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THE DECLINE OF SECURED DEBT

Efraim Benmelech  
Nitish Kumar  
Raghuram Rajan

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**ABSTRACT**

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

Efraim Benmelech  
Kellogg School of Management  
Northwestern University  
2001 Sheridan Road  
Evanston, IL 60208  
and NBER  
e-benmelech@kellogg.northwestern.edu

Raghuram Rajan  
Booth School of Business  
University of Chicago  
5807 South Woodlawn Avenue  
Chicago, IL 60637  
and NBER  
raghuram.rajan@ChicagoBooth.edu

Nitish Kumar  
PO Box 117168  
Stuzin 312  
Gainesville, FL 32611  
USA  
Nitish.Kumar@warrington.ufl.edu

What role does collateral play in corporate borrowing? At one level, the answer is straightforward. Collateral consists of hard assets, which are not subject to asymmetric valuations in markets and which the borrower cannot alter easily. Collateral gives comfort to a lender that even if she does little to monitor the borrower's activity, and even if a borrower's cash flow prove inadequate to service the debt, the lender's claim is protected by underlying value. In particular, the creditor's ability to seize collateral when a borrower defaults on a promised payment allows the lender to realize repayment, at least in part. And at the corporate level, all else being equal, firms that pledge collateral find it easier to obtain credit and at a reduced interest rate (Benmelech and Bergman (2009)).

An extensive theoretical literature spanning law, economics, and finance shows that collateral protects the lender's claim against strategic default by the borrower and alleviates financial frictions stemming from borrower moral hazard and adverse selection (Aghion and Bolton (1992), Bolton and Scharfstein (1996), Boot, Thakor, and Udell (1991), Hart and Moore (1994, 1998), Hart (1995), Jackson and Kronman (1979), Stulz and Johnson (1985), Williamson (1985)). In addition, some have suggested that collateral is an effective way of protecting debt against subsequent dilution by the debtor (see, e.g., Bjerre (1999), DeMarzo (2019), Donaldson, Gromb, and Piacentino (2019 a and b), Rampini and Vishwanathan (2013), and Schwartz (1997a)); When an effective system of seniority of claims is not available, creditors who register the collateral backing their debt with a collateral registry effectively establish the seniority of their debt claim, at least up to the value of that collateral. In fact, to reduce ex-post dissipative conflict among creditors, Welch (1997) argues that the most deep-pocketed creditors should have seniority/collateral, while Jackson and Kronman (1979) suggest that creditors that are least able to monitor should have their claims protected with collateral.

Given these stated (and sometimes contradictory) rationales for the virtues of secured debt, in the first part of this paper we study secured debt issuance by U.S. corporations over more than a century—from 1900 to 2017. Using data on bond issuance and on corporate balance sheets from a variety of overlapping datasets, we document that the issuance of secured debt has declined dramatically. Almost all debt issued during the early twentieth century was backed by collateral.

For example, secured bonds accounted for 98.5% of total bond issuance in 1900. By 1943, the share of secured bonds declined to 66.0%. The use of secured debt continued to decline, and in the 1970s only half of bonds issued were secured. By 2007, the median firm's secured debt amounted to only 13% of its outstanding debt. Since the Great Recession, the share of secured debt has hovered around 15%. Superimposed on this trend, we find a strong countercyclical component to the issuance of secured debt, with corporations more willing or compelled to issue it in the trough rather than peak of a cycle. The issuance of secured debt has increased slightly in recent years, but it is too early to tell how much of this is a reversal of the previous trend and how much of it is cyclical.

What harm is there for a borrowing firm to offer secured debt up front, instead of leaving the debt unsecured? After all, the firm stands to benefit from lower interest rates if the lender feels better protected against dilution by other creditors. What has led to the decline in the use of secured debt by U.S. corporations, despite its seeming theoretical merits?

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

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

Let us be more specific, starting with declining creditors' demand for security. We argue that early in the 20<sup>th</sup> century, when most firms in a number of industries were new entrants with large

investments and modest cash flows, and when corporate accounting as well as bankruptcy 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 conditional on borrower default. Even when corporate bankruptcy legislation was initially passed, the priority of unsecured debt vis a vis equity was not fully respected, which enhanced the attractiveness of collateral for creditors. As accounting improved and gave lenders more confidence in the reliability of reported cash flows, as stronger corporate governance protected firm cash flows and assets from being tunneled out to related parties, and as effective bankruptcy legislation gave lenders more confidence that the priority of debt versus equity would be respected, lenders no longer needed collateral to protect their claims against management or equity – the assets would be there in bankruptcy to support their claims, they would have priority over those assets, and they did not need the additional protection of having their claims collateralized by those very assets.

Financial development may therefore have reduced the need for lenders to take collateral in the normal course from established borrowers to protect themselves against the threat of being dispossessed by borrower malfeasance. Instead, collateral's main function may have changed to prioritizing the value of a secured lender's claims against other creditors in bankruptcy. With collateral now performing a more modest function, other issues probably came to the fore to continue the decline of the use of secured financing.

From the borrower's side, pledging assets up front is costly. Borrowers may be interested in having more financial flexibility by preserving collateral capacity, giving it up only when necessary to unlock access to further borrowing (see, e.g., Acharya, Almeida, and Campello (2007), Bjerre (1999), Li, Whited, and Wu (2016), Rampini and Vishwanathan (2010, 2013), and Schwartz (1997b)). Unpledged collateral is a form of financial slack (as in Myers and Majluf (1984)), and firms would want to preserve borrowing capacity for when it is needed.

In addition to preserving unpledged collateral to maintain *financial flexibility*, firms might want to avoid issuing secured debt to maintain *operational flexibility*. By pledging collateral, a firm is limiting its flexibility to sell or redeploy assets to craft a better business operation. While

presumably creditors might be willing to accept contractual modifications to permit value-enhancing redeployment, the process of making such modifications might take time, and creditors may extract rents from the borrower in return for flexibility. As a result, firms for which operational flexibility is important would prefer to borrow unsecured.

The legal literature emphasizes such problems associated with secured creditors (see, e.g., Baird and Jackson (1984), Baird and Rasmussen (2010), and Jackson and Kronman (1979)), as does an emerging empirical literature in finance (see, e.g., Vig (2013) and Ma, Tong, and Wang (2019)). With healthy firms incurring costs in pledging collateral, and with collateral helping lenders only closer to financial distress, borrowers would have become more inclined to issue collateralized debt only contingent on likely distress. Legal developments such as negative pledge clauses (whereby the borrower commits to a lender that it will not issue secured debt to any other lender, failing which the debt payment will be accelerated), coupled with better information about firm borrowing, would have given creditors the confidence to stay unsecured until they sensed impending borrower distress. Such developments might explain both the continuing secular decline in the issuance of secured debt through the century, even after accounting improved and bankruptcy legislation developed, as well as its use as a firm's risk of financial distress increased, or in business cycle downturns. In short, we argue that the development of U.S. capital markets, as well as the institutions that support such markets, have enabled modern U.S. firms to offer collateral on a more contingent basis—as they near financial distress—thus allowing firms to retain financial and operational flexibility in normal times while reassuring creditors their priority will be respected.

Finally, it is not just the business environment that has changed, firms have also changed. Assets traditionally used to collateralize debt such as property, plant, and equipment have declined as a fraction of the value of firm assets, while more “intangible” assets, normally thought of as hard to use as collateral, such as brand names and patents have increased. The decline in secured debt issuance towards the end of the last century probably is related to the decline in asset tangibility. However, contractual innovations in this century now allow firms to secure a greater variety of assets, including intellectual property, more easily, and have reduced the transactions

costs associated with pledging intangible assets. Although it is too early to tell whether secured debt is being resurrected with these new assets serving as collateral, we cannot rule out this possibility. This paper should certainly not be construed as an obituary.

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

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

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

### A. Hickman Data

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

We use data aggregated by year and security type from Hickman (1960), which classifies bonds into five categories based on security and seniority: (i) secured-senior, (ii) secured-intermediate, (iii) secured-junior, (iv) unsecured-senior, and (v) unsecured-junior.<sup>2</sup> We define the share of secured bonds in total bond issuance as the ratio of the amount of secured-senior, secured-

<sup>2</sup> A sixth category, “information lacking,” concerns only a small fraction of the bonds.

intermediate, and secured-junior bond issuances to total issuances. In Figure 1a, we plot the fraction of secured bond issuance by value from 1900 to 1943.<sup>3</sup> 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 its lowest ratio of 40.5% in 1929. As demonstrated in Figure 1b (which plots the same data between 1928 and 1940 to make for easier viewing), the share of secured bonds in total bonds issuance bounced back during the Depression to 78.7% in 1932 and 85% in 1935—reflecting the countercyclical nature of secured issuances that we will shortly establish in more detail. By 1943—the last year in the Hickman (1960) sample—the share of secured bonds declined to 66.0%. We also estimate a linear trend model of the share of secured bonds on a time index variable (defined as  $t$ =years since 1900). The fitted linear trend model is given by:

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

(0.023) (0.001)

$R^2 = 0.404$

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

In Figure 2, we decompose the ratio of secured bonds to total bonds into its two components: (i) issuance of secured bonds and (ii) total bond issuance. As the figure illustrates, total bond issuance increased from \$693 million in 1900 to \$1,489 million in 1901 and remained above \$1 billion until 1918. During this period, secured bonds accounted on average for 83.7% of total bond issuance. Total bond issuance increased dramatically during the 1920s, peaking at \$3,856.8 million in 1927. Total bond issuance declined sharply during the Great Depression (Benmelech and Bergman (2017)). For example, although total bond issuance in 1930 was \$2,978.3 million, it

<sup>3</sup> The data used to construct Figures 1a, 1b, and 2 are based on Hickman (1960), Table 85.

declined to \$2,030.1 million in 1931, \$873.7 million in 1932, and \$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 as a result of World War II.

Next, we supplement the analysis with information on *outstanding* bond issues during the same years.<sup>4</sup> Hickman (1960) classified the par amount outstanding of bond issues by their lien position quadrennially from 1900 to 1944.<sup>5</sup> In Figure 3, we report the share of secured bonds in outstanding bonds at a quadrennial frequency from 1900 to 1944. Similar to the pattern seen in Figure 1, the share of outstanding secured bonds (by value) declines steadily during this period. Because outstanding bonds include bonds issued in previous years, the decline in the share of secured bonds outstanding is not as sharp as that observed in the issuance data.

We next present secured bond issuance separately for the three major industries studied by Hickman: Utilities, Railroads, and Industrials.<sup>6</sup> In Figure 4a, we plot the share of secured bonds issued from 1900 to 1943 for utilities. As the figure indicates, the trend decline in secured bond issuances is also observed, though more modestly, in utilities. The share of secured bonds of utilities was 100% in 1900 and 1901, declined to 83% in 1926, and averaged 74% and 81% in 1942 and 1943, respectively.<sup>7</sup> A linear trend model suggests that the share of secured utility bonds fell, on average, at a statistically significant 0.5 percentage points a year.

In Figure 4b, we chart the evolution of the share of secured bonds for railroads. The overall trend in the share of secured bonds in the railroad sector is, if anything, positive, and the data are noisier. The secured share of railroad bonds declined from 97% in 1900 to 61% in 1907, but then it rose to 99% in 1916 and 96% in 1917 and remained between 85% and 95% until 1929, when it

<sup>4</sup> Hickman classified bonds outstanding based on their status on January 1 on each of the calendar years.

<sup>5</sup> The data used to construct Figures 3, 5a, and 5b are based on Hickman (1960), Table 17. The data are reported for the years 1900, 1904, 1908, 1912, 1916, 1920, 1924, 1928, 1932, 1936, 1940, and 1944.

<sup>6</sup> 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.

<sup>7</sup> Secured debt share jumped to 95% in 1943, a likely outlier similar to the 98% share in 1935.

declined to 48%. During the late 1930s, the share of secured bonds in railroads bond issuance increased again, reaching almost 100% in 1943. Given the volatility of the data, 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.

Next, we plot the share of secured bonds in bond issuance by industrial firms between 1900 and 1943. As Figure 4c shows, industrial firms experienced the largest decline in secured bonds among the three major sectors studied by Hickman (1960). Secured bonds accounted for all the bonds issued by industrial firms in 1900, and the share of secured bonds remained high at 97% in 1901 and 1902 and 100% in 1903. Secured bonds as a share of total bonds issuance declined over time and was between 53% and 58% between 1911 and 1913. The share of secured bonds continued to decline during the 1920s and averaged 49%. In 1940 the share of secured bonds was 39%, and it declined further to 26% in 1941, 23% in 1942, and 13% in 1943.

The linear trend model of the share of secured bonds issued by industrials on a time index variable (defined as  $t$ =years since 1900) is given by:

$$\frac{\textit{secured debt}}{\textit{total debt}}_{\textit{industrials}} = 0.888 - 0.014 * t + \epsilon_t$$

(0.052) (0.002)

$R^2 = 0.515$

The ratio of secured bonds to total bonds issuance of industrial firms 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), industrial firms drove the overall secular decline in secured bonds during the sample period: “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 founded by William Dana and published from 1865 to 1987. Our goal in collecting these data is to confirm the information in Hickman (1960) and to extend the data into the 1950s and 1960s. In March 1921, the *CFC* began publishing monthly compilations of new capital flotations in the United States (i.e., corporate, municipal, and government financing via new stock and bond issues). We collect the data at a semi-decadal frequency for the years 1922, 1927, 1932, and 1937 and then at a decadal frequency for the postwar years 1957 and 1967. We skip the year 1942 because it is during World War II and the year 1947 because it is too soon after the war for capital structures to have stabilized.

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

In Figure 5a, we plot the number of secured bond issues as a fraction of the total number of bond issues for each of the years 1922, 1927, 1932, 1937, 1957, and 1967. As the figure shows, the share of secured bond issues declined from 89% in 1922 to 35% by 1967. In Figure 5b, we chart the value of secured bond issues as a fraction of the total dollar value of bond issuance. The share of secured bonds out of the total value of bond issuance declined from 79% in 1922 to 32% in 1967. The share of secured bonds in the *CFC* data is similar to Hickman's calculations. For example, according to both the *CFC* data and Hickman (1960), the share of secured bonds in 1922 was 79%. Likewise, according to the *CFC*, the share of secured bonds was 72% in 1932, while according to Hickman, it was 78%. By 1937, the shares of secured bonds according to the *CFC* and Hickman (1960) were 63% and 65%, respectively. The only data point in which there is a double-digit percentage point difference between the *CFC* and Hickman is 1927, in which

according to the *CFC* the share of secured bonds was 60% whereas according to Hickman (1960) the share was 70%.

Importantly, 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 in the fraction of secured bonds in total value of bond issuance from its level of 98.5% in 1900.

### *C. The Mergent Data*

We now turn to the Mergent dataset to analyze trends in secured bond issuance from 1960 to today. The Mergent Fixed Income Securities Database (FISD) is a comprehensive database of publicly offered U.S. bonds. The FISD contains detailed information on more than 140,000 debt securities. Although the Mergent dataset also includes bonds issued before the 1960s, comprehensive coverage starts 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 "1<sup>ST</sup>." We omit bonds issued by financial firms and government and municipal agencies and entities. This results in a sample of 54,714 individual bond offerings from 1960 to 2017—out of which 9,540 bonds are classified as secured bonds, accounting for 17.4% of the sample.

In Figure 6, we plot the number of total bond issues and the number of secured bonds issued every year from 1960 to 2017. Bond issuance increased dramatically during the 1990s. As Figure 6 shows, secured bonds accounted for a larger share of total bond issuance in the 1960s and 1970s. For example, of the 242 bonds issued in 1970, 136 (56.2%) were secured. In 1980, 108 (40.5%) of the 267 bonds issued were secured, and 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 in 2013 and 2014, where secured bonds accounted for about 10% of bond issuance. By 2017, secured bonds accounted for only 8.8% of the total bond issuance.

We estimate a linear trend model of the fraction of secured bond issuances (by number) on a time index variable (defined as  $t$ =years since 1960) for the years 1960 to 2017. Our linear trend model suggests that between 1960 and 2017 the ratio of number of secured bonds to total bonds issuance has declined by an annual rate of 1.3 percentage points. In Figure 7, we plot the share of the value of secured bond issuance from 1960 to 2017. This share also declines over time. In 1960, secured bonds represented 59.4% of the value of all bonds issued. By 2017, the share had declined to 6.0%. The linear trend at which the share of secured bonds (by value) declined from 1960 to 2017 (0.9 percentage points a year) was more rapid than the rate of decline between 1900 and 1944 (0.6 percentage points a year). In Figure 8, we combine the different datasets and present the dramatic decline of secured bond issuance from 1900 to 2017.

#### *D. Trends in Firm-Level Secured Debt*

We now turn to analyze the evolution of secured debt on firms' balance sheets. The main advantage of analyzing firms' balance sheets rather than just bond issues is that it includes other forms of secured debt—most importantly, bank loans. Compustat reports the item “debt mortgages and other secured debt” for publicly traded U.S. firms starting in 1981. We define the share of secured debt in an individual firm as secured debt divided by total debt.<sup>8</sup> Our definition of secured debt is similar to Azariadis, Kaas, and Wen (2016) and Giambona, Golec, and Lopez-de-Silanes (2012). We focus on industrial firms with SIC codes between 2000 and 5999. We require that firms have information on assets, profitability, and share prices. We winsorize the data at the 1% and 99% percentiles. There are 988 firms with nonmissing information on secured debt in 1981, 1,088 such firms in 1990, 1,577 firms in 1995, 1,616 in 2000, 1,354 in 2005, 1,168 in 2010, and 1,083 in 2015. Table I presents summary statistics of different measures of secured debt. Mean secured debt divided by total debt is 0.334, with a median of 0.150. As the table shows, secured debt accounts, on average, for 10% of firms' total assets.

<sup>8</sup> The secured debt ratio is defined using the following Compustat items:  $DM/(DLC+DLTT)$ . DM is defined as “debt mortgages and other secured debt,” DLC is “debt in current liabilities,” and DLTT is “long-term debt.”

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

#### *E. Changes in Composition between Banks and Bond Issuances*

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

To examine this, we turn to Flow of Funds data. National Flow of Funds data come from the Financial Accounts of the United States released by the Federal Reserve every quarter. The data include information on transactions and levels of financial assets and liabilities, by sector and financial instrument, as well as full balance sheets for households and nonprofit organizations, nonfinancial corporate businesses, and nonfinancial noncorporate businesses. We use these data from 1945 to 2018 at the annual frequency. In Figure 10, we plot the outstanding amounts of loans and bond debt reported by U.S. nonfinancial corporations from 1945, and in Figure 11, we plot the ratio of loans to total debt. Although the ratio was relatively flat until the early 1960s, it rose by about 5 percentage points in the early 1960s, only to plummet by over 20 percentage points in the two and a half decades following the early 1990s (with a temporary blip up before the Global Financial Crisis). So the broad picture is of a decline in the share of loans, not an increase.

<sup>9</sup> 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 Vishwanathan (2013)).

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

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

#### *F. Collateral and Small Businesses Finance*

We now turn to an archetypical issuer of loans—small firms—to show that they too experienced an overall decline in secured borrowing, albeit from a high level. Small businesses rely on loans, in particular secured loans, rather than bonds (Berger and Udell (1995, 1998)).<sup>10</sup> 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 to estimate the share of secured debt in small business finances in the United States.

We use SSBF surveys for the years 1987, 1993, 1998, and 2003 (the survey was discontinued after 2003). The SSBF collected information on small businesses (fewer than 500 employees).

<sup>10</sup> Also see Bradley and Roberts (2015) and Lian and Ma (2019) who suggest that smaller firms tend to use secured lending more.

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

For each loan on their balance sheet, the surveys report whether collateral is or is not required. Although credit card loans are always marked as unsecured, loans in the other categories could be reported as secured or unsecured. For each category of loan outstanding at firm level, we calculate the share of secured loans (by value).<sup>11</sup> For each loan category, we then calculate the mean share of secured loans across firms for each survey year. For instance, 57% of lines of credit were reported as secured in the first survey in 1987, but only 46% in 2003. Because the reporting is uneven across surveys, we report the secured debt share in Table II assuming that all mortgages, motor vehicle loans, and equipment loans are secured. As the table illustrates, the share of secured debt has decreased steadily over time—from 81% in 1987 to 65% in 2003.

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

<sup>11</sup> Firms report up to three loans of each category. Hence, within each category of loan for a given firm, a portion could be secured and the remaining unsecured.

## II. Cyclicalities in Issuance of Secured Debt

Along with a secular decline in issuance of secured debt, we find a countercyclical pattern in the share of secured debt issuance (also see recent evidence in Bradley and Roberts (2015) where they also make the point that bond covenants follow such a pattern more generally). For example, we noted that the secured bond share showed a perceptible rise during the Great Depression of 1929 to 1933 (Figure 1a). Similarly, there is a perceptible increase in the share of secured bond issuance during the past two recessions of 2001 to 2002 and 2007 to 2009 (Figure 7). In this section, we examine empirically whether the share of secured bond issuance exhibits a distinct countercyclical pattern over the period 1900 to 2017.<sup>12</sup> It does!

At a broader level, external financing is expected to be procyclical: as output expands, firms need more financing to support increased production and investment (the demand channel). However, either debt or equity issuance could be countercyclical because of substitution between these two forms of financing. Covas and Haan (2011) find that both debt and equity issuance are procyclical. Korajczyk and Levy (2003) find that target leverage is countercyclical for unconstrained firms but procyclical for financially constrained firms. Credit supply can independently explain cyclicalities 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 procyclicalities 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.

