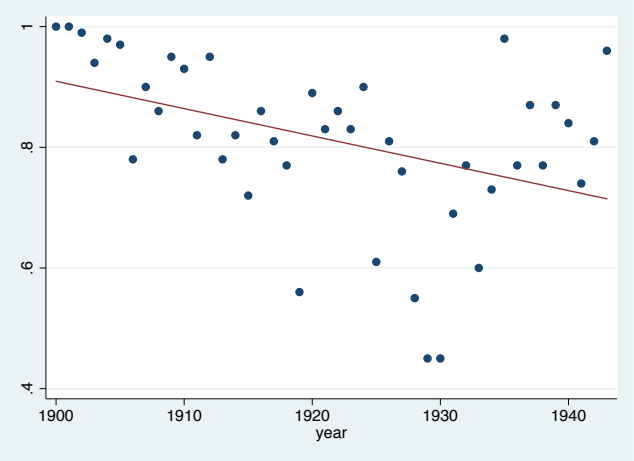


Figure 3b: Secured debt as a fraction of total debt issuance: Railroads, 1900-1943

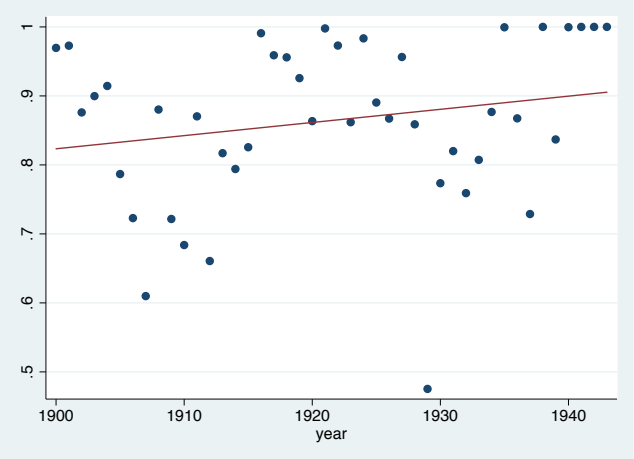
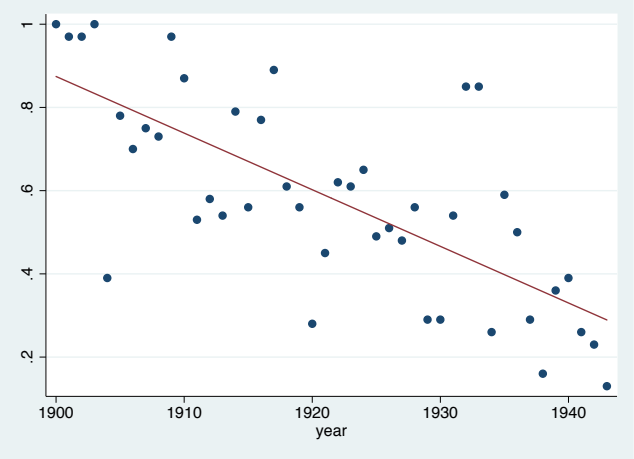
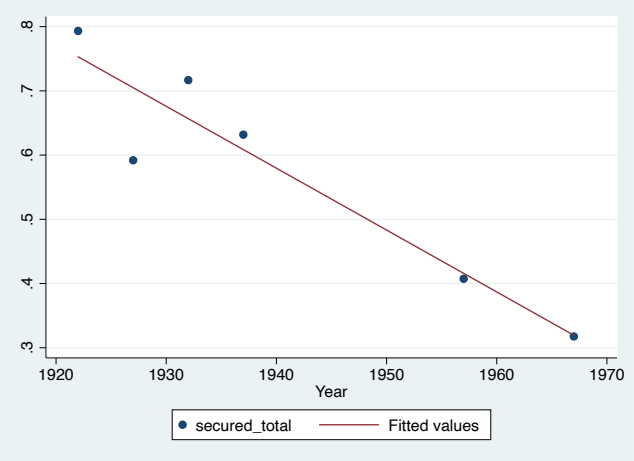


Figure 3c: Secured debt as a fraction of total debt issuance: Industrials, 1900-1943



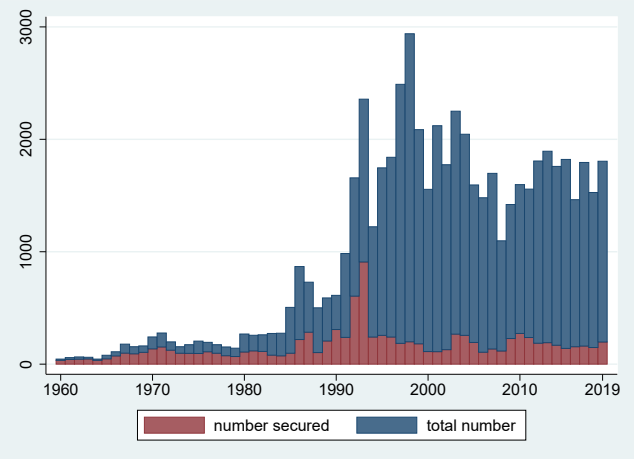
This figure displays the fraction of secured bond issuance by value by utilities (Panel A), railroads (Panel B) and industrials (Panel C) from 1900 until 1943.
Source: Hickman (1960).

Figure 4: Secured debt as a fraction of the value of bond issuance, 1922-1967



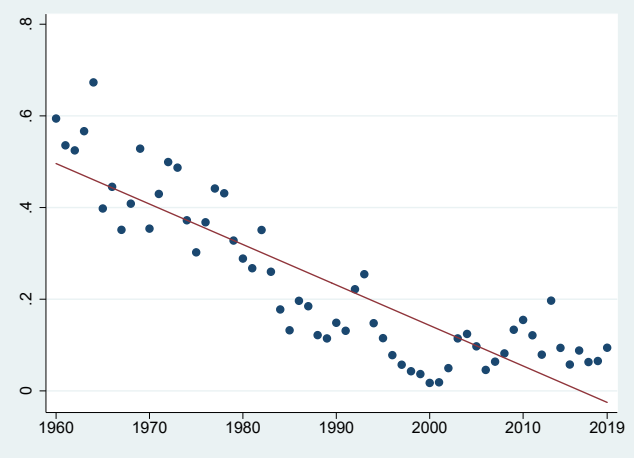
This figure displays the fraction of secured bond issuance by value from 1922 until 1967. Source: Commercial and Financial Chronicles, various years.

Figure 5: Total and secured debt issuance, 1970-2019 (number of issues)



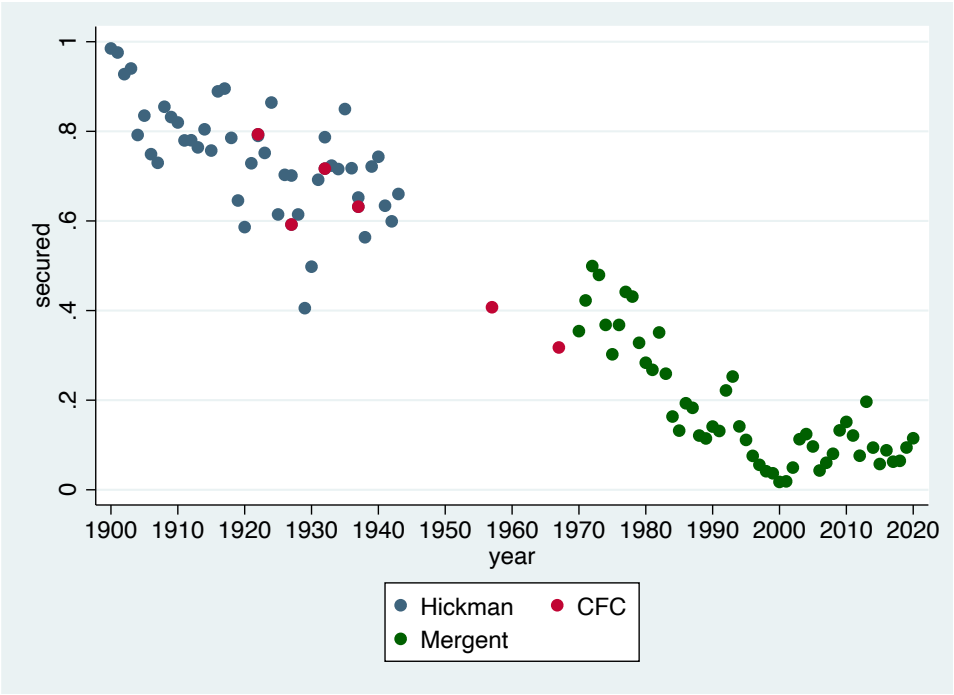
This figure displays (1) secured bonds issuance; and (2) total bond issuance (number of bonds) from 1970 until 2019. Source: Mergent.

Figure 6: Secured debt as a fraction of the value of bond issuance, 1960-2019



This figure displays the fraction of secured bond issuance by value from 1960 until 2019. Source: Mergent.

Figure 7: Secured debt as a fraction of total debt issuance, 1900-2019



This figure displays the fraction of secured bond issuance by value from 1900 until 2019. 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 8a: Secured debt as a fraction of total debt, 1981-2019

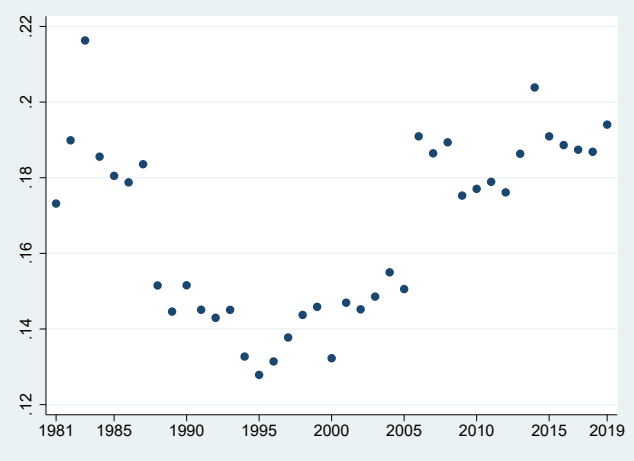
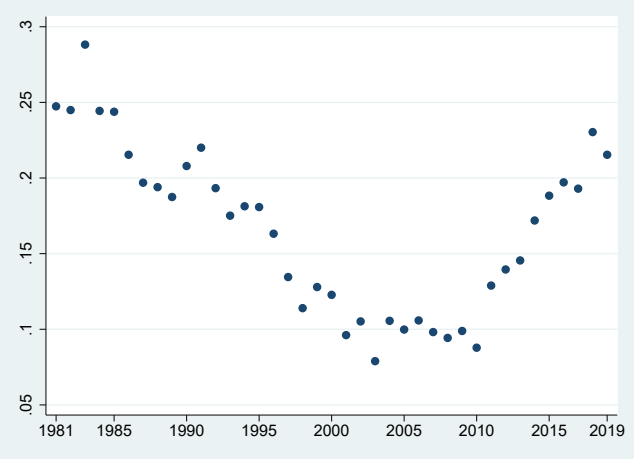
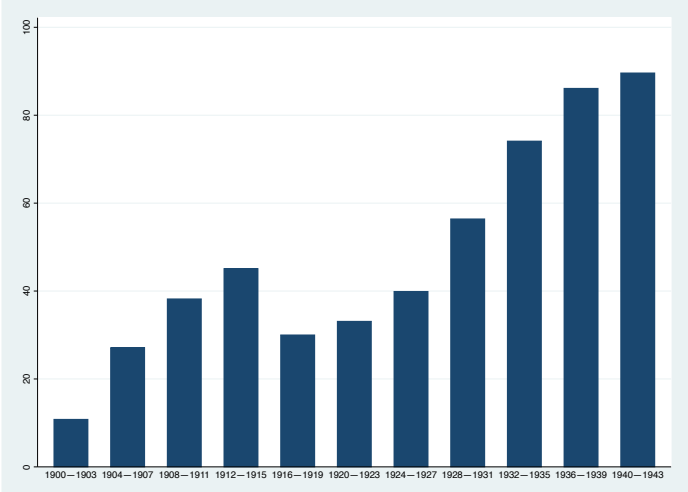


Figure 8b: Median firm-level secured debt as a fraction of total debt, 1981-2019



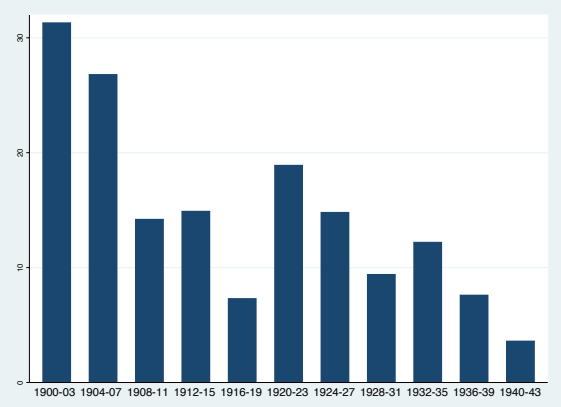
This figure displays the share of secured debt in total outstanding debt (Panel A) or median firm-level outstanding secured debt as a fraction of total outstanding debt (Panel B) from 1981 to 2019. Source: Compustat

Figure 9: Proportion of firms with nonmissing information on interest-coverage ratio, 1900-1943

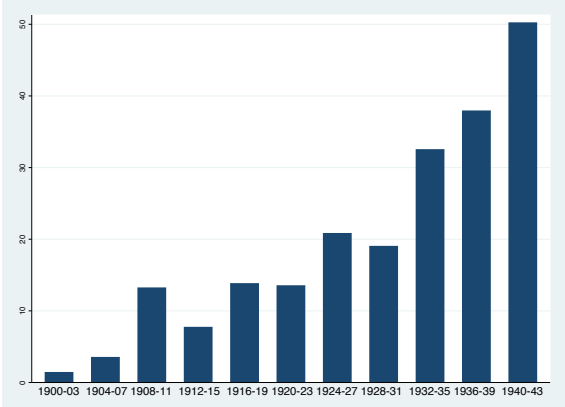


This figure displays the proportion of firms with nonmissing information on both earning and interest expenses from 1900 to 1943. Source: Hickman (1960).

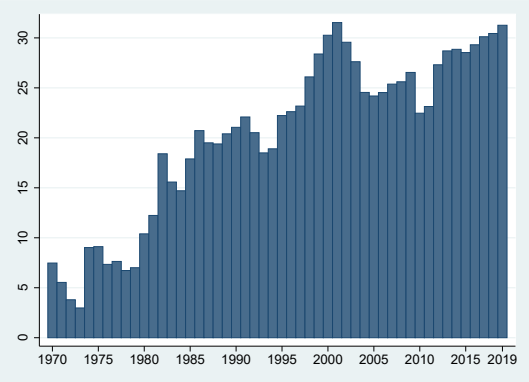
Figure 10: Interest-coverage ratios 1900-1943 and 1970-2019



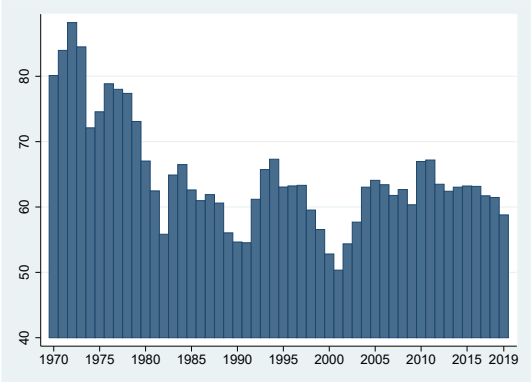
Panel A: Interest-coverage ratio <1, 1900-1943



Panel B: interest-coverage>3, 1900-1943



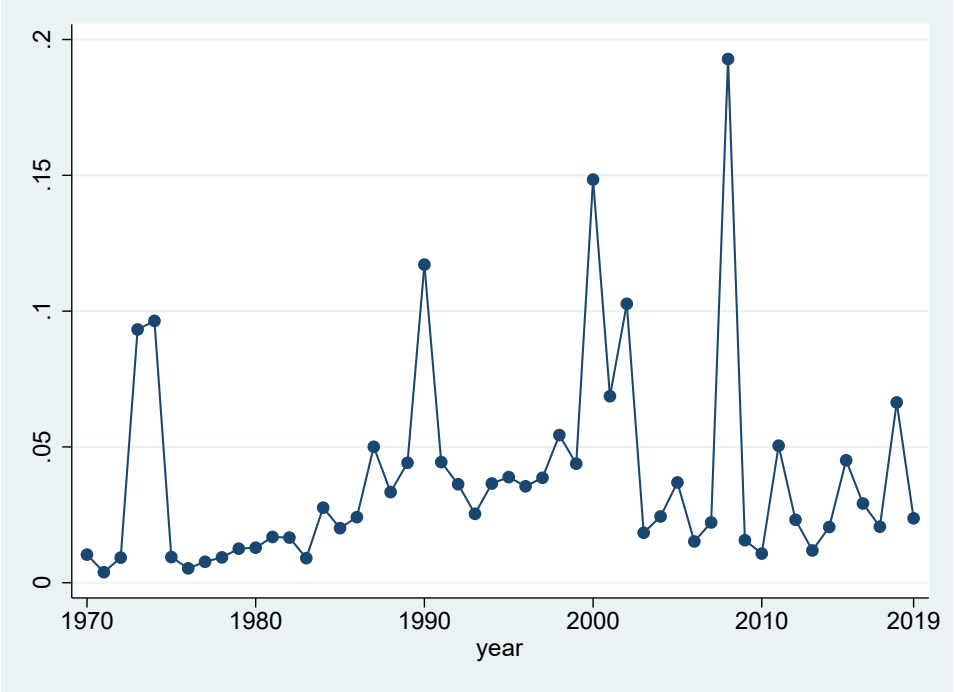
Panel C: Interest-coverage ratio <1, 1970-2019



Panel D: interest-coverage>3, 1970-2019

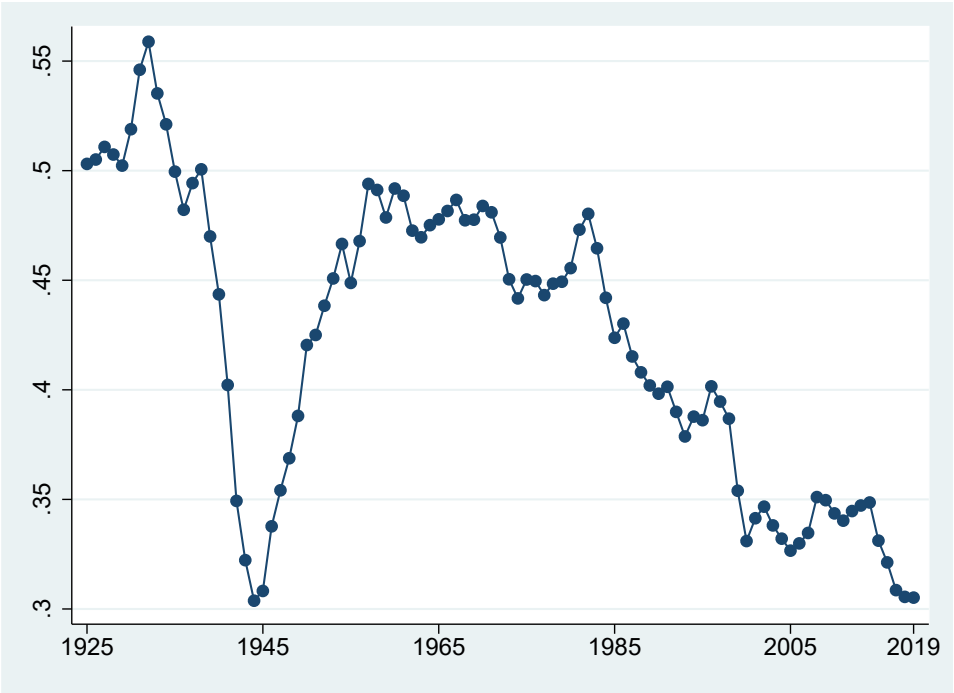
This figure displays the proportion of firms with interest-coverage ratio of less than one (Panels A and C) and more than three (Panels B and D). Sources: Compustat and Hickman (1960).