We begin by examining secured bond issuance for the period 1960 to 2017 using Mergent's data at the quarterly frequency. We estimate an ordinary least squares (OLS) model of the cyclical component of secured bond issuance (as a share of total dollar value of bond issuance in a year) as

<sup>12</sup> We do not have reliable data on the share of secured debt in loans, or when that debt was issued, hence this part of the analysis will focus on bonds.

a function of a variable proxying for the cyclical stage of economic activity. Specifically, we estimate the following specification:

$$\text{secured bond issuance}_t = \alpha + \beta Z_t + \varepsilon_t,$$

where  $Z_t$  represents the 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,  $\text{secured bond issuance}_t$ , using an HP filter (i.e., we extract the residuals from the HP filter).<sup>13</sup> We use two proxies for the business cycle: the Baa–Aaa credit spread and the logarithm of real gross domestic product (GDP). We use the detrended measures (residuals from the HP filter) to proxy for the state of the business cycle.

We report the results of this analysis in Table III, regressing the secured share in year  $t+1$  against the business cycle proxy in year  $t$  (i.e., a lag of four quarters). Results are equally strong for a lag of three quarters but become weaker for fewer or no lags—consistent with the view that lenders demand collateral once the business environment is clearly seen to have deteriorated. Panel A, columns (1)–(3), use Baa–Aaa spread for the proxy, whereas columns (4)–(6) use log real GDP. The regression coefficients suggest a strong countercyclical pattern in the share of secured bond issuance. The coefficients in all the columns are statistically significant at the 5% level or better. In terms of economic magnitude, the coefficient estimate in column (1) suggests that a one standard deviation increase in Baa–Aaa spread increases the share of secured bond issuance by 2.2 percentage points. Similarly, the coefficient estimate in column (2) suggests that the share of secured bond issuance is approximately 5 percentage points higher when the detrended change in spread is positive, while the coefficient estimate in column (3) indicates that it is 5.2 percentage points higher when the detrended change is above the median detrended change. Moving on to real GDP as the business cycle proxy, the coefficient estimate in column (4) suggests that a one standard deviation fall in real GDP growth increases the share of secured bond issuance by 1.8 percentage points. Similarly, the coefficient estimate in column (5) suggests that the share of

<sup>13</sup> As is standard in the macro literature, we use a smoothing coefficient of 1600 for quarterly data and 100 for annual data.

secured bond issuance is approximately 3 percentage points higher when detrended real GDP growth is negative. Overall, our analysis suggests that secured bond issuance was countercyclical during the last 58 years.

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

We are not the first to note a possible countercyclical component to secured debt. Although they do not focus on countercyclicity, 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 countercyclicity in the level of outstanding secured debt (as well as issuances if new secured debt is issued to replace the old unsecured debt). Luk and Zheng (2018) develop a macroeconomic model with debt heterogeneity that generates procyclical unsecured debt. Using firm-level data from Compustat for the period 1981 to 2017, they find that the amount of unsecured debt on a firm’s balance sheet is positively correlated with GDP growth. Azariadis, Kaas, and Wen (2016) obtain similar results for the period 1981 to 2012 using the same

dataset, as do Bradley and Roberts (2015) using loan data from Dealscan. In contrast to these studies, we use *bond issuance* data over a longer time period to examine whether the share of secured bond issuance follows a countercyclical pattern.

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

### **III. What Led to the Decline of Secured Debt: The Creditor Side**

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

#### *A. Theories of Secured Debt Usage*

Let us start first by examining the theory in more detail. Security helps protect the lender's claim against the borrower in a number of ways.<sup>14</sup> The value of an asset may be easier to establish than the prospective value of cash flows, especially if accounting is not reliable. Also, a hard asset will retain its value even if the borrower's business acumen is modest, he is untrustworthy, or he neglects maintenance, so it will require little monitoring (see Jackson and Kronman (1979)). Furthermore, as Hart and Moore (1994) argue, the ability to seize hard assets in case of default allows a lender to make credible threats that enable her to extract repayment even when cash flows are not verifiable and the borrower's human capital is inalienable (that is, it cannot be committed to generating cash flows). Yet none of this requires the loan to be secured by the asset. So long as a single lender confronts the borrower, the right to seize assets in case of default is sufficient – this

<sup>14</sup> This section benefited greatly from a discussion with Douglas Baird.

just requires the enforcement of absolute priority. So securing the loan with the assets helps the lender recover from the borrower primarily if (i) corporate governance/accounting is weak so assets can be sold to related parties for low value or cash flows can be tunneled out (ii) the bankruptcy process does not exist, is slow, or it does not respect the absolute priority of unsecured creditors vis a vis equity (iii) firm leverage is high so that stockholder-bondholder conflicts are rife and incentive concerns emerge (iv) there are multiple unsecured claimants whose relative priority needs to be established.

In situation (i), the lender's security interest prevents the assets from being sold, or gives her the legal ability to reach the asset if they are sold (her state-law "priority right"). Her ability to attach the asset also protects her against the accounting manipulation of cash flows. In situation (ii), a secured 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). With financial development, such as improvements in accounting, bankruptcy law, and governance, however, cash flows become more verifiable, and assets within the firm harder to tunnel out and easier to reach on default. Collateral's value as a means of protecting the debtholder against the firm's management or owner's questionable manipulations in the normal course of business diminishes. Lenders become more willing to lend unsecured against prospective cash flows, knowing that value will stay within the firm.

However, even after such institutional and financial development, there are circumstances in which creditors cannot be complacent. Much of the illegal behavior that reforms to accounting, governance, and laws seek to prevent can re-emerge, this time as legal behavior reclassified as stockholder-bondholder conflicts. For instance, the borrowing firm may make excess dividend payments (akin to tunneling cash), or increase the riskiness of project investments by selling old projects and investing in new ones (thus favoring equity), or issue new secured claims thus diluting old unsecured ones (again favoring equity), or not take up valuable investments for fear of bolstering debt claims.<sup>15</sup> As Smith and Warner (1979) and Bradley and Roberts (2015) show,

<sup>15</sup> See Jensen and Meckling (1976), Bebchuk and Fried (1996), and Myers (1977).

covenants can be written into debt to minimize some of this behavior, and this would be more likely in small, heavily indebted, firms where such conflicts would be more likely.

Turning specifically to collateral, the ability to secure debt can be both a source of stockholder bondholder conflict and a means to alleviate it. Bebchuk and Fried (1996) emphasize the incentive equity holders have to dilute existing unsecured claims (whom they call “non-adjusting creditors”) by issuing secured debt. Conversely, Stulz and Johnson (1985) point to secured debt’s beneficial role in resolving equity’s underinvestment problem, precisely because secured debt has priority over unsecured claims and thus leads to less of the NPV of new investments being shared with existing claims. Of course, collateral can also protect debt against other forms of equity debt holder conflict such as excess dividend payment or risk shifting. All this suggests that once basic institutions emerged to protect the firm’s cash flows and assets against manipulation, collateral may have become less important a means for mature moderately levered firms with steady cash flows of reassuring lenders, but may have still been important for firms with risky cash flows and high debt (or as a firm’s cash flows became riskier or debt increased). Collateral’s importance may thus have become more contingent.

Finally, there are a number of papers (e.g., Bolton and Scharfstein (1996), Diamond (1991), Jackson and Kronman (1979), Park (2000), Rajan (1992), Welch (1997)) that argue for a differentiation between the priority of different kinds of lenders in order for a firm to have a better capital structure. Differential collateralization would be one way of achieving such differentiation in priority. Once again, however, the issues discussed in such papers typically become more relevant as firms become riskier and more indebted.

Given these theoretical rationales, let us now turn to the historical evidence. We start by examining improvements in accounting. We then turn to changes in bankruptcy law, after which we will examine the effects of the interaction between the two in financial contracting. We then turn to changes in the nature of the firm, starting with the falling tangibility of firm assets and continuing to the changing profitability of firms relative to leverage. Finally, we will ask if changes in the amount of secured corporate debt is at all related to changes in the availability of safe assets such as government debt.

## *B. Better Accounting Quality*

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

Wootton and Wolk (1992) point to four major developments that led to a more careful accounting for, and disclosure of, firm operations. First, in 1909, Congress passed a franchise tax—essentially an income tax—on corporations. To know how much they had to pay, corporations had to set up more careful accounting systems to determine revenues and expenses. Second, an “Excess Profit Tax” on business passed in 1917, during World War I, necessitated yet more careful accounting, including for capital invested and capital charges incurred. Third, as accounting practices grew, the courts became more active in the 1920s in finding accounting firms liable for gross negligence vis-à-vis third parties who relied on their services. Finally, a flurry of legislation during the Depression, including the Securities Act of 1933 and the Securities Exchange Act of 1934, required audits for listing companies and imposed auditor liability for omissions or misstatements in the prospectus and filing statements. These changes may have improved both the quality and the reliability of disclosure.<sup>16</sup>

Consistent with the notion that financial reporting improved during the first half of the twentieth century, Hickman (1960) reports the proportion of firms (in four-year intervals) for which data on both earnings and fixed interest charges were available between 1900 and 1943. He finds a steady increase in the proportion of firms with sufficient data to calculate interest coverage ratios. As Figure 13a shows, from 1900 to 1903 only 10.8% of the firms had sufficient information to calculate a coverage ratio, but the proportion of firms with sufficient information increased to 45.1% by 1912 to 1915, and reached 86.1% and 89.6% in 1936 to 1939 and 1940 to 1943,

<sup>16</sup> 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.

respectively. According to Hickman (1960, pp. 394, 398): “By all odds the most popular measure of earnings coverage is the time-charges-earned ratio, or the number of times that interest charges were earned by the obligor over some specified period preceding the offering. . . . A pronounced improvement in coverage between 1900 and 1943 is evident, reflecting the larger volume of reliable financial information available for the latter part of the period.”

We extend Hickman’s data on earning coverage using Compustat. We calculate the proportion of firms with sufficient information on interest expenses and earnings and report the proportion of firms with nonmissing information in Figure 13b.<sup>17</sup> As the figure shows, year by year from 1970 to 2017 more than 90% of firms had sufficient information to calculate an interest coverage ratio (typically, interest expense is missing for those that do not allow a calculation), and there is little variation in this ratio over time. This suggests that by the early 1940s, most public firms disclosed data on key variables like earnings and interest expenses.

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

At the same time, however, the information and communications technology revolution has made it much more feasible for investors to gather information from other sources and process it quickly and cheaply. Assets that would otherwise be registered and perfected as collateral can be tracked and monitored in real time. Data on likely quarterly firm revenues can be obtained by analyzing customer credit card purchases. It may be that in the last few decades, these sources of

<sup>17</sup> We restrict the sample to firms in SIC 2000–5999. The proportion of firms with available information on coverage ratio is conditional on firms with nonzero-interest-bearing debt.

information, rather than more transparent accounting, have made lending safer and easier. While we have primarily anecdotal evidence of this, Petersen and Rajan (2002) and Granja, Leuz, and Rajan (2019) document that the average distance between small firm borrowers and their banks has increased steadily over recent decades, which is consistent with lenders getting more reliable information at arm's length, even for firms that are not generally required to make stringent public disclosures.

In summary, cash flows became steadily more contractible, especially in the first half of the twentieth century with the substantial improvements in accounting and corporate governance. There is little consensus, however, in the literature that accounting has become more informative in recent years, though it may well be the case that investors have obtained more information about corporations from other sources. Taken together, greater reliability of accounting, as well as new sources of information on corporate performance, may have made the upfront pledging of collateral a less important device for assuring creditors about repayment.

### *C. Fairer, Predictable Bankruptcy*

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

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

the distressed railroad as a going concern (see Baird and Rasmussen (2002)). Indeed, railroad equity receiverships developed many of the elements of corporate reorganization before their formalization in the bankruptcy legislation of the 1930s (Skeel (2001)).

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

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

The act strengthened the rights of secured creditors, including allowing them to push the debtor into involuntary bankruptcy (Gerdes (1938)). The Supreme Court, through *Los Angeles Lumber Products* and *Consolidated Rock Products* also reaffirmed a strict priority rule, so that no junior creditors could be paid until senior creditor claims had been fully satisfied (Columbia Law Review Association (1952)). Because debtors lost control in bankruptcy, the number of reorganizations fell dramatically (Skeel (2001)). It was not that creditors gained significantly in

value either—the investment banks that had looked after their interests were also taken out of the reorganization process. Arguably, by coming in the way of effective restructuring by the incumbent, the 1938 act pushed up the costs to debtors of an inflexible capital structure. It is hard, however, to see any change in the pattern of the secular decline of the share of secured debt around the Act (see Figure 1a). It is also hard to see any immediate change in corporate leverage as a result of the Act—the debt to capital ratio for US corporations, as tracked in Graham, Leary, and Roberts (2015), remained fairly steady until the end of World War II, though this may have been a consequence of the war. After the war, Graham et al. document a steady rise in measures of corporate leverage for unregulated firms till the early 1970s.

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

Finally, in this century, bankruptcy practice may have moved to becoming creditor friendly again, with senior secured creditors exercising virtually full control over the debtor’s access to new cash (see Baird and Rasmussen (2002)). As a result, bankruptcy may have become simply a

process led by secured creditors to sell the firm, repay claimants, and refresh its capital structure, unlike the extended negotiations between management and creditors of the past. Consistent with this view, Bharath, Panchapagesan, and Werner (2014) suggest that innovations in the bankruptcy process, including the reliance on debtor-in-possession financing and the adoption of key employee retention plans that give management an incentive to speed bankruptcy, have made Chapter 11 outcomes more creditor friendly in recent years. Violations of absolute priority have come down significantly from the 1990s onwards.

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

Arguably, the reform of the UCC in 2001, enacted into state law on July 1, 2002, enhanced the range of available security to firms, lowered the transaction costs of securing loans, and eased the enforcement of security interest. It had benefits for both debtors and creditors in securing debt and should have resulted in a greater use of secured debt. Indeed, as Figure 8 and Figure 9 show, the secular decline in both secured bond issuances as a fraction of total bonds and secured debt issuance as fraction of total debt over the twentieth century seemed to stabilize and reverse itself

somewhat in the early years of the twenty-first century.<sup>18</sup> It is, however, hard to tell at this time how much of this reversal is secular (and thus potentially tied to changes in the UCC) and how much is cyclical.

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

#### *D. Covenants and Collateral*

We argued that the accounting variables that creditors need to contract on, such as cash flows and earnings, have become more reliable and hence verifiable in the economic sense. When coupled with other sources of information that allow creditors to monitor the health of borrowers, and the greater effectiveness of bankruptcy courts in protecting creditor rights, it may partly explain the continuing decline of secured debt. Creditors may have become increasingly willing in recent years to use covenants rather than upfront collateral to strengthen their creditor rights and control over borrowers (Bradley and Roberts (2015), Chava and Roberts (2008), Nini, Smith, and Sufi (2009), Roberts and Sufi (2009), Roberts (2015), Smith and Warner (1979)).<sup>19</sup> One example, as Lian and Ma (2019) argue, is that creditors of large U.S. firms today seem to use cash flow–

<sup>18</sup> 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.

<sup>19</sup> Covenant thresholds serve as important trip wires that can allow creditors to exert more control rights to protect their interest in the firm (Aghion and Bolton (1992), Dewatripont and Tirole (1994), Rajan and Winton (1995)) on a contingent basis. Demiroglu and James (2010) argue that riskier firms have tighter covenants because tighter covenants give lenders the option to reassess the loan and take action for even modest deteriorations in performance.

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 (see Rajan and Winton (1995)).

Some researchers have argued that collateral offers a superior way of establishing priority among debt claimants, and hence 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). These assure unsecured creditors that other creditors will not be offered the security that they themselves have not taken. Such clauses prevent a “run on security,” dissuading individual creditors from trying to improve the effective priority of their claims in normal circumstances. The NPC is the most common covenant found in unsecured debentures (McDaniel (1983)).

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

Negative pledges in the post-Depression era are frequently accompanied with an affirmative covenant (Coogan, Kripke, and Weiss (1965)). The affirmative clause grants an equal right to the pledge holder if the debtor enters into a security arrangement with a third party. There is, however, a puzzle associated with such clauses (see, for example, the discussion in Bjerre (1999)). If indeed a borrower violates a negative pledge clause by issuing secured debt to a new lender against an

asset, existing creditors stand behind the new lender for claims against the asset – essentially they are faced with a *fait accomplis*. If so, what teeth does a negative pledge/affirmative covenant have?

Of course, the new lender’s priority can be denied by a court if it finds that the lender knew about the existence of the negative pledge clause, and it may be that with more and more information available today (and the indenture trustee required to supply information) it is hard for a substantial lender to claim ignorance. Importantly, however, existing lenders are also not without recourse. They can accelerate their claims because of the covenant violation, and as Donaldson, Gromb, and Piacentino (2019b) argue, this may allow them to punish a violation of the NPC unless they are consulted and agree. Put differently, the borrower benefits from collateralizing new debt if it helps her stay out of bankruptcy and avoid costs of financial distress (in bankruptcy, the borrower has recourse to other sources of finance such as super senior debtor-in-possession financing). Given this, the borrower is unlikely to issue secured debt if existing creditors are alert and do not consent, for that would surely allow them to push the firm into bankruptcy.

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

#### *E. Changes in the Nature of the Firm*

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

proportion of property, plant, and equipment to total assets—from 1965 to 2017. The figure shows that mean (median) tangibility declined from 47% (40%) in 1965 to 28% (17%) by 2017.<sup>20</sup>

Although the decline in asset tangibility is a compelling explanation for the decline in secured debt over the second half of the twentieth century (recall that the SSBF indicates that the share of equipment loans declined for small firms and the Flow of Funds data indicate that the share of mortgages also declined), the expansion in intangible assets probably spurred legal innovation such as the changes to the UCC’s Article 9 just described. It also led to a variety of court rulings, which together enhanced the pledgeability of a variety of intangible assets, including intellectual property, and financial and legal claims. Mann (2018) shows that patents are often pledged as collateral today: he finds that in 2013, 28% of U.S. patenting firms had previously pledged patents as collateral.

One interesting case that sheds more light on the variety of assets that modern corporations pledge as collateral is 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.”

<sup>20</sup> Interestingly, though, Compustat firms seemed to use more such hard assets to generate sales till about the early 1980s – the ratio of sales to property plant and equipment went down from about 12 in 1950 to 8 in the mid 1980s. Since then it has shot up to about 15 in 2015.

Ford’s Form 10-K also provides a detailed account of the various categories of collateral, its eligible value, and the borrowing base against each of the collateral categories, which we report in Table IV. As the table demonstrates, although Ford’s collateralized credit line had a borrowing base of \$22.5 billion, traditional property, plant, and equipment—or tangible assets—accounted for only \$5.0 billion, or 22% of the total borrowing base. Ford was able to borrow against its inventories, intercompany notes, equity in its subsidiaries, and intellectual property and trademarks. Ford’s collateralized credit line illustrates that modern corporations have a variety of assets that can be pledged as collateral—and that these assets are not 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.<sup>21</sup> To test this conjecture, using data from Compustat, we regress the ratio of secured debt to the firm’s total debt on lagged firm-level characteristics that include the typical variables the literature associates with debt—firm size, Tobin’s Q, Return on Assets (ROA), and tangibility—the ratio of property, plant, and equipment to total assets. In order to assess the effect of tangibility on secured debt, we also interact tangibility with year fixed effects:

$$secured_{i,t} = \alpha + \beta_1 \times Size_{i,t-1} + \beta_2 \times Q_{i,t-1} + \beta_3 \times ROA_{i,t-1} + \beta_4 \times Tang_{i,t-1} + \sum_{t=1981}^{2017} \gamma_t \times year_t \times Tang_{i,t-1} + \varepsilon_{i,t}$$

We will postpone a discussion of the main effects in this regression to the next section. Figure 15a displays the marginal effect of asset tangibility on secured debt from 1981 to 2017.<sup>22</sup> As the figure clearly shows, the marginal effect of tangibility declined from around 0.30 in the early 1980s to below 0.10 in the second half of the 1990s and remained around 0.10 thereafter. Interestingly,

<sup>21</sup> We are not arguing that tangible assets do not make good collateral. In fact, in the cross-section, a firm with more tangible assets should be able to issue more secured debt—a result that we confirm later.

<sup>22</sup> We measure the marginal effect of tangibility for each year as the sum of  $\beta_4$  (the direct effect of tangibility) and the corresponding  $\gamma_t$ .

the effect of tangibility becomes stronger during the Global Financial Crisis and doubles in size before dropping to its precrisis level in 2013.

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

The declining effect of tangibility jointly with the increasing effect of intangibles on the use of secured debt is consistent with the notion that as the share of tangible assets, and traditional ways of backing debt, declined, the legal environment was altered to enable firms to pledge a greater variety of assets as collateral 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.<sup>23</sup>

#### *F. Greater Borrower Ability to Pay*

It is possible that creditors required less security over the twentieth century because borrowers became healthier. Although this may have been a factor explaining the decline in secured debt in the early decades of the twentieth century, we will see that it cannot, *prima facie*, explain the trend in the ending decades.