Figure 11: The share of firms with one-year default probabilities greater than 75%, 1970-2019



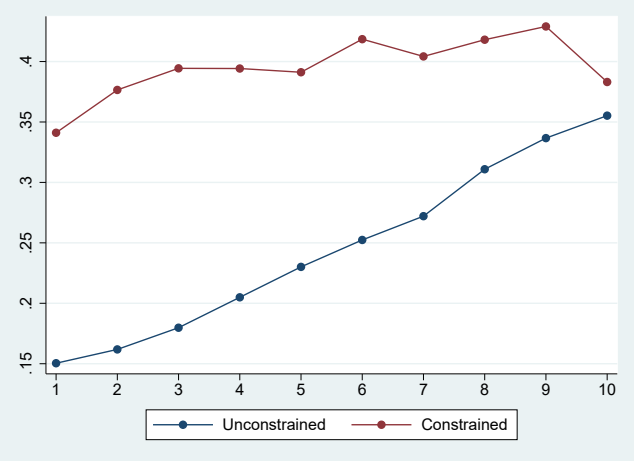
This figure plots the share of firms over time (1970-2019) that have a one-year default probability greater than 0.75. One-year default probability is calculated using the Merton distance to default model. The default probability incorporates both the volatility of a firm's asset value as well as the level of its debt.
Source: Authors' calculations using Compustat data.

Figure 12: Asset tangibility over time, 1925-2019



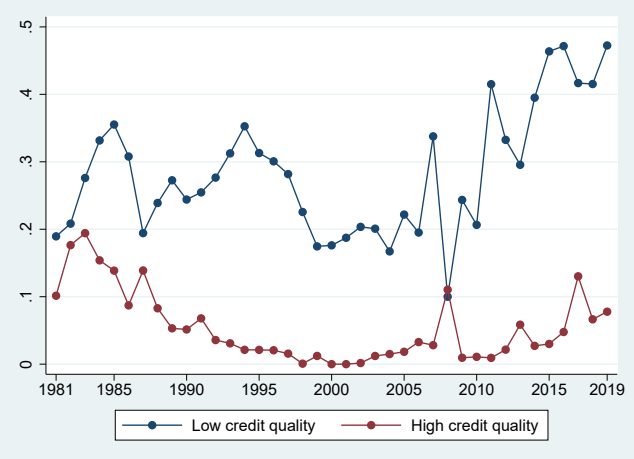
This figure plots the evolution of aggregate asset tangibility – the ratio of property, plant and equipment to total assets – over time from 1965 to 2019.
Source: Graham, Leary and Roberts (2015) and Compustat.

Figure 13: Financial flexibility and secured debt.



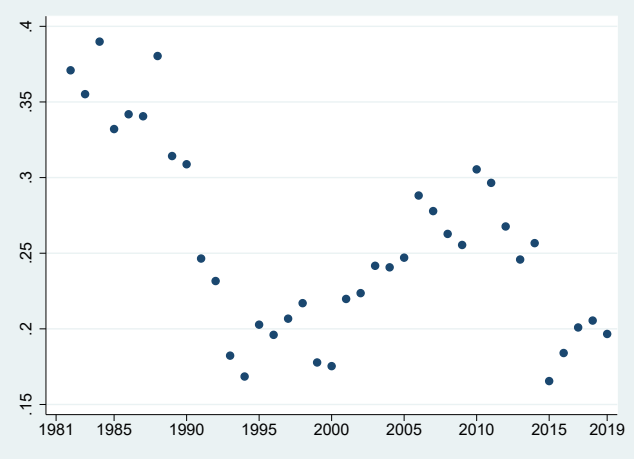
This figure plots the mean share of secured debt to total debt for unconstrained and constrained firms for different one-year default probability deciles. Source: Authors' calculations using Compustat data.

Figure 14: Credit Quality and secured debt trend.



This figure plots the median share of secured debt to total debt for high and low credit quality firms based on Merton distance to default values. Source: Authors' calculations using Compustat data.

Figure 15: Marginal effect of asset tangibility on secured debt, 1981-2019



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.

Table I: Secured Debt: Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)
Year	Loans/ Total Debt	Secured Loan/ Total Loan	Secured Debt/Total Debt			
1926	10.0%	100.0%	80.0%	81.7%	80.4%	78.5%
1936	22.1%	48.7%	69.4%	64.9%	70.7%	69.0%
1946	31.8%	12.0%	27.1%	23.7%	37.7%	35.0%
1956	36.4%	82.2%	17.5%	24.0%	36.9%	33.0%
1966	60.1%	34.5%	8.6%	8.2%	46.0%	38.5%
1976	47.3%	34.7%	6.7%	10.0%	31.7%	26.8%

This table displays trends in usage of debt type by firms in Moody's Industrial Manuals. The sample consists of 100 randomly selected industrial firms (SIC code 2000-5999) for each of the years 1926, 1936, 1946, 1956, 1966, and 1976, resulting in 600 firm-year observations. Column (1) reports share of loan in total debt aggregated across firms each year. Column (2) reports the aggregate share of loan that was secured each year. For this calculation, we drop loans for which secured status in unknown. Column (3) reports the aggregate share of total debt that was secured. As in column (2), we drop loans for which secured status is not known. Column (4) repeats the calculation of column (3), using secured loan shares calculated each year in column (2) and applying the same share for loans with missing security status. In columns (5) and (6), we use aggregate secured dollar denominated loan share reported by non-financial U.S. corporations in Capital IQ and Dealscan, respectively, and apply those shares for loans with missing security status.

Table II: Secured Debt: Summary Statistics, 1981-2019

	Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Observations
Secured debt/total debt	0.330	0.372	0.0	0.134	0.673	64,070
Secured debt/total assets	0.106	0.169	0.0	0.019	0.152	64,070
Leverage	0.369	0.496	0.129	0.270	0.432	64,070

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 III: Secured Debt Usage by Small Businesses

	Panel A: 2003	
	Share of total debt	Secured share within debt type
Credit cards	0.17	0.00
Lines of credit	0.24	0.46
Mortgages	0.17	1.00
Motor Vehicle loans	0.25	1.00
Equipment loans	0.08	1.00
Other loans	0.10	0.32
	1.00	0.65

	Panel B: 1998	
	Share of total debt	Secured share within debt type
Credit cards	0.15	0.00
Lines of credit	0.22	0.48
Mortgages	0.19	1.00
Motor Vehicle loans	0.24	1.00
Equipment loans	0.10	1.00
Other loans	0.11	0.42
	1.00	0.69

	Panel C: 1993	
	Share of total debt	Secured share within debt type
Credit cards	0.10	0.00
Lines of credit	0.23	0.58
Mortgages	0.10	1.00
Motor Vehicle loans	0.28	1.00
Equipment loans	0.14	1.00
Other loans	0.14	0.43
	1.00	0.72

	Panel D: 1987	
	Share of total debt	Secured share within debt type
Credit cards	N/A	N/A
Lines of credit	0.21	0.57
Mortgages	0.24	1.00
Motor Vehicle loans	0.25	1.00
Equipment loans	0.14	1.00
Other loans	0.16	0.36
	1.00	0.81

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 IV: The Cyclicality of Secured Debt Issuance

Panel A: Secured Debt Share, Credit Spreads, and GDP Growth, 1960-2019						
	(1)	(2)	(3)	(4)	(5)	(6)
Period	1960-2019	1960-2019	1960-2019	1960-2019	1960-2019	1960-2019
ΔBaa-Aaa spread	0.070***					0.057 **
	(0.020)					(0.026)
ΔBaa-Aaa spread>0		0.044***				
		(0.012)				
ΔGDP growth			-1.179***			-0.648
			(0.398)			(0.523)
ΔGDP growth<0				0.028**		
				(0.012)		
NBER					0.030*	-0.010
Recession					(0.018)	(0.021)
Adjusted R^2	0.044	0.054	0.031	0.020	0.008	0.042
Observations	240	240	240	240	240	240
Panel B: Secured Debt Share, Credit Spreads, and GDP Growth, 1900-1943						
	(1)	(2)	(3)	(4)	(5)	(6)
Period	1920-1943	1920-1943	1920-1943	1900-1943	1900-1943	1900-1943
ΔBaa-Aaa spread	0.077**					
	(0.028)					
ΔBaa-Aaa spread>0		0.112***				
		(0.033)				
ΔBaa-Aaa spread>			0.085**			
median(ΔBaa-Aaa spread)			(0.037)			
ΔGDP growth				-0.344***		
				(0.094)		
ΔGDP growth<0					0.068***	
					(0.023)	
ΔGDP growth<						0.068***
median(ΔGDP growth)						(0.023)
Adjusted R^2	0.222	0.308	0.157	0.225	0.157	0.157
Observations	24	24	24	44	44	44

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 1960-2019 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: Δ*Baa-Aaa spread* is the cyclical component of the Baa-Aaa credit spread calculated from the residuals from HP filter, whereas Δ*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 V: Secured Debt by Credit Rating, 1985-2019

	Secured debt					Tangibility		
	Mean	Standard deviation	25th Percentile	Median	75th Percentile	Mean	Median	Observations
AAA	0.063	0.137	0.0	0.012	0.039	0.617	0.707	270
AA+	0.093	0.214	0.0	0.016	0.065	0.581	0.613	127
AA	0.135	0.277	0.0	0.013	0.067	0.539	0.544	540
AA-	0.118	0.256	0.0	0.006	0.074	0.468	0.405	479
A+	0.123	0.236	0.0	0.005	0.112	0.455	0.391	765
A	0.101	0.235	0.0	0.001	0.049	0.403	0.333	1,303
A-	0.089	0.191	0.0	0.006	0.066	0.406	0.349	959
BBB+	0.080	0.182	0.0	0.006	0.053	0.400	0.352	1,272
BBB	0.090	0.188	0.0	0.006	0.077	0.411	0.379	1,668
BBB-	0.114	0.223	0.0	0.007	0.106	0.379	0.350	1,244
BB+	0.268	0.329	0.001	0.097	0.483	0.378	0.345	1,024
BB	0.314	0.329	0.001	0.196	0.542	0.356	0.318	1,365
BB-	0.380	0.345	0.021	0.330	0.649	0.333	0.301	1,826
B+	0.375	0.342	0.026	0.320	0.628	0.322	0.294	2,119
B	0.436	0.359	0.061	0.399	0.762	0.332	0.290	1,360
B-	0.453	0.376	0.047	0.410	0.837	0.337	0.301	771
CCC+	0.334	0.331	0.014	0.239	0.590	0.307	0.267	290
CCC	0.337	0.326	0.010	0.240	0.574	0.348	0.294	156
CCC-	0.327	0.310	0.019	0.286	0.632	0.377	0.317	43
CC	0.332	0.366	0.002	0.186	0.672	0.413	0.402	58
C	0.494	-	-	-	-	0.079	-	1
D	0.376	0.427	0.0	0.112	0.907	0.450	0.453	189

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 VI: Secured Debt and Firm Characteristics

Period	1981-2019	1981-2019	1981-2019	1981-2019	1981-2019	1981-2019	1985-2019	1985-2019	1985-2019	1985-2019
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9).	(10)
Log(assets)_{t-1}	-0.045 ***	-0.045 ***	-0.029 ***	-0.026 ***	-0.029 ***	-0.056 ***	-0.032 ***	-0.041 **	-0.031 ***	-0.049 **
	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.002)	(0.007)	(0.011)	(0.006)	(0.010)
Q_{t-1}	-0.041 ***	-0.042***	-0.010 ***	-0.009 ***	-0.010 ***	-0.068 ***	-0.010	-0.007	-0.013 *	-0.009
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.008)	(0.008)	(0.007)	(0.008)
$\text{Profitability}_{t-1}$	0.069 ***	0.068 ***	0.028 ***	0.026 ***	0.027 ***	0.144 ***	0.104 **	0.018	-0.035	-0.032
	(0.04)	(0.004)	(0.004)	(0.004)	(0.004)	(0.010)	(0.062)	(0.046)	(0.059)	(0.052)
Tangibility_{t-1}	0.207 ***	0.216 ***	0.132 ***	0.146 ***	0.132 ***	0.282 ***	0.075 **	0.091 *	0.089 **	0.090 *
	(0.020)	(0.020)	(0.023)	(0.023)	(0.023)	(0.028)	(0.038)	(0.053)	(0.036)	(0.053)
Cash_{t-1}	0.126 ***	0.129 ***	0.035**	0.036 **	0.033 **	0.206 ***	-0.173	-0.022	-0.193 ***	-0.042
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.025)	(0.047)	(0.047)	(0.045)	(0.047)
Leverage_{t-1}					-0.004	0.049 ***				
					(0.006)	(0.012)				
Rating_{t-1}							0.028 ***	0.019 ***		
							(0.003)	(0.003)		
Non-IG_{t-1}									0.228 ***	0.140 ***
									(0.016)	(0.018)
Adjusted R^2	0.119	0.121	0.506	0.511	0.506	0.073	0.290	0.661	0.321	0.664
Observations	64,070	64,070	64,070	64,070	63,080	63,080	14,128	14,128	14,128	14,128
Number of firms	7,682	7,682	7,682	7,682	7,660	7,660	1,657	1,657	1,657	1,657
Fixed Effects										
industry	Yes	No	No	No	No	Yes	No	No	No	No
industry×year	No	Yes	No	Yes	No	No	Yes	No	Yes	No
firm	No	No	Yes	Yes	Yes	No	No	Yes	No	Yes
estimation	OLS	OLS	OLS	OLS	OLS	Tobit	OLS	OLS	OLS	OLS

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, tangibility, and cash holdings scaled by book value of assets. Columns (5) and (6) also control for lagged firm leverage. All regressions include year fixed-effects and are estimated with heteroscedasticity robust standard errors that are clustered by firm and reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

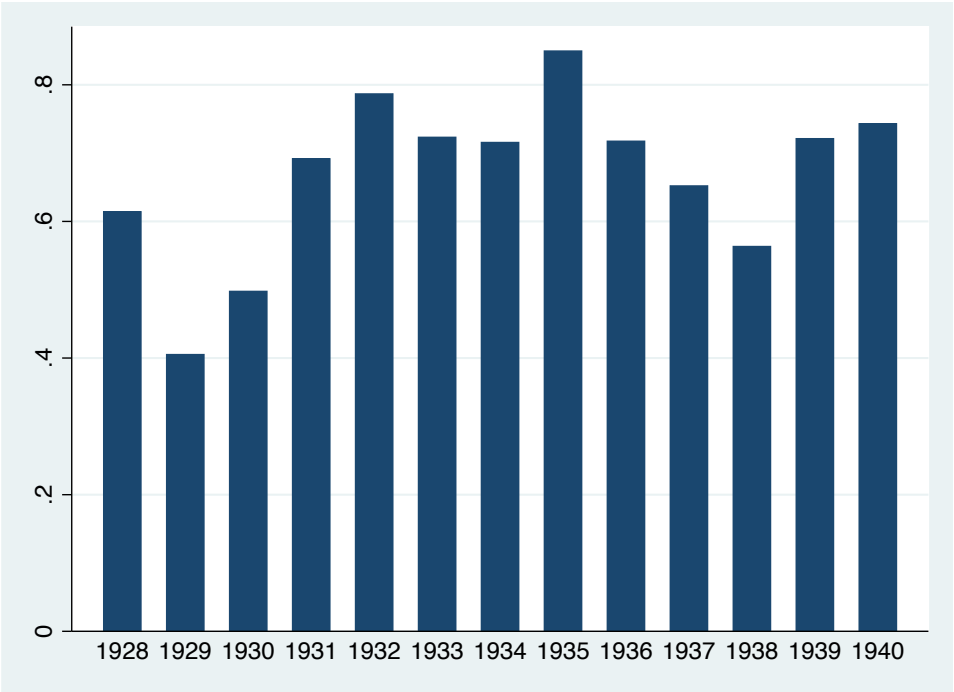
Table VII: Determinants of the Decline in Secured Debt

	(1)	(2)	(3)	(4)	(5)
Period	1925-2019	1925-2019	1925-2019	1925-2019	1925-2019
Tangibility	0.763***			1.181 ***	1.181 ***
	(0.274)			(0.275)	(0.244)
Total debt-to-capital	-1.056***			-0.522***	-0.522***
	(0.197)			(0.177)	(0.171)
Intermediary share debt		-0.374***		-0.157	-0.157
		(0.112)		(0.104)	(0.102)
Intermediary share equity		-1.455***		-0.953***	-0.953***
		(0.184)		(0.149)	(0.142)
Output of finance		-0.111**		-0.093**	-0.093**
		(0.048)		(0.041)	(0.037)
Equity risk premium			0.703*	0.711**	0.711*
			(0.420)	(0.317)	(0.308)
Real per capital GDP growth			0.156	0.261	0.261
			(0.240)	(0.263)	(0.253)
3 months treasury rate			-0.011 ***	-0.015***	-0.015***
			(0.003)	(0.003)	(0.003)
Time trend	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.884	0.892	0.866	0.934	0.934
Standard errors	robust	robust	robust	robust	Newey-West
Observations	79	79	79	79	79

This table reports the results of OLS regressions relating aggregate secured debt issuance share to aggregate firm characteristics and proxies for institutional and economic environment. The dependent variable is the aggregate dollar share of secured bond in total bond issuance at the annual frequency using data from Hickman and Mergent. Tangibility is the aggregate share of net plant, property, and equipment in total assets. Tangibility and Total debt to capital ratio are obtained from Graham, Leary and Roberts (2015). Intermediary share of debt is calculated as the holdings of corporate and foreign bonds by the financial sector scaled by aggregate holdings of corporate and foreign bonds by all sectors in the US. Intermediary share of equity is calculated in a similar way. Data for both these variables come from US Flow of Funds. Output of Finance is the business credit and equity component of the financial sector's output, and is obtained from Philippon (2012). We use excess CAPE yield, obtained from Robert Shiller's website, as a proxy for equity risk premium. Data on real GDP and three-month treasury-bill rates come from the Global Financial Database. Aggregate firm and economic variables are available for the period 1925-2019. Standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