##### *F.1. Interest Coverage*

The early 1900s was a period when the United States was industrializing rapidly. The early years of economic development may also have resulted in many more mature firms with stable businesses. Figures 16a and 16b report corporate interest coverage over time, using information

<sup>23</sup> We must also not ignore the possibility that corporate structure can be used to generate priority structures among debt holders (see Baird and Casey (2013)) and this may also have helped firms use intangible assets as security, even if legally not pledgeable. For instance, if a firm places assets in a subsidiary or wholly owned special purpose vehicle (SPV), and borrows both through the SPV and at the holding company, the debt at the holding company is effectively subordinated to the debt against the SPV assets (also see Li, Whited, and Wu (2016) for the use of SPVs). However, the use of corporate structure to establish priority (in lieu of collateralization) would tend to reduce, not increase, the share of secured debt. Most recently, of course, we see the opposite.

from Hickman (1960). As Figure 16a shows, the proportion of firms with interest coverage ratio of less than one declined from 31.3% from 1900 to 1903 to 14.8% from 1924 to 1927 and eventually to 3.6% from 1940 to 1943. In Figure 16b, the proportion of firms with a coverage ratio of more than three—the highest category reported by Hickman (1960)—increased dramatically from 1.3% in 1900 to 1903 to 20.8% in 1924 to 1927 and 50.2% in 1940 to 1943. Thus, in the early years of the twentieth century, not only does accounting seem to have become more informative but firms themselves seemed to be more able to handle debt repayment. This may explain the decline in secured debt issuances in those first few decades.

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

### *F.2. Distance to Default*

Interest coverage is, of course, a crude measure of a firm's ability to service its debt. Perhaps more useful than coverage is to measure a firm's default probability directly using the Merton distance to default model (see Vassalou and Xing (2004) and Bharath and Shumway (2008) for detailed description of the methodology); this default probability reflects both the volatility of a

firm's underlying cash flows as well as the level of its debt. Using Compustat data, in Figure 17a we plot the share of firms with one-year default probabilities greater than 75%, and in Figure 17b we plot default probabilities for firms at the 85th percentile of the distance to default (higher percentiles are closer to default). Both plots suggest that default probabilities peak during recessions (except, curiously, during the double-dip recession in the early 1980s, when perhaps high inflation eroded debt value). In more normal times, probabilities increased steadily between the early 1970s and the early 2000s, fell after that, spiked during the Great Recession, and seems to have picked up in the most recent data. So the pattern for default probabilities does seem to correspond strongly to increases in corporate leverage.

Although the initial decades of the twentieth century were characterized by a rising level of cash flows relative to interest due, the reverse has been true more recently, especially since the 1970s. We cannot therefore argue that the continuing decline in secured debt from the 1970s until the early part of this century is because firms moved farther from distress over the period. Nevertheless, it is interesting to ask whether the share of secured debt issued by a firm is related to its distance to default, and whether that relationship has been changing over time.

Using Compustat data, we regress the ratio of a firm's secured debt to its total debt on lagged firm-level characteristics that include not only firm size, Tobin's Q, Return on Assets (ROA), and tangibility but also the probability of default. Because we are interested in the changing marginal effect of distance to default on secured debt over time, we also interact default probability with year fixed effects:

$$\begin{aligned}
 \text{secured}_{i,t} = & \alpha + \beta_1 \times \text{Size}_{i,t-1} + \beta_2 \times Q_{i,t-1} + \beta_3 \times \text{ROA}_{i,t-1} \\
 & + \beta_4 \times \text{Tang}_{i,t-1} + \sum_{t=1981}^{t=2017} \gamma_t \times \text{year}_t \times \text{DefPr}_{i,t-1} + \delta_t + \varepsilon_{i,t}
 \end{aligned}$$

In Figure 18, we plot the marginal effect of default probability on secured debt from 1981 to 2017 (i.e., the coefficients  $\gamma_t$ ). As the figure shows, the marginal effect of default probability on secured debt has declined from around 0.15 in 1981 to about -0.07 by 2017, with spikes in sensitivity around the recessions in 1980 to 1981 and 1990 to 1991 and right after the Global

Financial Crisis. This suggests that the sensitivity of a firm's share of secured debt to its distance to default is particularly high around business cycle downturns, but has otherwise been declining.

The negative sensitivity of secured debt share to default risk during many non-downturn years of the twenty-first century needs further explanation, for it runs counter to our intuition (that the share of secured debt should be positively correlated with risk). In Figure 19a, we plot median firm leverage (measured as the book debt to assets ratio) for the Compustat sample (1981 to 2018) for different default probability deciles. As might be expected, firm leverage increases steadily with default probability. In Figure 19b, we plot the median secured debt share for the different default probability deciles. Here again, secured debt share increases except for the highest two default probability deciles, when it falls. One explanation, then, is that since these are also the deciles with the highest debt, many firms run out of pledgeable collateral—indeed, when we plot median secured debt to assets in Figure 19c, the ratio increases until the decile closest to default, and then it dips slightly. Since this decile is closest to bankruptcy, it may also be that lenders protect themselves in other ways once collateral is scarce—for instance, by shortening the maturity of debt. In support of this last point, we plot the debt in current liabilities as a share of total debt for the different default probability deciles in Figure 19d. We see a sharp increase as default probabilities increase.<sup>24</sup>

In sum, then, the negative sensitivity of secured debt share to default risk during the twenty-first century in Figure 18, outside of periods of generalized distress like the Great Recession, could be explained by the fall in the share of secured debt when firms are on the brink of default, coupled with the lower sensitivity of secured debt share to default risk in normal times -- as the sensitivity of secured share to default risk flattened during this period, the negative relationship in the tail potentially dominated the overall relationship.

### *F.3. Security and Ratings*

The distance to default measure from a Merton model does not capture possible competitive

<sup>24</sup> It may also be that secured lenders are in control closer to bankruptcy, and can force the firm to stop repaying unsecured short term debt. This too would cause a rise in short term debt, and a fall in the share of secured debt. We thank Douglas Baird for this suggestion.

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

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

In Table V, we report summary statistics of secured debt (measured as a fraction of total debt) stratified by S&P firm-level credit rating. A clear and striking pattern emerges from the table: secured debt is issued mostly by low-rated firms.<sup>25</sup> The mean ratios of secured debt to total debt of firms that are rated AAA, AA+, and AA are 0.0116, 0.0044, and 0.0072, respectively. Firms that are rated between A– and A+ have secured debt ratios that are between 0.0238 and 0.0296, and firms rated between BBB– and BBB+ have similar ratios. Firms that are rated below investment grade (BB+ and below) use much more secured debt in their financing. For example, the mean ratio of secured debt to total debt is 0.0877 for firms rated BB+, 0.1243 for BB rated firms, and 0.1481 for firms with a rating of BB–. Secured debt accounts for 19% of the total debt of firms rated B+, 24.3% for B– rated firms, and 30% for firms rated CCC. Interestingly, secured debt ratios for firms that are rated lower than CCC—that is, firms near or in default—are lower. We have already suggested an explanation for the lower secured debt ratio for firms near or in bankruptcy.

<sup>25</sup> Rauh and Sufi (2010) and Colla et al. (2013) document similar findings.

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

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

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

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

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

In columns (5)–(7) we add S&P firm-level credit rating as an explanatory variable to the regressions.<sup>26</sup> 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)–(4). Nevertheless, as the table demonstrates, and consistent with the results presented in Table V, lower-rated firms tend to have higher ratios of secured debt to total debt. The effect of credit rating on secured debt is considerably larger when we include industry fixed effects (column (6)): a change of 5 notches in ratings (say, from BBB+ to BB–) is associated with an increase of 9 percentage points in the ratio of secured debt to total debt, representing an increase of 27% relative to the unconditional mean. In column (7) we add firm fixed effects to the regressions and hence identify firm variation in credit rating over time. The coefficient on rating in the firm fixed effects specification is smaller compared to those in columns (5) and (6) but is still considerable—a downgrade of 2 notches increases secured debt by 2 percentage points, or 6% relative to the mean. Of the four other explanatory variables, only size and tangibility remain statistically significant, and their coefficients are much smaller than those reported in columns (1)–(4). In the last two columns of the table we replace the S&P firm-level credit rating variable with a dummy variable that takes the value of one if the firm has below investment grade credit rating (BB+ or below). The idea behind this specification is to capture the non-linearity in the relation between secured debt and credit rating observed in Table V. The coefficient on the non-investment grade dummy in column (8) suggests an increase in secured debt of 32.6% relative to the mean. When we include firm fixed-effects (column (9)), the effect is smaller but still sizeable (an increase of 16.8% relative to the unconditional mean).

In sum, we see that large, highly rated firms with considerable distance to default tend not to offer collateral to back their debt, while small, risky firms with a high probability of default back more of their debt with security. Furthermore, as firms' credit risk rises, lenders tend to get more security for their loans. The declining correlation between distance to default and the use of secured

<sup>26</sup> Higher values of the variable *credit rating* imply a lower rating. For example, we assign a value of 1 to AAA, 2 to AA+, 3 to AA, etc.

debt suggests that, over time, creditors have become comfortable lending unsecured to riskier firms, taking collateral on a more contingent basis.

#### *G. Alternative Assets*

Finally, could part of the explanation for a secular decline in creditor demand for security be the satiation of the demand for safer debt securities through other alternatives? For instance, if government bonds satisfy the need of a certain clientele for having safe financial assets, there may be less value for corporations in providing them by securing its debt. Of course, this explanation runs counter, *prima facie*, to the facts we have presented – it is not the most highly rated firms that secure their debt in order to provide the public with super safe assets. Instead, it is risky firms that try and enhance the creditworthiness of their claims by collateralizing them. Furthermore, it is hard to see much relationship between outstanding government debt stock and the share of secured debt—U.S. gross federal debt peaked at 119 percent of GDP in 1946 after the buildup in war debt, hit a nadir in 1981 at 31 percent of GDP after the Great Inflation, and then has risen steadily (except for the period of surpluses in President Bill Clinton’s second term) to 105 percent of GDP in 2018. This U-shaped graph since the war bears little resemblance to the change in secured debt share. The explanation for the fall in secured debt probably does not lie here.

#### *H. Overall Assessment*

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

This then led to the possibility that all creditors of a firm could remain unsecured in the normal course until the firm’s performance deteriorated or its leverage increased so much that it needed to offer security for new debt. Only at that time would existing creditors, empowered by negative

pledge clauses, also demand security as protection. A movement to such contingent collateralization, made possible by greater experience with negative pledge clauses, as well as greater confidence among creditors that they had information to detect violations, would have accentuated the fall in the share of debt secured.

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

There is still one important puzzle. Why might borrowers wish to leave their debt unsecured up front – would they not want to get the lowest interest rate up front by offering lenders all the security they had? That is what we turn to now.

#### **IV. What Led to the Decline of Secured Debt: The Borrower Side**

The traditional costs to the borrowing firm of offering collateral up front include the loss of financial flexibility, the loss of operational flexibility, and the granting of excess bargaining power to creditors.

##### *A. Loss of Financial Flexibility*

A variety of papers (see, e.g., Acharya, Almeida, and Campello (2007), Rampini and Vishwanathan (2013), and Donaldson, Gromb, and Piacentino (2019a)) have argued that repaying debt with cash or issuing secured debt can reduce a firm's financial flexibility and leave it less prepared to take full advantage of its growth opportunities. For instance, if investments tend to emerge when a firm's cash flows are low, and if debt markets are closed at that point, it would have made sense for the firm to hoard cash at an earlier date rather than pay down debt then. If lending dries up, hoarded cash enables the firm to invest, whereas paid-down debt does not.

Similarly, by preserving collateral capacity and giving it up only when necessary to unlock access to further borrowing, the firm may be able to undertake investments that it would not have been able to if it had been more liberal in collateralizing its borrowing in the past. Unpledged collateral (or cash) then is a form of financial slack (see Myers and Majluf (1984)) 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.

Because finance is usually available when a firm is doing well, unpledged collateral is most likely to be useful when a firm has positive net present value (NPV) uses of funds in bad times—either new investment projects or, more likely, the desire to avoid a negative NPV liquidation (see Holmstrom and Tirole (1997)). So this argument would suggest preserving collateral in good times and may account for the countercyclical pattern we observe. Indeed, according to Ford Motor Co., its decision to pledge most of its assets as collateral for its secured credit line in 2006 was needed “to address near- and medium-term negative operating-related cash flow, to fund its restructuring, and to provide added liquidity to protect against a recession or other unanticipated events.”<sup>27</sup> An analyst from Moody’s argued that it was important for Ford to structure the secured credit lines in order to “ensure that it had adequate liquidity as it enters a highly challenging period.”<sup>28</sup>

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

<sup>27</sup> “Ford Pledges Major Assets in Financing,” *New York Times*, November 28, 2006.

<sup>28</sup> “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.

unsecured debt at maturity, and the more likely that a higher recovery can be realized in the event of default.”<sup>29</sup>

In addition, as part of its analysis of leverage, Moody’s assigns a lower credit score to firms with higher ratios of secured debt to gross assets: “The ratio of secured debt to gross assets is an important indicator of financial flexibility. Companies with low levels of secured debt typically have greater financial flexibility. In periods of stress, the existence of a pool of unencumbered assets (particularly a pool of larger, more diverse and higher-quality assets) can help maintain market access, because the commercial real estate firm may be able to issue secured debt even if market conditions preclude the issuance of unsecured debt.”<sup>30</sup>

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

<sup>29</sup> Moody’s Investors Service, “Proposed Update to the Global Rating Methodology for REITs and Other Commercial Property Firms,” January 31, 2018, 14.

<sup>30</sup> Moody’s Investors Service, “Proposed Update,” 16.

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. Moreover, the pattern of firms selling core patents in Chapter 11 seems to be pronounced only after 2000, when Bharath, Panchapagesan, and Werner (2014) argue that bankruptcy laws became more creditor friendly. Taken together, these findings suggest that when creditors have control over key assets, they may prefer to liquidate them to make themselves whole rather than let them remain as part of the going concern; moreover, the study finds such selling firms underperform when they emerge from bankruptcy.

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

Indeed, the same Moody's document cited earlier also views secured debt and encumbered properties as limiting operational flexibility: "Mortgaged assets can be more difficult to sell due to restrictions or penalties related to transfer. Also, a mortgage agreement can restrict the ability of an owner to make changes to a property, or can delay the implementation of changes, making the repositioning of problem properties even more challenging. Recasting a first mortgage to raise

the loan-to-value (LTV) ratio can be difficult, if not impossible, and the same applies to obtaining a second mortgage. As a result, much of the value of a mortgaged asset can effectively be sequestered and cannot be used as a source of alternative liquidity. In some mortgage structures, even determining the proper administrative party (e.g., special servicer or master servicer) with whom to discuss an issue can be difficult.”<sup>31</sup>

### *C. In Sum . . .*

Arguably, as enforcement of creditor rights and the ability to perfect and track collateral has improved, creditors have obtained more power. The borrowing firm has commensurately less wiggle room if it has pledged collateral, especially when it nears financial distress. In contrast, to the extent that technological change and corporate asset churn have become more rapid, the need for operational flexibility may have increased relative to the past. *Ceteris paribus*, this would enhance the costs to the borrower of pledging assets up front.

In the previous section, we argued that the development of the U.S. financial system over time has made pledging collateral up front less useful for increasing access to capital or reducing its costs for reasonably sized healthy firms. It has also allowed lenders to become more confident in a contingent acquisition of collateral to protect their claims. Taken together, these two sections suggest that there may be a confluence of interests over time in arrangements, with lenders demanding less collateral up front and borrowers offering collateral on a more contingent basis to preserve access to financing.

The benefits and costs we discuss also explain the countercyclical nature of secured debt share. The cost of foregone operational flexibility is probably larger in good times when there is a lot of asset churn (see Eisfeldt and Rampini (2006, 2008)). At the same time, as we show in Benmelech, Kumar, and Rajan (2020), the reduction in financing costs from offering creditors collateral is small in economic good times. Diamond, Hu, and Rajan (forthcoming) argue this is because all the firm’s assets are very liquid and creditors can rely on prospective cash flows or asset liquidity

<sup>31</sup> Moody’s Investors Service, “Proposed Update,” 16.

to support debt repayment. These considerations suggest that firms would be unlikely to give up collateral in good times but would be more willing to do so in bad times.

## **V. Conclusion**

We document a steady decline in the share of secured debt in the capital structures of publicly traded U.S. firms over the twentieth century. The decline was likely driven by improvements in accounting, information, and legal protections that gave unsecured creditors greater confidence in their debt claims without the need for security up front. The decline also suggests a dark side of secured debt—one that borrowers try to avoid whenever possible. This side of secured debt stems from secured lenders' excess bargaining power as well as from the borrowers' desire to maintain financial and operational flexibility.

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

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

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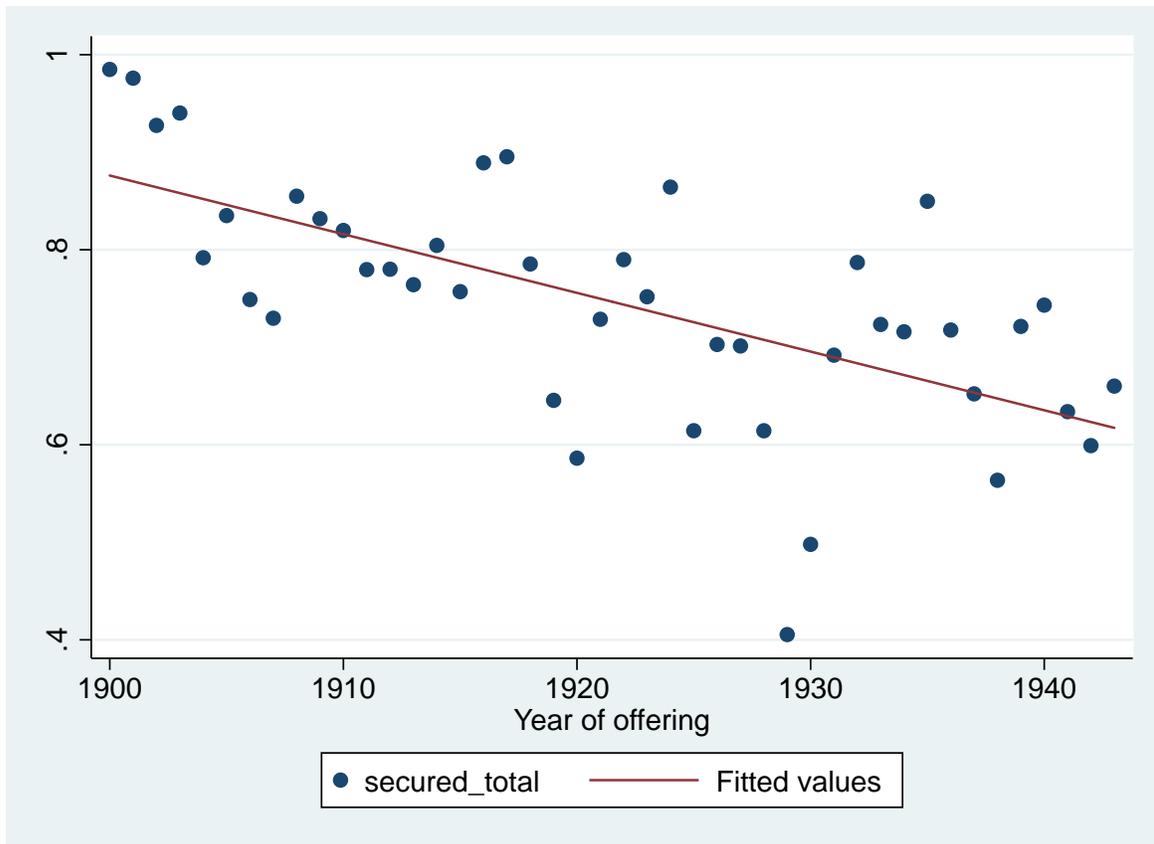
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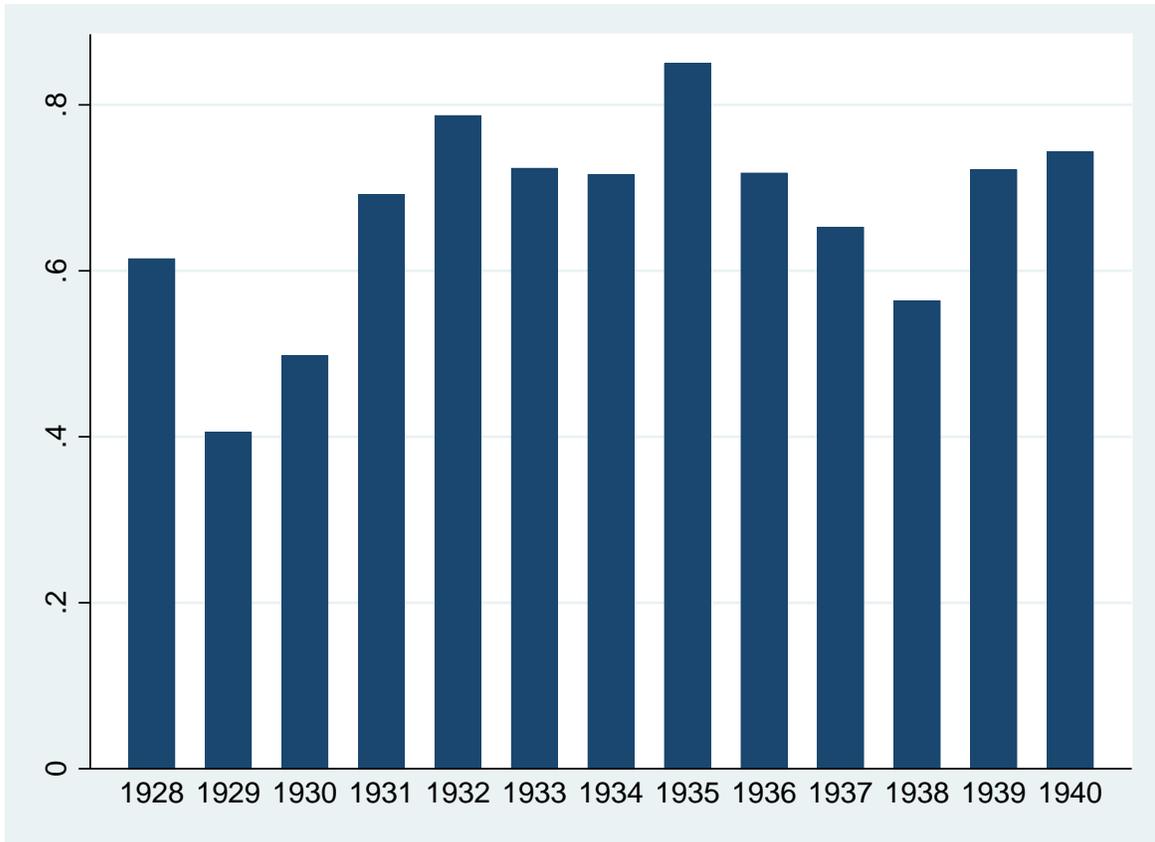
**Figure 1a:** Secured debt as a fraction of total debt issuance, 1900-1943



This figure displays the fraction of secured bond issuance by value from 1900 until 1943.