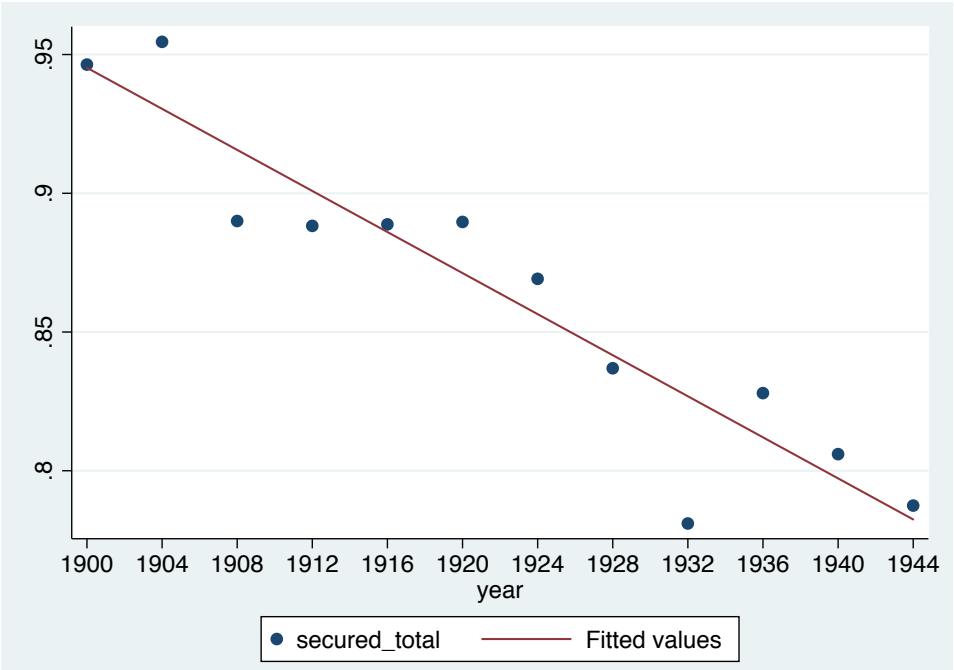
Internet Appendix for "The Decline of Secured Debt"

Figure A1: Secured debt as a fraction of total debt issuance, 1928-1940



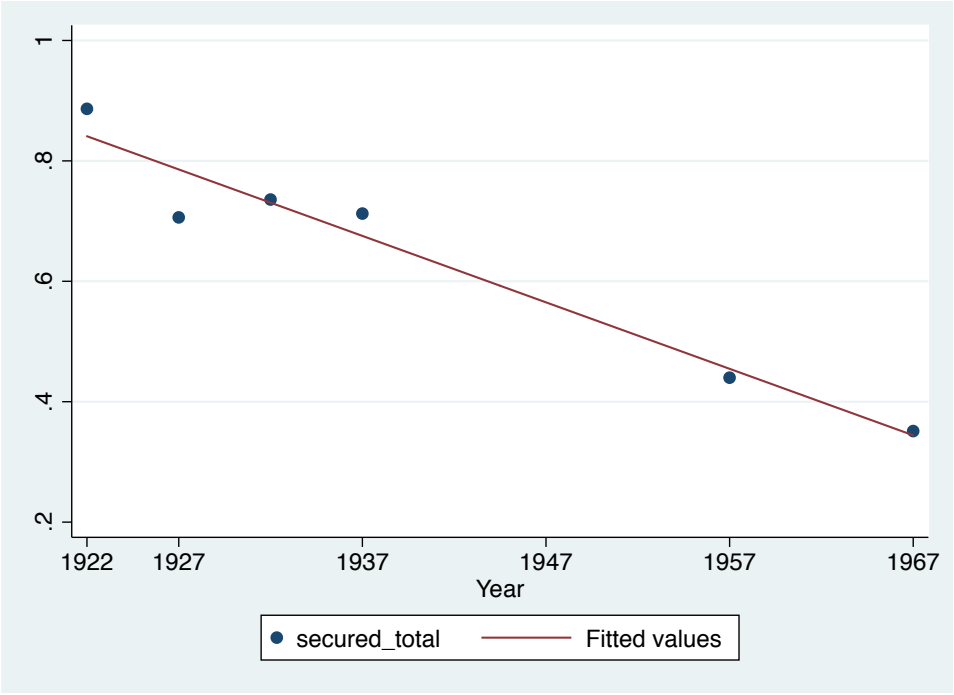
This figure displays the fraction of secured bond issuance by value from 1928 until 1940.
Source: Hickman (1960).

Figure A2: Secured debt as a fraction of total debt outstanding, 1900-1944



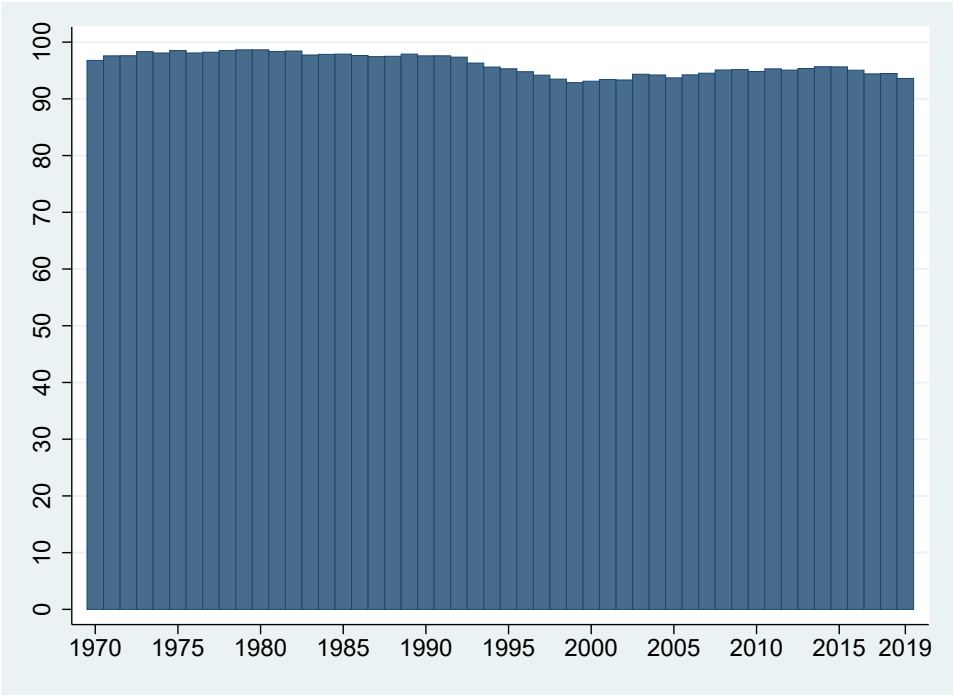
This figure displays the ratio of secured debt outstanding to total debt outstanding.
Source: Hickman (1960).

Figure A3: Secured debt as a fraction of the number of bond issuance, 1922-1967



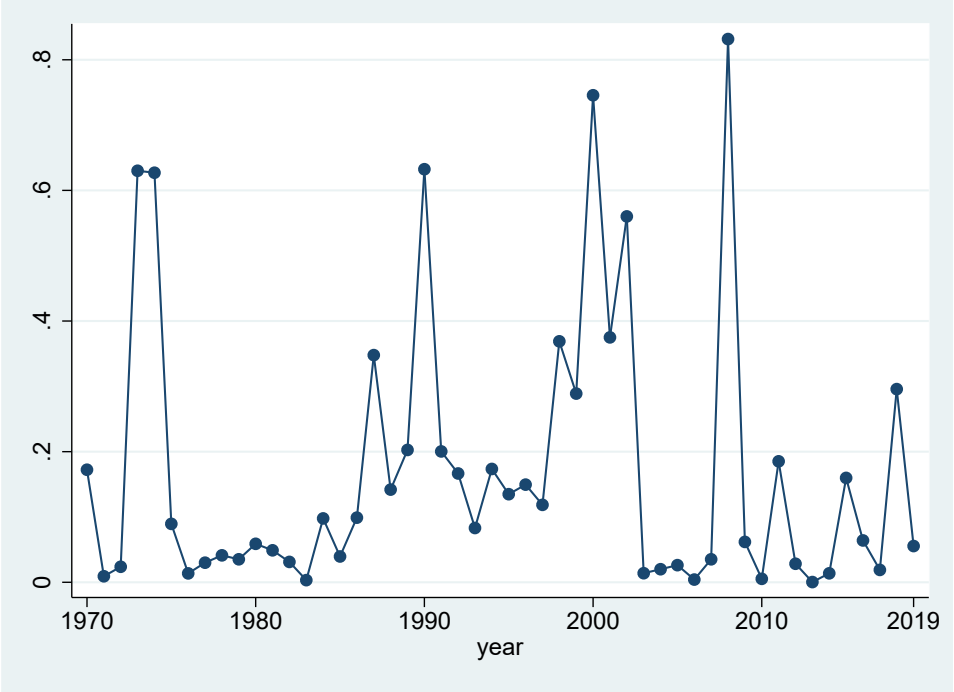
This figure displays the fraction of secured bond issuance by number from 1922 until 1967.
Source: Commercial and Financial Chronicles, various years.

Figure A4: Proportion of firms with nonmissing information on interest-coverage ratio, 1970-2019



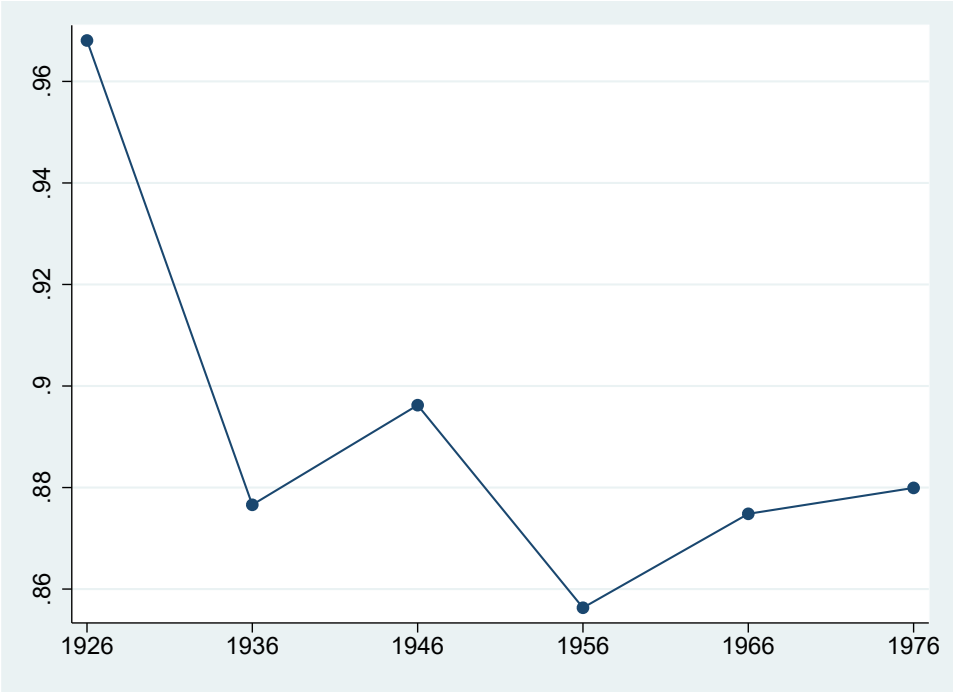
This figure displays the proportion of firms in SIC 2000-5999 with nonmissing information on both earning and interest expenses and that have nonzero-interest-bearing debt from 1970 to 2019. Source: Compustat.

Figure A5: Default probabilities for firms at the 85th percentile of the distance to default, 1970-2019



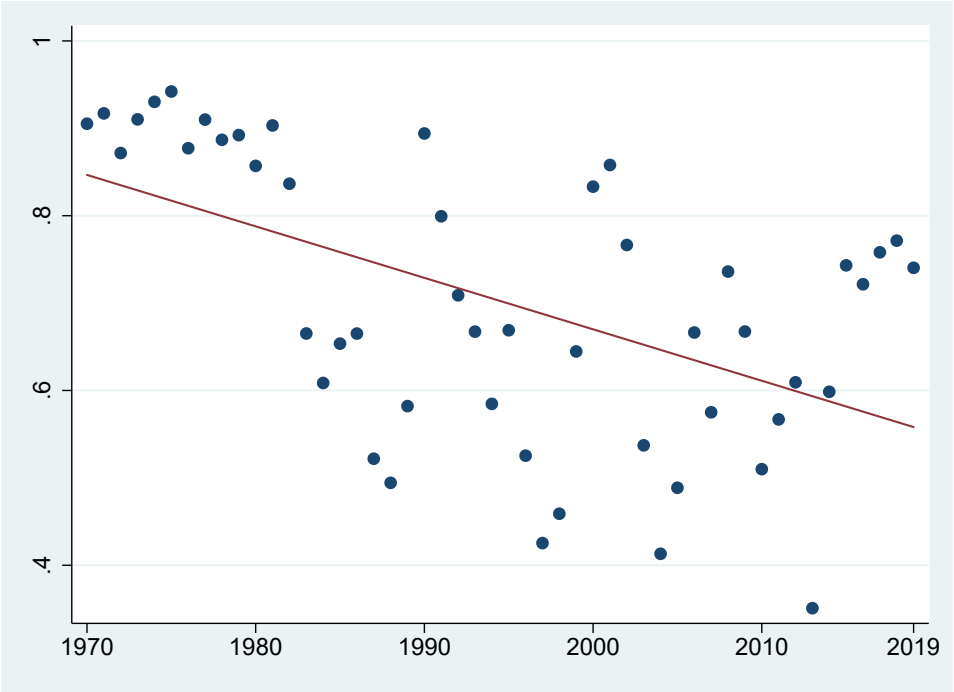
This figure plots the 85th percentile value of one-year default probability for firms over time (1970-2019). One-year default probability is calculated using the Merton distance to default model. The default probability incorporates both the volatility of a firm's asset value as well as the level of its debt. Source: Authors' calculations using Compustat data.

Figure A6a: Share of investment grade bonds: Moody's Manuals, 1926-1976



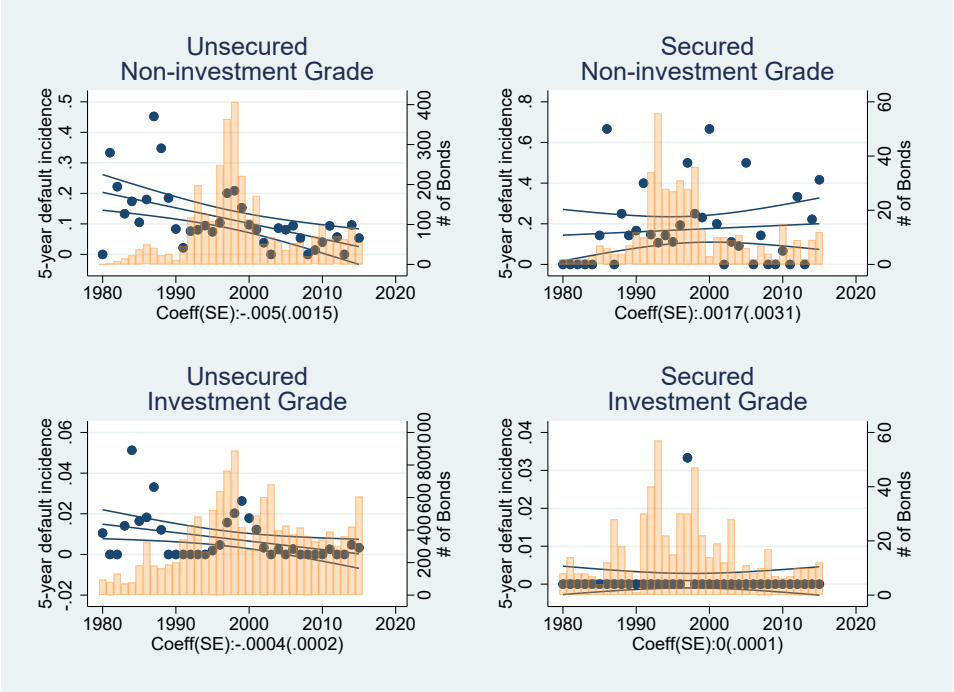
This figure displays the aggregate share of investment grade rated bonds in total bonds outstanding.
Source: Authors' calculations using Moody's data.

Figure A6b: Share of investment grade bonds: Mergent, 1970-2019



This figure displays the aggregate share of investment grade rated bonds in total bonds issued.
Source: Authors' calculations using Mergent data.

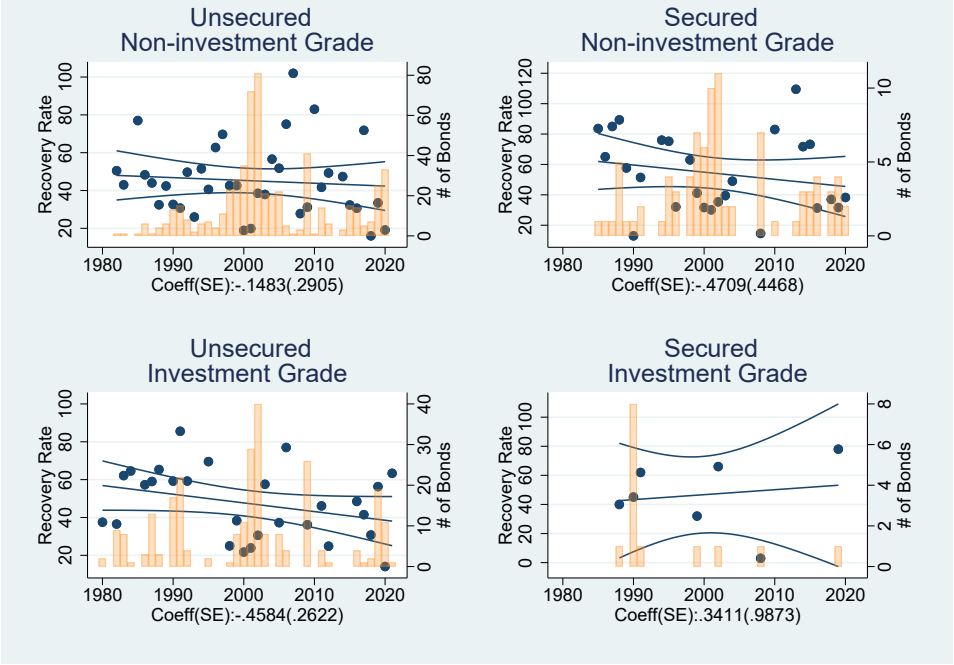
Figure A7a: Five-year default incidence



This figure reports bond default rate in a window of five years from issuance for different categories of bonds.