Source: Hickman (1960).

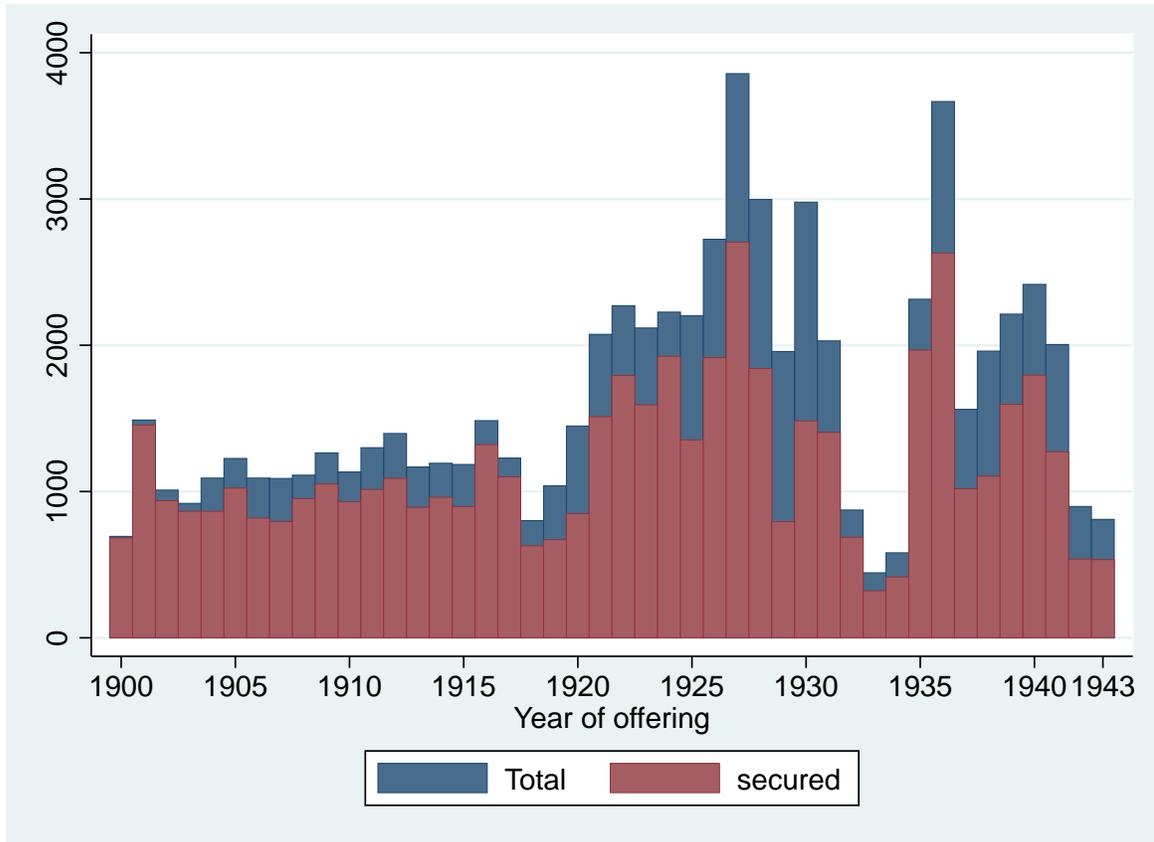
**Figure 1b:** Secured debt as a fraction of total debt issuance, 1928-1940



This figure displays the fraction of secured bond issuance by value from 1928 until 1940.

Source: Hickman (1960).

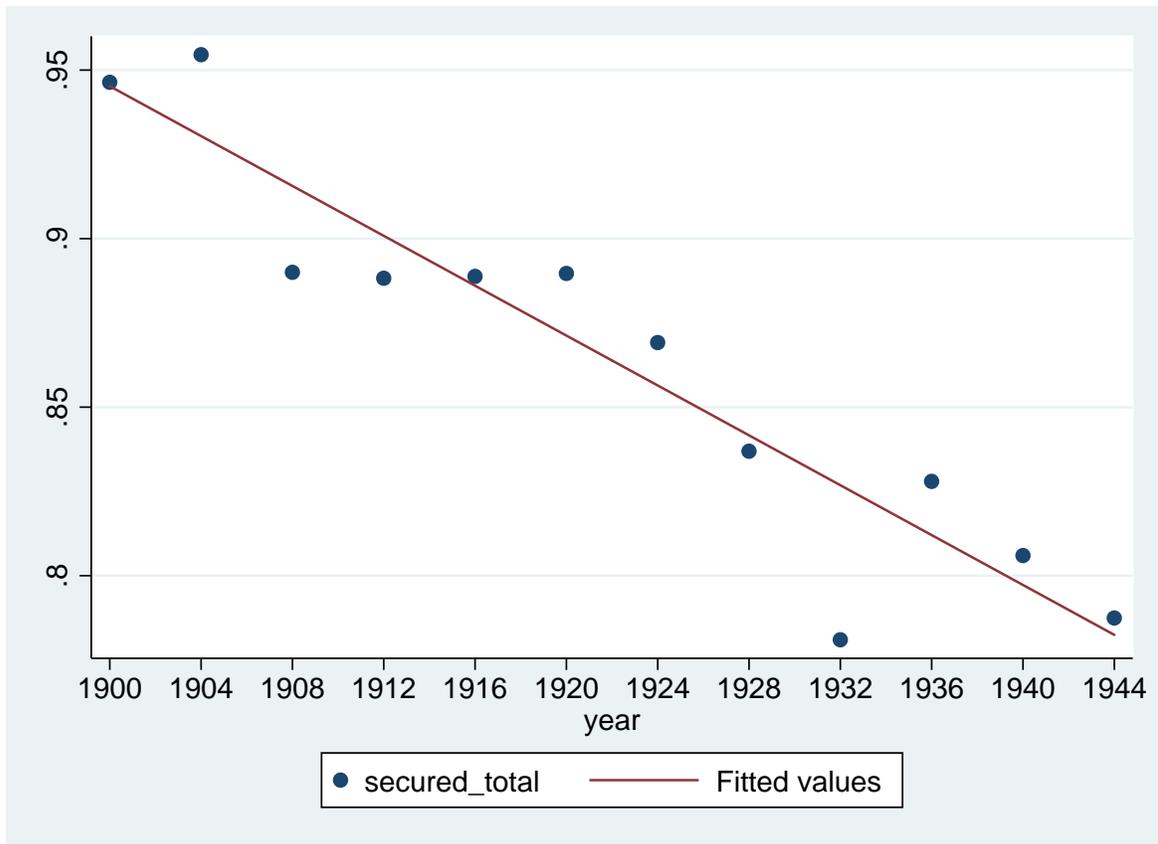
**Figure 2:** Total and secured debt issuance, 1900-1943



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

Source: Hickman (1960).

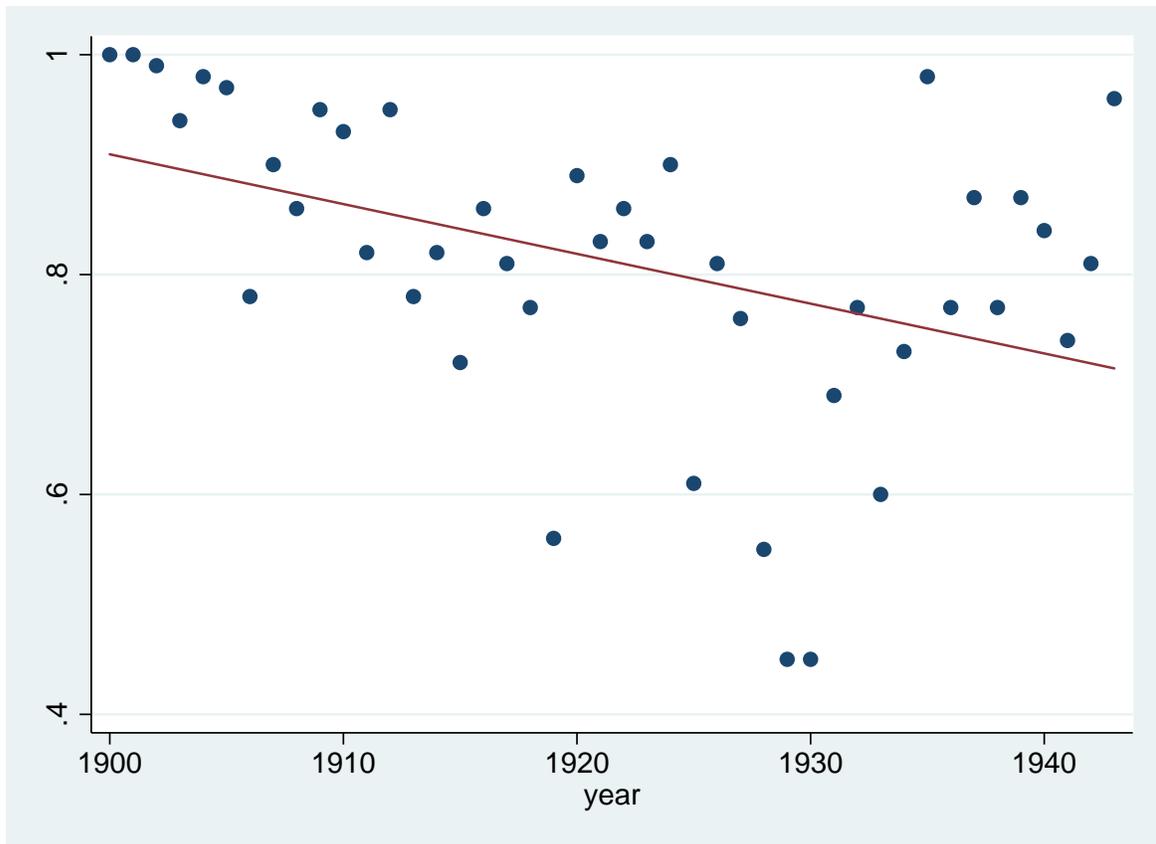
**Figure 3:** Secured debt as a fraction of total debt outstanding, 1900-1944



This figure displays the ratio of secured debt outstanding to total debt outstanding.

Source: Hickman (1960).

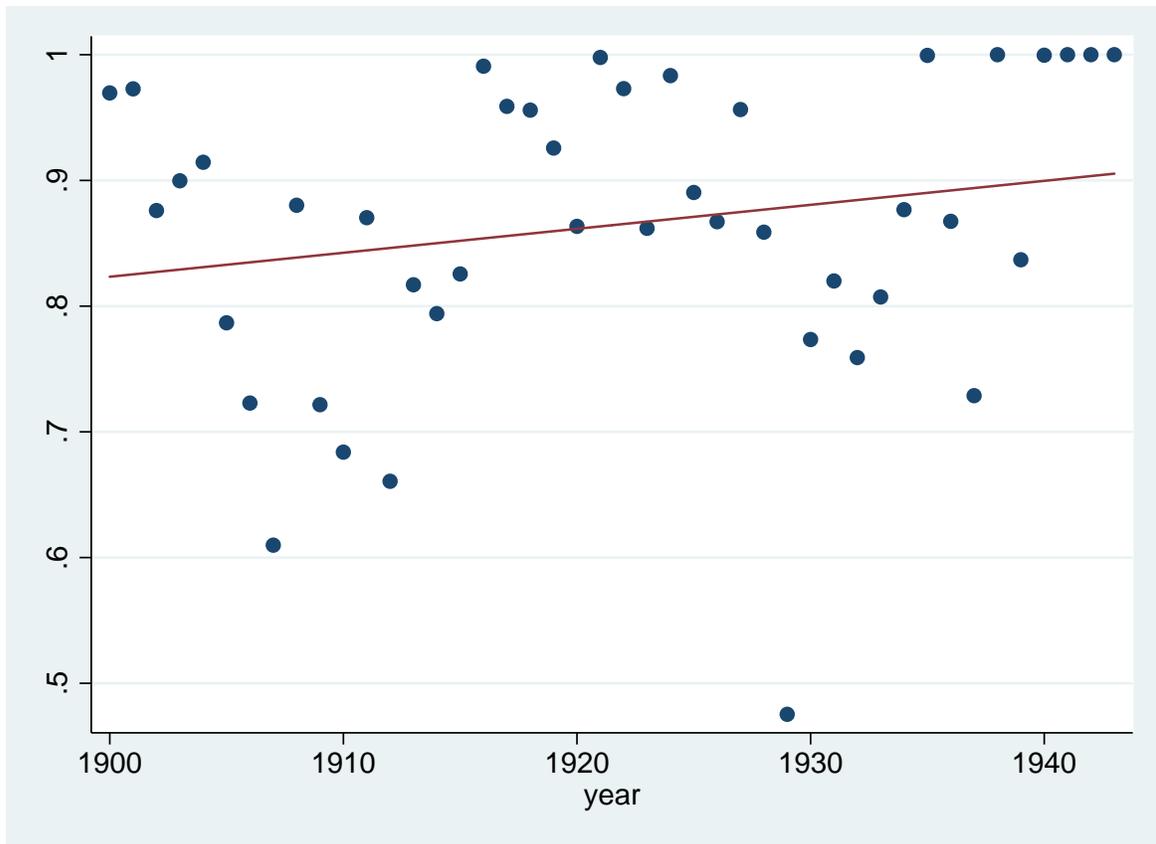
Figure 4a: Secured debt as a fraction of total debt issuance: Utilities, 1900-1943



This figure displays the fraction of secured bond issuance by utilities from 1900 until 1943.

Source: Hickman (1960).

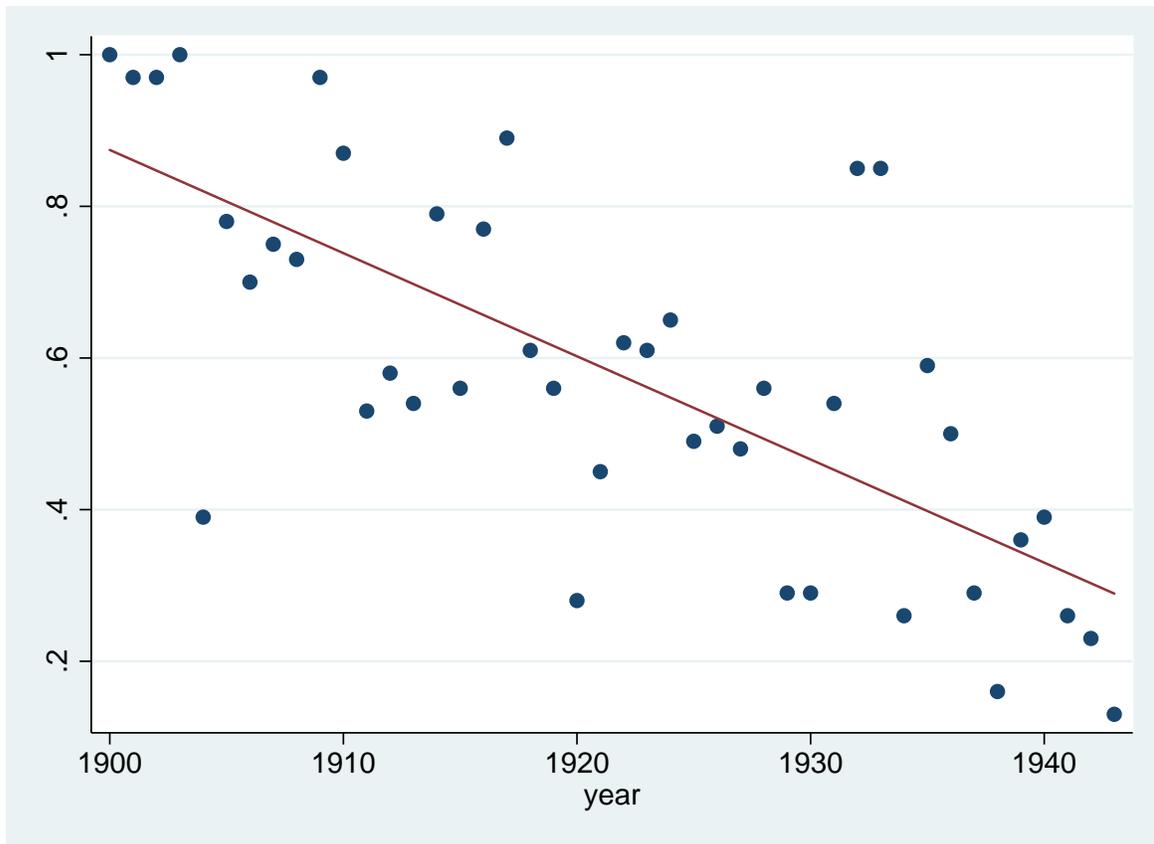
**Figure 4b:** Secured debt as a fraction of total debt issuance: Railroads, 1900-1943



This figure displays the fraction of secured bond issuance by railroads from 1900 until 1943.

Source: Hickman (1960).

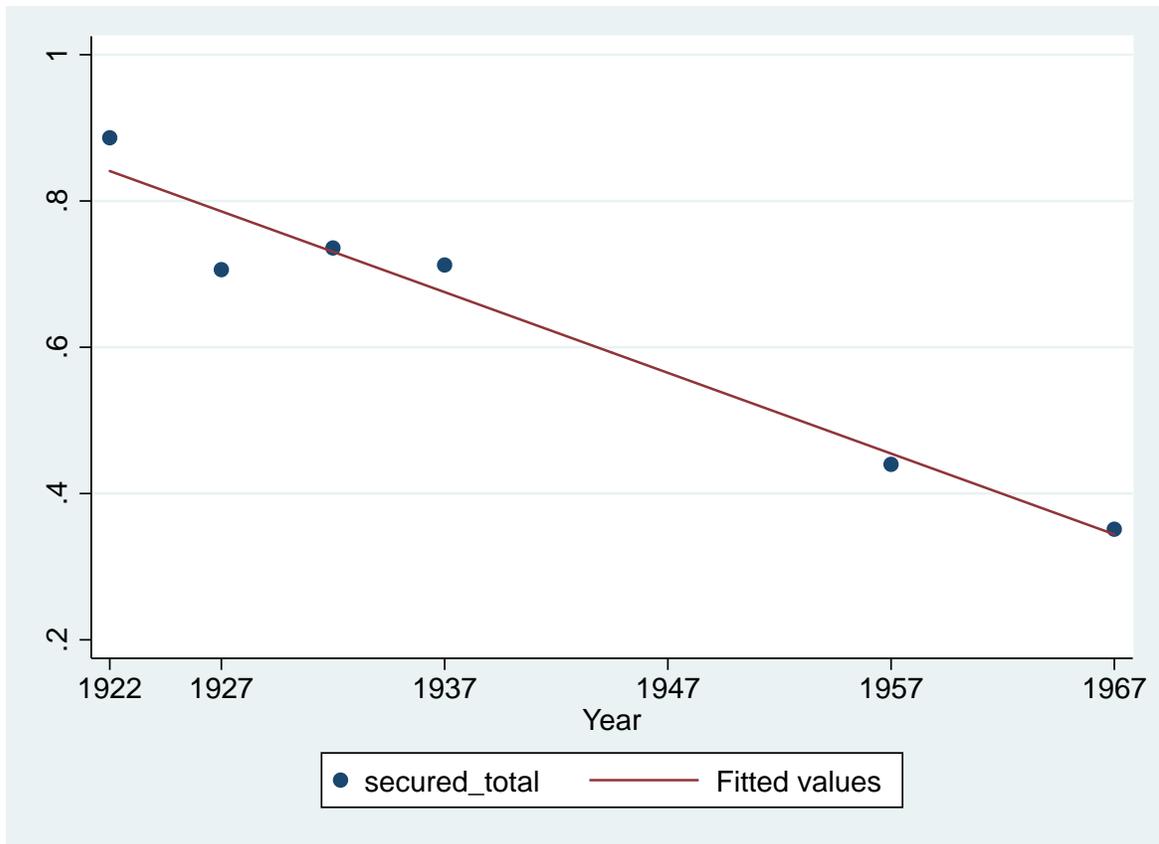
Figure 4c: Secured debt as a fraction of total debt issuance: Industrials, 1900-1943



This figure displays the fraction of secured bond issuance by industrials from 1900 until 1943.