Source: Authors' calculations using Moody's Default & Recovery Database (DRD).

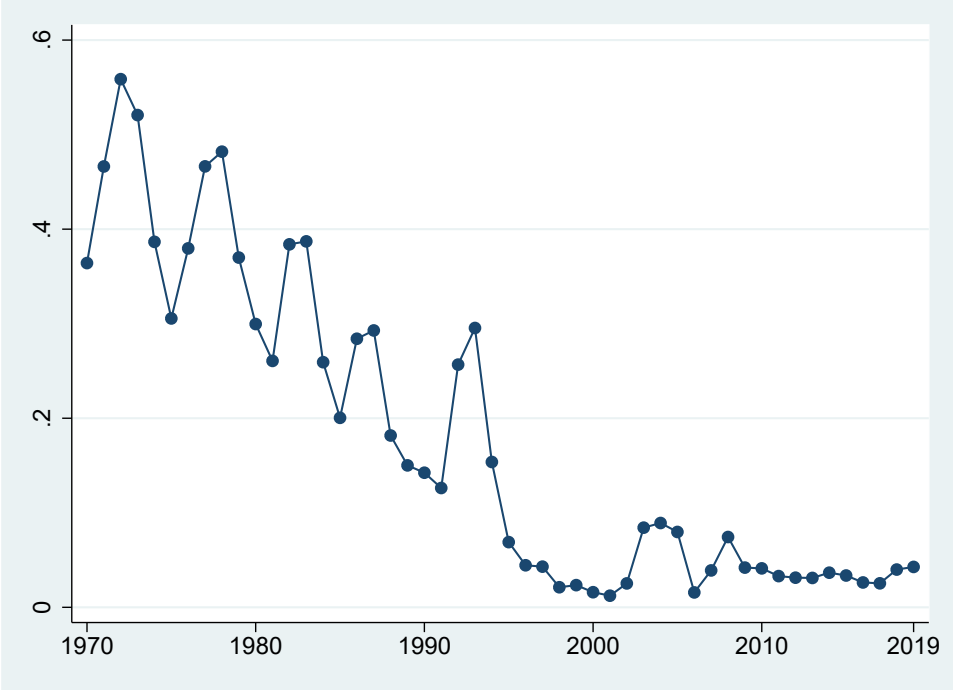
Figure A7b: Default price



This figure reports recovery rates conditional on default using the quoted price of the bond one month after default.

Source: Authors' calculations using Moody's Default & Recovery Database (DRD).

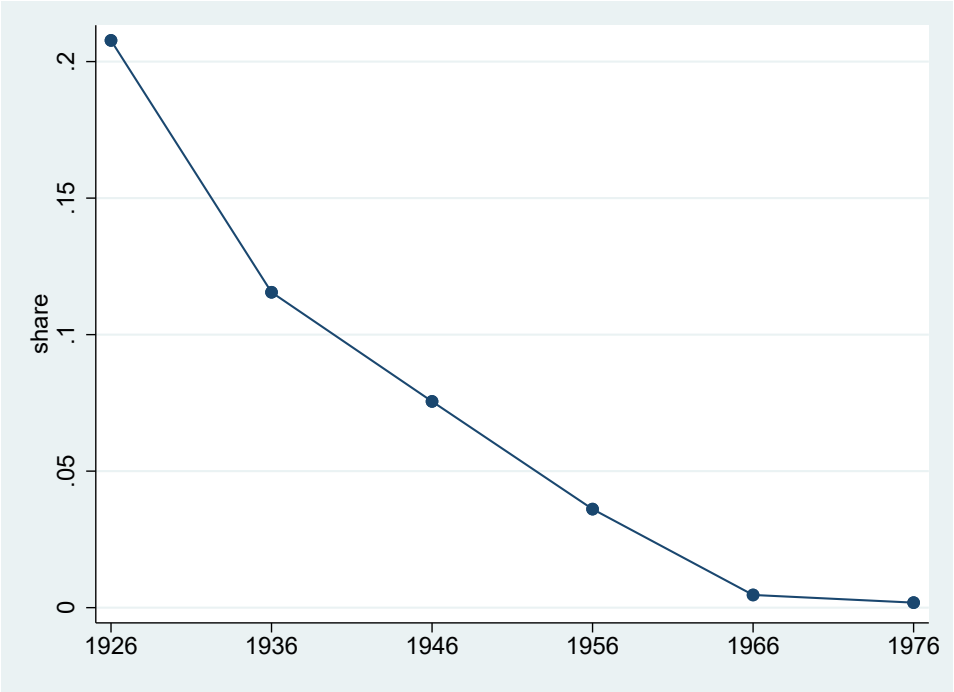
Figure A8: Secured bond as a fraction of the value of bond issuance: Investment-grade rated bonds, 1970-2019



This figure displays the fraction of secured bond issuance by value within the investment-grade rated category from 1970 to 2019.

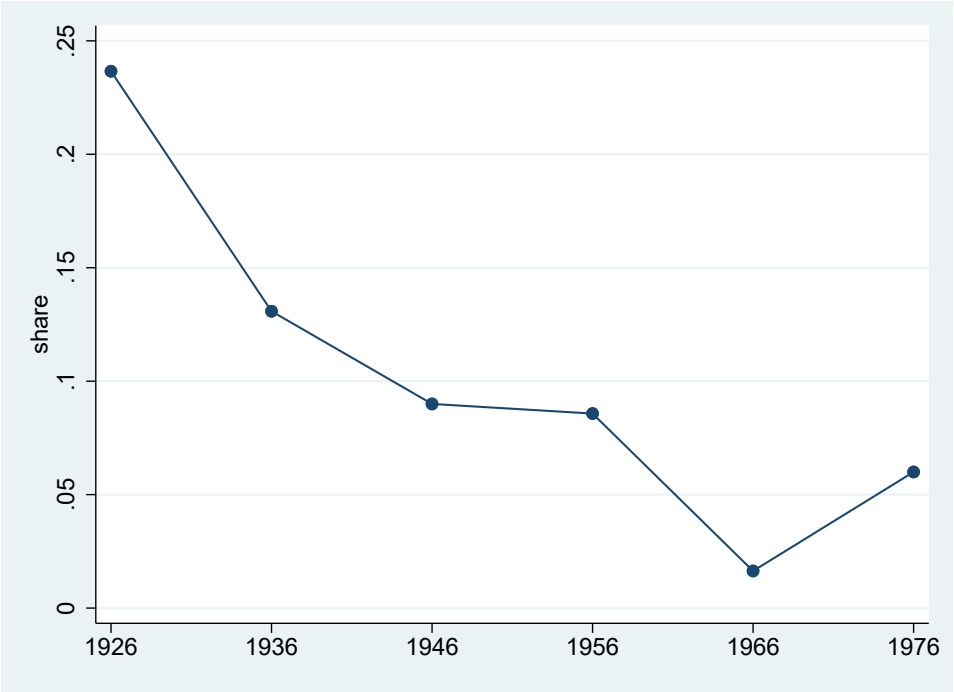
Source: Authors' calculations using Mergent data.

Figure A9a: Secured bond as a share of plant, property, and equipment, 1926-1976



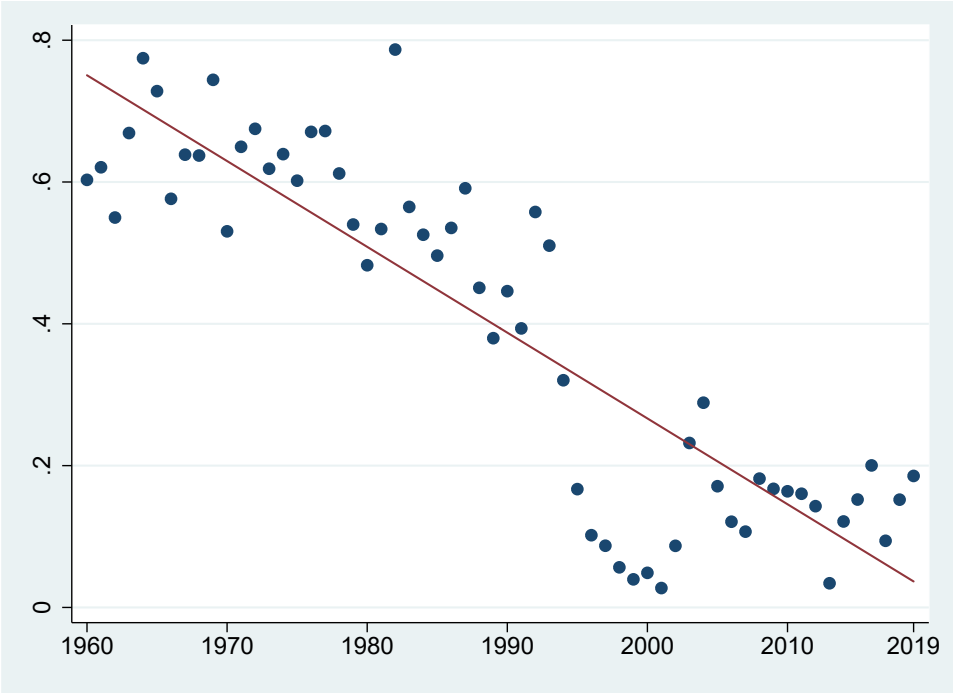
This figure displays the aggregate ratio of secured bonds to plant, property, and equipment on firms' balance sheet.
Source: Authors' calculations using Moody's data.

Figure A9b: Secured debt as a share of plant, property, and equipment, 1926-1976



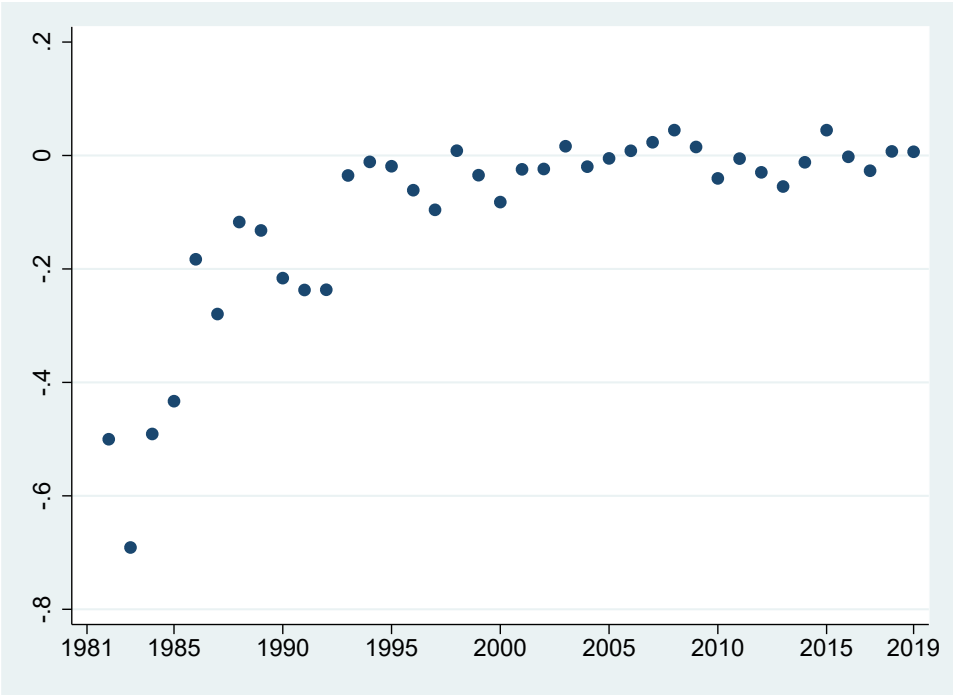
This figure displays the aggregate ratio of secured debt to plant, property, and equipment on firms' balance sheet.
Source: Authors' calculations using Moody's data.

Figure A10: Secured debt as a fraction of total debt issuance: Utilities, 1960-2019



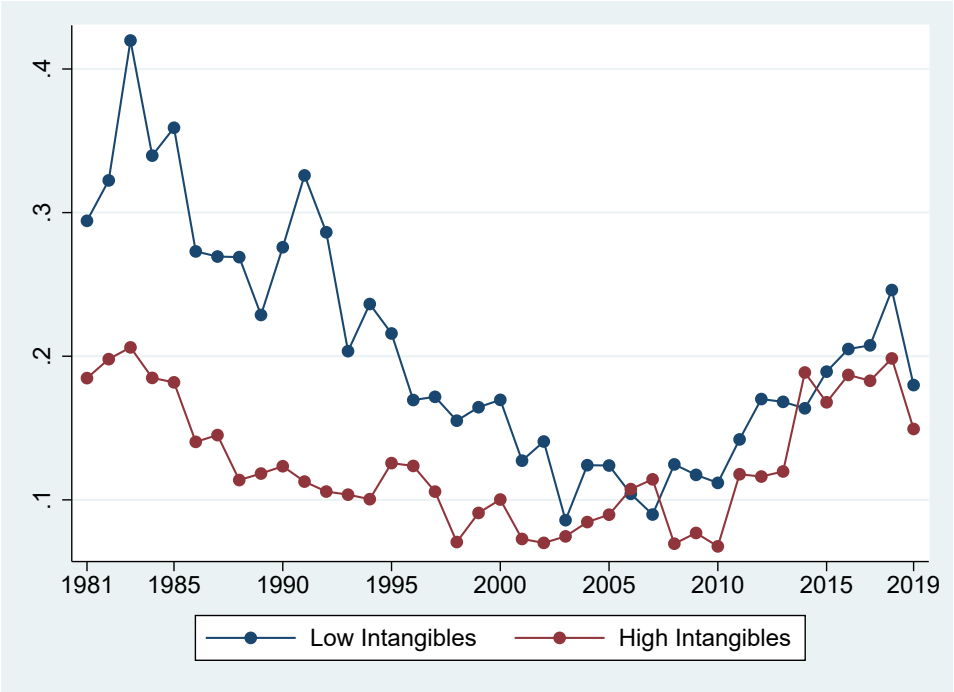
This figure displays the fraction of secured bond issuance by value by utilities from 1960 until 2019.
Source: Authors' calculations using Mergent data.

Figure A11: Marginal effect of intangible assets on secured debt, 1981-2019



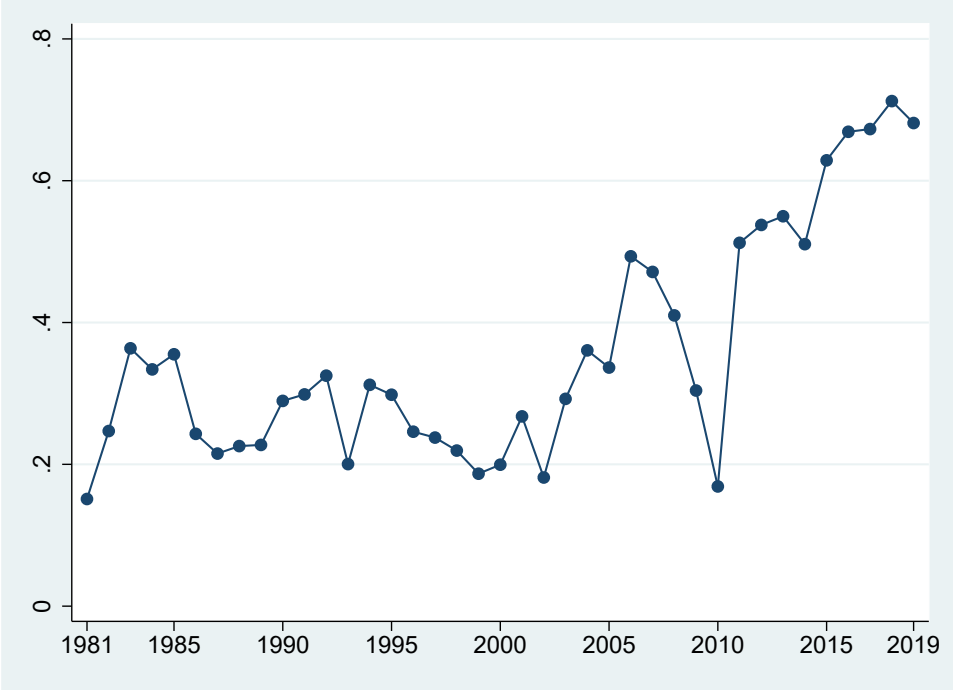
This figure plots the coefficients on a measure of intangibles interacted with year dummies in a regression of the ratio of secured debt to total debt on firm size, Tobin's Q, Return on Assets (ROA), intangibles and intangibles interacted with year fixed effects.
Source: Authors' calculations using Compustat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

Figure A12a: : Secured debt as a fraction of total debt, 1981-2019



The figure displays the median ratio of secured debt to total debt for low and high intangible firms.
Source: Authors' calculations using Compustat data.

Figure A12b: Secured debt as a fraction of total debt for firms with zero intangibles, 1981-2019



The figure displays the median ratio of secured debt to total debt for zero intangible firms.
Source: Authors' calculations using Compustat data.

Table A1: Ford Motor Co. Secured Credit Lines: Borrowing Base Values for Various Categories of Collateral

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

Source: Ford Motor Co. Form 10-K for Period Ending 12/31/2006.

Table A2: Determinants of the Decline in Secured Debt with Time-varying Tangibility

	(1)
Period	1925-2019
Tangibility 1925-1943	1.447***
	(0.465)
Tangibility 1960-1980	1.237***
	(0.294)
Tangibility 1981-2000	1.144***
	(0.291)
Tangibility 2001-2019	1.178***
	(0.326)
Total debt-to-capital	-0.371
	(0.261)
Intermediary share debt	-0.003
	(0.212)
Intermediary share equity	-0.822**
	(0.180)
Output of finance	-0.104**
	(0.046)
Equity risk premium	0.663**
	(0.331)
Real per capital GDP growth	0.313
	(0.277)
3 months treasury rate	-0.014***
	(0.004)
Time trend	Yes
Adjusted R^2	0.935
Observations	79

This table repeats the analysis of column (4) of Table VII after splitting the tangibility variable into four sub-variables for the different time-periods. The dependent variable is the aggregate dollar share of secured bond in total bond issuance at the annual frequency using data from Hickman and Mergent. Tangibility is the aggregate share of net plant, property, and equipment in total assets. Tangibility and Total debt to capital ratio are obtained from Graham, Leary and Roberts (2015). Intermediary share of debt is calculated as the holdings of corporate and foreign bonds by the financial sector scaled by aggregate holdings of corporate and foreign bonds by all sectors in the US. Intermediary share of equity is calculated in a similar way. Data for both these variables come from US Flow of Funds. Output of Finance is the business credit and equity component of the financial sector's output, and is obtained from Philippon (2012). We use excess CAPE yield, obtained from Robert Shiller's website, as a proxy for equity risk premium. Data on real GDP and three-month treasury-bill rates come from the Global Financial Database. Aggregate firm and economic variables are available for the period 1925-2019. Standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.