Source: Hickman (1960).

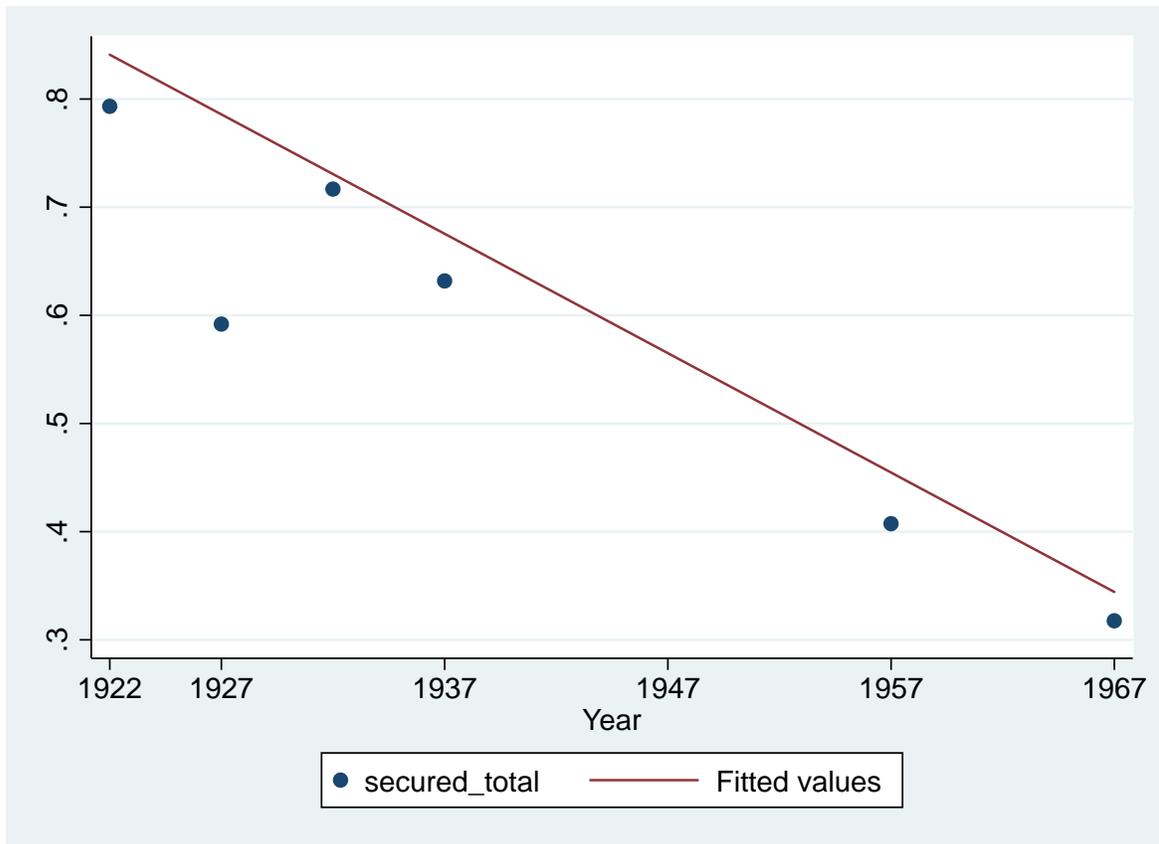
**Figure 5a:** Secured debt as a fraction of the number of bond issuance, 1922-1967



This figure displays the fraction of secured bond issuance by number from 1922 until 1967.

Source: Commercial and Financial Chronicles, various years.

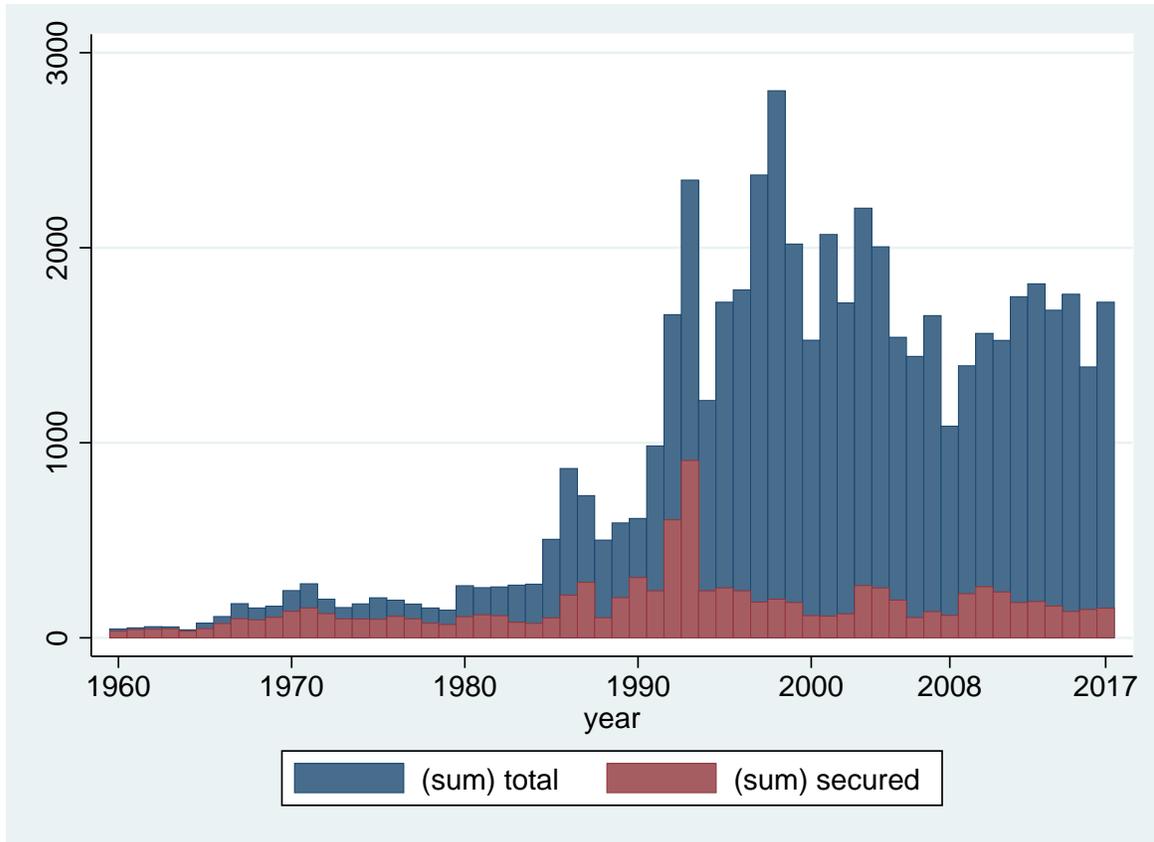
**Figure 5b:** Secured debt as a fraction of the value of bond issuance, 1922-1967



This figure displays the fraction of secured bond issuance by value from 1922 until 1967.

Source: Commercial and Financial Chronicles, various years.

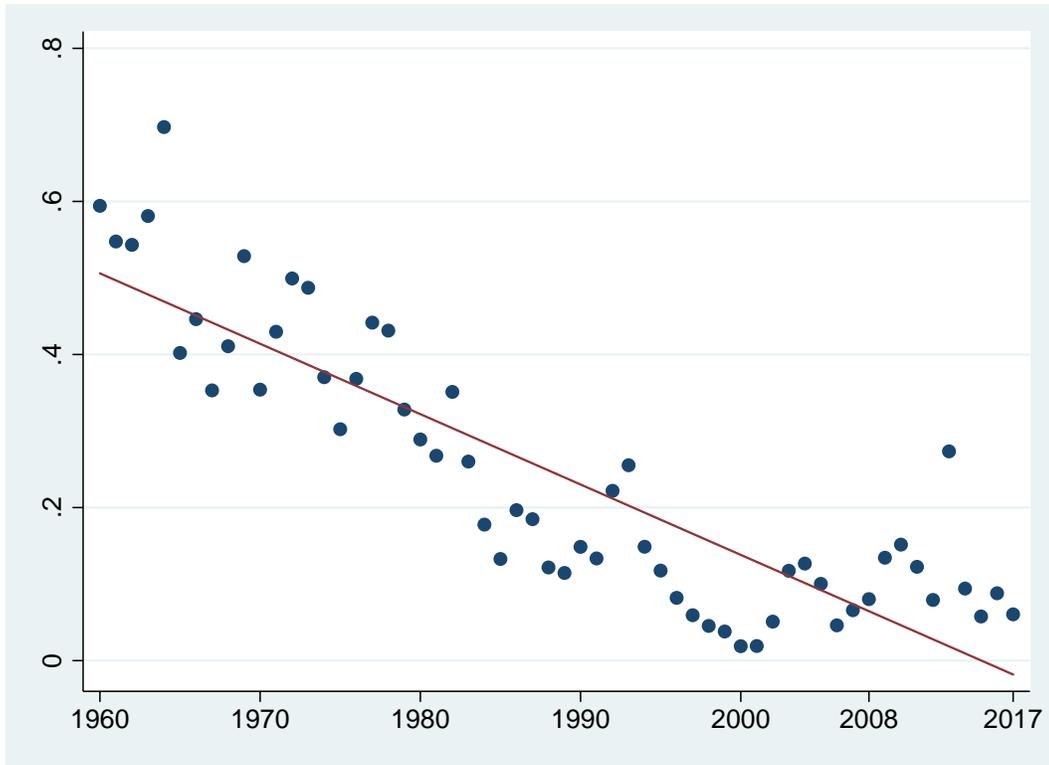
**Figure 6:** Total and secured debt issuance, 1960-2017 (number of issues)



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

Source: Mergent.

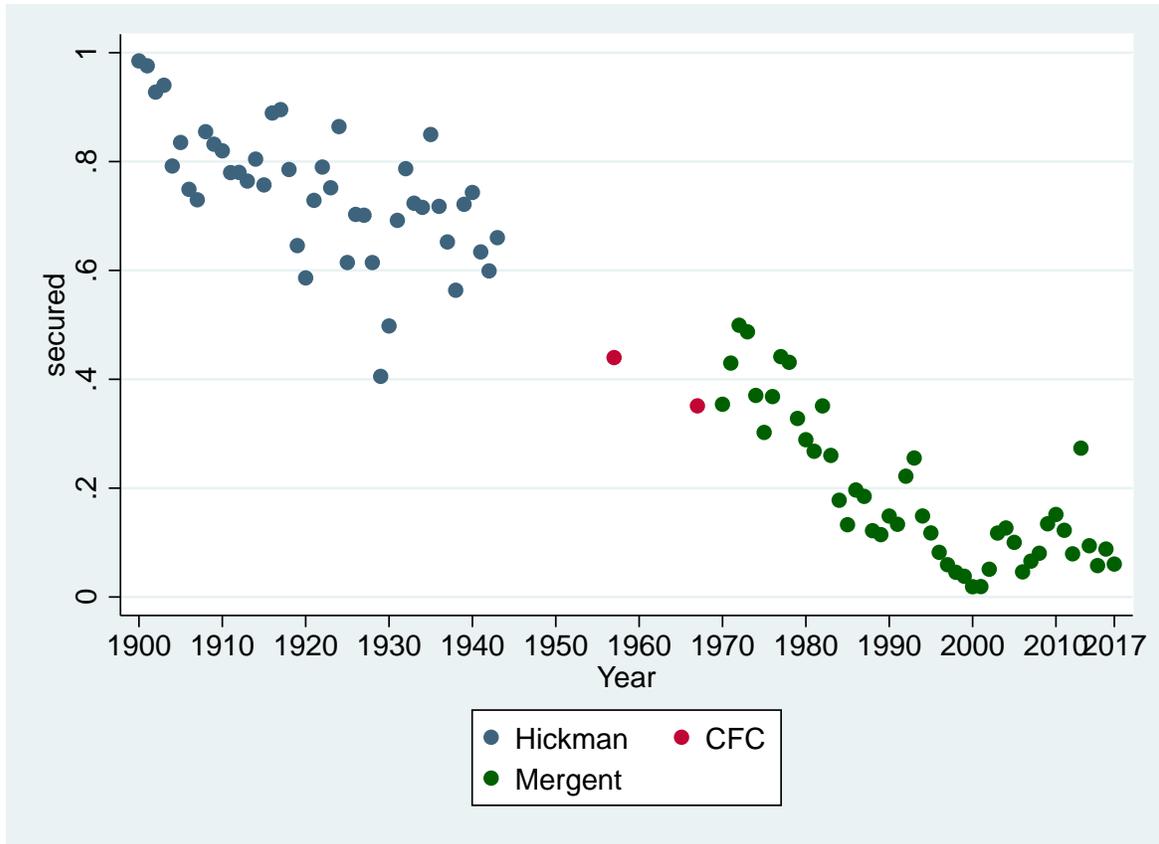
**Figure 7:** Secured debt as a fraction of the value of bond issuance, 1960-2017



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

Source: Mergent.

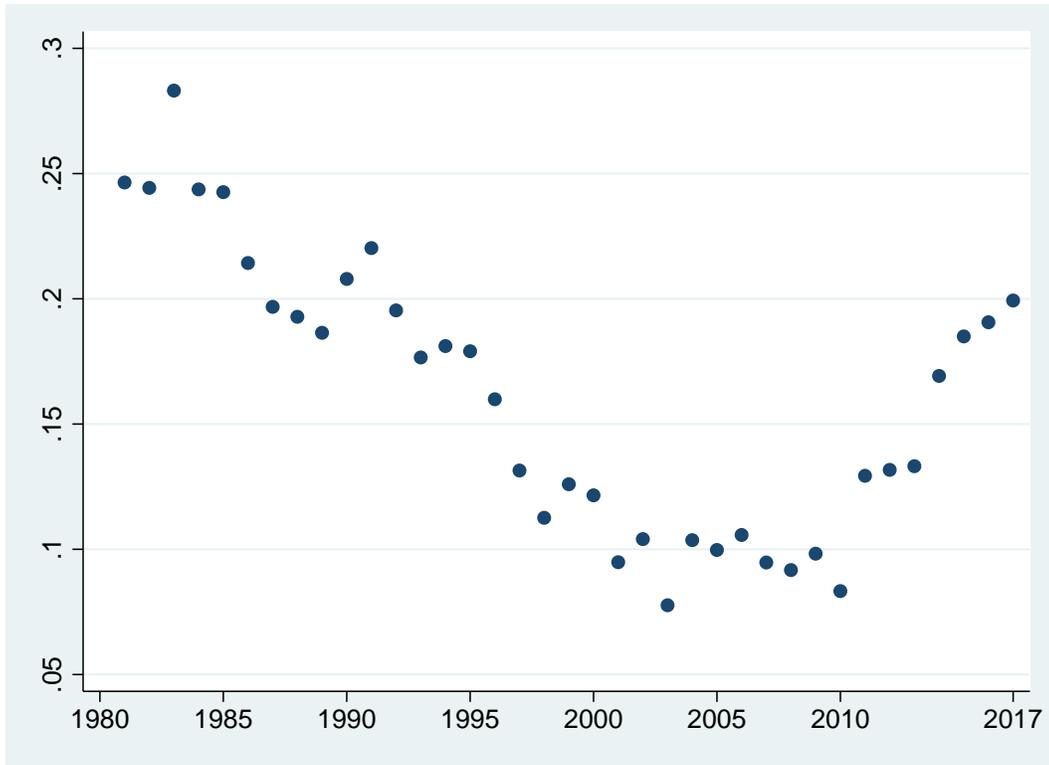
**Figure 8:** Secured debt as a fraction of total debt issuance, 1900-2017



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

Sources: Hickman (1960), *Commercial and Financial Chronicles* and Mergent.

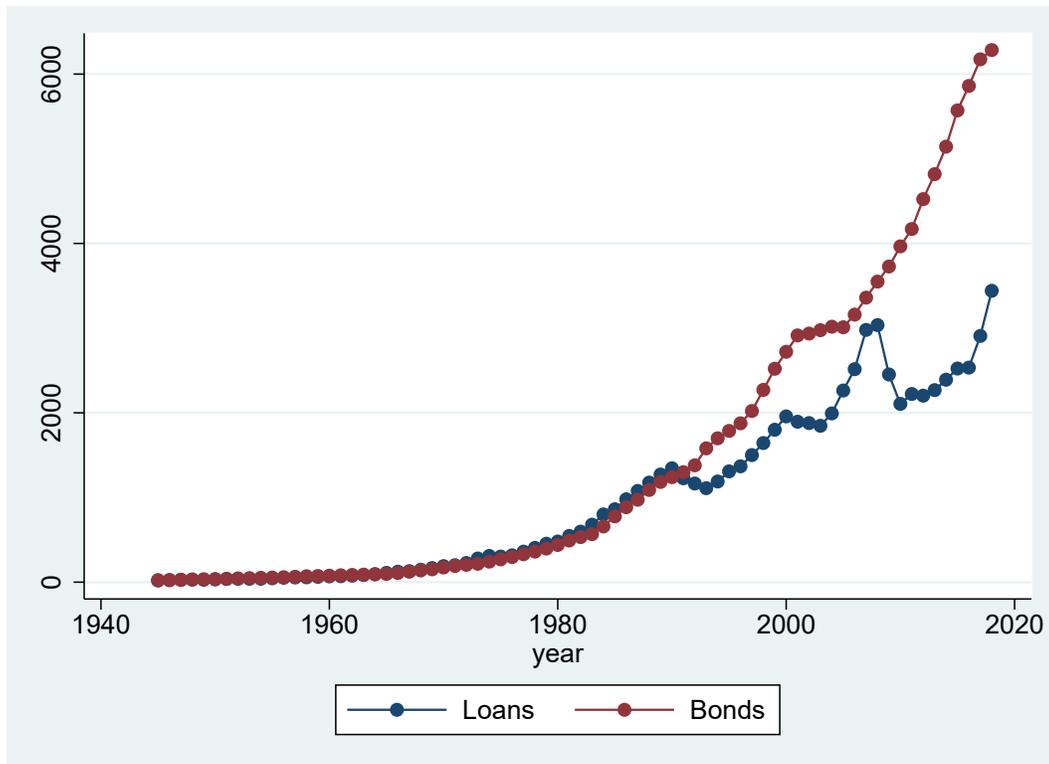
**Figure 9:** Median firm-level secured debt as a fraction of total debt, 1981-2017



This figure displays median firm-level outstanding secured debt as a fraction of total outstanding debt from 1981 to 2017.

Source: Compustat.

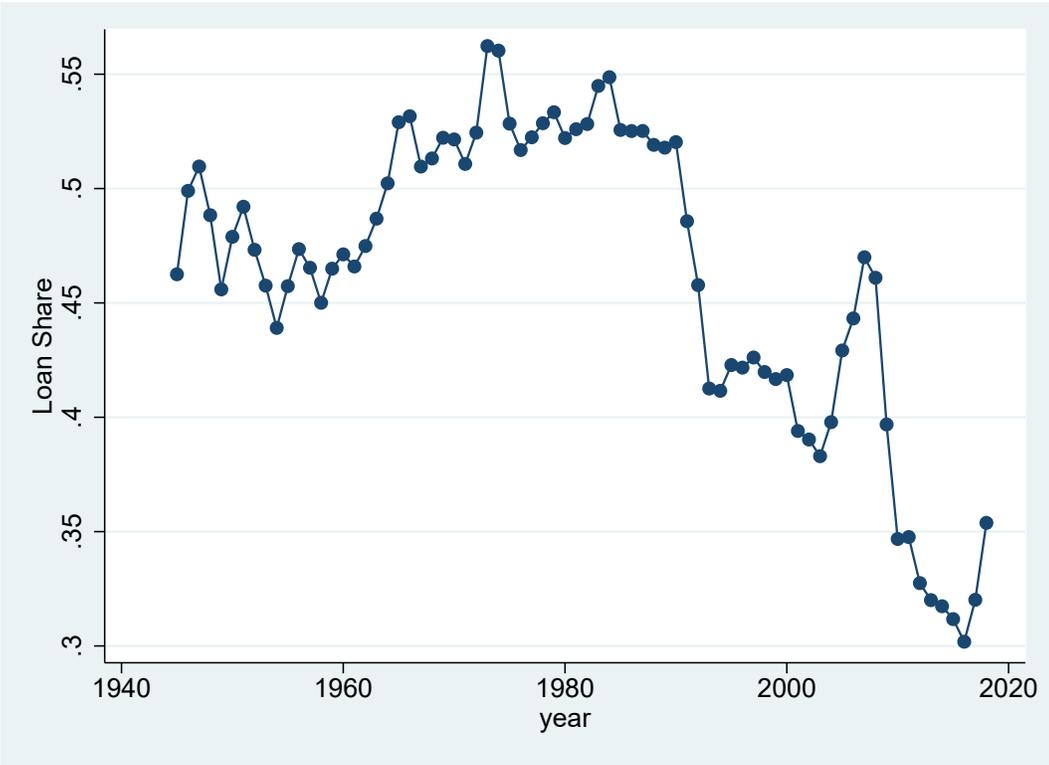
**Figure 10:** Outstanding amount of corporate bonds and loans, 1945-2018



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

Source: Flow of Funds accounts of the United States.

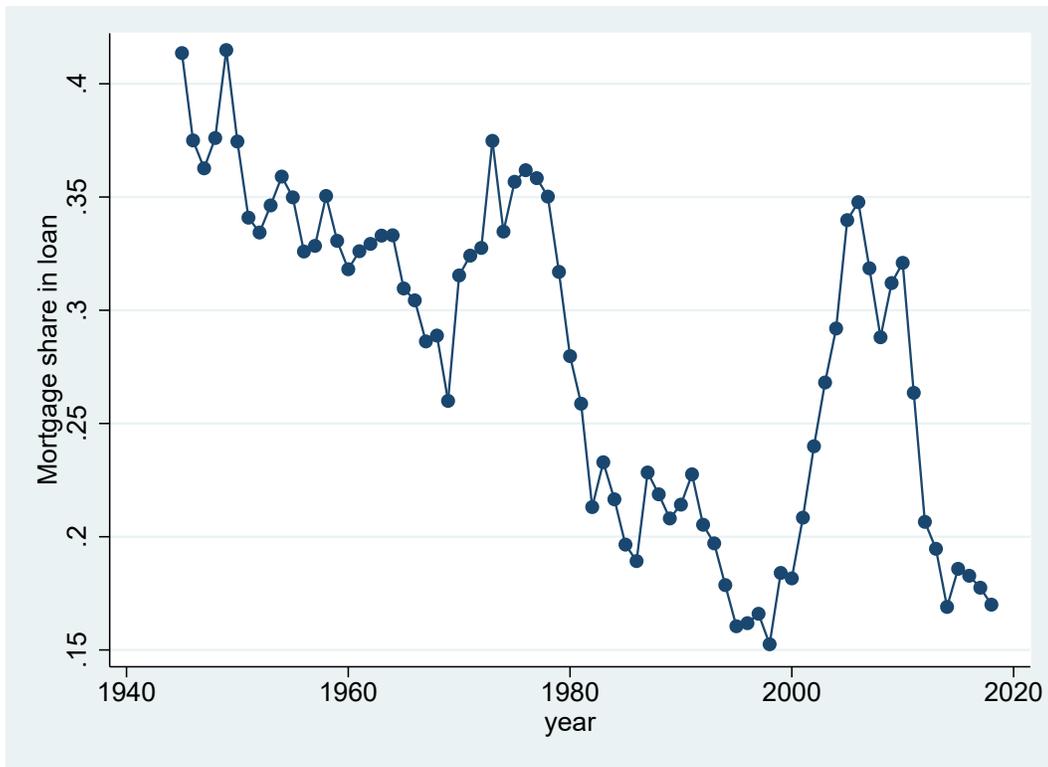
Figure 11: Loans as a share of total corporate debt, 1945-2018



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

Source: Flow of Funds accounts of the United States.

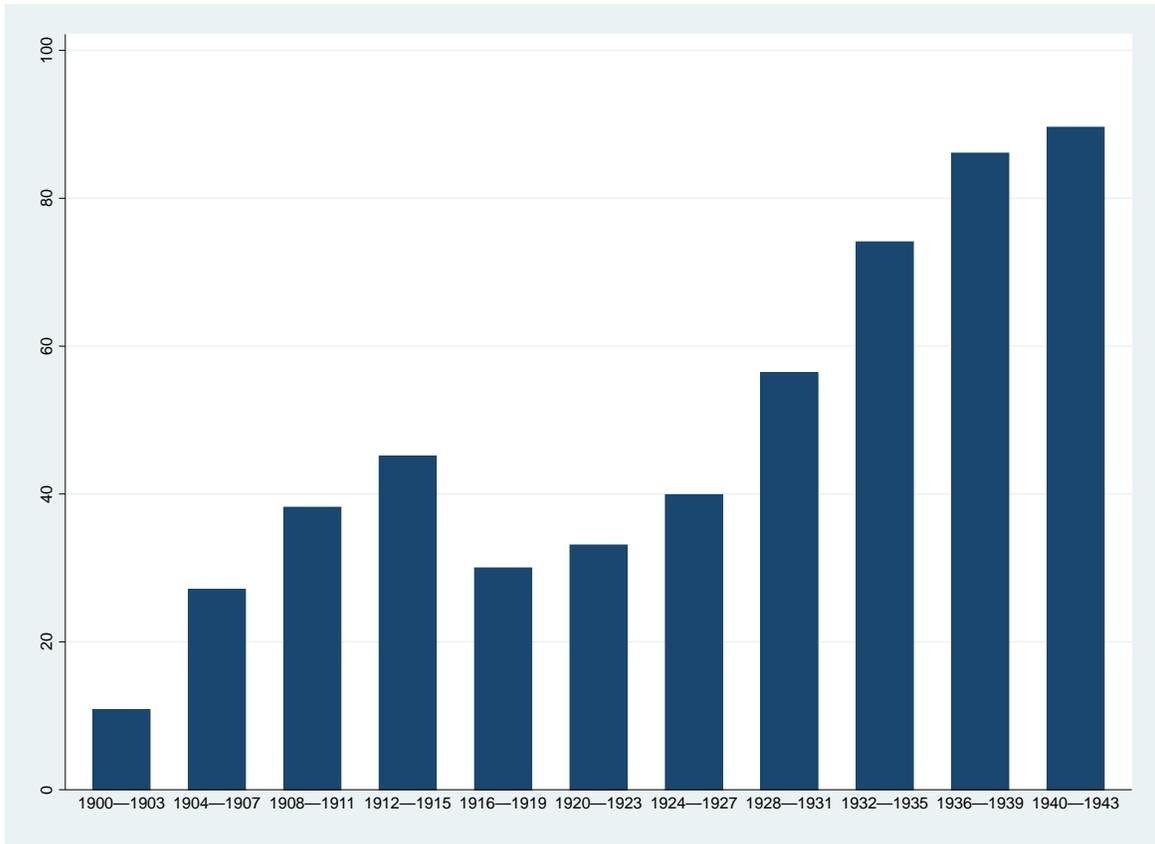
Figure 12: Commercial mortgages as a share of total corporate loans, 1945-2018



This figure displays the ratio of commercial mortgages of U.S. nonfinancial corporations to total corporate loans from 1945 to 2018.

Source: Flow of Funds accounts of the United States.

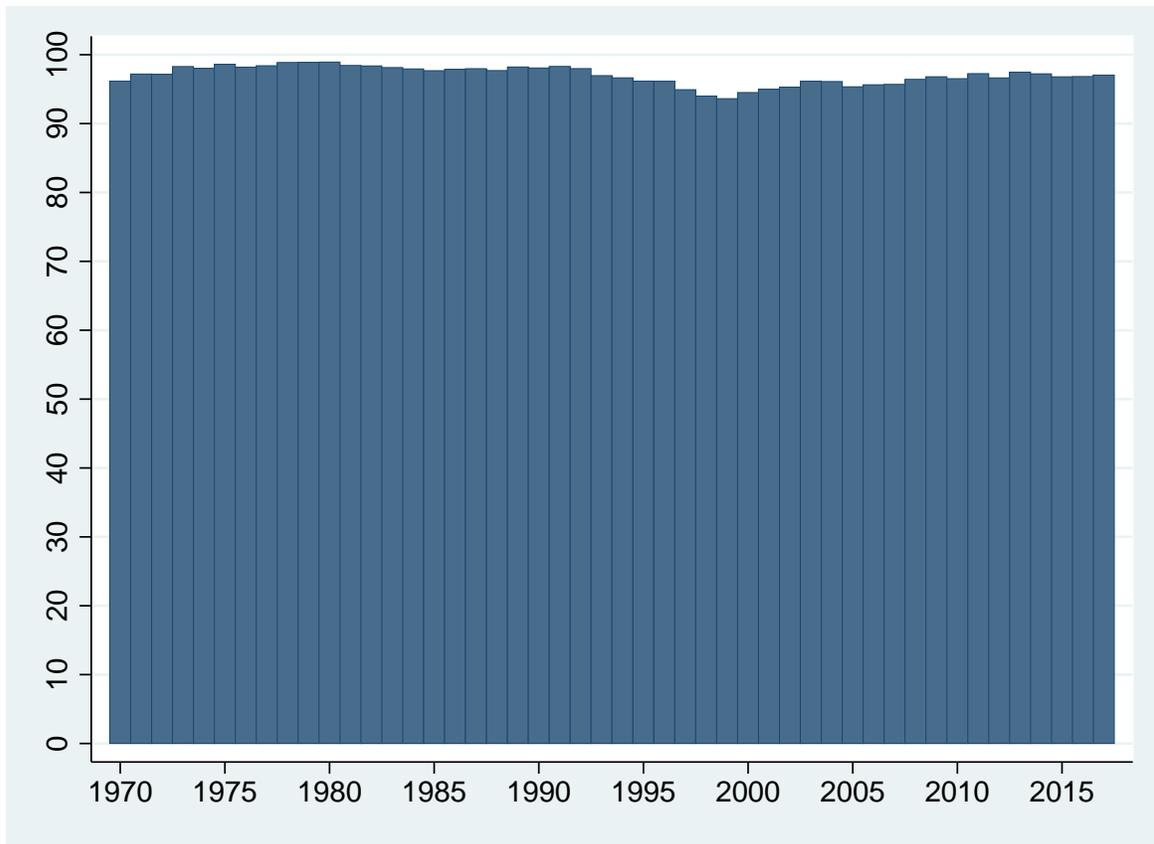
**Figure 13a:** Proportion of firms with nonmissing information on interest-coverage ratio, 1900-1943



This figure displays the proportion of firms with nonmissing information on both earning and interest expenses from 1900 to 1943.

Source: Hickman (1960).

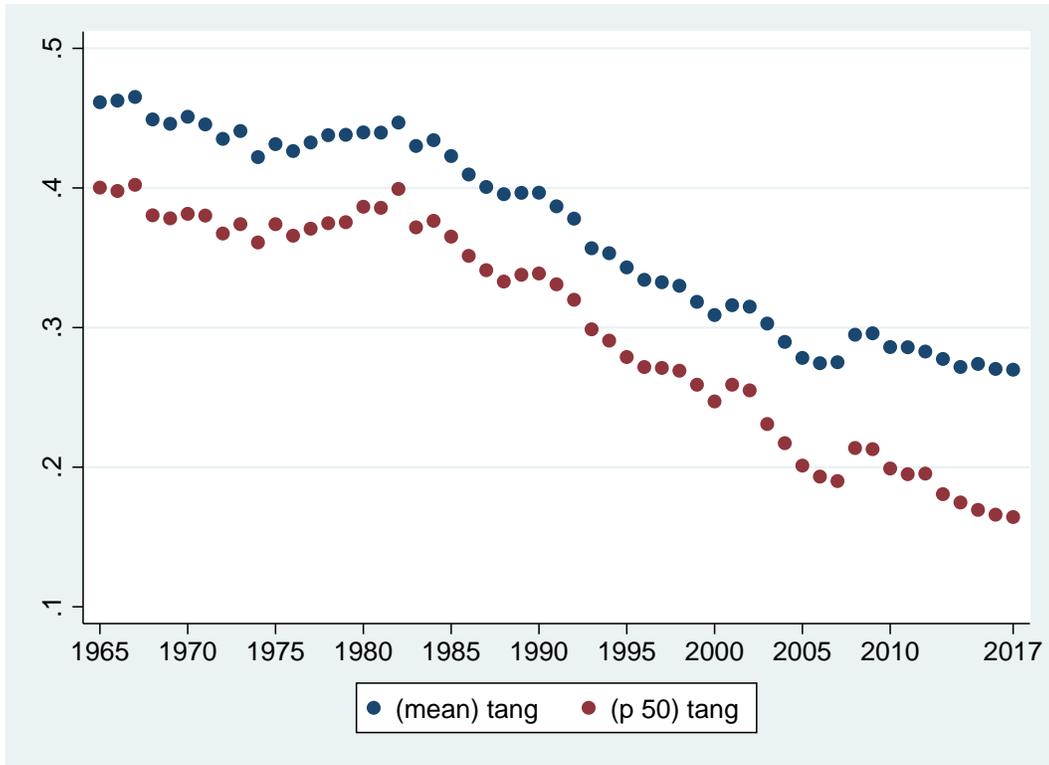
**Figure 13b:** Proportion of firms with nonmissing information on interest-coverage ratio, 1970-2017



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

Source: Compustat.

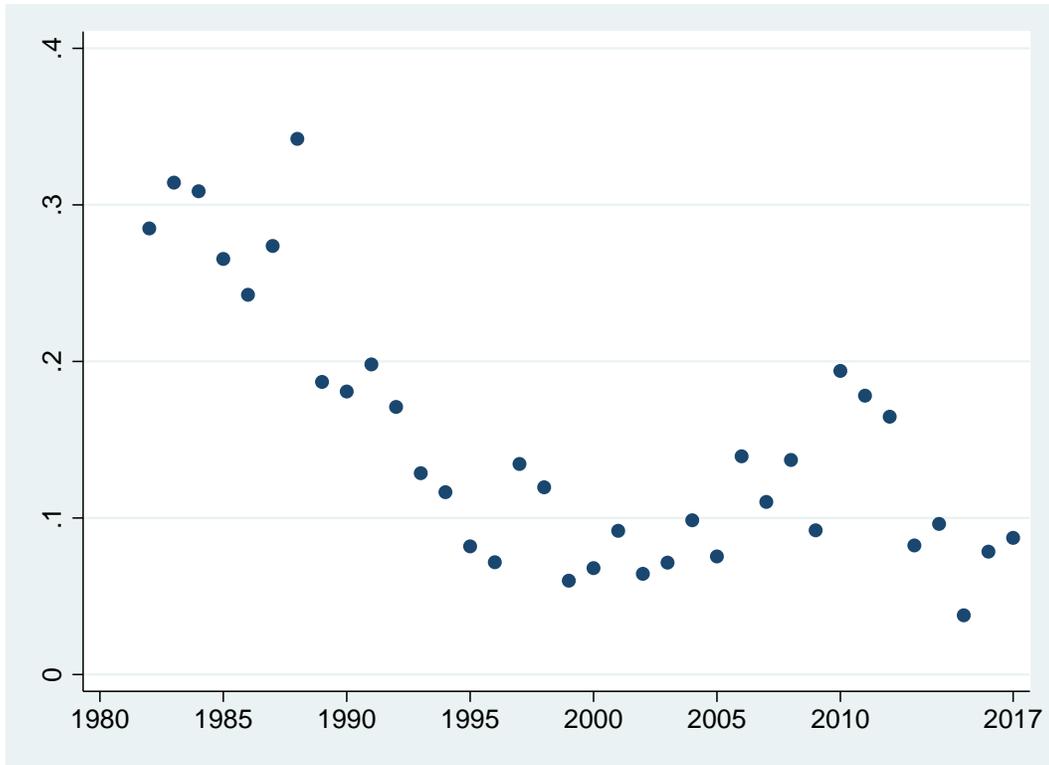
Figure 14: Asset tangibility over time, 1965-2017



This figure plots mean and median asset tangibility – the ratio of property, plant and equipment to total assets – over time from 1965 to 2017.

Source: Compustat.

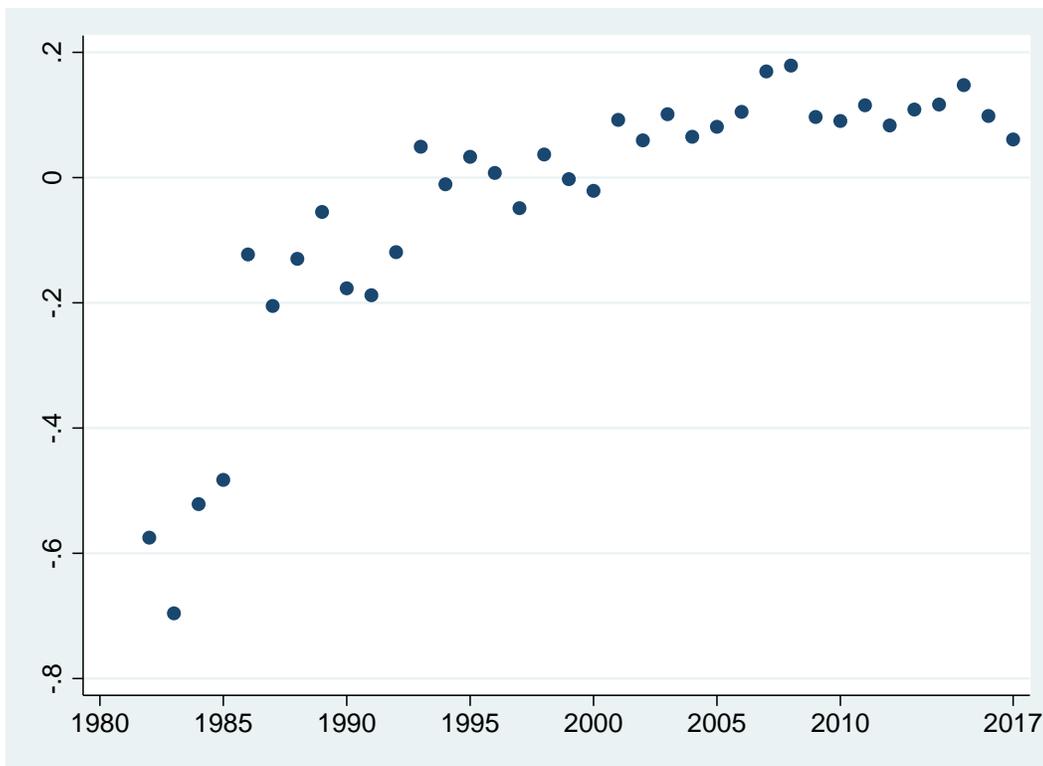
**Figure 15a:** Marginal effect of asset tangibility on secured debt, 1981-2017



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

Source: Authors' calculations using Compustat data.

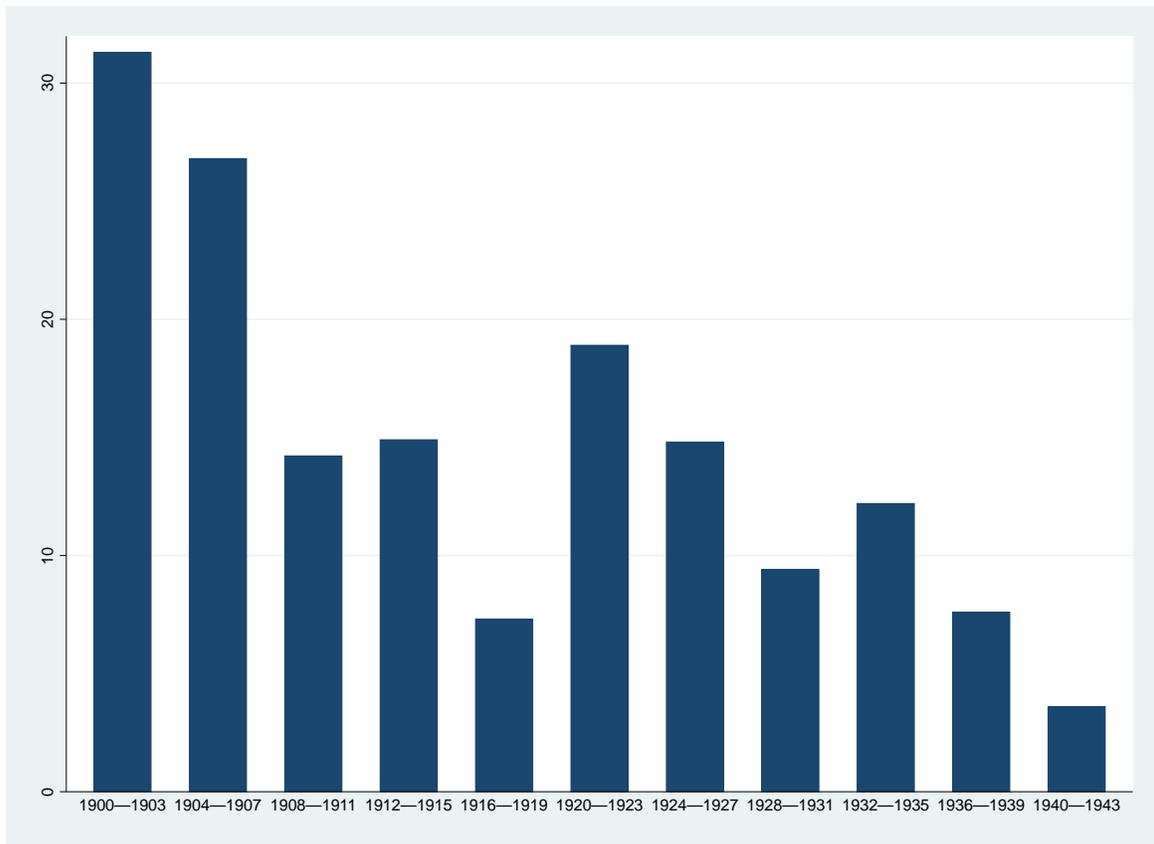
**Figure 15b:** Marginal effect of intangible assets on secured debt, 1981-2017



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

Source: Authors' calculations using Compustat data.

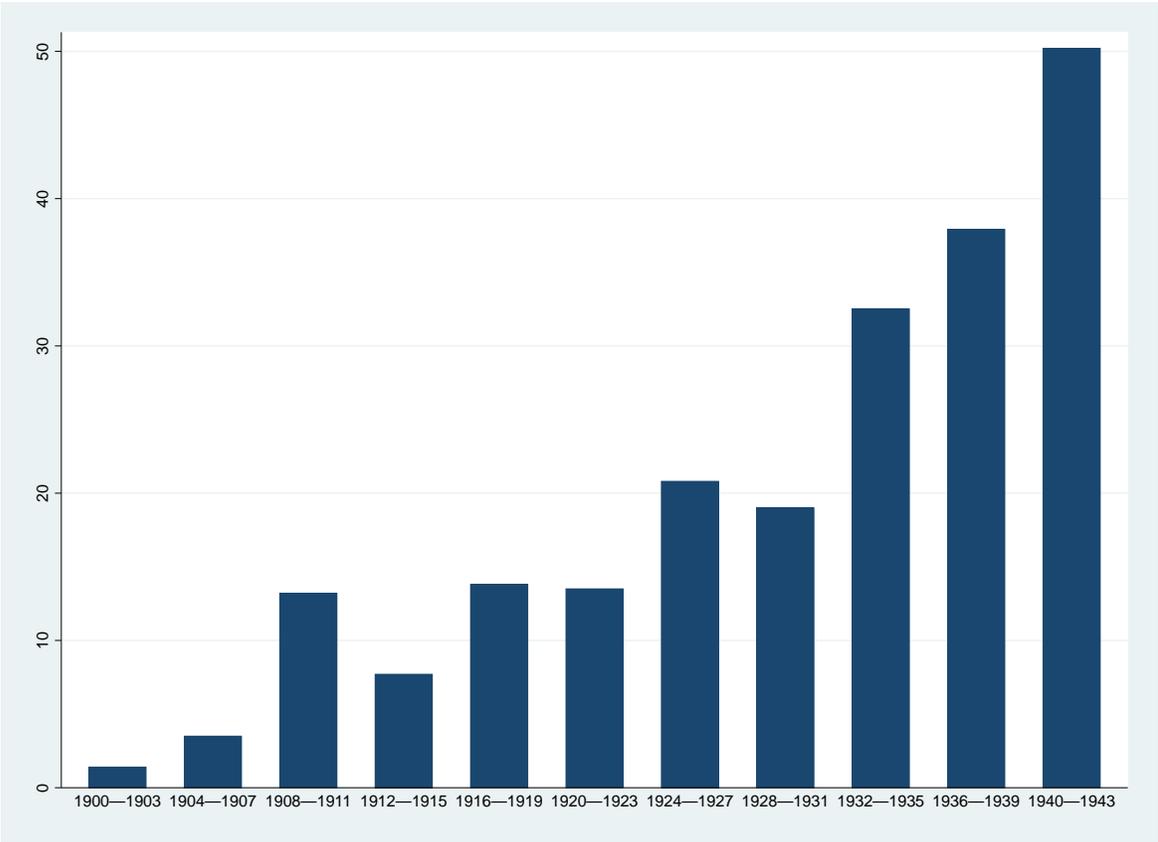
**Figure 16a:** Proportion of firms with interest-coverage ratio of less than one, 1900-1943



This figure displays the proportion of firms with interest-coverage ratio of less than one from 1900 to 1943.

Source: Hickman (1960).

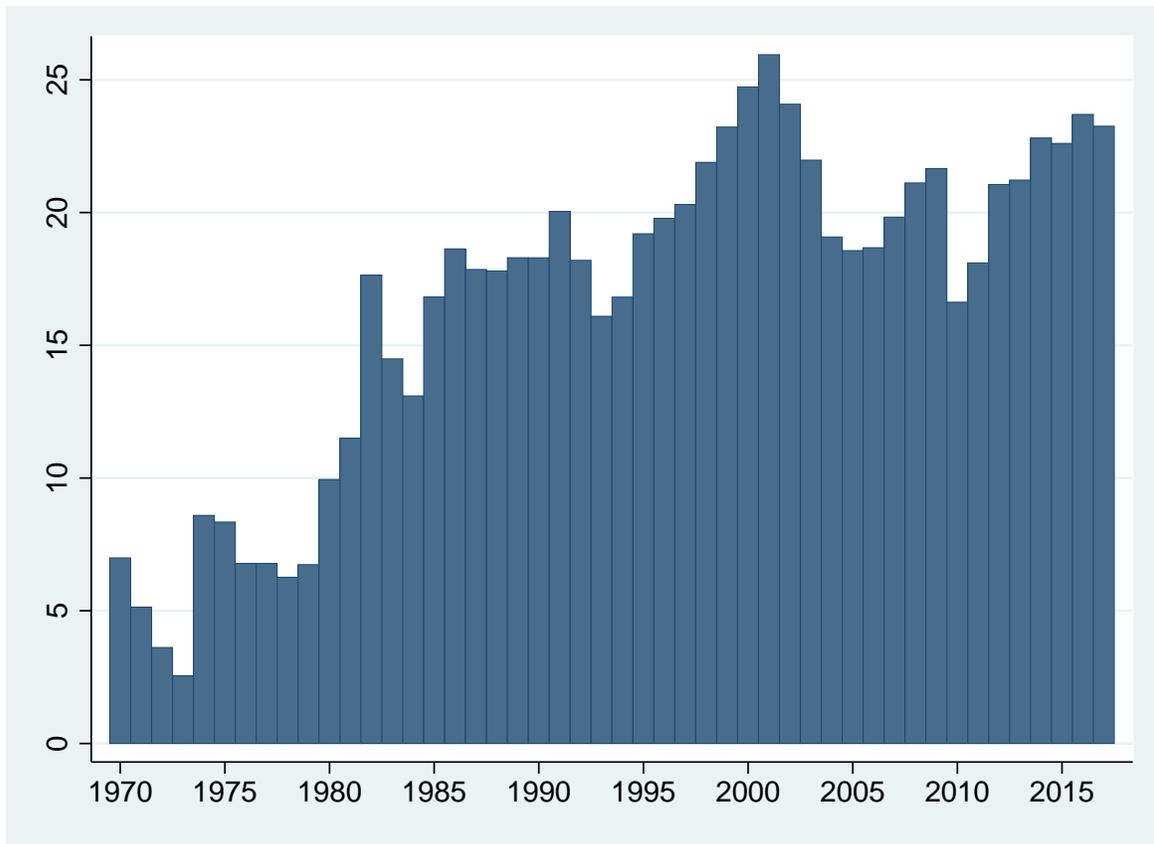
**Figure 16b:** Proportion of firms with interest-coverage ratio of more than three, 1900-1943



This figure displays the proportion of firms with interest-coverage ratio of more than three: from 1900 to 1943.

Source: Hickman (1960).

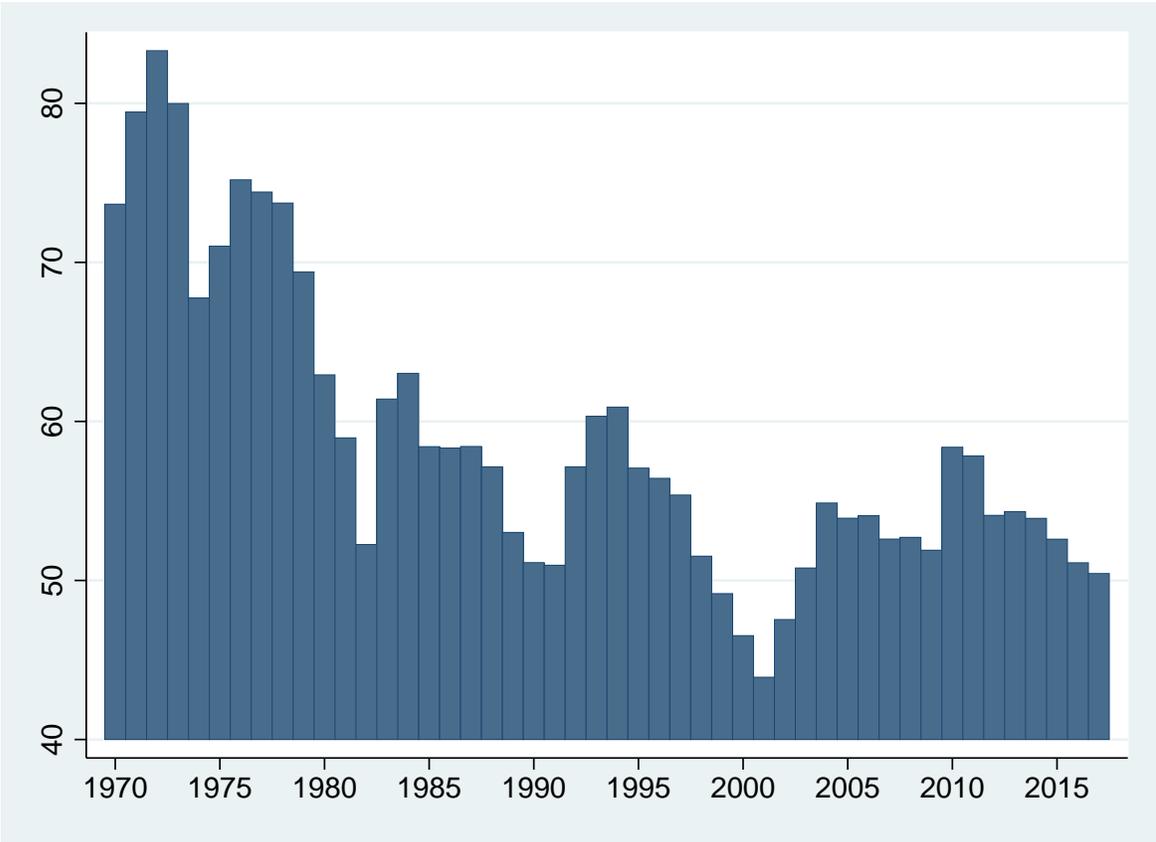
**Figure 16c:** Proportion of firms with interest-coverage ratio of less than one, 1970-2017



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

Source: Compustat.

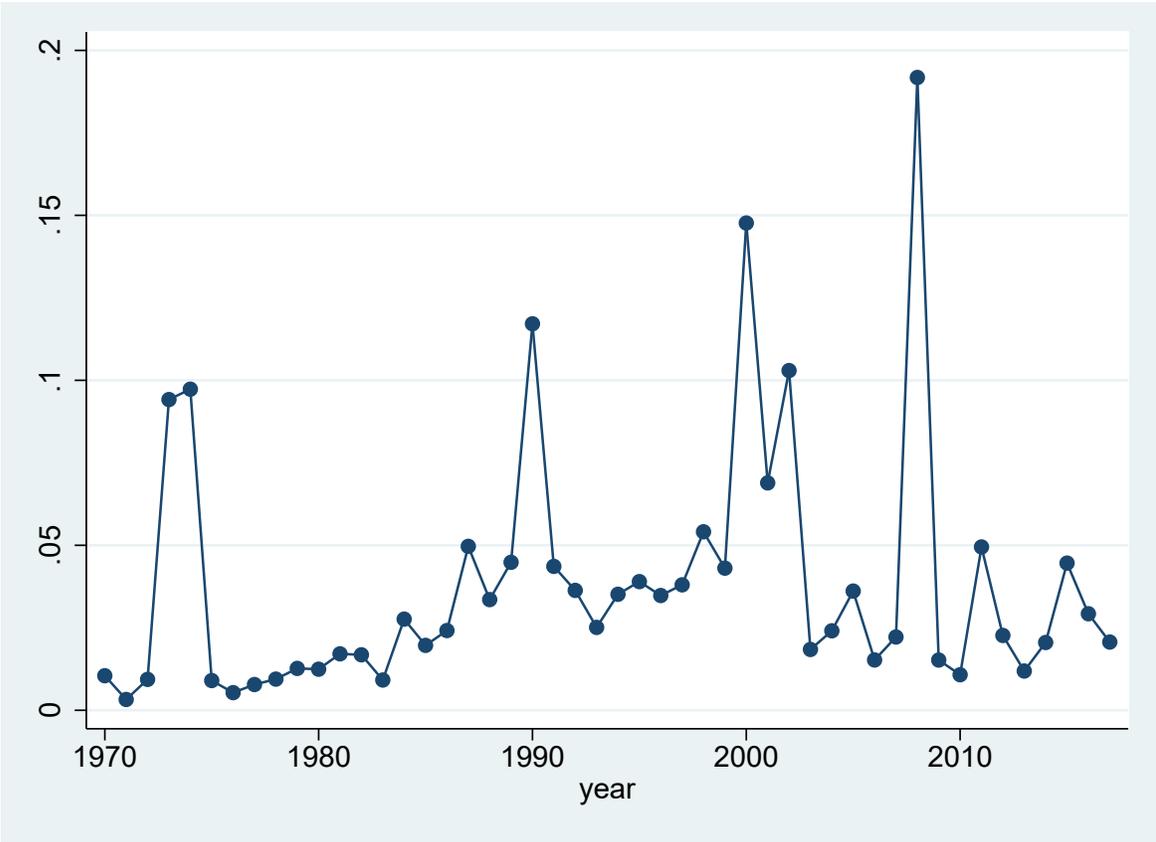
Figure 16d: Proportion of firms with interest-coverage ratio of more than three, 1970-2017



This figure displays the proportion of firms with interest-coverage ratio of more than three from 1970 to 2017.

Source: Compustat.

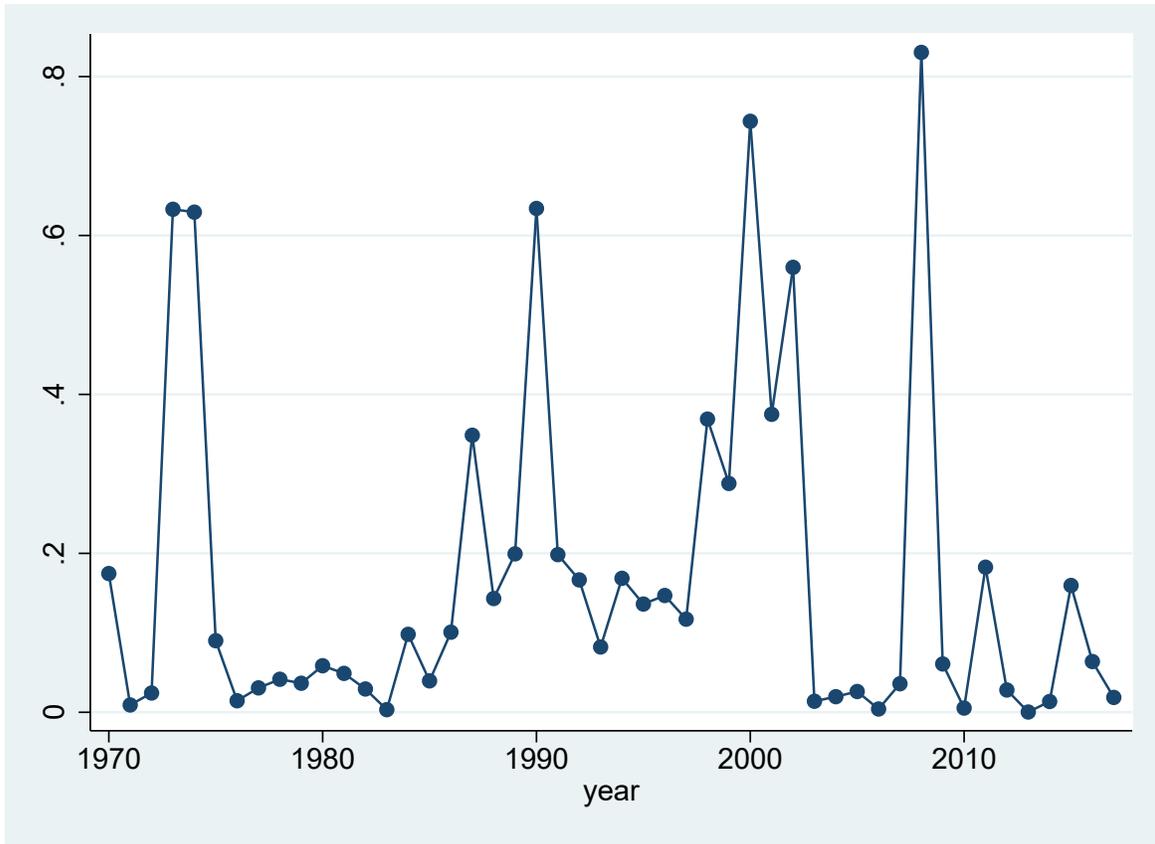
**Figure 17a:** The share of firms with one-year default probabilities greater than 75%, 1970-2017



This figure plots the share of firms over time (1970-2018) that have a one-year default probability greater than 0.75. One-year default probability is calculated using the Merton distance to default model. The default probability incorporates both the volatility of a firm’s asset value as well as the level of its debt.

Source: Authors’ calculations using Compustat data.

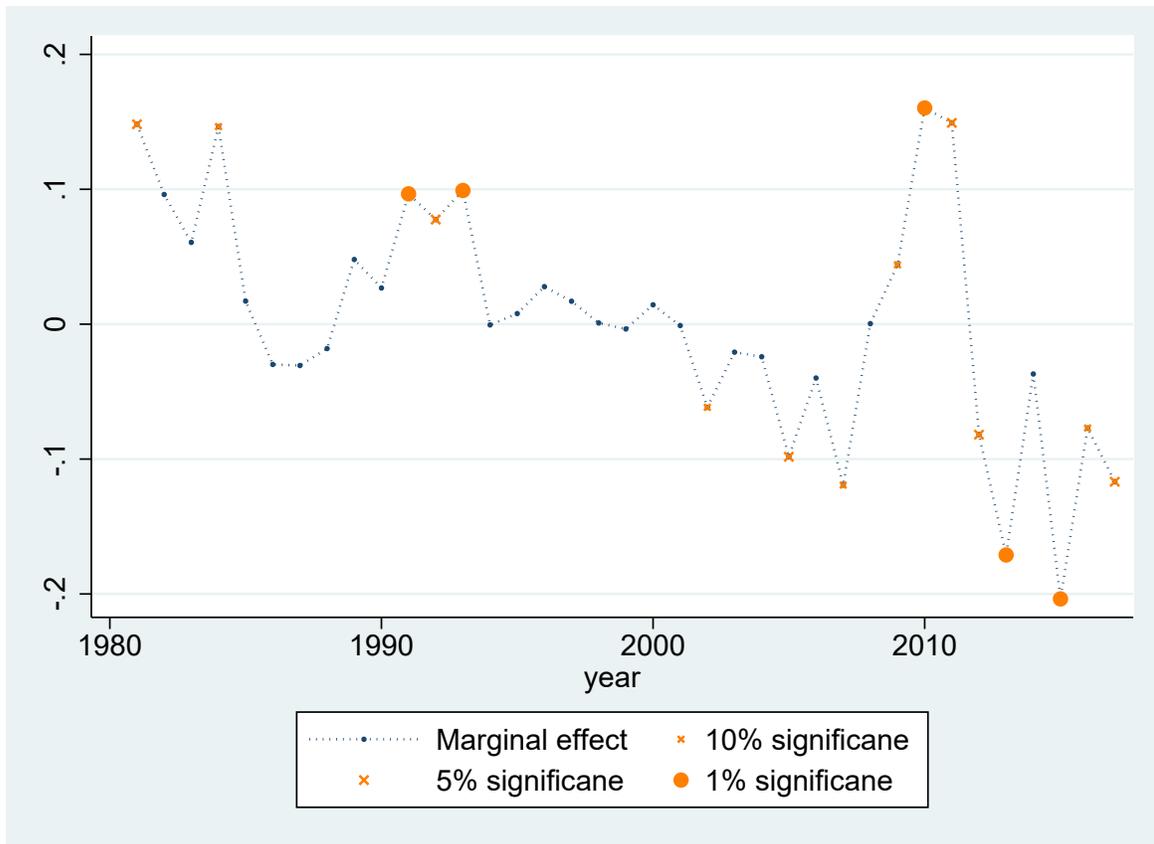
**Figure 17b:** Default probabilities for firms at the 85th percentile of the distance to default, 1970-2017



This figure plots the 85th percentile value of one-year default probability for firms over time (1970-2018). One-year default probability is calculated using the Merton distance to default model. The default probability incorporates both the volatility of a firm's asset value as well as the level of its debt.

Source: Authors' calculations using Compustat data.

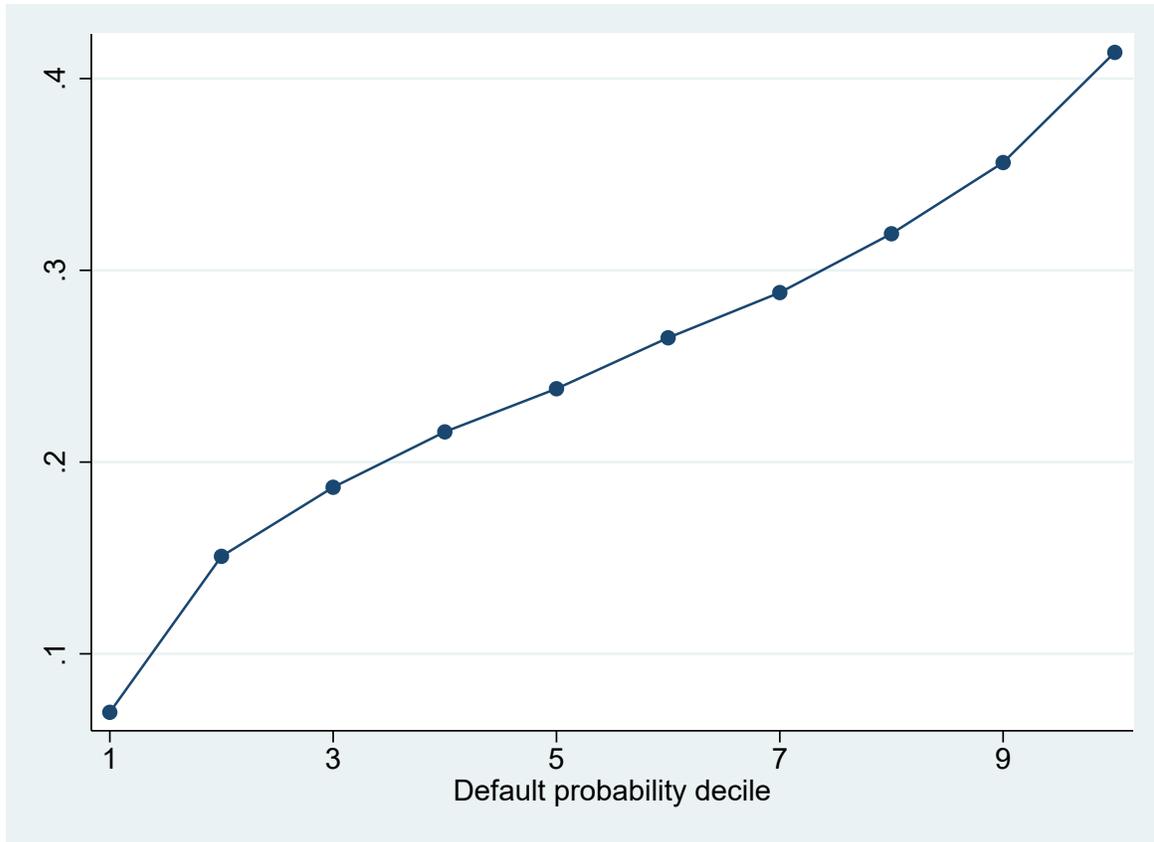
**Figure 18:** Marginal effect of default probability on secured debt, 1981-2017



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

Source: Authors' calculations using Compustat data.

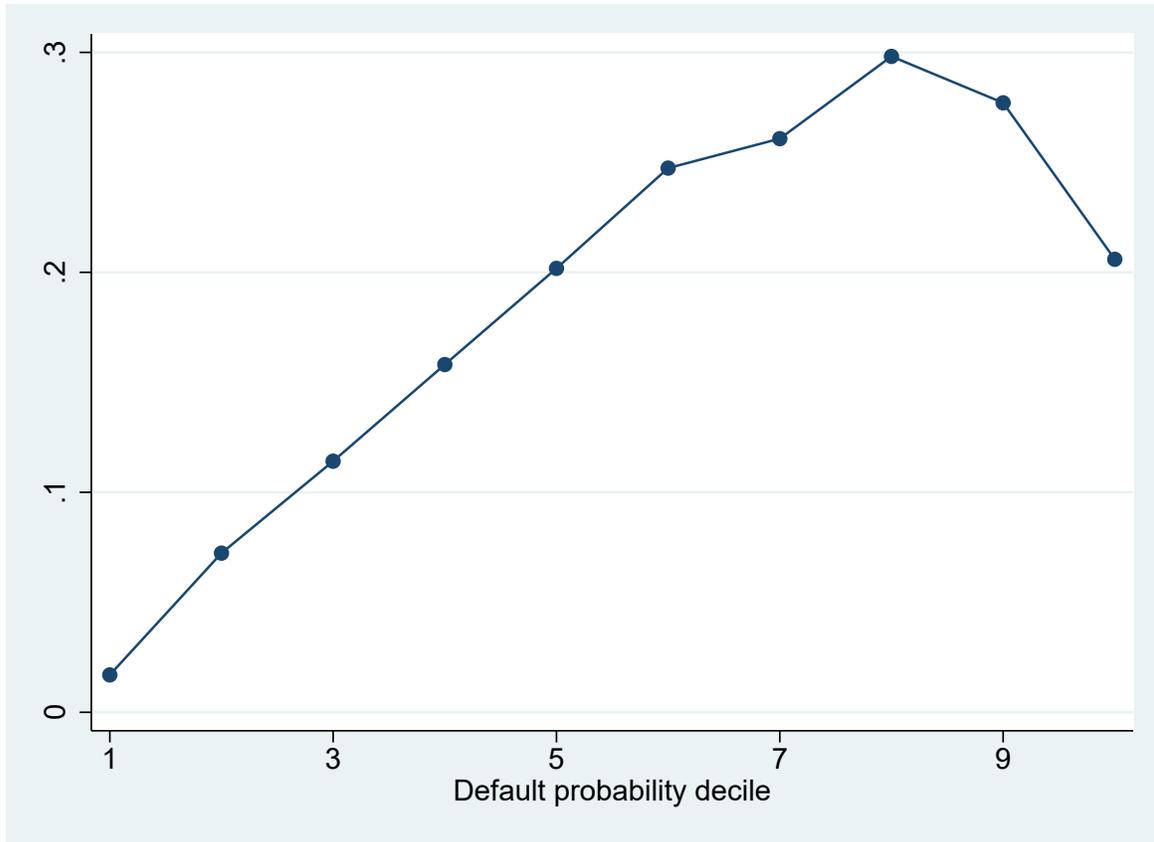
**Figure 19a:** Median leverage by one-year default probability deciles



This figure plots the median firm leverage (measured as the ratio of book debt to assets) for firm-year observations in the Compustat sample (1981-2017) for different one-year default probability deciles. One-year default probability is calculated using the Merton distance to default model. The default probability incorporates both the volatility of a firm's asset value and the level of its debt. Firms are grouped into ten deciles based on their default probability, and the median firm leverage is calculated for each group.

Source: Authors' calculations using Compustat data.

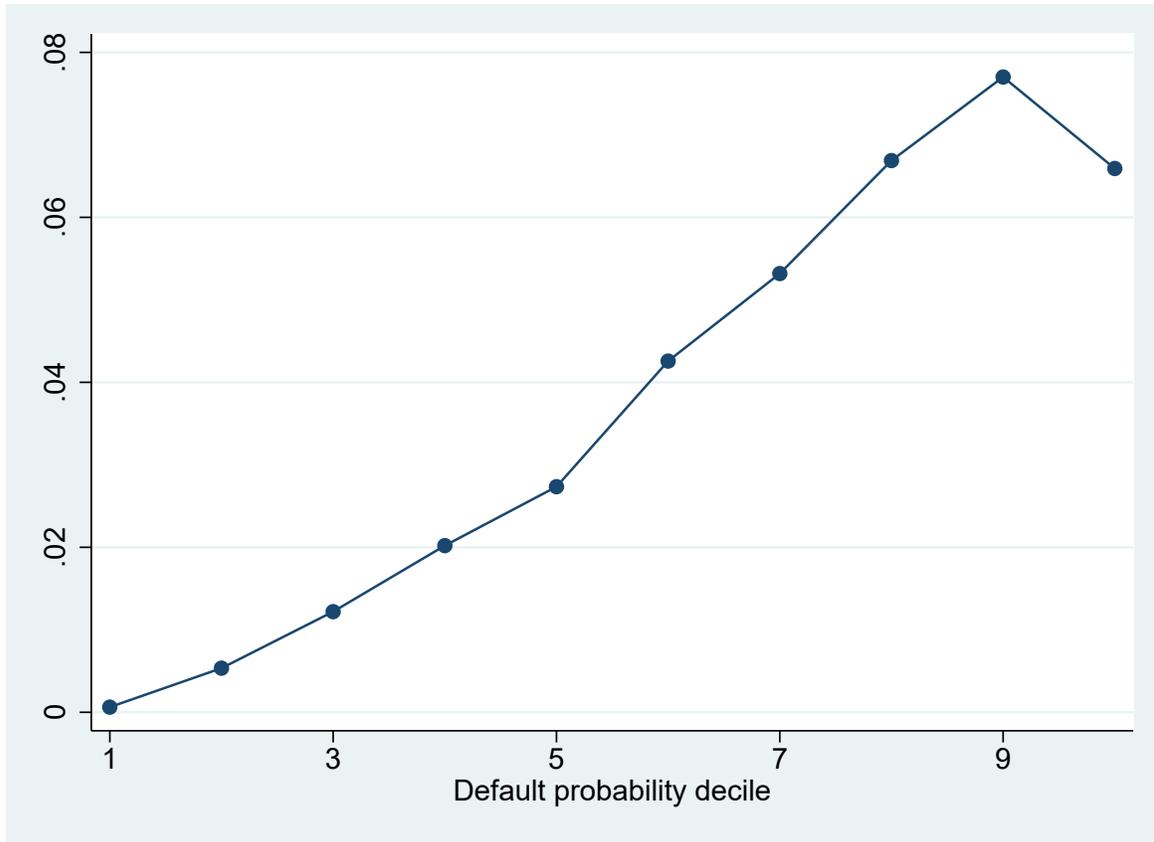
**Figure 19b:** Median share of secured debt by one-year default probability deciles



This figure plots the median share of secured debt (measured as the ratio of secured debt to total debt) for firm-year observations in the Compustat sample (1981-2017) for different one-year default probability deciles. One-year default probability is calculated using the Merton distance to default model. The default probability incorporates both the volatility of a firm's asset value and the level of its debt. Firms are grouped into ten deciles based on their default probability, and the median share of secured debt is calculated for each group.

Source: Authors' calculations using Compustat data.

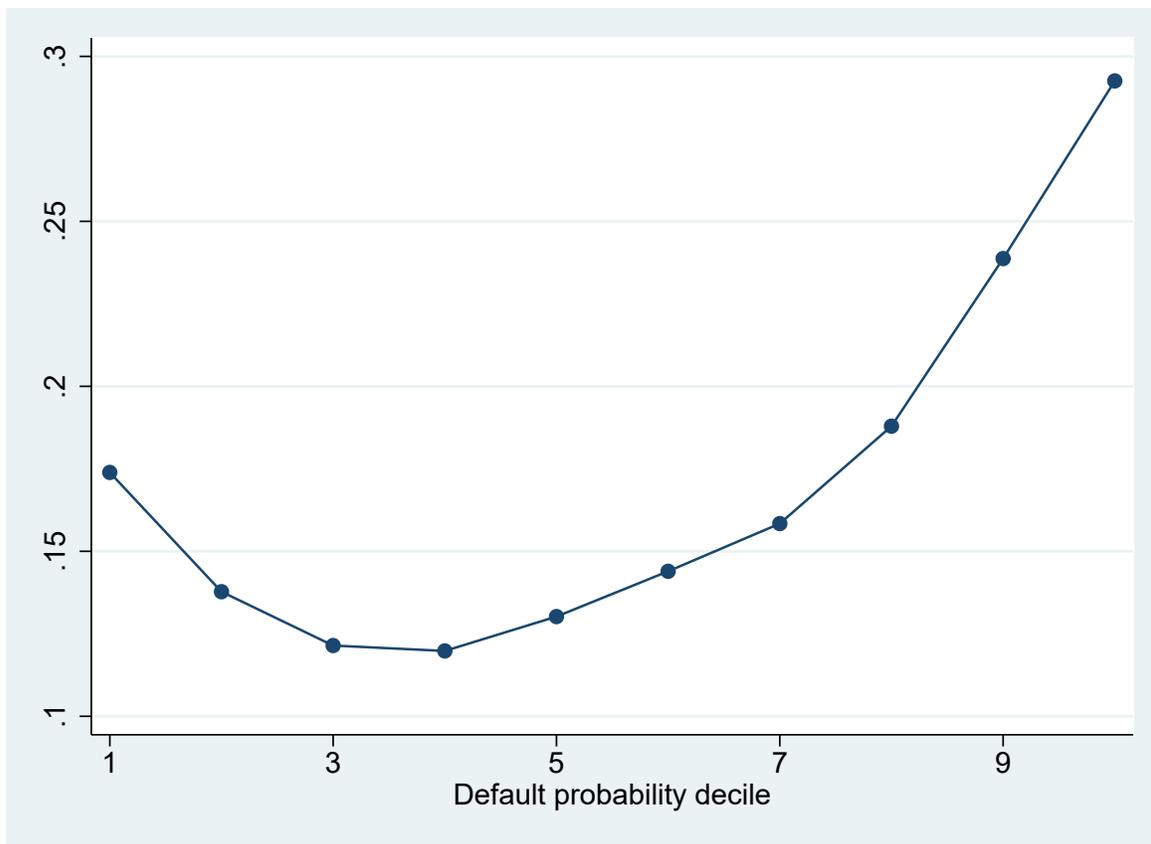
**Figure 19c:** Median secured debt to assets by one-year default probability deciles



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

Source: Authors' calculations using Compustat data.

**Figure 19d:** : Median share of debt in current liabilities by one-year default probability decile



This figure plots the median share of debt in current liabilities to total debt for firm-year observations in the Compustat sample (1981-2017) for different one-year default probability deciles. Debt in current liabilities includes short-term debt as well as current portion of long-term debt. One-year default probability is calculated using the Merton distance to default model. The default probability incorporates both the volatility of a firm’s asset value and the level of its debt. Firms are grouped into ten deciles based on their default probability, and the median share of debt in current liabilities to total debt is calculated for each group.

Source: Authors’ calculations using Compustat data.

**Table I:** Secured Debt: Summary Statistics

	Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Observations
Secured debt/total debt	0.334	0.370	0.0	0.150	0.677	52,703
Secured debt/total assets	0.100	0.150	0.0	0.022	0.149	52,703
Leverage	0.295	0.203	0.137	0.269	0.413	52,703

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

**Table II:** Secured Debt Usage by Small Businesses

<b>Panel A: 2003</b>		
	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

<b>Panel B: 1998</b>		
	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

<b>Panel C: 1993</b>		
	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

<b>Panel D: 1987</b>		
	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 III: The Cyclicity of Secured Debt Issuance**

<b>Panel A: Secured Debt Share, Credit Spreads, and GDP Growth, 1960-2017</b>						
	(1)	(2)	(3)	(4)	(5)	(6)
Period	<u>1960-2017</u>	<u>1960-2017</u>	<u>1960-2017</u>	<u>1960-2017</u>	<u>1960-2017</u>	<u>1960-2017</u>
$\Delta$ Baa-Aaa spread	0.047*** (3.78)					
$\Delta$ Baa-Aaa spread>0		0.049*** (4.22)				
$\Delta$ Baa-Aaa spread> median( $\Delta$ Baa-Aaa spread)			0.052*** (4.50)			
$\Delta$ GDP growth				-1.232*** (-3.04)		
$\Delta$ GDP growth<0					0.031** (2.58)	
$\Delta$ GDP growth< median( $\Delta$ GDP growth)						0.032*** (2.73)
Adjusted $R^2$	0.0543	0.0678	0.0769	0.0345	0.0238	0.0271
Observations	232	232	232	232	232	232
<b>Panel B: Secured Debt Share, Credit Spreads, and GDP Growth, 1900-1943</b>						
	(1)	(2)	(3)	(4)	(5)	(6)
Period	<u>1922-1943</u>	<u>1922-1943</u>	<u>1922-1943</u>	<u>1900-1943</u>	<u>1900-1943</u>	<u>1900-1943</u>
$\Delta$ Baa-Aaa spread	0.077** (2.75)					
$\Delta$ Baa-Aaa spread>0		0.112*** (3.35)				
$\Delta$ Baa-Aaa spread> median( $\Delta$ Baa-Aaa spread)			0.085** (2.30)			
$\Delta$ GDP growth				-0.344*** (-3.67)		
$\Delta$ GDP growth<0					0.068*** (3.00)	
$\Delta$ GDP growth< median( $\Delta$ GDP growth)						0.068*** (3.00)
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 cyclicity in secured debt issuance. Panel A reports results using bond issuance data from Mergent for the 1960-2017 time period, whereas Panel B reports results using bond issuance data from Hickman (1960) for the 1900-1943 time period. The dependent variable is the cyclical component of the dollar share of secured debt issuance in each quarter (Panel A) or year (Panel B). The cyclical component is calculated by extracting the residuals from a Hodrick- Prescott (HP) filter. We use two proxies for the cyclical stage of economic activity:  $\Delta$ Baa-Aaa spread is the cyclical component of the Baa-Aaa credit spread calculated from the residuals from HP filter, whereas  $\Delta$ GDP growth is the cyclical component of the logarithm of real gross domestic product (GDP) calculated from HP filter in a similar manner. Smoothing coefficients of 1600 and 100 are used for quarterly and annual data, respectively. GDP data for the 1900-1943 period are available at the annual frequency. Data on Baa-Aaa credit spread exists from 1919 onward. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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

	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 V: Secured Debt by Credit Rating**

	Secured debt					Tangibility		Observations
	Mean	Standard deviation	25th Percentile	Median	75th Percentile	Mean	Median	
AAA	0.0116	0.042	0.0	0.0009	0.0019	0.845	0.826	68
AA+	0.0044	0.007	0.0	0.0013	0.0062	0.524	0.544	78
AA	0.0072	0.0249	0.0	0.0001	0.0050	0.577	0.607	281
AA-	0.0294	0.0690	0.0	0.0014	0.0125	0.574	0.597	333
A+	0.0238	0.0600	0.0	0.0008	0.0136	0.532	0.505	618
A	0.0296	0.0949	0.0	0.0001	0.0083	0.524	0.514	1,127
A-	0.0281	0.0805	0.0	0.0003	0.0127	0.514	0.500	817
BBB+	0.0198	0.0524	0.0	0.0003	0.0089	0.529	0.511	1,003
BBB	0.0256	0.0643	0.0	0.0004	0.0149	0.533	0.526	1,516
BBB-	0.0326	0.0750	0.0	0.0008	0.0210	0.496	0.454	1,322
BB+	0.0877	0.1352	0.0	0.0159	0.1352	0.516	0.515	958
BB	0.1243	0.1633	0.001	0.0508	0.1980	0.468	0.421	1,602
BB-	0.1481	0.1742	0.001	0.0812	0.2494	0.464	0.415	2,140
B+	0.1903	0.2158	0.003	0.1076	0.3213	0.466	0.438	2,671
B	0.2214	0.2413	0.006	0.1398	0.3631	0.452	0.417	1,661
B-	0.2426	0.2539	0.010	0.1608	0.4026	0.452	0.422	885
CCC+	0.2537	0.2631	0.009	0.1734	0.4183	0.459	0.410	1290
CCC	0.3015	0.2654	0.0798	0.2275	0.4390	0.514	0.488	143
CCC-	0.2016	0.1793	0.0313	0.1466	0.3116	0.580	0.621	132
CC	0.2307	0.2371	0.0322	0.1627	0.4041	0.473	0.395	47
C	0.1551	0.1877	0.0	0.0950	0.2913	0.617	0.516	10
D	0.0997	0.1689	0.0	0.0	0.1806	0.425	0.421	35

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**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\text{Log}(\text{assets})_{t-1}$	-0.054 *** (0.002)	-0.053 *** (0.002)	-0.039 *** (0.005)	-0.053 *** (0.002)	-0.002 (0.003)	-0.006 * (0.003)	-0.012 ** (0.006)	-0.013 *** (0.003)	-0.019 *** (0.006)
$Q_{t-1}$	-0.031 *** (0.003)	-0.034 *** (0.003)	-0.009 ** (0.003)	-0.003 *** (0.003)	0.003 (0.005)	0.007 (0.005)	-0.002 (0.004)	0.002 (0.005)	-0.003 (0.004)
$\text{Profitability}_{t-1}$	0.118 *** (0.012)	0.142 *** (0.012)	0.079 *** (0.015)	0.159 *** (0.012)	0.003 (0.002)	0.003 (0.003)	0.002 (0.002)	0.004 * (0.002)	0.002 (0.002)
$\text{Tangibility}_{t-1}$	0.286 *** (0.018)	0.211 *** (0.022)	0.131 *** (0.029)	0.194 *** (0.023)	0.044 *** (0.010)	0.024 ** (0.012)	-0.0002 (0.014)	0.018 (0.012)	-0.002 (0.014)
$\text{Leverage}_{t-1}$				0.082 *** (0.019)					
$\text{Rating}_{t-1}$					0.019 *** (0.001)	0.018 *** (0.001)	0.010 *** (0.002)		
$\text{Non-IG}_{t-1}$								0.109 *** (0.007)	0.056 *** (0.010)
Adjusted $R^2$	0.099	0.146	0.518	0.161	0.184	0.327	0.641	0.340	0.651
Observations	52,703	52,703	52,703	52,703	12,639	12,639	12,639	12,639	12,639
Number of firms	6,931	6,931	6,931	6,931	1,418	1,418	1,418	1,418	1,418
<b>Fixed Effects</b>									
industry	No	Yes	No	Yes	No	Yes	No	Yes	No
firm	No	No	Yes	No	No	No	Yes	No	Yes
year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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:  $\text{DM}/(\text{DLC}+\text{DLTT})$ . All regressions include lagged values of the natural logarithm of book assets, Tobin's Q, profitability, and tangibility. Column (4) also controls for lagged firm leverage. Columns (5)-(7) control for S&P firm-level credit rating, and Columns (8) and (9) include a dummy variable that equals one if the firm credit rating is below investment grade. All regressions include year fixed effects. Columns (2), (4), (6), and (8) include industry fixed effects and Columns (3), (7) and (9) include firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .