Preliminary Draft

March 2025

Debt and Assets

EFRAIM BENMELECH, NITISH KUMAR, and RAGHURAM RAJAN[1]

ABSTRACT

We examine the importance of corporate assets in supporting debt. Prior studies typically see only secured debt as asset backed, while the rest is deemed cash flow based, which implies only a small fraction of US debt is asset backed. Yet because corporations often resist offering security explicitly to debt, much unsecured debt is implicitly asset backed. Moreover, we find that whether unsecured debt is asset backed or not can change with a firm's condition and the economic situation. Consequently, asset values can affect the quantum and price of borrowing, with effects accentuated in adverse economic conditions, as suggested by financial accelerator theories. Given that a corporation's debt is typically supported by both expected cash flows and assets, with the relative support varying with time and situation, the industry practice of classifying debt as "asset based" or "cash flow based" is overly categorical, especially for long term corporate bonds.

[1]Efraim Benmelech is at the Kellogg School of Management. Nitish Kumar is at the Warrington College of Business, University of Florida. Raghuram Rajan is at the University of Chicago Booth School of Business. We thank Bob Chirinko, Douglas Diamond, Oliver Hart, Steve Kaplan, Anil Kashyap, Luc Laeven, and Yueran Ma, as well as seminar participants at the Hebrew University and the University of Illinois Chicago for very helpful comments.

Correspondence: Efraim Benmelech, Department of Finance, The Kellogg School of Management, Northwestern University, 2211 Campus Drive, Evanston, IL 60208; e-mail:e-benmelech@kellogg.northwestern.edu.

Does financial development make a firm's assets less critical to its ability to borrow? This is a matter of much economic interest (see, e.g., Braun (2005); Fisher (1933); Hart and Moore (1994, 1998); Kiyotaki and Moore (1997); Williamson (1988)). If corporate assets and their values are unimportant to the bulk of corporate borrowing once the financial system is sufficiently developed, then asset-value-based amplifications to business cycles through borrowing and investment – such as those seen in Japan in the late 1980s, and emphasized by Fisher (1933) in his "debt-deflation" theory of the Great Depression, by Bernanke and Gertler (1989, 1995) in their financial accelerator theory, as also by Geanakoplos (2023) and Kiyotaki and Moore (1997) – should be viewed merely as of historical interest in financially developed economies. Conversely, if assets even today support borrowing for many corporations in the United States, especially under trying circumstances, then a concern about asset values and their volatility becomes much more central to both macroeconomic policy making and corporate capital structure decisions. Our paper attempts to shed more light on this issue by examining the importance of assets to borrowing for relatively large US firms in recent decades.

Prima facie, assets should be of secondary importance in corporate borrowing; creditors lend with the expectation of being paid out of cash flows, Shylock in *The Merchant of Venice* notwithstanding. Corporate cash flows are the primary means of repaying debt, so non-economists would not be surprised to learn that firms with good prospects of high and stable cash flows find it easy to borrow. Yet the literature focuses largely on the importance of the value of a firm's *tangible assets* – property, plant, and equipment (PP&E) – in facilitating borrowing.

One reason is that assets are a fallback support to debt value and recovery when cash flows prove inadequate. For instance, assets such as land or machinery are easily valued, retain value over time, and are easy to transfer or alienate. Their distinctiveness (think of a demarcated plot of land or the serial number on a motor vehicle) makes them simple to track if the borrower tries to sell them surreptitiously. Their liquid market makes them easy to price, and they will hold their value even if the borrower has modest business acumen, is untrustworthy, or neglects maintenance. Therefore, they require little monitoring (see Jackson and Kronman (1979)). Contrast this with a firm's cash flows, which may be uncertain, unverifiable, and mutable, especially in the case of young or risky firms.

However, important recent work by Caglio, Darst, and Kalemli-Özcan (2021), Ivashina, Laeven, and Moral-Benito (2022), Lian and Ma (2021), and Kermani and Ma (2023) emphasizes

the prominence of "cash-flow-based" debt in corporate borrowing. Although definitions differ, the literature typically classifies debt as "cash flow based" if it is unsecured or secured via a blanket lien on firm assets. Conversely, debt secured by specific hard assets such as Property, Plant & Equipment (PPE) is termed "asset-based" debt.

Lian and Ma (2021) find that 80% of borrowing by US corporations is cash flow based, that there is a negative correlation between outstanding cash-flow-based debt and a firm's tangible assets, and that for large established firms, "earnings-based" covenants limit a firm's borrowing against cash flows – there is a positive correlation between the quantum of borrowing and cash flows in the presence of these covenants, with the sensitivity increasing the more they are binding. These findings suggest that financial development of the kind that has occurred in the United States may have rendered corporate assets unimportant for unsecured borrowing, which is the predominant form of corporate borrowing. Consistent with such a view is Benmelech, Kumar, and Rajan's (2024) finding that secured debt as a fraction of outstanding debt has declined steadily in the twentieth century in the United States. Indeed, as Graham (2022) finds from surveys of corporate CFOs, the predominant way of assessing borrowing sustainability is to use earnings-based measures like Debt/EBITDA.

However, to conclude from this that most unsecured corporate debt is not asset backed is too strong for a number of reasons. First, debt can be backed by assets even if it is not secured by them, as Rampini and Vishwanathan (2024) emphasize. Large established firms have more choice than small or risky firms that are financially constrained relative to their investment opportunities. The latter are likely to want to borrow as much as possible, and since secured debt offers lenders more comfort than unsecured debt, such firms will issue secured debt to maximize borrowing (see Rampini and Vishwanathan (2010)). Large established firms' investment needs are more moderate relative to their borrowing capacity. For them, the benefit (in terms of reduced rates) of issuing debt secured by assets relative to issuing unsecured debt is small when the firm has plenty of unpledged assets – essentially, the unsecured debt is implicitly backed by unpledged assets, with creditors knowing they can demand and get security if the need arises.

All this implies that financially unconstrained firms may want to issue unsecured debt as long as they possibly can, implicitly rather than explicitly backing it with assets, partly to avoid a collateral rat race (see Donaldson, Gromb, and Piacentino (2020)) and partly to preserve the option

of issuing secured debt in the future. They thus retain a form of financial slack with great value in bad times (see Rampini and Vishwanathan (2010)). Indeed, Benmelech, Kumar, and Rajan (2022) find evidence consistent with such behavior.[3]

This would then suggest that for a range of firms, unsecured debt is also supported by assets, a possibility that is overlooked when only debt secured by specific assets is termed asset based. Yet such backing is hard to discern in traditional regression analysis: for instance, a simple regression of a firm's outstanding unsecured debt against tangible assets and other controls typically yields a statistically insignificant or even a significant negative coefficient estimate on tangibility.

One reason why tangible assets do not seem to matter in such regressions is the existence of secured debt. Secured debt not only eats up available collateral but also may cause other unsecured creditors to demand collateral, which may obscure underlying correlations. A second explanation is that one would expect a strong correlation between debt outstanding and determinants of debt capacity, such as tangible assets, only for firms where outstanding debt is near debt capacity – that is, for firms that are (almost) credit constrained. Firms that are relatively unconstrained, for instance because they generate a lot of internal cash flow, may be below the limits to their borrowing capacity for long periods. In that case, outstanding debt may be a poor proxy for debt capacity. Indeed, consistent with the literature, we find that in the set of large firms, highly rated firms, or firms that are deemed financially unconstrained, there is little reliable positive correlation between measures of leverage and tangible assets.

How then can we check whether asset backing matters for borrowing in such firms? We address these issues in multiple ways. In the cross-section, we correct for the extent to which collateralizable assets are encumbered by secured debt. Once we do that, the positive correlation

[3] Benmelech, Kumar, and Rajan (2022) offer the example of Carnival Corporation, which operates cruise lines, during the recent pandemic. Carnival had an investment grade rating before the pandemic hit, but was bleeding $1 billion of cash a month as cruise bookings fell off a cliff. A downgrade was imminent as the pandemic's consequences became apparent, and indeed Carnival was downgraded in June 2020 below investment-grade and fell a few further notches subsequently. However, in April 2020, it managed a sale of $4 billion of bonds, backed by $28 billions of its ships. The Financial Times wrote, "Carnival had so much freedom to pledge its assets because its investment-grade rating meant it was previously able to borrow freely on an unsecured basis." See: "Why Cruise Ship Backed Bonds Drew $17 billion of demand", Financial Times, April 7, 2020, https://www.ft.com/content/d85cf0bc-1c6b-4680-bee3-b32eb9c598f9.

between unsecured debt and unencumbered collateralizable assets (which we term "unpledged tangibility") emerges strongly in the overall sample of firms.

Firms that issue debt reveal that they need financing and are more likely to be closer to debt capacity than firms that do not issue debt. We show, largely following the analysis of Campello, Connolly, Kankanhalli, and Steiner (2022), that unconstrained or investment grade firms that see an exogenous increase in the value of their real estate holdings tend to issue more debt, largely unsecured. We also know that firms are more likely to be credit constrained when either their own or the general economic situation deteriorates. So we examine whether net debt issuances increase more for firms with unpledged tangibility when the macroeconomic environment deteriorates. They do.

Furthermore, even if a large, highly rated firm is far from its borrowing capacity, the interest rate spreads at which it can borrow unsecured should reflect the implicit backing of debt by unencumbered tangible assets, especially in difficult economic times. Once again, we find evidence consistent with this.

The important takeaway from all this evidence is that the extent of asset backing is not a permanent property of unsecured debt but can vary with corporate and economic conditions. It also suggests another rationale for assets other than as something debt claims can fall back on in case of liquidation: a larger stock of collateralizable assets can also improve creditor control (on creditor control, also see Nini, Smith, and Sufi (2012)). For large successful established firms in normal times, creditors look to the going concern value rather than liquidation value for repayment (see Kermani and Ma (2023)). Borrowers are unlikely to behave badly with creditors, given the large going concern value that could be jeopardized. Nevertheless, high tangible asset value can also help, especially if the firm's situation or environment deteriorates. The availability of plentiful collateral prevents a collateral rat race, which may reduce the firm's flexibility as a going concern. It also allows the firm to draw in debtor-in-possession financing to preserve its going concern value in bankruptcy. Monitoring creditors like banks would also want there to be enough available assets that if they demand security, their debt claim is fully backed. Apart from protecting the value of their claim, full backing ensures banks are paid interest on the claim during the bankruptcy process (see Badoer, Dudley, and James (2020)), allowing them to be patient and allowing other creditors to get greater value. In sum, even if unsecured debt stays unsecured when a large firm is

reorganized in bankruptcy so that repayment does not directly depend on the value of assets, the going concern value it relies on for repayment may be enhanced by the presence of plentiful collateralizable assets – another form of implicit asset backing.

Of course, the closer a firm is to difficulties, the more such implicit asset backing matters. Indeed, if we divide our sample based on the Tobin's Q of firms, the relationship between unsecured debt and unsecured tangibility is much stronger for firms with low Tobin's Q than for firms with high Tobin's Q.

The bottom line is that there is undoubtedly a class of firms that is compelled to issue only secured debt to maximize borrowing. Our paper suggests there is also a class of firms where what may seem to be solely cash-flow-based debt may also be implicitly asset based because the link between debt and assets is masked. Finally, some firms can indeed have such stable and reliable cash flows and going concern value at a point in time that cash flows and going concern value, not underlying assets, becomes the primary basis of debt issuance and repayment.

Importantly, though, membership in these classes is not static. The same debt for a firm in good times could be more "cash flow based" but becomes more (implicitly) asset backed in bad times. We do know that some unsecured debt becomes explicitly secured in bad times (see, e.g., Colla, Ippolito, and Li (2013); Rauh and Sufi (2010); Roberts (2015)); here we add suggestive evidence that the implicit asset backing increases too. Since most debt is typically both cash flow and asset based, with the relative emphasis varying with the firm's situation and macroeconomic conditions, the industry practice of classifying debt as "cash-flow-based" and "asset-based" is too categorical.

Also, because debt issuance and pricing depend more heavily on asset backing in adverse corporate situations or economic times, the valuation of assets matters. Phenomena such as fire sales, financial accelerator effects, debt deflation, and collateral constraints are not merely historical curiosities even in a developed economy such as that of the United States with sophisticated financial markets. At the same time, theories should allow for debt capacity departing from being tied down by asset values in good times.

The rest of the paper is organized as follows. Section I examines theories of why debt might be dependent on cash flows or assets. Section II describes the data we use for the analysis. Section

III presents the baseline correlations between debt and asset tangibility. Section IV shows that the act of securing debt tends to mask the relationship between unsecured debt and assets, and establishes the relationship between unsecured debt and unpledged tangibility. Section V looks at the association between debt issuance and unpledged tangibility across firms and over time, and Section VI takes a stab at establishing causality using the methodology and data of Campello et al. (2022). Section VII shows that unpledged tangibility also matters for pricing of unsecured debt, especially during market downturns. Section VIII concludes with a discussion of the results and their implications for corporate borrowing, credit cycles, and macroeconomic fluctuations.

I. Theories

A. Cash Flows and Assets

In addition to the reasons stated above why strong prospective cash flows alone may not be sufficient for a firm to borrow, here are more. Borrowers can affect cash flows or threaten to affect them, in Hart and Moore (1994, 1998) by threatening to walk away from the enterprise (or, more generally, by shirking, underinvesting, or risk shifting), and in Diamond, Hu, and Rajan (2020) by weakening accounting and governance over cash flows. Also, firm-generated cash is very liquid and easily hidden or tunneled out of the firm. The accounting and control systems needed to make cash verifiable may be inadequate to the task in some countries and some firms.

Borrowers' ability to impair hard assets such as land is more limited, and lenders' ability to seize hard assets in case of default allows them to make credible threats that enable them to extract repayment even when cash flows are not verifiable. Hard assets, being distinctive, may be hard to tunnel out even with accounting and control systems of modest quality (see Myers and Rajan (1998)). Consequently, hard assets offer comfort to lenders and facilitate borrowing when prospective cash flows are uncertain, unverifiable, or volatile, as in the case of small or risky firms.

Importantly, however, as a firm's cash flows become more sizeable, reliable and pledgeable, they should support financing directly, including debt financing, without necessarily having assets to back them (see Diamond, Hu, and Rajan (2020); Ivashina, Laeven, and Moral-Benito (2022); Lian and Ma (2021)). High cash flows typically are also associated with high going concern value, which gives the borrower something significant to lose if they try and undercut creditor rights, while creditors themselves are likely to remain united in facing the borrower.

Of course, although assets might become less important in determining credit availability at that point, theory does not say that they should be of no importance (see, e.g., Diamond, Hu, and Rajan (2020) where both assets and pledgeable cash contribute to debt capacity). As argued in the introduction, in a firm with multiple creditors, some of who require explicit asset backing and others do not, the firm's going concern value can be enhanced if the value of its collateralizable assets are higher, especially if there is a deterioration in the firm's prospects. Thus, creditors that rely on going concern value for repayment can also benefit if asset values are higher, a form of implicit asset backing.

Any attempt to gauge the importance of assets in borrowing immediately confronts a number of questions. First, what is the role played by securing the debt against specific assets? Is only secured debt "asset based"? Second, even if debt is asset based, should we necessarily see a correlation between debt levels and asset levels? Third, should we be concerned about the going concern value of the assets or the liquidation value of assets?

B. Secured or Unsecured Debt

Is only debt secured by assets "asset-based debt"? Securing debt with an asset requires registering that security interest with a collateral registry. Securing does give debt added protections. If a specific asset is not registered as collateral, it can be sold for cash and the cash can be spirited out of the firm through transfer pricing to related parties, expense padding, or plain theft. So unless the lender has an explicit claim against the asset, they will have little control over its disposal. When debt is secured by specific assets, however, the creditor effectively has some say over whether the assets can be sold, as well as the legal ability to reach the assets if they are sold (under state law "priority right"). If the bankruptcy process is slow and unpredictable, the secured creditor does not have to go to court to reach the asset if they can take possession of it without a breach of the peace ("repossessory right") or has ownership (as with a lease).

When a firm has multiple creditors, with different maturities, seniority, and monitoring capabilities complicating relative priority, debt secured with specific collateral has higher priority relative to other creditors in bankruptcy, and if fully backed, is paid interest in a reorganization (Badoer, Dudley, and James (2020)). Regardless of the initial credit quality of the borrower, we would expect more debt to become secured as bankruptcy nears.

Nevertheless, even if debt is unsecured, assets do matter. After all, all debt has prior recourse to the assets, say ahead of equity, as Rampini and Vishwanathan (2024) emphasize. Thus,

assets that have not previously been used to collateralize debt (that is, unencumbered assets) serve to back unsecured debt if a firm cannot pay off its debts.

Unused collateralizable assets are also a form of financing "slack" (Benmelech, Kumar, and Rajan (2022, 2024)); they allow the firm to undertake profitable investment opportunities (or avoid fire sales of assets) when the environment turns hostile to the firm's unsecured debt issuances (consistent with the theory in Rampini and Vishwanathan (2010), and the survey evidence in Graham (2022) on CFOs' emphasis on retaining financial flexibility). Indeed, Benmelech, Kumar, and Rajan (2022) argue that for firms with significant unpledged assets, yields on unsecured debt are not very different from hypothetical yields on secured debt because unsecured debt can become secured if the need arises, given the plentiful availability of unencumbered assets. Conversely, when most of a firm's collateralizable assets are already pledged to creditors, unsecured debt trades at a price suggesting it cannot become secured, and unsecured debt is effectively unsupported by assets, that is, less asset based.[4]

Finally, as discussed earlier, when a firm has multiple classes of creditors, a larger asset base can enhance going concern value as the firm nears distress, and thus recovery by unsecured creditors. Following these arguments, unsecured debt is not automatically "cash flow based," as the existing literature suggests, but can be implicitly "asset based," as Benmelech, Kumar, and Rajan (2022) and Rampini and Vishwanathan (2024) indicate. Indeed, because some unsecured creditors take security or are replaced by creditors who lend against security as a firm approaches distress, significant amounts of such debt becomes explicitly "asset based" closer to distress.

C. Debt Levels and Asset Levels

The literature typically regresses various measures of debt against various measures of assets (tangible assets, intangible assets, receivables and inventories, liquidation value of assets) to establish whether the debt is asset based. For the test to be effective, the majority of firms being examined must be either financially constrained or must borrow up to their optimal debt level or debt capacity. Since debt capacity is augmented by any support from assets facilitating debt issues, a regression of debt against some measure of assets is a reasonable test of whether debt is "asset based" – we would expect a positive and significant coefficient estimate on the measure of assets.

[4] Indeed, it may well be that the "cash-flow based secured" category of debt proposed by Lian and Ma (2021) and Kermani and Ma (2023) is secured by all residual assets (a blanket lien) precisely because key valuable assets have already been pledged away. Almost by default, then, this kind of debt becomes cash flow based.

However, if firms are not financially constrained (see Rampini and Vishwanathan (2010)) and their debt level is more a residual of other decisions such as internal cash generation (see Myers and Majluf (1984)) rather than driven by conscious optimization or debt capacity, their actual debt level may not have a positive correlation with assets even if their capacity to borrow is supported by assets. We will address this issue later. In the meantime, we recognize that the absence of positive correlation between debt and assets, especially for large, high-cash-generating financially unconstrained firms does not necessarily mean that assets are unimportant to their borrowing capacity.

D. Going Concern Value or Liquidation Value

Should the value of the assets in their best use (usually in the firm as a going concern or at replacement value) or their value in alternative uses (as redeployed after being seized by creditors or in liquidation) be the relevant asset value? Rampini and Vishwanathan (2024) suggest that value in current use is the relevant measure, while Kermani and Ma (2023) focus on liquidation value.

Of course, the right measure depends on how the assets help creditors. If they are facing a situation where the borrower tries to renegotiate debt down in or out of bankruptcy, even as the firm is likely to continue as a going concern, then the creditors' threat is to impair the going concern value of the firm, bolstered or made more credible by their option to lay claim on the replacement value of tangible assets. This may then be the measure of asset support to debt value. On the other hand, if the firm's going concern value is eroded and the best alternative for the firm is liquidation, then the liquidation value of assets is the appropriate basis of debt value.

We use Compustat data, with fairly large firms where liquidation is rare (see Corbae and D'Erasmo (2017)). So the book value of assets, assuming that accounting depreciation approximates true depreciation, is a reasonable proxy for replacement value. It is what we will use.

II. Data

A. Data and Summary Statistics

We use data from Compustat Annual Industrial Files. We focus on industrial firms (SIC codes 2000 to 5999). Several of our empirical tests use information on secured debt, and hence our sample begins in 1981 – the first year in which Compustat consistently covers the item "debt mortgages and other secured debt." Our sample spans the years 1981 to 2022 with 88,873 firm-

year observations in the full sample. Appendix A provides detailed definitions of the variables used in the paper. Table I reports summary statistics for the main variables used in the analysis.

Our main dependent variable in most of our analysis is financial leverage – or *leverage*. We follow Benmelech, Bergman, and Seru (2021) and define *leverage* as total debt (Compustat annual items *dltt*+*dlc*) divided by total assets (Compustat annual item *at*). As Table I shows, the mean [median] financial leverage in our sample is 0.272 [0.242] with a standard deviation of 0.204. Our leverage ratio is slightly lower than the one reported in Benmelech, Bergman, and Seru (2021) mostly because of differences in sample periods and sample construction. Colla, Ippolito, and Li (2020) report an average annual book leverage between 0.226 and 0.308 during the 2002 to 2018 period. We recognize that there are criticisms of this traditional way of proxying for leverage (see, e.g., Welch (2011)), and we address these in the Internet Appendix.

Compustat also reports the item "debt mortgages and other secured debt" for publicly traded US firms starting in 1981. We define *secured debt leverage* in an individual firm as secured debt divided by total assets.[5] Table I presents summary statistics for secured debt. Mean secured debt divided by total assets is 0.101, with a median of 0.026 – which is similar to the mean 10.6% reported by Benmelech, Kumar, and Rajan (2024). We also define *unsecured debt leverage* as unsecured debt divided by total assets.[6] Mean unsecured debt divided by total assets is 0.170, with a median of 0.122 and a standard deviation of 0.173. Table I also provides descriptive statistics on additional explanatory variables used in the analysis. We include the variables pertaining to firm size (in logs), Tobin's Q (proxied for by the market-to-book ratio of assets), profitability (calculated as operating profits divided by total assets), and tangibility (net PP&E divided by total assets).

Following Rajan and Zingales (1995), we control wherever relevant in our regressions for size, Tobin's Q, and profitability while focusing on asset tangibility. To further investigate the role that different assets play in firms' capital structure, we also define *inventory* as the ratio of inventory to total assets and *receivables* as the ratio of receivables to total assets. To analyze how the relationship between tangibility and leverage varies with financial constraints, we construct

[5] The secured debt leverage is defined using the following Compustat items: *dm*/*at,* where *dm* is "debt mortgages and other secured debt" and *at* is total assets.

[6] The unsecured debt leverage is defined using the following Compustat items: (*dltt*+*dlc*-*dm*)/*at*, where *dltt* is "long-term debt – total," *dlc* is "debt in current liabilities," *dm* is "debt mortgages and other secured debt," and *at* is total assets.

three proxies for financial constraints: HP Index (see Hadlock and Pierce (2010)), WW Index (see Whited and Wu (2006)), and the availability of rating from a credit rating agency. We follow the methodology of Farre-Mensa and Ljungqvist (2016) to classify firms as financially constrained or unconstrained using all three proxies. Finally, we also use information on whether a firm is rated investment grade or below investment grade.[7]

We require firms to have a positive value for total assets and non-missing values for leverage, tangibility, profitability, Tobin's Q, and secured debt amount. We also drop firms with leverage greater than 1. We obtain data on firm-level intangible capital stock from Ewens, Peters, and Wang (2024).[8] This measure represents the sum of net knowledge capital and net organizational capital, scaled by book value of total assets. We winsorize all variables at the 1st and 99th percentiles. We adjust all data for inflation to 2004 dollars. We multiply dependent variables by 100 when necessary to facilitate easier representation of regression coefficients.

We start in Section III with revisiting standard correlations between leverage and tangible assets in Compustat data. We also look at the correlation of debt of different maturities and assets of different maturities. These regressions then form the baseline from which we check for the existence of asset-based unsecured debt.

III. Baseline Results: Leverage and Tangibility

A. Overall Leverage and Tangibility

We begin our empirical analysis by examining the relationship between firm-level leverage and tangibility. We estimate the following regression specification:

$$leverage_{i,t} = \beta * tangibility_{i,t-1} + \theta X_{i,t-1} + \delta_i + \lambda_t + \varepsilon_{i,t}, \quad (1)$$

where $leverage_{i,t}$ is the financial leverage of firm i at time t and the key variable of interest is $tangibility_{i,t-1}$, that is, the lagged value of net PP&E scaled by total assets. $X_{i,t-1}$ is a vector that controls for lagged firm characteristics including size, Tobin's Q and profitability, δ_i represents firm or industry (three-digit SIC codes) fixed effects, and λ_t captures year fixed effects, respectively. Standard errors are clustered at the firm level.

[7] Rated firms are those that have a credit rating from S&P, Moody's, or Fitch, using data obtained from Compustat and Mergent FISD.
[8] We obtain these data from Michael Ewens's website: https://github.com/michaelewens/Intangible-capital-stocks.

Column (1) of Table II reports the results from estimating regression (1) without any fixed effects. Columns (2) to (6) present estimates from specifications that include year (column (2)), industry (column (3)), and firm fixed effects (column (4)), year and industry fixed effects (column (5)), and year and firm fixed effects (column (6)).

The coefficients on log(assets), Q, and profitability are in line with those documented in the empirical literature on capital structure (Lemmon, Roberts, and Zender (2008); Rajan and Zingales (1995); Rauh and Sufi (2010)). Larger firms (measured by the logarithm of total assets) tend to have higher leverage ratios, while firms with higher Tobin's Q – or market-to-book ratio – have lower leverage. Finally, in line with numerous empirical studies on leverage, more profitable firms tend to have lower leverage ratios.

Across all the specifications in Table II the coefficient on tangibility is economically large and statistically significant at the 1% level. The point estimate of β in column (6) with firm and year fixed effects suggests that a one standard deviation increase in tangibility is associated with a 9.6% increase in firm leverage. So an increase in a firm's leverage, correcting for simultaneous economywide changes, is strongly positively correlated with increases in the firm's tangibility.[9] In Figure 1, we plot the average residuals of leverage against quartiles of residual tangibility. We obtain residuals of leverage by running the regression specification of column (6) after excluding tangibility as an explanatory variable. Similarly, we obtain residuals of tangibility by running the regression specification of column (6) but using tangibility as the dependent variable. The steady pattern of increasing leverage with increased tangibility, after correcting for other firm characteristics and macroeconomic conditions, is clear.

B. Tangibility and Financial Constraints

The positive association between leverage and tangibility is consistent with the notion that tangible assets serve as useful collateral that mitigate financing constraints and enhance firms' debt capacity (Benmelech and Bergman (2009); Rajan and Zingales (1995)). However, firms' borrowing decisions are ultimately driven by investment needs and financing choices. It is possible that firms with a lower share of tangible assets have a lower demand for debt, rather than limited access to debt financing. Although column (6) of Table II accounts for time-invariant firm

[9] We repeat a number of key analyses performed in the paper after replacing leverage (i.e., debt scaled by assets) with debt scaled by capital, that is, debt/(debt + market value of equity) as the dependent variable. The results are reported in Appendix Table IA.I and are similar to those using leverage as the key dependent variable.

heterogeneity in the demand for debt, it is possible that firms' demand for debt falls concurrently with a reduction in tangible assets.

To mitigate concerns about omitted variables such as investment needs driving the relationship between leverage and tangibility, we exploit cross-sectional heterogeneity in financial constraints faced by firms. Rampini and Viswanathan (2010) argue that in contrast to unconstrained firms that preserve borrowing capacity as a reserve to draw on only when needed, financially constrained firms tend to use all their borrowing capacity, since their marginal returns to investment are high.[10] If tangible assets mitigate financial constraints, the sensitivity of leverage to tangible assets should be greater for firms facing greater financial constraints. On the other hand, there is no reason to expect unobserved investment opportunities to systematically drive the strength of correlation between leverage and tangibility that aligns with financial constraints faced by firms. We now explore this.

B.1. Leverage, Tangibility, and Firm Size

A common proxy for a more constrained firm is its size. The positive correlation of tangibility with leverage should be stronger among smaller firms. A number of empirical studies find smaller firms to be financially more constrained than large firms (e.g., Hadlock and Pierce (2010); Hennessy and Whited (2007); Whited and Wu (2006)). Raising debt financing will be more costly for small, typically younger firms because of their lack of an established reputation and track record in the financial markets, which may hinder their ability to borrow due to adverse selection and incentive problems (Diamond (1989)). They may also not have a stable growth model, established markets, or large positive reliable sustainable cash flows (Kermani and Ma (2023)). As a result, creditors may be more likely to provide credit to those firms only if they have larger stocks of tangible assets.

We divide the firm-year data into three groups, each containing equal number of observations, based on firm size, and we re-estimate equation (1) for each one of the three subsamples. Results are presented in Table III. As measures of a firm's size, we use the either the number of employees (columns (1) to (3)) or an inflation-adjusted book value of total assets

[10] Indeed, consistent with Rampini and Viswanathan's model, firms whose credit quality is lower in the cross-section and whose credit quality deteriorates tend to use secured debt (see, e.g., Benmelech (2024); Benmelech, Kumar, and Rajan (2022, 2024); Colla, Ippolito, and Li (2013); Rauh and Sufi (2010); Roberts (2015)).

(columns (4) to (6)).[11] As Table III indicates, the sensitivity of leverage to tangibility is indeed highest for smaller firms. For example, column (1) of Table III shows that a one standard deviation increase in tangibility for firms in the first tercile of the number of employees (small) is associated with a 15.5% increase in leverage. For *medium*-sized firms (those at the second tercile of number of employees), a one standard deviation increase in tangibility is associated with a 12.2% increase in leverage. In contrast, for large firms – those in the third tercile of number of employees – the association of tangibility with leverage is close to zero and is statistically insignificant. We obtain similar results when we measure size with an inflation-adjusted book value of assets in columns (4) to (6).

B.2. Leverage, Tangibility, and Other Measures of Financial Constraints

To further explore the role of assets in alleviating financial constraints, we divide firm-year observations into groups based on direct measures of financial constraints and examine the sensitivity of leverage to tangibility across the spectrum of financial constraints. We use three different measures of financial constraints: (1) the WW index proposed in Whited and Wu (2006); (2) the HP Index proposed by Hadlock and Pierce (2010); and (3) the availability and level of the credit rating. We start by splitting the firm-level data into three groups based on either WW or HP and re-estimate equation (1) for each one of the three subsamples and report the results in Table IV. As is standard in the literature, we use lagged values of either WW or HP in sorting the data (see Farre-Mensa and Ljungqvist (2016) for a detailed methodology for constructing the terciles based on these measures and a discussion of standard practices used in this literature). Firm-year observations belonging to the group with highest index value are considered financially constrained while firms in the group with the lowest value are considered financially unconstrained.[12]

As Table IV demonstrates, firms in the financially constrained group show a strong sensitivity of leverage to tangibility while firms in the unconstrained group show no relationship

[11] The cutoffs for employee groups are: less than 303 employees (small), 304–2,500 employees (medium), and greater than 2,500 employees (large). The cutoffs for asset size groups are: less than $55.28 million (small), $55.28 million–$438.91 million (medium), and greater than $438.91 million (large) in 2004 dollar terms.

[12] The cutoffs for WW Index values that split the sample into three groups containing equal number of observations are: less than −0.288 (low constraints), between −0.288 and −0.153 (medium constraints), and greater than −0.153 (high constraints). The cutoffs for HP Index are: less than −3.37 (low constraints), between −3.37 and −2.56 (medium constraints), and greater than −2.56 (high constraints).

between tangibility and leverage, correcting for year and firm fixed effects.[13] Column (1) of Table IV shows that a one standard deviation increase in tangibility for firms that are most financially constrained based on the WW index is associated with a 13.8% increase in leverage. Similarly, as column (2) demonstrates, firms with medium levels of WW have a somewhat lower sensitivity, with a one standard deviation increase in tangibility associated with a 11.8% increase in leverage. For the least constrained firms (column (3)), the partial correlation of tangibility with leverage is close to zero and is statistically insignificant. We obtain similar results when we use the HP index of financial constraints.

Firms with a credit rating are generally believed to be less financially constrained because they have access to arm's length credit markets (Faulkender and Petersen (2006); Goldstein and Huang (2020)). Moreover, the rating process itself reduces information asymmetries between the firm and investors, thereby mitigating the need for asset backing (see, e.g., Whited (1992)). Consistent with this, we find that firms without a credit rating show a strong relationship between leverage and tangibility with a one standard deviation increase in tangibility associated with a 13.0% increase in leverage (column (7)). Firms rated below investment grade show a positive but weaker association. For these firms, a one standard deviation increase in tangibility is associated with a 3.6% increase in leverage (column (8)). Finally, investment-grade-rated firms show a negative relationship with tangibility. While the results in Table IV are widely known, it makes the point in a variety of ways in order to establish a common baseline for our further analysis.

C. Which Assets Matter for Leverage?

Property, plant, and equipment are not the only collateral that firms can pledge. Firms often use inventories and receivables to obtain secured financing (Luck and Santos (2023)). Increasingly, firms can use intangibles such as patents and other intellectual property as collateral (see, e.g., Mann (2018)). To evaluate the importance of each of these assets in supporting firm borrowing, we re-estimate equation (1), introducing each asset individually as the primary explanatory variable. We report the results from this analysis in columns (2) to (4) of Table V. To facilitate comparison, column (1) of Table V reproduces the result from the analysis of the sensitivity of leverage to tangibility reported in column (6) of Table II.

[13] We get similar results when we divide firms into groups based on their time-series average values. This ensures that firms do not change their group over time. See Appendix Table IA.II for the results.

Recall the coefficient on tangibility in column (1) indicates that a one standard deviation increase in tangibility is associated with a 9.6% increase in firm leverage. In column (2), the coefficient on inventory is positive and statistically significant at 1% level and indicates that a one standard deviation increase in inventory is associated with a 3.4% increase in firm leverage. In column (3), the coefficient on receivables is small and statistically insignificant, suggesting that leverage does not depend on receivables. We revisit the sensitivity of leverage to receivables in the next subsection where we focus on debt maturity.

A notable feature of firms in the twenty-first century is the considerable rise of intangible assets. While some intangible assets may not support firm borrowing to the same extent as tangible assets (for example, if intangible assets' value is likely to be more uncertain than the value of tangible assets; enforcing security interests is likely more difficult for intangible assets; and intangible assets are less alienable or redeployable than tangible assets), Kermani and Ma (2023) note the positive association of leverage with intangibles. Moreover, firms have increasingly been successful in pledging intangible assets including patents as collateral (see, e.g., Ma, Tong, and Wang (2022); Mann (2018)). Column (4) examines the sensitivity of leverage to intangible assets. The coefficient on intangibles is positive and statistically significant at 1% level. The coefficient suggests that a one standard deviation increase in intangibles is associated with 3.7% increase in firm leverage.

Finally, we include all these asset types in a single regression and report the results in column (5). The point estimates and statistical significance of each asset type are comparable to those reported in columns (1) to (4). These results suggest that PP&E, inventories, and intangibles are all strongly positively associated with leverage. However, tangible assets are economically more important in determining total firm leverage compared to inventories, intangibles, and receivables.

D. Assets and Debt Maturity

The nature of assets may influence not only the amount of debt a firm can take but also the maturity of its debt (Custódio, Ferreira, and Laureano (2013); Morris (1976); Myers (1977)). For instance, if assets turn over quickly, the borrower has plenty of scope to alter the nature of the asset unfavorably for the lender if the loan is long-term (e.g., Jensen and Meckling (1976); Myers and Rajan (1998)). Conversely, if the asset is of long duration (e.g., property or a project), while the

loan is short-term, the borrower is subject to an unfavorable liquidity risk (see Diamond (1991)). These arguments would suggest some extent of maturity matching between assets and debt.

To examine this, in Table VI we repeat the analysis of Table V separately for short- and long-term debt. We define short-term leverage as debt in current liabilities (Compustat item *dlc*) minus long-term debt due in one year (Compustat item *dd1*), scaled by book value of assets.[14] Similarly, we define long-term leverage as long-term debt total (Compustat item *dltt*) plus long-term debt due in one year (Compustat item *dd1*), scaled by book value of assets.

To facilitate comparison, column (1) of Table VI reproduces column (5) of Table V. To recap, a one standard deviation increase in tangibility, inventory, and intangibles is associated with an increase of firm leverage by 9.8%, 3.5%, and 2.9%, respectively, whereas receivables do not seem significantly associated with leverage. Column (2) presents results from the analysis where the dependent variable is short-term leverage. The coefficient on tangibility suggests that a one standard deviation increase in tangibility is associated with a 6.4% increase in short-term leverage. This is lower than the 9.8% increase in leverage reported in column (1). The coefficient on inventory suggests that a one standard deviation increase in inventory is associated with a 36.5% increase in short-term leverage. This is considerably greater than the 3.5% increase in leverage reported in column (1). Moving on to receivables, a one standard deviation increase in receivables is associated with a 20.1% increase in short-term leverage. Note that the association of receivables with total leverage was close to zero. Finally, intangibles are not related to short-term leverage.

Column (3) presents results from the analysis where the dependent variable is long-term leverage. The coefficients on tangibility and intangibles are positive and statistically significant, while the coefficients on inventory and receivables are both negative and significant. The coefficient on tangibility suggests that a one standard deviation increase in tangibility is associated with a 10.5% increase in long-term leverage. This is greater than the 9.8% increase in leverage reported in column (1) and more than the 6.4% increase in short-term leverage reported in column (2). The coefficient on inventory suggests that a one standard deviation increase in inventory is

[14] The intent here is to look at debt maturity as issued, which may be more related to the underlying asset maturity, and not to focus on the residual maturity at any point in time, which may be less intentional. When we use residual maturity, results are similar except for the effect of intangibles. Short-term leverage is positively related to intangibles, and long-term leverage is positively related but insignificant.

associated with a 2.7% reduction in long-term leverage. Similarly, a one standard deviation increase in receivables is associated with a 3% fall in long-term leverage. Liquid short-term assets do not appear supportive of long-term leverage.[15]

Finally, the coefficient on intangibles suggests that a one standard deviation increase in intangibles is associated with a 2.4% increase in long-term leverage. Overall, while tangibility and intangibles seem positively associated with long-term leverage, inventory and receivables are more related to short-term leverage.

E. Tangibility and Unsecured Debt

Having established the basic correlations, we turn to the central focus of the paper: tangible assets not only act as useful collateral for secured borrowing but can also implicitly support a firm's unsecured debt capacity (Benmelech, Kumar, and Rajan (2022); Rampini and Viswanathan (2024)). In other words, assets may also allow firms to borrow more on an unsecured basis. We directly address the baseline hypothesis by estimating the following regression specification:

$$unsecured\ leverage_{i,t} = \beta * tangibility_{i,t-1} + \theta X_{i,t-1} + \delta_i + \lambda_t + \varepsilon_{i,t}, \qquad (2)$$

where $unsecured\ leverage_{i,t}$ is defined as unsecured debt divided by total assets of firm *i* at time *t*. All explanatory variables remain the same as in equation (1). As column (1) of Table VII shows, in the full pooled sample when we include year and industry fixed effects, or in column (2) when we include year and firm fixed effects, the point estimate of tangibility is not statistically significant.[16]

Next, similar to the analysis presented in Table III, in columns (3) to (5) of Table VII we divide the firm-year level data into three firm size groups, each with an equal number of observations, based on firm size, and we re-estimate equation (2) for each one of the three subsamples.[17] The coefficient on tangibility in column (3) suggests that a one standard deviation increase in tangibility for small firms is associated with a 4.5% increase in unsecured leverage compared to the unconditional mean for this firm-group. Moving on to medium-sized firms, we

[15] The negative correlation would emerge if they do not support long term borrowing but add to assets, which is a denominator on the left hand side.
[16] As column (2) of Table VII shows, using year and firm fixed effects leads to a larger and positive point estimate, albeit not statistically significant.
[17] We obtain similar results by using number of employees as the measure of firm size.

find that the coefficient on tangibility in column (4) is positive but not statistically significant. Finally, the coefficient on tangibility for large firms in column (5) is negative but small in magnitude and not statistically significant.

When we divide firm-year observations into groups based on the WW index of financial constraints and re-estimate equation (2) for each one of the three subsamples (columns (6) to (8) of Table VII), firms in the high and medium financially constrained group show a strong sensitivity of unsecured leverage to tangibility, but tangibility and unsecured debt usage seem to not be significantly correlated for unconstrained firms.[18]

Similarly, we find that firms without a credit rating show a strong positive relationship between unsecured leverage and tangibility, firms with a rating but below investment grade show no relationship between unsecured leverage and tangibility, while investment-grade-rated firms have a negative relationship (reminiscent of Lian and Ma (2021), who find a negative association between tangibility and cash-flow based debt for their overall sample).

In sum, unsecured debt and tangibility are positively associated, but only for smaller, financially constrained, or unrated firms. Could the relationship in the broader set of firms be masked by the act of securing debt? We consider this question next.

IV. Tangibility, Secured Interests, and Unsecured Debt

A. Secured Debt and Unsecured Debt

Assets are available to support unsecured debt only when they have not been previously pledged as collateral for other debt.[19] This means that a sharper test of whether debt benefits from asset backing is to correct for secured interests. In Table VIII, we analyze the association between unsecured debt usage and tangibility separately for firms with different levels of secured debt on their balance sheet. The estimates for equation (2) for subsamples are reported in Table VIII.

In column (1), we estimate the coefficient on tangibility for firms without any secured debt on their balance sheet (we report regressions with firm and year fixed effects; estimates with other fixed effects are available from the authors). A one standard deviation increase in tangibility is

[18] The results are similar when we use the HP Index as the measure of financial constraints.
[19] Of course, if debt is overcollateralized, the unneeded assets support other debt.

associated with a 6.8% increase in unsecured leverage – recall that the coefficient estimate was not significantly different from zero in the full sample (column (2) of Table VII).

Next, we split the remaining sample of firms (all with positive secured leverage) into two groups. The coefficients on *tangibility* in column (2), the set of firms with secured leverage < 7.3% (the median value among firms with positive secured leverage), is smaller but still statistically significant compared to the estimate in column (1); a one standard deviation increase in tangibility is associated with a 4.9% increase in unsecured leverage. In column (3), we repeat the analysis for firms with an above-median value of secured leverage, and the coefficient on tangibility is yet smaller; a one standard deviation increase in tangibility is associated with a 3.8% increase in unsecured leverage.

So as a firm secures more of its assets, the association between tangibility and unsecured debt weakens. This is partly because secured creditors have a first claim on tangible assets – it is the residual or unpledged collateral that is likely to support unsecured debt.[20] Relatedly, it may also be that once a significant portion of assets is secured, the collateral rat race ensures that the firm finds it hard to issue unsecured debt – the premium unsecured debt demand becomes very high (see Benmelech, Kumar, and Rajan (2022)).

B. Unpledged Tangibility and Unsecured Debt

To test directly how securing debt with assets modulates the effect of tangibility on debt capacity, we create a measure of unpledged collateral at the firm level. *Unpledged tangibility* equals net property, plant, and equipment (Compustat item *ppent*) minus secured debt (Compustat item *dm*). To allow comparison with previous tables explaining levels of debt, we scale by the book value of total assets (Compustat item *at*), but we could also scale this by tangible assets instead (results available from the authors are qualitatively similar). We then estimate the following regression specification:

$$unsecured\ leverage_{i,t} = \beta * unpledged\ tangibility_{i,t-1} + \theta X_{i,t-1} + \delta_i + \lambda_t + \varepsilon_{i,t}. \qquad (3)$$

[20] Under the US Bankruptcy Code, unsecured creditors have a claim only to those assets that remain after secured claims and the claims of certain priority unsecured creditors (including postbankruptcy administrative claims and wage and other compensation-related claims) are paid or provided for (Bebchuk and Fried (1996)).

In contrast to the estimate in column (2) of Table VII, which shows no significant association between unsecured debt and tangible assets, column (1) of Table IX suggests a strong positive correlation between unsecured debt usage and unpledged tangible assets; a one standard deviation increase in unpledged tangibility is associated with a 14.4% increase in unsecured leverage compared to the sample mean level of unsecured leverage.[21]

In Figure 2, we plot the residuals of unsecured leverage against quartiles of residual unpledged tangibility. We obtain residuals of unsecured leverage by running the regression specification of column (1) after excluding unpledged tangibility as an explanatory variable. Similarly, we obtain residuals of unpledged tangibility by running the regression specification of column (1) but using unpledged tangibility as the dependent variable. The steady pattern of increasing unsecured leverage with increased unpledged tangibility is clear.

In column (2), we estimate the coefficient on tangibility and secured leverage separately. The coefficient on tangibility is now positive and statistically significant at the 1% level, suggesting that the association in column (2) of Table VII was being masked because we did not correct for secured leverage. In column (3), we include the interaction term *tangibility*secured debt*. The coefficient estimate on the interaction term between secured debt and tangibility is negative and statistically significant at the 1% level. This suggests that as secured borrowing increases, the positive association between tangibility and unsecured leverage becomes weaker – consistent with our findings in Table VIII. For instance, when calculated at the 25th percentile value of secured leverage, a one standard deviation increase in tangibility is associated with a 9.8% increase in unsecured leverage. However, at the 75th percentile value of secured leverage, a one standard deviation increase in tangibility is associated with a lower 6.5% increase in unsecured leverage. This again suggests that previously pledged assets do little to support unsecured borrowing, indeed may make it harder to borrow unsecured.

Since unsecured debt is calculated by subtracting secured debt from total debt and, similarly, unpledged tangibility in our analysis above is calculated by subtracting secured debt from tangible assets, concern might arise about a potential mechanical correlation in Table IX

[21] Even large, unconstrained firms show a positive and statistically significant association between unsecured leverage and unpledged tangibility—see Appendix Table IA.III.

stemming from subtracting a common term that has a potential measurement error. We do note that columns (2) and (3) mitigate this concern somewhat. As a further robustness test, we obtain unsecured and secured debt information from Capital IQ, where the measurement error for secured debt should differ from that in Compustat.[22] Capital IQ data start in 2002. After merging firms in our sample with Capital IQ and requiring that firm-level total debt in Capital IQ is within 10% of the total debt reported in Compustat, we are left with 25,979 firm-year observations. We replicate the analysis from Table IX using the secured and unsecured debt measures from Capital IQ for this restricted sample (and the unpledged tangibility measure from Compustat) and find similar results, as reported in Appendix Table IA.IV.

C. Debt vs. Net Debt

While we define leverage as debt divided by the book value of assets, an alternative leverage definition uses net (of cash) debt (i.e., debt minus cash and equivalents, scaled by book value of assets). The rationale behind net leverage is that cash in hand can always be used to pay off debt. For instance, Hennessy and Whited (2005) develop a dynamic trade-off model that incorporates net leverage, while Lambrecht and Pawlina (2012) propose a theory of transferable human capital in which firms target a net leverage ratio that could be negative for human capital intensive firms. Similarly, Gamba and Triantis (2008) and Acharya, Almeida, and Campello (2007), view leverage and cash as jointly determined as part of a firm's financing and capital structure policy. As a robustness, we re-estimate our main analyses using net leverage instead of leverage and confirm that all results hold. For brevity, we present these results in the Internet Appendix.

Appendix Table IA.V reports results for the full-sample as well as for subsamples based on measures of financial constraints. As the table shows, net leverage is positively associated with tangibility, with this relationship being stronger for financially constrained firms. Appendix Table IA.VI documents a similar relationship between *net unsecured leverage* and tangibility. We defined net unsecured leverage as total unsecured debt minus residual cash and equivalents, scaled by book value of assets. Residual cash and equivalents is computed as cash and equivalents minus secured debt. In doing so we assume that since secured debt has priority over other types of debt, it will be paid with cash before unsecured debt. If secured debt is greater than cash and equivalents, residual

[22] Capital IQ examines the footnotes in corporate SEC filings to classify each individual debt as either secured or unsecured and aggregates these debt items to construct firm-level measures of secured and unsecured debt.

cash and equivalents is set to zero.[23] Furthermore, Appendix Table IA.VII shows that the relationship between net unsecured leverage and tangibility is stronger for firms with zero or low secured debt but weaker for firms that have already pledged a considerable amount of collateral to secured lenders. Finally, Appendix Table IA.VIII shows that net unsecured leverage is strongly and positively associated with unpledged assets.[24]

Overall, our analysis in this section suggests the issuance of secured debt may mask the importance of asset backing for unsecured debt, the predominant form of corporate debt issuance. However, we have not exhausted the reasons why it may be hard to see asset backing in the data.

V. Leverage, Issuance, and Tangibility over Time

There are other reasons why it may be hard to see asset backing in the data, especially for the largest, least financially constrained, most highly rated firms. They may be fundamentally different, relying on cash flows rather than on tangible assets for borrowing because they have established reputations for probity or because they are resolved differently in bankruptcy (e.g., reorganized rather than liquidated). Not unrelatedly, they might be distant from conditions that would cause lenders to worry about repayment. As yet another possibility, they simply may not be at their debt capacity, so actual borrowing is a noisy indicator of their capacity to borrow.

One way to shed more light on these is to see whether correlations for the same firms become more pronounced when they become more credit constrained (when leverage is closer to debt capacity as in Rampini and Vishwanathan (2010)). Another is to combine this idea with debt issuances, based on the premise that issuers are more likely to approach their debt capacity when they have substantial positive net issuances, especially in bad economic times. A final way is to

[23] We obtain similar results using two alternative definitions of net unsecured leverage – (i) unsecured debt minus cash and equivalents, scaled by the book value of assets; and (ii) unsecured debt minus (unsecured debt/total debt)*cash and equivalents, scaled by the book value of assets.

[24] Alternatively, one might be tempted to treat cash holdings as an independent variable and include it as a control. However, this approach can be problematic if cash is jointly determined with debt as a part of the capital structure decision rather than an asset that is determined exogenously. Moreover, controlling for both tangibility and cash in the same regression presents another challenge –Cash and PP&E are significant components of total assets. As a result, scaling these variables by total assets mechanically induces a negative correlation between them. To address this issue, we use capital (i.e., book value of assets plus market value of equity) instead of book assets as the scaling variable. Even when treating cash as an independent variable, we continue to find a strong positive association between unsecured debt and unpledged tangibility (results available upon request).

look at bond pricing rather than debt quantities and see if asset backing influences unsecured bond spreads, especially in bad times – an issue we take up in Section VII.

A. Leverage and Tangibility for Rating Switchers

We have seen that leverage is not positively associated with tangibility for highly rated firms. To check whether this is an intrinsic attribute of the firm and the nature of its business or assets, we examine "switchers": firms that were rated investment grade during part of our sample period and below investment grade during another. Specifically, we analyze the relationship between leverage and tangibility for the same set of firms using the specification in Table IV, columns (8) and (9), when they were rated below investment grade and again when they were rated investment grade. The results of this analysis are reported in Table X.

Out of a total of 9,601 firm-year observations for below-investment-grade firms in our sample, 2,457 are from firms that were also rated investment grade during the sample period. There are 3,267 investment-grade observations for these "switching" firms. The coefficient on tangibility estimated using observations when these firms are rated below investment grade in column (1) is positive and statistically significant at the 5% level. The coefficient suggests that a one standard deviation increase in tangibility is associated with an 8.7% increase in firm leverage. However, the same set of firms do not show any association between leverage and tangibility when they are rated investment grade. The coefficient on tangibility in column (2) is small and statistically insignificant. The coefficient on tangibility in column (1) is statistically greater than the coefficient on tangibility in column (2) at the 10% level.

Table X suggests that when a firm is doing well, its debt level does seem to be dissociated from its assets but not so when it does poorly. Importantly, since the same firms are in both subsamples, the estimates suggest that the measurable association of leverage with assets is not necessarily a fixed property of the nature of assets or of the form of eventual bankruptcy but instead related to the firm's changing economic conditions.

B. Macroeconomic Conditions, Issuances, and Sensitivity to Tangibility

Although the lack of association between debt levels and assets for highly rated firms may be because lenders are focused on cash flows rather than assets, it may also be because they are far from debt capacity and don't need to borrow. To address this, we switch our focus from leverage levels to net debt issuance (the "net debt issuance" here refers to an increment in debt

stock, that is net of repayments. Recall that "net debt" earlier referred to the stock of debt net of cash. Any confusion in the multiple interpretations of the word "net" are regretted, but we are trying to stick to common usage). The consequences of asset backing should be most identifiable when firms make net debt issuances that take them closer to their debt capacity.

Moreover, a rich literature in finance and macroeconomics argues that economic downturns reduce firms' cash flows, liquid assets, and net worth, reducing their ability or willingness to repay debt from cash flows (see, e.g., Bernanke and Gertler (1989, 1995); Kiyotaki and Moore (1997)). From the supply side, banks reduce their lending during periods of tighter monetary and worse economic conditions, and their portfolios shift to safer loans (Bernanke, Gertler, and Gilchrist (1996); Jimenez et al. (2012); Lang and Nakamura (1995)). So downturns should make debt issuance more sensitive to collateral, even for normally unconstrained firms.

We estimate the following regression specification:

$$net\ debt\ issuance_{i,t} = \alpha * unpledged\ tangibility_{i,t-1} + \beta * Z_t + \gamma * unpledged\ tangibility_{i,t-1} * Z_t + \theta X_{i,t-1} + \delta_j + \varepsilon_{i,t}, \quad (4)$$

where $net\ debt\ issuance_{i,t}$ is the change in total debt of firm *i* from time *t*−1 to time *t* scaled by beginning of period's total assets, and $unpledged\ tangibility_{i,t-1}$ is the lagged value of net PPE minus secured debt scaled by total assets. We focus on unpledged tangibility rather than overall tangibility because unencumbered collateral directly supports net debt issuances. Z_t is a vector of macroeconomic and market variables. $X_{i,t-1}$ is a vector that controls for lagged firm characteristics including size, Tobin's Q, and profitability, and δ_j represents industry fixed effects. All firm and macro variables are at annual frequency. Standard errors are clustered at the firm level.

The direct correlation between net debt issuance and unpledged tangibility (unlike the correlation with tangibility) is hard to sign. Firms that don't borrow at all will, ceteris paribus, have high unpledged tangibility, while firms that borrow heavily may have little unpledged tangibility. At the same time, unpledged tangibility can facilitate additional borrowing. The key variable of interest in regression (5) is the interaction term $unpledged\ tangibility_{i,t-1} * Z_t$, which captures the degree to which the sensitivity of net debt issuance to unpledged tangibility varies with macroeconomic or market conditions. We report the results from estimating regression (4) in Table XI. We use the Baa–Aaa spread as a measure of tightness in market conditions and real GDP

growth rates and NBER recession indicators as measures of macroeconomic conditions.[25] Column (1) reports results where we use the Baa–Aaa spread as our time-series variable. The coefficient on unpledged tangibility is negative but not statistically significant, the coefficient on Baa–Aaa spread is negative, and the coefficient on the interaction term between these two variables is positive. Let us first focus on the effect of the Baa–Aaa spread on net debt issuance. The regression result suggests:

$$\frac{\partial net\ debt\ issuance}{\partial Baa - Aaa\ spread} = -2.015 + 2.672 * unpledged\ tangibility. \quad (5)$$

Equation (5) suggests that net debt issuance falls as the Baa–Aaa spread increases (i.e., market condition tightens), and this negative effect is mitigated as firm-level unpledged tangibility increases. What about unpledged tangibility? Net debt issuance is unrelated to unpledged tangibility when the Baa–Aaa spread is zero (the coefficient is not statistically significant) but matters when the spread widens and market conditions tighten. In terms of economic magnitude, one standard deviation increase in unpledged tangibility is associated with a 5.9% increase in net debt issuance when the Baa–Aaa spread is at the 25th percentile level (i.e., during relatively better market conditions) and a 11.6% increase in net debt issuance when Baa–Aaa is at the 75th percentile level (i.e., when market conditions are relatively tighter).

Column (2) reports results where we focus on real GDP growth and Column (3) reports results where we focus on the NBER recession indicator as our measures of economic conditions. The coefficient estimates are as expected.

Arguably, the association of unpledged tangibility with net issuances is more visible in the cross-section of firms, but we should also see some association within firms over time. In columns (4) to (6), we add firm fixed effects to the regressions in columns (1) to (3). The coefficient estimates on the interaction are all the expected sign, but the estimate on the interaction on unpledged tangibility with the Baa–Aaa spread loses statistical significance. Finally, for robustness, in columns (7) to (9), we replace unpledged tangibility with tangibility. The coefficient estimates are as expected.

[25] We obtain data on real gross domestic product in chained 2017 dollars from FRED Economic Data hosted by St. Louis Fed; the recession indicator dummies are based on data from the NBER's Business Cycle Dating Committee; and the Baa–Aaa credit spread is calculated using Moody's Seasoned Baa and Aaa corporate bond yields data, obtained from FRED Economic Data hosted by St. Louis Fed.

VI. Causality

Thus far, we have been careful to emphasize that we have documented associations not causality. Ideally, we would check if an exogenous increase in the value of a firm's tangible assets, unrelated to a firm's investment opportunities, leads to an increase in the firm's unsecured debt.

We follow Campello, Connolly, Kankanhalli, and Steiner (2022) who determine changes in value of a firm's real estate holdings driven by plausibly exogenous changes in local real estate prices unrelated to firm fundamentals. We thank Eva Steiner for sharing her data, which determines from a near-universal database of commercial real estate transactions the value, location, and end-use of firms' real estate holdings in the U.S. over the 2000-2017 period. Campello et al. (2022) link this dataset to debt issuance data from Capital IQ. They classify debt issuance into unsecured issuance as well as secured issuance backed by various collateral types. We use their dataset and regression specifications to test the key hypothesis of our paper – does the increase in an *unconstrained* firm's real estate holdings lead to an increase in its unsecured debt issuance.

While earlier papers (Chaney et al., (2012), Cvijanovic (2014), Lin (2016), among others) have used real estate price movements in the location of a firm's headquarter to proxy for changes in the value of the firm's entire real estate holdings, Campello et al. (2022) obtain data on the locations of each firm's real estate holdings across the United States. They thus track the market value of each real estate property using local (CBSA) real price appreciation. To alleviate concerns that local real estate prices may endogenously respond to local investment opportunities or other firm fundamentals, Campello et al. follow Saiz (2010) and regress CBSA-level real estate (RE) price indices as a joint function of two plausibly exogenous instrumental variables – local land supply elasticity based on land availability as measured by satellite imaging and the national mortgage rate. They then use this predicted CBSA-level RE index to construct a firm-level measure of RE value plausibly driven by changes in local real estate values that are unrelated to firm fundamentals.

Following Campello et al. (2022), we estimate the following model relating firms' debt issuance to the value of their real estate holdings:

$$Debt_{i,t} = \alpha_i + \beta_{l,t} + \gamma RE\ Value_{i,t-1} + \theta Controls_{i,t-1} + \varepsilon_{i,t}, \quad (7)$$

where $Debt_{i,t}$ denotes alternative measures of debt issuance (scaled by lagged fixed assets) by firm i in year t. α_i are firm fixed effects and $\beta_{l,t}$ are headquarter location×time interacted fixed effects (CBSA l in year t). The firm fixed effects account for firm-specific characteristics that affect debt and real estate holdings, such as the headquarter location and the industry in which a firm operates. The second set of fixed effects captures location and time-specific shocks in firms' headquarter CBSAs. *RE Value*$_{i,t-1}$ is the instrumented market value of real estate owned by firm i in year $t-1$, scaled by lagged fixed assets. The resulting estimates contrast debt issuance of firms headquartered in the same CBSA, in the same year, as a function of differences in the value of their real estate portfolio holdings. *Controls* is a vector of firm-level, time-varying covariates; namely, cash flow, Q, size, and establishment-portfolio growth (which measures local economic conditions across CBSAs in which a firm operates). Standard errors are clustered by CBSA×year.

Since our interest is in issuances by unconstrained firms, we restrict the Campello et al. sample to financially unconstrained firms based on WW Index (columns (1)-(2)) or investment grade rating (columns (3)-(4)), and present the results from estimating Eq. (7) in Table XII.[26] Starting with financially unconstrained firms based on WW Index, column (1) presents the results for secured debt issuance as the dependent variable, while column (2) reports results for unsecured debt issuance. The coefficient on *RE Value*$_{i,t-1}$ in column (1) is positive but statistically insignificant, suggesting unconstrained firms do not reliably increase their secured debt issuance in response to an exogenous increase in the value of their real estate holdings. More importantly, the coefficient on *RE Value*$_{i,t-1}$ in column (2) is positive and statistically significant at the 5% level. The coefficient suggests that a one standard deviation increase in *RE Value*$_{i,t-1}$ increases unsecured debt issuance by 117%. Investment grade rated firms exhibit a similar behavior (see columns (3)-(4)), with firms issuing more unsecured debt in response to an increase in the value of real estate holdings. These results offer stronger causal evidence than our previous analysis that tangible assets such as real estate support unsecured debt issuance for a broad cross-section of firms in the United States. If indeed creditors are less inclined to require debt to be secured when there is plenty of available security, then the results in Table XII are precisely what we would expect – as the value of underlying collateral goes up, more debt is issued, but much of it is unsecured.

[26] We find similar results for unconstrained firms when we use other ways of sorting into unconstrained and constrained such as firm size, number of employees, or HP Index.

VII. Asset Backing and the Pricing of Unsecured Debt

Certainly in normal times, but even in bad times, cash-generating firms may not need to issue much debt. In that case, debt or issue quantities may not tell us much about how their debt capacity relates to their assets. However, if assets support unsecured debt, this should be reflected in debt pricing even when a firm has not issued much debt. Specifically, all else being equal, a higher amount of unpledged tangibility should lead to lower spreads on unsecured debt. And if assets are particularly helpful in borrowing in bad times, the spread effect should be more pronounced then.

A. Tangible Assets and Pricing of Unsecured Debt

To test this hypothesis empirically, we obtain bond issuance data from Mergent Fixed Income Securities and supplement the issuance data with information on secondary bond trades from the Trade Reporting and Compliance Engine (TRACE) database.[27] TRACE reports dates, implied yields, and prices at which bonds trade. We follow Benmelech, Kumar, and Rajan (2022) in cleaning the data and creating a measure of bond spread from secondary market trading prices. We augment the data with information on bond characteristics (security, seniority, and so on) from Mergent. We retain only senior unsecured bonds for this analysis. Finally, we merge this dataset to our baseline Compustat sample in order to obtain firm characteristics.

To examine the effect of available tangible assets on unsecured bond spreads, we estimate the following regression specification:

$$spread_{i,j,t} = \beta_1 * unpledged\ tangibility\ share_{j,t} + \beta_2 * X_{j,t} + \theta * Z_{i,t} + \delta_j + \lambda_t + \varepsilon_{i,t}, \quad (8)$$

where $spread_{i,j,t}$ is the spread for unsecured bond *i* of firm *j* at time *t*. Note that in the earlier debt level regressions, the dependent variable was some form of debt scaled by assets, so explanatory variables such as tangible assets or unpledged tangible assets were appropriately scaled by assets. Here, the dependent variable is the bond interest rate spread, so the choice of scaling for explanatory variables is more open. Arguably, the share of tangible assets that are unpledged should indicate the room for more pledging, and affect spreads. So the key explanatory variable of

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

interest is $unpledged\ tangibility\ share_{j,t}$, which is net property, plant, and equipment (Compustat item *ppent*) minus secured debt (Compustat item *dm*), scaled by net property, plant, and equipment. $X_{j,t}$ is a vector that controls for firm characteristics, importantly including tangibility but also credit rating, leverage, asset size, Tobin's Q, and profitability, while $Z_{i,t}$ controls for bond characteristics such as maturity, amount, and presence of covenants. Finally, δ_j represents firm or industry (three-digit SIC codes) fixed effects, and λ_t captures year fixed effects. Standard errors are clustered at the firm level. We report the results from this analysis in Table XIII.

Before estimating our regression specification, we must address a potential challenge: bond spreads are closely linked to firm credit risk, which we measure using issuer credit ratings. These ratings are influenced by various firm characteristics, potentially including unpledged collateral – our key variable of interest. Consequently, a naive regression that includes both firm credit rating and unpledged collateral as explanatory variables might not reveal a negative association between bond spreads and available collateral, even if such a relationship exists.

To address this issue, we first test directly whether the senior unsecured credit rating reported in Mergent's *Ratings* file is influenced by the firm's available collateral.[28] Following Benmelech (2017), we estimate firm credit ratings based on firm characteristics. We construct an ordinal variable, *Credit Rating Score*, which assigns a value of one for an AAA rating, two for AA+, three for AA, and so forth. The results of this analysis are reported in column (1) of Table XIII. The coefficient on the unpledged tangibility share is negative and statistically significant at the 1% level, and implies that a one standard deviation increase in unpledged tangibility share is associated with an improvement in the credit rating by 0.3 notches (a lower credit rating score refers to a better credit rating). It is worth noting that unpledged tangibility share and other firm characteristics are likely to be highly correlated, which may lead to an underestimation of the association of unpledged collateral on ratings. In Appendix Table IA.IX, we include one firm characteristic at a time alongside unpledged tangibility share and find that the economic impact of unpledged tangibility share nearly triples.

[28] Mergent's *Ratings* file contains bond-level ratings from S&P, Moody's, and Fitch. We use the senior unsecured bond rating as the measure of issuer rating.

Having established that firm credit ratings are associated with unpledged collateral, we estimate the effect of unpledged collateral on unsecured bond spreads using equation (8). Instead of controlling for firm credit risk using the issuer rating, we directly control for all firm characteristics used in column (1) to estimate firm credit risk. We report the results from this analysis in column (2). The coefficient on unpledged tangibility share is negative and statistically significant at the 5% level. The coefficient suggests that a one standard deviation increase in unpledged tangibility share is associated with a 15.2 basis points lower credit spread. Since this specification may again lead to similar concerns that unpledged collateral and other firm characteristics are likely to be highly correlated, Appendix Table IA.X reports results where we include one firm characteristic at a time alongside unpledged tangibility share. The results suggest that a one standard deviation increase in unpledged tangibility share is associated with a 30 basis point lower credit spread on average.

As another robustness check, we construct our own version of firm credit risk using a regression specification similar to the one used in column (1). Specifically, we include all firm characteristics *excluding* unpledged tangibility share to estimate a credit rating score. We then use the predicted credit rating score from this regression as the measure of firm credit risk and re-estimate equation (8). We report the results from this analysis in column (3). Not surprisingly, we find a strong positive association between the predicted rating score (a higher score denotes a worse credit rating) and unsecured bond spreads. A one-notch deterioration in the predicted rating is associated with a 32 basis points higher bond spread. More important, after controlling for this measure of credit risk, we find a strong negative relationship between unpledged tangibility share and bond spread. A one standard deviation increase in unpledged tangibility share is associated with an 18 basis points lower unsecured bond spread.

B. Pricing of Unsecured Investment-Grade Debt

Unsecured bonds are typically issued by investment-grade firms. Table XIII includes all bonds, most of them issued by investment-grade firms. There may be a lingering worry that the results are driven by non-investment-grade bonds. We focus only on investment-grade bonds in Table XIV but also incorporate the fact that unpledged tangibility matters more for pricing in tough market conditions (a similar table for all bonds is in Internet Appendix Table IA.XI).

We use the Baa–Aaa spread to proxy for market conditions. We begin by confirming that there exists a strong negative relationship between unpledged tangibility share and unsecured bond spread for investment-grade bonds. We follow the regression specification of column (3) of Table XIII but restrict the sample to investment-grade unsecured bonds. The result is reported in column (1) of Table XIV. The coefficient on unpledged tangibility share is negative and statistically significant at the 5% level. The coefficient suggests that a one standard deviation increase in unpledged tangibility share is associated with a 15 basis points lower unsecured bond spread.

In column (2) of Table XIV, we examine how the sensitivity of spread to unpledged tangibility share varies with market conditions. We divide our sample period (2002 to 2023) into months with high Baa–Aaa spread (greater than the median Baa–Aaa spread of 0.95% over our sample period) and months with low Baa–Aaa spread (less than 0.95%). The coefficient on unpledged tangibility share is negative and statistically significant at the 5% level. The coefficient suggests that a one standard deviation increase in unpledged tangibility share is associated with an 11 basis points lower unsecured bond spread when Baa–Aaa spreads are low. The coefficient on the interaction term *unpledged tangibility share* × *high Baa–Aaa spread* is also negative and statistically significant at the 10% level. The coefficient suggests that a one standard deviation increase in unpledged tangibility share is associated with a 22 basis points lower unsecured bond spread when Baa–Aaa spreads are high.[29] The implication from Table XIV is that even investment-grade debt benefits from the backing of unpledged assets, especially in tough market conditions.

Perhaps an illustration may help fix ideas. In the early days of the Covid-19 pandemic, bond spreads blew out in March 2020, even for investment-grade issuers, and then narrowed slowly over time as the Federal Reserve intervened to support investment-grade bonds and the US government rolled out fiscal support measures. In Figure 3, we plot the sensitivity of investment-grade unsecured bond spreads to the issuing firm's unpledged tangibility share for each month from September 2019 to September 2020 (i.e., from six months before March 2020 to six months after March 2020). The sensitivities (i.e., the coefficient on unpledged tangibility share) are calculated by running monthly regressions similar to the one used in column (1) of Table XIV. The

[29] One might worry that the results are driven by firms with no secured debt. These firms could be safer and fundamentally different from the rest of the firms. To address this concern, we include an indicator variable for firms with no secured debt, and the interaction of this variable with *high Baa–Aaa spread*. We continue to find negative and statistically significant coefficients on *unpledged tangibility* and on the interaction of *unpledged tangibility* with *high Baa–Aaa spread* (results available from the authors).

coefficient estimate is negative but small before the onset of the Covid pandemic, it becomes much more negative after the onset of the pandemic, slowly returning to normal levels by year end.

In summary, our findings indicate a robust negative relationship between unpledged tangibility share and unsecured bond spreads, even for investment-grade debt in normal times suggesting that higher unpledged tangible assets effectively lower borrowing costs.

VIII. Discussion and Conclusion

We find in this paper that unsecured debt, even of investment grade, benefits from the backing of unpledged tangibility, especially under difficult economic conditions. This finding is obscured in the prior literature because previous research fails to fully account for the act of pledging tangible assets and because firms, especially large, highly rated ones, may be far from their borrowing limits. Once we account for these, asset backing for even investment-grade unsecured debt reemerges.

That asset backing for borrowing is important, especially in bad times, suggests that even in developed economies such as that of the United States, theories that relate changes in asset prices to changes in borrowing capacity (see Bernanke and Gertler (1989, 1995); Fisher (1933); Geanakoplos (2023); Kiyotaki and Moore (1997)) and thence to economic outcomes are not merely of historical interest but of current relevance.

Also, the distinction between cash-flow-based debt and asset-based debt, which is based on practitioner terminology (see Udell (2004)), seems less clear-cut than earlier assumed. While indeed the seminal work of Lian and Ma (2021) shows persuasively that for large and highly rated firms, cash flows are an important determinant of borrowing capacity, our work suggests that asset backing also plays a role; even investment-grade bonds, constituting the bulk of corporate borrowing, seem to benefit from asset backing – not just because assets directly support repayment but also because unpledged assets can augment going concern value, indirectly supporting repayment. At a minimum, our work points to the existence of *unsecured asset-supported* debt, a category that does not appear in the prior literature.

But more generally, our finding that both firm-specific adversity (when a firm drops below investment grade) and an economic or credit market downturn seem to increase the importance of

asset backing suggests that a more protean view of debt categories, where the dependence of debt on cash flows or assets varies with conditions, is warranted. Put differently, the same issue of debt by a firm may change dependence over time.[30]

In this, more dynamic, view, going concern value may be the fundamental support to debt for well-performing firms in good times, both as proxy for the cash flows that will be generated to repay debt but also the value the creditors can threaten (and the value the debtor has to lose) if disputes over repayment arise. Book assets become more important when the firm's condition deteriorates, both as direct and indirect supports to repayment.

A good proxy for going concern value is Tobin's Q. We split the firm-year level data into three groups, each with an equal number of observations, based on firm's Q, and we re-estimate equation (3) for each one of the three subsamples. The results of this analysis are reported in columns (1)-(3) of Table XV. While the coefficient on unpledged tangibility is positive and statistically significant in all three columns, the point estimate is largest for the lowest Q tercile and smallest for the highest Q tercile. The coefficient on unpledged tangibility in column (1) suggests a one standard deviation increase in unpledged tangibility is associated with a 21.6% increase in unsecured leverage, whereas the coefficient on unpledged tangibility in column (3) suggests a one standard deviation increase in unpledged tangibility is associated with an 8.6% increase in unsecured leverage.

While we view this evidence only as suggestive, it hints at an interplay between going concern value and book asset value in facilitating borrowing. It also suggests questions for further research. For instance, when in a firm's life cycle does it start becoming more dependent on cash flows and going concern value for borrowing? What kind of industries is this more likely in? Under what circumstances does cash flow dependence wane and asset dependence dominate? There is much scope for additional research.

[30] This blurring of distinctions, especially over time and economic conditions, also suggests that it may be hard to tie debt types to the form of bankruptcy (i.e., the idea that cash-flow-based debt is issued by firms that are reorganized and asset-based debt is issued by firms that are liquidated). The fraction of bankruptcies in the Compustat sample is around 1% a year, and most firms (around 80%) are likely to be reorganized (see Corbae and D'Erasmo (2017)). Most firms also issue some debt in normal conditions that is deemed by the literature to be cash flow based as well as some debt that is deemed to be asset based (Kermani and Ma (2023)), and even issue these different classifications of debt in the same package of loans (Benmelech, Kumar, and Rajan (2022)). Since firms presumably have a good sense of the type of bankruptcy they are likely to experience, this suggests that it is not the central factor in the type of debt they issue.

REFERENCES

Acharya, Viral, Heitor Almeida, and Murillo Campello, 2007, Is cash negative debt? A hedging perspective on corporate financial policies, *Journal of Financial Intermediation* 16, 515–554.

Badoer, Dominique, Evan Dudley, and Chris James, 2020, Priority Spreading of Corporate Debt, *The Review of Financial Studies*, Volume 33, Issue 1, January 2020, Pages 261–308,

Bebchuk, Lucian, and Jesse Fried, 1996, The uneasy case for the priority of secured claims in bankruptcy, *Yale Law Journal* 105, 857–934.

Benmelech, Efraim, 2017, Credit Ratings: Qualitative Versus Quantitative Information (June 15, 2017). Available at SSRN: https://ssrn.com/abstract=2987211 or http://dx.doi.org/10.2139/ssrn.2987211

Benmelech, Efraim, 2024, The benefits and costs of secured debt, *Annual Review of Financial Economics* 16, 325–342.

Benmelech, Efraim, and Nittai K. Bergman, 2009, Collateral pricing, *Journal of Financial Economics* 91, 339–360.

Benmelech, Efraim, Nittai K. Bergman, and Amit Seru, 2021, Financing labor, *Review of Finance* 25, 1365–1393.

Benmelech, Efraim, Nitish Kumar, and Raghuram Rajan, 2022, The secured credit premium and the issuance of secured debt, *Journal of Financial Economics* 146, 143–171.

Benmelech, Efraim, Nitish Kumar, and Raghuram Rajan, 2024, The decline of secured debt, *Journal of Finance* 79, 35–93.

Bernanke, Ben, and Mark Gertler, 1989, Agency costs, net worth, and business fluctuations, *American Economic Review* 79, 14–31.

Bernanke, Ben, and Mark Gertler, 1995, Inside the black box: The credit channel of monetary policy transmission, *Journal of Economic Perspectives* 9, 27–48.

Bernanke, Ben, Mark Gertler, and Simon Gilchrist, 1996, The financial accelerator and the flight to quality, *Review of Economics and Statistics* 78, 1–15.

Braun, Matias, 2005, Financial contractability and asset hardness, Working paper, UCLA Anderson School of Management.

Caglio, Cecilia R, R Matthew Darst, and Sebnem Kalemli-Özcan, 2021, Risk-taking and monetary policy transmission: Evidence from loans to SMEs and large firms, Working paper.

Campello, Murillo, Robert A. Connolly, Gaurav Kankanhalli, and Eva Steiner, 2022, Do real estate values boost corporate borrowing? Evidence from contract-level data, *Journal of Financial Economics* 144, 611-644.

Chaney, T., Sraer, D., Thesmar, D., 2012. The collateral channel: How real estate shocks affect corporate investment. *Am. Econ. Rev*. 102 (6), 2381–2409.

Colla, Paolo, Filippo Ippolito, and Kai Li, 2013, Debt specialization, *Journal of Finance* 68, 2117–2141.

Corbae, Dean, and Pablo D'Erasmo, 2017, Organization or liquidation: Bankruptcy choice and firm dynamics, Working paper 17-14, Federal Reserve Bank of Philadelphia.

Custódio, Cláudia, Miguel A. Ferreira, and Luís Laureano, 2013, Why are US firms using more short-term debt?, *Journal of Financial Economics* 108, 182–212.

Cvijanovic, D., 2014. Real estate prices and firm capital structure. Rev. Financ. Stud. 27 (9), 2690–2735.

Diamond, Douglas W., 1989, Reputation acquisition in debt markets, *Journal of Political Economy* 97, 828–862.

Diamond, Douglas W., 1991, Debt maturity structure and liquidity risk, *Quarterly Journal of Economics* 106, 709–737.

Diamond, Douglas W., Yunzhi Hu, and Raghuram G. Rajan, 2020, Pledgeability, industry liquidity, and financing cycles, *Journal of Finance* 75, 419–461.

Donaldson, Jason Roderick, Denis Gromb, and Giorgia Piacentino, 2020, The paradox of pledgeability, *Journal of Financial Economics* 137, 591–605.

Ewens, Michael, Ryan Peters, and Sean Wang, 2024, Measuring intangible capital with market prices, *Management Science*.

Faulkender, Michael, and Mitchell A. Petersen, 2006, Does the source of capital affect capital structure?, *Review of Financial Studies* 19, 45–79.

Farre-Mensa, Joan, and Alexander Ljungqvist, 2016, Do measures of financial constraints measure financial constraints?, *Review of Financial Studies* 29, 271–308.

Fisher, Irving, 1933, The debt-deflation theory of great depressions, *Econometrica* 1, 337–357.

Gamba, Andrea, and Alexander Triantis, 2008, The value of financial flexibility, *Journal of Finance* 63, 2263-2296.

Geanakoplos, John, 2023, Leverage cycle theory of economic crises and Booms, Cowles Foundation Discussion Papers 2771.

Goldstein, Itay, and Chong Huang, 2020, Credit rating inflation and firms' investments, *Journal of Finance* 75, 2929–2972.

Graham, John, 2022, Presidential Address: Corporate Finance and Reality, *Journal of Finance*, vol LXXVII No 4, 1975-2049.

Hadlock, Charles, and Joshua R. Pierce, 2010, New evidence on measuring financial constraints: Moving beyond the KZ Index, *Review of Financial Studies* 23, 1909–1940.

Hart, Oliver, and John Moore, 1994, A theory of debt based on the inalienability of human capital, *Quarterly Journal of Economics* 109, 841–879.

Hart, Oliver, and John Moore, 1998, Default and renegotiation: A dynamic model of debt, *Quarterly Journal of Economics* 113, 1–41.

Hennessy, Christopher A., and Toni M. Whited, 2007, How costly is external financing? Evidence from a structural estimation, *Journal of Finance* 62, 1705–1745.

Ivashina, Victoria, Luc Laeven, and Enrique Moral-Benito, 2022, Loan types and the bank lending channel, *Journal of Monetary Economics* 126, 171-187.

Jackson, Anthony T., and Thomas H. Kronman, 1979, Secured financing and priorities among creditors, *Yale Law Journal* 88, 1143–1182.

Jensen, Michael C., and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305–360.

Jimenez, Gabriel, Steven Ongena, Jose-Luis Peydro, and Jesus Saurina, 2012, Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications, *American Economic Review* 102, 2301–2326.

Kermani, Amir, and Yueran Ma, 2023, Asset specificity of nonfinancial firms, *Quarterly Journal of Economics* 138, 205–264.

Kiyotaki, Nobuhiro, and John Moore, 1997, Credit cycles, *Journal of Political Economy* 105, 211–248.

Lambrecht, Bart, and Grzegorz Pawlina, 2012, A theory of net debt and transferable human capital, *Review of Finance* 17, 321-368.

Lang, William W., and Leonard I. Nakamura, 1995, "Flight to quality" in banking and economic activity, *Journal of Monetary Economics* 36, 145–164.

Lemmon, Michael L., Michael R. Roberts, and Jaime F. Zender, 2008, Back to the beginning: Persistence and the cross-section of corporate capital structure, *Journal of Finance* 63, 1575–1608.

Li, S., T. M. Whited, and Y. Wu (2016). Collateral, taxes, and leverage. *Review of Financial. Studies* 29, 1453–1500.

Lian, Chen, and Yueran Ma, 2021, Anatomy of corporate borrowing constraints, *Quarterly Journal of Economics* 136, 229–291.

Lin, L., 2016. Collateral and the choice between bank debt and public debt. Manag. Sci. 62 (1), 111–127.

Luck, Stephen, and Joao Santos, 2023, The valuation of collateral in bank lending, *Journal of Financial and Quantitative Analysis* 59, 1–30.

Mann, William, 2018, Creditor rights and innovation: Evidence from patent collateral, *Journal of Financial Economics* 130, 25–47.

Ma, Song, Joy Tianjiao Tong, and Wei Wang, 2021, Bankrupt innovative firms, *Management Science* 68, 6971–6992.

Morris, James R., 1976, On corporate debt maturity strategies, *Journal of Finance* 31, 29–37.

Myers, Stewart C., 1977, Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147–175.

Myers, Stewart C., and Nicholas S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187–221.

Myers, Stewart C., and Raghuram Rajan, 1998, The paradox of liquidity, *Quarterly Journal of Economics* 113, 733–771.

Nini, Greg, David C. Smith, Amir Sufi, 2012, Creditor Control Rights, Corporate Governance, and Firm Value, *The Review of Financial Studies*, Volume 25, Issue 6, June 2012, Pages 1713–1761.

Rajan, Raghuram, and Luigi Zingales, 1995, What do we know about capital structure? Some evidence from international data, *Journal of Finance* 50, 1421–1460.

Rampini, Adriano A., and S. Viswanathan, 2010, Collateral, risk management, and the distribution of debt capacity, *Journal of Finance* 65, 2293–2322.

Rampini, Adriano A., and S. Viswanathan, 2024, Collateral and secured debt, Working paper, Duke University.

Rauh, Joshua D., and Amir Sufi, 2010, Capital structure and debt structure, *Review of Financial Studies* 23, 4242–4280.

Roberts, Michael R., 2015, The role of dynamic renegotiation and asymmetric information in financial contracting, *Journal of Financial Economics* 116, 61–81.

Udell, Gregory F., 2004, *Asset-based Finance: Proven Disciplines for Prudent Lending* (Commercial Finance Association, New York).

Welch, Ivo, 2011, Two Common Problems in Capital Structure Research: The Financial Debt-To-Asset Ratio and Issuing Activity Versus Leverage Changes, *International Review of Finance*, 11:1, 2011: pp. 1–17 DOI: 10.1111/j.1468-2443.2010.01125.x

Whited, Toni M., 1992, Debt, liquidity constraints, and corporate investment: Evidence from panel data, *Journal of Finance* 47, 1425–1460.

Whited, Toni M., and Guojun Wu, 2006, Financial constraints risk, *Review of Financial Studies* 19, 531–559.

Williamson, 1988, Corporate finance and corporate governance, *Journal of Finance* 43, 567–591.

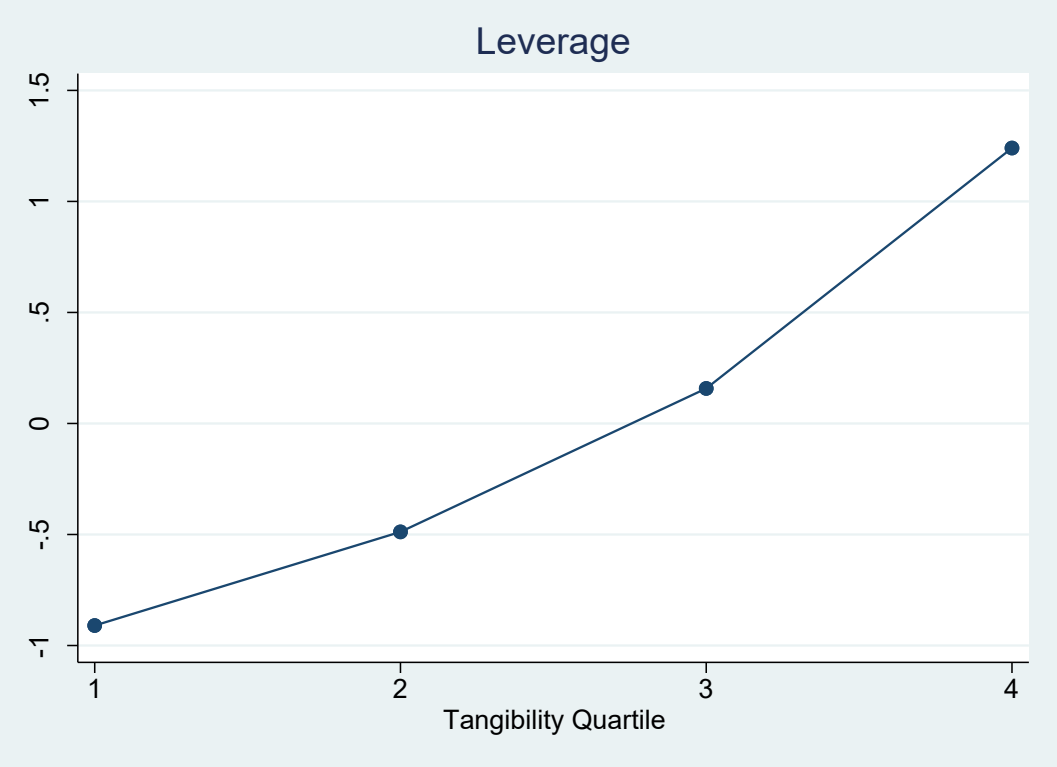

Figure 1. Residuals of leverage against quartiles of residual tangibility. This figure plots residuals of leverage against quartiles of residual tangibility. We obtain residuals of leverage by running regression specification of column (6) of Table II after excluding tangibility as an explanatory variable. Similarly, we obtain residuals of tangibility by running the regression specification of column (6) of Table II but using tangibility as the dependent variable.

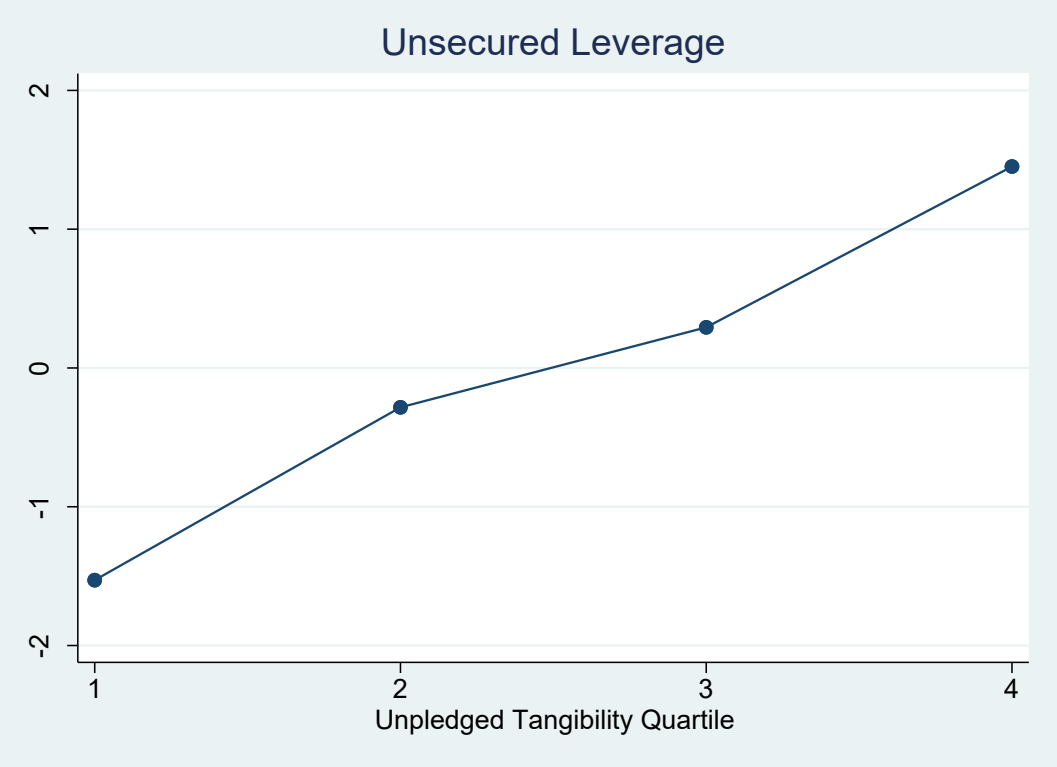

Figure 2. Residuals of unsecured leverage against quartiles of residual unpledged tangibility. This figure plots residuals of unsecured leverage against quartiles of residual unpledged tangibility. We obtain residuals of unsecured leverage by running the regression specification of column (1) of Table IX after excluding unpledged tangibility as an explanatory variable. Similarly, we obtain residuals of unpledged tangibility by running the regression specification of column (1) of Table IX but using unpledged tangibility as the dependent variable.

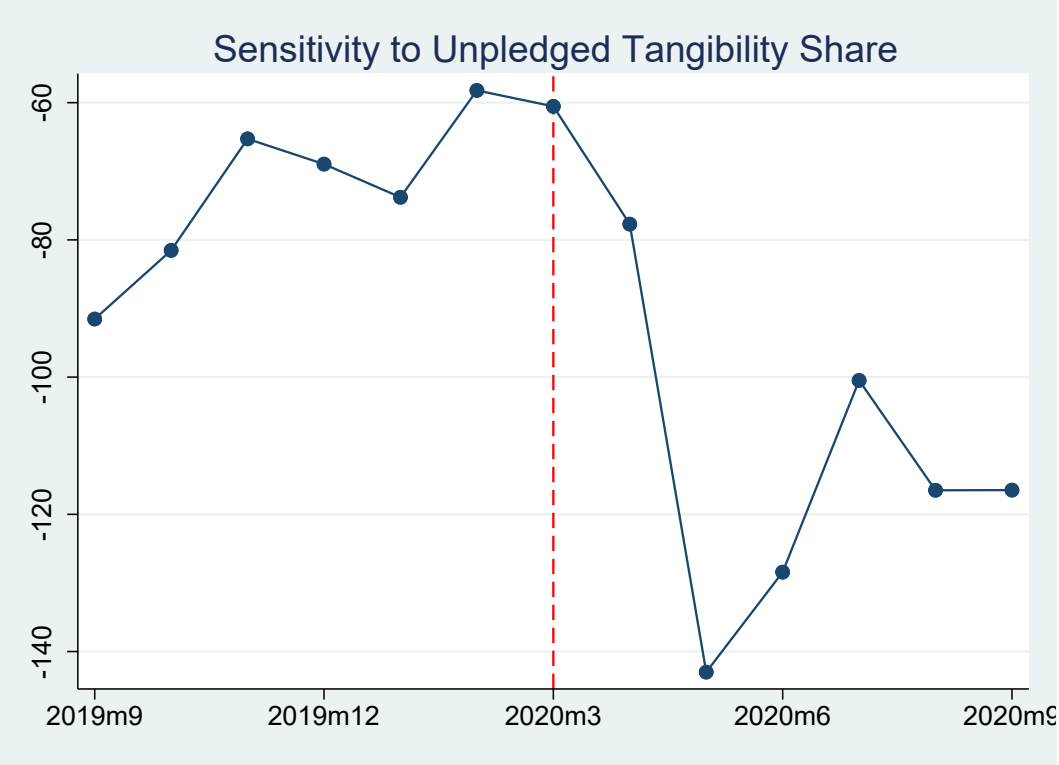

Figure 3. Unpledged tangibility and investment-grade unsecured bond spreads around the Covid-19 pandemic. This figure displays monthly estimates of the sensitivity of spreads on investment-grade unsecured bonds to unpledged tangibility share obtained from the following regression run at the monthly frequency:

$$spread_{i,j} = \beta * unpledged\ tangibility\ share_{i,j} + \theta X_{i,j} + \lambda Z_j + \varepsilon_{i,j},$$

where $spread_{i,j}$ is the spread for bond i of firm j. The variable $unpledged\ tangibility\ share_{i,j}$ is the unpledged tangible assets share available to support a firm's unsecured debt. The variable $X_{i,j}$ controls for bond characteristics, while Z_j controls for firm characteristics, including the estimated rating. The estimate β is plotted.

Table I

Summary Statistics

This table provides descriptive statistics for the variables used in the empirical analysis. We report mean, median, 25th, and 75th percentiles, standard deviation, and the number of observations for these variables. Appendix A provides information on construction and definition of these variables. Our analysis covers the period from 1981 to 2022.

	Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Observations
Leverage	0.272	0.204	0.106	0.242	0.393	88,873
Secured debt leverage	0.101	0.147	0.000	0.026	0.150	88,873
Unsecured debt leverage	0.170	0.173	0.021	0.122	0.266	88,873
Short-term leverage	0.041	0.092	0.000	0.000	0.034	87,861
Long-term leverage	0.229	0.196	0.063	0.195	0.344	87,861
Net leverage	0.121	0.320	-0.049	0.153	0.331	88,873
Net unsecured leverage	0.051	0.275	-0.049	0.059	0.217	88,873
Net debt issuance	0.048	0.219	0.000	0.000	0.068	88,808
Net unsecured debt issuance	0.030	0.168	-0.018	0.00	0.046	84,321
Log(asset)	5.037	2.264	3.404	4.964	6.608	88,873
Tobin's Q	1.719	1.115	1.034	1.348	1.968	88,873
Profitability	0.012	0.345	0.013	0.105	0.164	88,873
Tangibility	0.278	0.209	0.113	0.230	0.395	88,873
Cash and equivalents	0.160	0.212	0.021	0.072	0.205	88,873
Inventory	0.183	0.156	0.048	0.155	0.280	88,563
Receivables	0.167	0.122	0.070	0.152	0.239	88,396
Intangibles	0.484	0.615	0.142	0.300	0.576	80,605

Table II

Tangibility Matters

This table reports the results of regressions relating leverage to tangibility. The dependent variable used in the regressions is *leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. Column (2) includes year fixed effects, column (3) includes three-digit SIC fixed effects, column (4) includes firm fixed effects, column (5) includes year and three-digit SIC fixed effects, and column (6) includes year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1) leverage	(2) leverage	(3) leverage	(4) leverage	(5) leverage	(6) leverage
Tangibility	16.863***	17.092***	12.025***	11.952***	12.158***	12.468***
	(0.861)	(0.889)	(1.012)	(1.187)	(1.046)	(1.183)
Log(assets)	0.790***	0.758***	0.536***	2.165***	0.513***	1.692***
	(0.085)	(0.090)	(0.083)	(0.171)	(0.088)	(0.198)
Q	−1.593***	−1.642***	−1.193***	−0.827***	−1.218***	−0.912***
	(0.133)	(0.135)	(0.130)	(0.135)	(0.132)	(0.137)
Profitability	−8.755***	−8.651***	−8.921***	−8.735***	−8.863***	−8.328***
	(0.451)	(0.471)	(0.445)	(0.515)	(0.461)	(0.525)
Fixed Effects						
Year	N	Y	N	N	Y	Y
Industry	N	N	Y	N	Y	N
Firm	N	N	N	Y	N	Y
Observations	88,873	88,873	88,873	87,509	88,873	87,509
Adj. R-squared	0.0486	0.0569	0.111	0.524	0.119	0.531

Table III

Tangibility Matters for All Except the Large Firms

This table reports the results of regressions relating leverage to tangibility for subsamples of firms based on size. Columns (1) to (3) divide the sample into three groups, each containing an equal number of observations, based on number of employees, while columns (4) to (6) divide the sample based on the inflation-adjusted book value of total assets. The dependent variable used in the regressions is *leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Employee Size			Asset Size (Inflation Adjusted)		
	Small	Medium	Large	Small	Medium	Large
	(1)	(2)	(3)	(4)	(5)	(6)
	leverage	leverage	Leverage	leverage	leverage	leverage
Tangibility	18.641***	16.486***	0.492	18.056***	14.466***	3.265
	(1.665)	(2.111)	(2.347)	(1.618)	(2.148)	(2.329)
Log(assets)	0.211	3.765***	0.702*	−0.363	3.963***	0.213
	(0.339)	(0.399)	(0.411)	(0.355)	(0.400)	(0.380)
Q	−0.710***	−0.823***	−0.810**	−0.868***	−0.972***	−0.638*
	(0.179)	(0.279)	(0.412)	(0.183)	(0.256)	(0.361)
Profitability	−5.028***	−19.386***	−21.272***	−5.198***	−15.778***	−20.278***
	(0.585)	(1.583)	(3.282)	(0.590)	(1.362)	(3.089)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	27,690	28,125	28,476	28,449	28,649	29,260
Adj. R-squared	0.467	0.655	0.616	0.450	0.649	0.640

Table IV

Tangibility Matters for All Except Financially Unconstrained Firms

This table reports the results of regressions relating leverage to tangibility for subsamples of firms based on measures of financial constraints. Columns (1) to (3) divide the sample into three groups, each containing equal number of observations, based on the WW Index, columns (4) to (6) divide the sample based on the HP Index, and columns (7) to (9) divide the sample based on credit ratings. The dependent variable used in the regressions is *leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	WW Index			HP Index			Ratings		
	High	Medium	Low	High	Medium	Low	Unrated	Below IG	IG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	leverage	leverage	leverage	leverage	Leverage	leverage	Leverage	leverage	leverage
Tangibility	18.589***	15.572***	1.140	18.245***	16.258***	2.384	15.741***	7.507**	−7.905**
	(1.739)	(2.076)	(2.369)	(1.624)	(2.361)	(2.406)	(1.281)	(3.760)	(3.534)
Log(assets)	1.010***	4.413***	1.418***	−0.461	4.001***	1.462***	1.555***	−0.616	−1.053
	(0.316)	(0.361)	(0.394)	(0.349)	(0.386)	(0.420)	(0.217)	(0.609)	(0.664)
Q	−0.537***	−1.117***	−0.300	−0.883***	−0.289	−0.481	−0.986***	−0.132	−1.346*
	(0.198)	(0.282)	(0.405)	(0.173)	(0.277)	(0.411)	(0.141)	(0.647)	(0.776)
Profitability	−6.605***	−18.321***	−23.115***	−4.577***	−20.196***	−20.677***	−7.979***	−12.854***	−5.102
	(0.650)	(1.900)	(3.127)	(0.580)	(1.540)	(2.913)	(0.529)	(3.965)	(7.830)
Fixed Effects									
Year	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	26,405	26,788	27,398	28,090	28,698	29,387	69,597	9,601	7,927

Adj. R-squared	0.447	0.641	0.634	0.469	0.694	0.615	0.518	0.624	0.611

Table V

PP&E vs. Other Sources of Collateral

This table reports the results of regressions relating leverage to different asset types. The dependent variable used in the regressions is *leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. Key explanatory variables used in the regressions are *tangibility*, *inventory*, *receivables*, and *intangibles*. All regressions include lagged values of the book value of firm assets (in log), market-to-book ratio, and profitability as additional explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1) leverage	(2) leverage	(3) leverage	(4) leverage	(5) leverage
Tangibility	12.468***				12.711***
	(1.183)				(1.246)
Inventory		5.959***			6.160***
		(1.541)			(1.590)
Receivables			0.539		1.047
			(1.599)		(1.658)
Intangibles				1.638***	1.270***
				(0.396)	(0.402)
Log(assets)	1.692***	1.781***	1.646***	2.110***	2.070***
	(0.198)	(0.200)	(0.200)	(0.230)	(0.233)
Q	−0.912***	-0.998***	−1.010***	-1.181***	−0.997***
	(0.137)	(0.137)	(0.137)	(0.143)	(0.144)
Profitability	−8.328***	-8.765***	−8.709***	-7.953***	−7.769***
	(0.525)	(0.525)	(0.529)	(0.640)	(0.646)
Fixed Effects					
Year	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y
Observations	87,509	87,195	87,023	79,476	78,762
Adj. R-squared	0.531	0.527	0.528	0.537	0.539

Table VI

Asset Type and Debt Maturity

This table reports the results of regressions relating debt maturity to different asset types. The dependent variable in column (1) is *leverage*, in column (2) *short-term leverage*, and in column (3) *long-term leverage*. The three dependent variables are all multiplied by 100 to facilitate easier representation of regression coefficients. Key explanatory variables used in the regressions are *tangibility*, *inventory*, *receivables*, and *intangibles*. All regressions include lagged values of the book value of firm assets (in log), market-to-book ratio, and profitability as additional explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1) leverage	(2) short-term leverage	(3) long-term leverage
Tangibility	12.711***	1.263**	11.507***
	(1.246)	(0.536)	(1.199)
Inventory	6.160***	9.695***	−3.976***
	(1.590)	(0.935)	(1.452)
Receivables	1.047	6.851***	−5.610***
	(1.658)	(0.814)	(1.478)
Intangibles	1.270***	0.119	0.904**
	(0.402)	(0.199)	(0.369)
Log(assets)	2.070***	-0.013	2.014***
	(0.233)	(0.096)	(0.220)
Q	−0.997***	-0.055	−0.960***
	(0.144)	(0.065)	(0.131)
Profitability	−7.769***	−3.244***	−4.129***
	(0.646)	(0.337)	(0.586)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	78,762	77,913	77,913
Adj. R-squared	0.539	0.492	0.551

Table VII

Tangibility and Unsecured Debt

This table reports the results of regressions relating unsecured debt to tangibility. The dependent variable used in the regressions is *unsecured leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. Columns (1) and (2) analyze the full sample, columns (3) to (5) divide the sample into three groups, each containing equal number of observations, based on inflation-adjusted book value of total assets, columns (6) to (8) divide the sample into three groups based on WW Index, and columns (9) to (11) divide the sample based on credit ratings. All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Full Sample		Asset Size (Inflation Adjusted)			WW Index			Ratings		
			Small	Medium	Large	High	Medium	Low	Unrated	Below IG	IG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Tangibility	−0.263	1.525	3.435**	3.141	-0.637	2.986**	3.880**	−1.668	3.736***	−0.902	-7.073**
	(0.815)	(1.011)	(1.391)	(1.910)	(2.328)	(1.519)	(1.885)	(2.288)	(1.049)	(4.345)	(3.548)
Log(assets)	1.726***	1.998***	−0.839***	4.216***	2.254***	0.767***	4.053***	2.732***	1.388***	1.901***	0.357
	(0.072)	(0.166)	(0.297)	(0.348)	(0.362)	(0.274)	(0.317)	(0.368)	(0.182)	(0.682)	(0.705)
Q	0.467***	−0.050	-0.389**	−0.216	0.498	−0.138	−0.139	0.820**	−0.181	0.963	−1.302*
	(0.112)	(0.117)	(0.153)	(0.218)	(0.338)	(0.170)	(0.233)	(0.366)	(0.118)	(0.670)	(0.745)
Profitability	−9.691***	−7.037***	−4.616***	−10.161***	−10.745***	−5.738***	−14.050***	−12.328***	−6.427***	−10.798***	−0.558
	(0.388)	(0.461)	(0.524)	(1.199)	(2.628)	(0.579)	(1.596)	(2.839)	(0.462)	(4.089)	(7.191)
Fixed Effects											
Year	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry	Y	N	N	N	N	N	N	N	N	N	N
Firm	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	88,873	87,509	28,449	28,649	29,260	26,405	26,788	27,398	69,597	9,601	7,927

Adj. R-squared	0.0963	0.446	0.386	0.516	0.532	0.371	0.499	0.545	0.424	0.545	0.593

Table VIII

Tangibility and Unsecured Debt for Different Levels of Secured Debt

This table reports the results of regressions relating unsecured debt to tangibility for different levels of secured debt on firms' balance sheets. The dependent variable used in the regressions is *unsecured leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. Column (1) analyzes firm-year observations with zero *secured leverage*. We split the remaining sample of firms into two groups containing an equal number of observations based on secured leverage. Firms with secured leverage < 7.3% (the median value among firms with positive secured leverage) are analyzed in column (2), while firms with secured leverage > 7.3% are analyzed in column (3). All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Secured/total assets = 0	*Secured/total assets >0 & <= median*	*Secured/total assets > median*
	(1)	(2)	(3)
Tangibility	7.556***	4.598**	2.159*
	(2.259)	(1.803)	(1.195)
Log(assets)	0.568	2.302***	2.039***
	(0.355)	(0.283)	(0.227)
Q	−0.363	−0.505***	0.036
	(0.233)	(0.174)	(0.179)
Profitability	−5.952***	−6.444***	−5.717***
	(0.792)	(0.787)	(0.729)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	21,606	31,244	31,283
Adj. R-squared	0.517	0.606	0.511

Table IX

Unpledged Tangibility and Unsecured Debt

This table reports the results of regressions relating unsecured debt usage to unpledged tangibility. The dependent variable used in the regressions is *unsecured leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. The key explanatory variable in column (1) is *unpledged tangibility*. Columns (2) and (3) use *tangibility* and *secured leverage* as key explanatory variables. All regressions include lagged values of the book value of firm assets (in log), market-to-book ratio, and profitability as additional explanatory variables. The regressions also include year fixed effects and either three-digit SIC code or firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)
Unpledged tangibility	10.799***		
	(0.751)		
Tangibility		5.746***	7.974***
		(0.979)	(1.139)
Secured leverage		−0.396***	−0.342***
		(0.009)	(0.013)
Tangibility × Secured leverage			−0.176***
			(0.034)
Log(assets)	1.922***	1.891***	1.887***
	(0.168)	(0.161)	(0.161)
Q	−0.050	−0.394***	−0.393***
	(0.119)	(0.118)	(0.118)
Profitability	−6.664***	−7.487***	−7.437***
	(0.469)	(0.456)	(0.456)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	82,986	87,509	87,509
Adj. R-squared	0.454	0.501	0.502

Table X

Leverage and Tangibility Across Credit Ratings – Switching Firms

This table reports the results of regressions relating leverage to tangibility for a subset of firms that were rated investment grade (IG) during a portion of our sample period and were rated below investment grade (below IG) for the remaining sample period. We separately examine the relationship between leverage and tangibility for these firms when they were rated below IG (column (1)) and when they were rated IG (column (2)). The dependent variable used in the regressions is *leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. All regressions include lagged values of the log of the book value of firm assets, market-to-book ratio, and profitability as additional explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Below IG	IG
	(1)	(2)
Tangibility	16.580**	−1.757
	(8.299)	(6.729)
Log(assets)	−0.312	-0.937
	(1.052)	(1.009)
Q	4.010***	−0.193
	(1.457)	(1.244)
Profitability	−20.519**	−1.528
	(8.912)	(15.911)
Fixed Effects		
Year	Y	Y
Firm	Y	Y
Observations	2,457	3,267
Adj. R-squared	0.589	0.552

Table XI

Economic Conditions and Sensitivity to Unpledged Tangibility

This table presents the results of the analysis on the cyclicality of net debt issuance sensitivity to unpledged tangibility. The dependent variable used in the regressions is *net debt issuance*, which is multiplied by 100 to facilitate easier representation of regression coefficients. *Baa–Aaa spread* is the difference between Moody's Seasoned Corporate Bond Yield on Baa- and Aaa-rated bonds. *GDP growth* is the annual growth rate in real GDP. *NBER recession* is a dummy variable equal to one if any part of the year was classified as a recession by the NBER. Columns (1)-(6) use unpledged tangibility as the explanatory variable, whereas columns (7)-(9) use tangibility. All regressions also include lagged values of the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include three-digit SIC code fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)	(4)	(5)	(6)
Unpledged Tangibility	−0.727	3.946***	1.196**	−1.264	1.743*	−0.500
	(1.084)	(0.609)	(0.466)	(1.355)	(1.012)	(0.898)
Baa–Aaa spread	−2.015***			−2.068***		
	(0.284)			(0.312)		
Unpledged Tangibility × Baa–Aaa spread	2.672***			1.292		
	(0.934)			(1.000)		
GDP growth		59.113***			28.519***	
		(5.191)			(5.277)	
Unpledged Tangibility × GDP growth		−85.690***			−64.850***	
		(17.253)			(16.925)	
NBER recession			−3.207***			−2.125***
			(0.246)			(0.240)
Unpledged Tangibility × NBER recession			4.324***			3.446***
			(0.829)			(0.761)
Log(assets)	−0.239***	−0.164***	−0.232***	−3.106***	−2.999***	−3.053***
	(0.042)	(0.042)	(0.042)	(0.181)	(0.180)	(0.180)
Leverage	−0.149***	−0.150***	−0.148***	−0.457***	−0.457***	−0.456***
	(0.006)	(0.006)	(0.006)	(0.009)	(0.009)	(0.009)
Q	2.755***	2.801***	2.756***	3.841***	3.890***	3.864***
	(0.124)	(0.123)	(0.123)	(0.178)	(0.178)	(0.178)
Profitability	0.413	0.121	0.361	-3.650***	-3.730***	-3.667***
	(0.465)	(0.465)	(0.465)	(0.756)	(0.756)	(0.756)
Fixed Effects						
Firm	N	N	N	Y	Y	Y
Observations	84,392	84,384	84,392	83,017	83,011	83,017
Adj. R-squared	0.0465	0.0476	0.0478	0.185	0.185	0.185

…continued

	(7)	(8)	(9)
Tangibility	2.018*	6.014***	3.851***
	(1.142)	(0.660)	(0.504)
Baa–Aaa spread	-2.186***		
	(0.342)		
Tangibility ×	2.480***		
Baa–Aaa spread	(0.947)		
GDP growth		61.522***	
		(6.671)	
Tangibility ×		-66.860***	
GDP growth		(18.252)	
NBER recession			-3.325***
			(0.312)
Tangibility ×			3.642***
NBER recession			(0.870)
Log(assets)	-0.239***	-0.170***	-0.236***
	(0.040)	(0.041)	(0.040)
Leverage	-0.162***	-0.162***	-0.161***
	(0.006)	(0.006)	(0.006)
Q	2.813***	2.864***	2.813***
	(0.122)	(0.123)	(0.121)
Profitability	0.464	0.154	0.436
	(0.460)	(0.463)	(0.459)
Fixed Effects			
Firm	N	N	N
Observations	88,808	86,715	88,808
Adj. R-squared	0.0468	0.0476	0.0479

Table XII

Debt Issuance as a Function of Corporate Real Estate Values

This table presents the results of the analysis on debt issuance as a function of corporate real estate values. We restrict the sample to financially unconstrained firms based on WW Index (columns (1)-(2)) or investment grade rating (columns (3)-(4)). The dependent variable used in the regressions is debt issuance, scaled by lagged fixed assets. Column (1) uses secured debt whereas column (2) uses unsecured debt. RE Value is the market value of corporate real estate holdings. RE Value is estimated based on instrumented CBSA-level real estate price indices. Cash Flow is income before extraordinary items plus depreciation, scaled by lagged fixed assets. Q is the market-to-book ratio. Size is the logarithm of total assets. Establishment-Portfolio Growth is annual per capita personal income growth, weighted by a given firm's exposure to different CBSAs based on the firm's operations in each CBSA. Firm and CBSA×time fixed effects are included as indicated. All regressions are estimated over the 2000–2017 period. * p<0.1, ** p<0.05, *** p<0.01.

	WW Index		IG Ratings	
	Secured	Unsecured	Secured	Unsecured
	(1)	(2)	(3)	(4)
RE Value True	0.189	0.326**	0.004	0.294*
	(0.177)	(0.132)	(0.015)	(0.172)
Cash Flow	-0.005	0.065	0.012	0.138
	(0.049)	(0.054)	(0.009)	(0.126)
Q	-0.007	0.039	-0.011	0.124**
	(0.023)	(0.026)	(0.007)	(0.063)
Size	0.176	0.067	-0.040**	0.417*
	(0.114)	(0.099)	(0.017)	(0.214)
Establishment-Portfolio Growth	5.549*	-2.120	-0.236	-2.276
	(3.312)	(2.340)	(0.500)	(4.662)
Fixed Effects				
Firm	Yes	Yes	Yes	Yes
CBSA x Time	Yes	Yes	Yes	Yes
Observations	2,467	2,467	1,161	1,161
R-squared	0.46	0.56	0.44	0.62

Table XIII

Unpledged Tangibility and Unsecured Bond Spreads

This table reports the results of regressions relating either firm ratings or unsecured bond spreads to available collateral. The dependent variable in column (1) is *Credit Rating Score*, which takes a value of one for an AAA rating, two for AA+, three for AA, and so forth. The key explanatory variable is *unpledged tangibility share*. The regression also controls for tangibility, interest coverage ratio, profitability, leverage, firm size, debt-to-EBITDA ratio, a dummy indicating negative value of debt-to-EBITDA, cash holdings, capex, and the standard deviation of earnings. The dependent variable in columns (2) and (3) is the bond spread, calculated as the difference between the implied yield from secondary trade prices and maturity-matched treasury. The regression also controls for bond characteristics including maturity, callability, issuance amount, and the presence of a covenant in the bond contract. All firm controls used in column (1) are also included in column (2). Column (3) controls for *predicted credit score* estimated from running a regression specification similar to the one used in column (1) but excluding unpledged tangibility share as an explanatory variable. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1) Credit Rating Score	(2) Spread	(3) Spread
Unpledged tangibility share	-0.490***	-60.822**	-71.981***
	(0.142)	(23.739)	(26.612)
Tangibility	0.587	45.120	
	(1.051)	(29.424)	
Interest coverage	0.001	0.336	
	(0.004)	(0.239)	
Profitability	-18.215***	-474.315***	
	(1.503)	(97.271)	
Leverage	0.052***	1.562***	
	(0.007)	(0.603)	
Log(assets)	-1.208***	-62.893***	
	(0.081)	(6.619)	
Debt/EBITDA	0.070***	11.025***	
	(0.023)	(2.612)	
Negative Debt/EBITDA	0.223	122.815*	
	(0.868)	(68.383)	
Cash	-0.579	62.978	
	(0.870)	(44.367)	
Capex	1.426	390.045*	
	(2.962)	(208.485)	
Volatility	12.540***	-3.770	
	(3.465)	(193.257)	
Predicted credit score			32.462***
			(7.493)

Maturity		1.869***	1.766***
		(0.360)	(0.386)
Callable		-42.038**	-41.437**
		(17.520)	(18.694)
Amount		3.786	-10.392
		(5.622)	(9.770)
Covenant		-21.665	-18.065
		(18.224)	(21.150)
Fixed Effects	industry, year	month	month
Observations	2,723	1,094,204	1,094,219
Adj. R-squared	0.694	0.455	0.404

Table XIV

Market Conditions, Unpledged Tangibility, and Investment-Grade Unsecured Bond Spreads

This table reports the results of regressions relating unsecured bond spreads of investment-grade firms to available collateral. The dependent variable is the bond spread, calculated as the difference between the implied yield from secondary trade prices and maturity-matched treasury. The key explanatory variable is *Unpledged tangibility share*. The regression controls for *predicted credit score* estimated from running a regression specification similar to the one used in column (1) of Table XIII but excluding unpledged tangibility share as an explanatory variable. The regression also controls for bond characteristics including maturity, callability, issuance amount, and the presence of a covenant in the bond contract. In column (2), we examine how sensitivity of spreads to unpledged tangibility share changes with market conditions. *High Baa–Aaa* spread is an indicator variable that equals one for months where Baa–Aaa spread is greater than the median Baa–Aaa spread over our sample period. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1) Spread	(2) Spread
Unpledged tangibility share	-99.844**	-71.148**
	(46.220)	(33.407)
Unpledged tangibility share ×		-71.731*
High Baa–Aaa spread		(39.232)
Predicted credit score	28.696***	28.670***
	(3.872)	(3.868)
Maturity	2.487***	2.491***
	(0.261)	(0.260)
Callable	-1.880	-1.804
	(11.195)	(11.169)
Amount	-6.260	-6.175
	(5.292)	(5.290)
Covenant	-17.613	-17.779
	(14.193)	(14.199)
Fixed Effects	month	month
Observations	898,492	898,492
Adj. R-squared	0.380	0.382

Table XV

Does the Relationship between Debt and Tangibility Vary with Q?

This table reports the results of regressions relating unsecured leverage to unpledged tangibility for firms with different levels of Tobin's Q. We divide the sample into three groups, each containing equal number of observations, based on firm's Q. The dependent variable used in the regressions is *unsecured leverage*. The key explanatory variable is *unpledged tangibility*. All regressions include lagged values of the book value of firm assets (in log), market-to-book ratio, and profitability as additional explanatory variables. The regressions also include year fixed effects and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Tobin's Q		
	Low	Medium	High
	(1) unsecured leverage	(2) unsecured leverage	(3) unsecured leverage
Unpledged tangibility	15.486***	13.189***	6.603***
	(1.263)	(1.205)	(1.351)
Log(assets)	3.520***	2.223***	-0.079
	(0.292)	(0.279)	(0.277)
Q	0.381	-0.477*	-0.468***
	(0.285)	(0.255)	(0.153)
Profitability	-7.497***	-9.735***	-4.073***
	(1.091)	(1.129)	(0.582)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	25,522	25,862	26,460
Adj. R-squared	0.566	0.540	0.435

Appendix A: Variable Description and Construction

For reference, the following is a list of the main variables used in the paper, their construction, and their sources.

HP Index: constructed following Hadlock and Pierce (2010) as $-0.737\text{Size} + 0.043\text{Size}^2 - 0.040\text{Age}$, where Size equals the log of inflation-adjusted Compustat item *at* (in 2004 dollars) and Age is the number of years the firm is listed with a nonmissing stock price on Compustat. In calculating the index, we follow Hadlock and Pierce and cap Size at (the log of) $4.5 billion and Age at 37 years. Following convention, firms are sorted into terciles based on their index values in the previous year. Firms in the top tercile are coded as constrained, and those in the bottom tercile are coded as unconstrained.

Intangibles: sum of knowledge capital (net) and organizational capital (net) divided by total assets (Compustat annual item *at*). Estimates on knowledge capital and organizational capital stock are obtained from Michael Ewens's website (https://github.com/michaelewens/Intangible-capital-stocks). See Ewens, Peters, and Wang (2024) for details.

Inventory: total inventory (Compustat annual item *invt*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Leverage: total debt (Compustat annual items *dltt*+*dlc*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Long-term leverage: long-term debt total (Compustat annual item *dltt*) plus long-term debt due in one year (Compustat annual item *dd1*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Net debt issuance: total debt at time *t* (Compustat annual items *dltt(t)*+*dlc(t)*) minus total debt at time *t*–1 (Compustat annual items *dltt(t–1)*+*dlc(t–1)*) divided by total assets at time *t*–1 (Compustat annual item *at(t–1)*). (Source: Compustat).

Net leverage: total debt (Compustat annual items *dltt*+*dlc*) minus cash and equivalents (Compustat annual item *che*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Net unsecured leverage: unsecured debt minus residual cash divided by total assets (Compustat annual item *at*), where *unsecured debt* is total debt (Compustat annual items *dltt*+*dlc*) minus debt mortgages and other secured debt (Compustat annual item *dm*) and *residual cash* is debt mortgages and other secured debt (Compustat annual item *dm*) minus cash and equivalents (Compustat annual item *che*). *Residual cash* equals zero if *dm* is greater than *che*. (Source: Compustat).

Profitability: EBITDA (Compustat annual item *oibdp*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Rated: a dummy variable that takes the value of one and zero otherwise, if the firm has a credit rating from S&P, Moody's, Fitch, or Duff & Phelps, using data obtained from Compustat and Mergent FISD.

Receivables: total receivables (Compustat annual item *rect*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Secured leverage: debt mortgages and other secured debt (Compustat annual item *dm*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Size: either the dollar book value or the natural logarithm of the book value of the assets (Compustat annual item *at*). (Source: Compustat).

Short-term leverage: debt in current liabilities (Compustat annual item *dlc*) minus long-term debt due in one year (Compustat annual item *dd1*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Tangibility: net property, plant, and equipment (Compustat annual item *ppent*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

Tobin's Q: proxied by market-to-book ratio calculated as book value of assets plus the market value of equity (Compustat annual items *at*+(*csho***prcc f*)) minus the book value of equity and deferred taxes (Compustat annual item *ceq*+*txdb*), all over (book value of assets*0.9 (Compustat annual item *at*) + market value of assets*0.10. (Source: Compustat).

Unpledged tangibility: net property, plant, and equipment (Compustat item *ppent*) minus secured debt (Compustat item *dm*) divided by book value of total assets (Compustat item *at*). (Source: Compustat).

Unpledged tangibility share: net property, plant, and equipment (Compustat item *ppent*) minus secured debt (Compustat item *dm*) divided by net property, plant, and equipment (Compustat item *ppent*). (Source: Compustat).

Unrated: a dummy variable that takes the value of one and zero otherwise, if the firm does not have a credit rating from S&P, Moody's, Fitch, or Duff & Phelps, using data obtained from Compustat and Mergent FISD.

Unsecured leverage: total debt (Compustat annual items *dltt*+*dlc*) minus debt mortgages and other secured debt (Compustat annual item *dm*) divided by total assets (Compustat annual item *at*). (Source: Compustat).

WW Index: constructed following Whited and Wu (2006) and Hennessy and Whited (2007) as −0.091 [(*ib* + *dp*)/*at*] – 0.062[indicator set to one if *dvc* + *dvp* is positive, and zero otherwise] + 0.021[*dltt/at*] – 0.044[1og(*at*)] + 0.102[average industry sales growth, estimated separately for each three-digit SIC industry and each year, with sales growth defined as above] – 0.035[sales growth], where all variables in italics are Compustat data items. Following convention, firms are sorted into terciles based on their index values in the previous year. Firms in the top tercile are coded as constrained, and those in the bottom tercile are coded as unconstrained.

Internet Appendix

Table IA.I

Tangibility and Leverage – Alternative Measure of Leverage

This table reports the results of regressions relating leverage to tangibility. The dependent variable used in the regressions is *debt/(debt+mkt equity)* in columns (1) to (4), and *unsecured debt/(debt+mkt equity)* in columns (5) to (8). The dependent variable is multiplied by 100 to facilitate easier representation of regression coefficients. All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. Columns (1) and (5) use the full sample, whereas columns (2) to (4) and columns (6) to (8) divide the sample into three groups, each containing an equal number of observations, based on the inflation-adjusted book value of total assets. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Debt/(Debt+Mkt Equity)				Unsecured Debt/(Debt+Mkt Equity)			
		Asset Size (Inflation Adjusted)				Asset Size (Inflation Adjusted)		
	Full Sample	Small	Medium	Large	Full Sample	Small	Medium	Large
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tangibility	13.159***	16.955***	16.191***	7.694***	2.042**	3.208***	3.879*	2.420
	(1.240)	(1.509)	(2.499)	(2.412)	(0.981)	(1.160)	(2.063)	(2.266)
Log(assets)	3.003***	2.399***	5.821***	1.695***	2.804***	1.104***	5.241***	3.435***
	(0.209)	(0.351)	(0.438)	(0.417)	(0.162)	(0.291)	(0.377)	(0.333)
Q	−5.393***	−3.600***	−5.168***	−7.050***	−2.993***	−2.147***	−2.539***	−4.538***
	(0.132)	(0.157)	(0.257)	(0.382)	(0.096)	(0.122)	(0.191)	(0.274)
Profitability	−10.866***	−5.265***	−25.157***	−44.522***	−7.807***	−3.789***	−15.456***	−24.370***
	(0.469)	(0.476)	(1.442)	(3.339)	(0.373)	(0.407)	(1.113)	(2.375)
Fixed Effects								
Year	Y	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y	Y
Observations	86,897	28,074	28,570	29,107	86,897	28,074	28,570	29,107
Adj. R-squared	0.613	0.577	0.678	0.685	0.498	0.447	0.548	0.567

Table IA.II

Tangibility and Leverage – Subsample Analysis

This table reports the results of regressions relating leverage to tangibility for subsamples of firms based on size and financial constraints. Columns (1) to (3) divide the sample into three groups, each containing an equal number of observations, based on the inflation-adjusted book value of total assets, and columns (4) to (6) divide the sample based on the WW Index. We first calculate firm-level averages for size and WW Index and then assign firms to one of the three groups based on firm-level average values. Note that this ensures that firms do not jump across groups over time. The dependent variable used in the regressions is *leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Asset Size (Inflation Adjusted)			WW Index		
	Small	Medium	Large	High	Medium	Low
	(1)	(2)	(3)	(4)	(5)	(6)
	leverage	leverage	leverage	leverage	leverage	leverage
Tangibility	17.533***	14.025***	4.642**	16.218***	16.862***	2.233
	(1.673)	(2.343)	(2.315)	(1.722)	(2.191)	(2.335)
Log(assets)	0.479	3.717***	0.812**	1.080***	3.188***	0.861**
	(0.351)	(0.360)	(0.337)	(0.326)	(0.343)	(0.358)
Q	−0.850***	−0.975***	−0.864**	−0.766***	−0.936***	−1.016***
	(0.183)	(0.261)	(0.343)	(0.185)	(0.267)	(0.364)
Profitability	−5.675***	−14.276***	−17.454***	−6.270***	−14.904***	−16.113***
	(0.607)	(1.305)	(2.761)	(0.617)	(1.396)	(2.786)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	28,838	29,180	29,491	28,832	28,889	29,056
Adj. R-squared	0.449	0.565	0.589	0.441	0.580	0.611

Table IA.III

Unpledged Tangibility and Unsecured Debt – Large Unconstrained Firms

This table reports the results of regressions relating unsecured debt usage to unpledged tangibility for large unconstrained firms. The dependent variable used in the regressions is *unsecured leverage*, which is multiplied by 100 to facilitate easier representation of regression coefficients. The key explanatory variable is *unpledged tangibility*. Columns (1) and (2) analyze large firms. We divide the sample into three groups, each containing an equal number of observations, based on the inflation-adjusted book value of total assets. The analysis uses firms in the largest size category. Columns (3) and (4) analyze unconstrained firms based on the WW Index. We divide the sample into three equal groups, each containing an equal number of observations, based on the WW Index. The analysis uses firms belonging to the most unconstrained category. All regressions include lagged values of the book value of firm assets (in log), market-to-book ratio, and profitability as additional explanatory variables. The regressions also include year fixed effects and either three-digit SIC code or firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Asset Size		WW Index	
	(1)	(2)	(3)	(4)
Unpledged tangibility	14.427***	18.093***	12.430***	15.624***
	(1.065)	(1.418)	(1.095)	(1.530)
Log(assets)	2.025***	2.081***	2.528***	2.657***
	(0.201)	(0.359)	(0.163)	(0.368)
Q	0.297	0.501	0.564*	0.810**
	(0.330)	(0.342)	(0.320)	(0.376)
Profitability	−15.805***	−15.420***	−14.682***	−15.616***
	(2.423)	(2.686)	(1.535)	(2.983)
Fixed Effects				
Year	Y	Y	Y	Y
Industry	Y	N	Y	N
Firm	N	Y	N	Y
Observations	27,690	28,125	28,476	28,449
Adj. R-squared	0.183	0.549	0.200	0.559

Table IA.IV

Unpledged Tangibility and Unsecured Debt Using Capital IQ Data

This table reports the results of regressions relating unsecured debt usage to unpledged tangibility. The dependent variable used in the regressions is *unsecured leverage*, which we obtain from Capital IQ, and is multiplied by 100 to facilitate easier representation of regression coefficients. The key explanatory variable in column (1) is *unpledged tangibility*. Columns (2) and (3) use *tangibility* and *secured leverage* as key explanatory variables. All regressions include lagged values of the book value of firm assets (in log), market-to-book ratio, and profitability as additional explanatory variables. The regressions also include year fixed effects and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)
Unpledged tangibility	7.972***		
	(1.139)		
Tangibility		4.443***	9.280***
		(1.685)	(2.066)
Secured leverage		−0.331***	−0.271***
		(0.013)	(0.016)
Tangibility × Secured leverage			−0.247***
			(0.050)
Log(assets)	1.806***	1.694***	1.720***
	(0.317)	(0.299)	(0.298)
Q	0.511**	0.244	0.246
	(0.206)	(0.201)	(0.201)
Profitability	−3.899***	−4.736***	−4.677***
	(0.701)	(0.673)	(0.673)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	25,490	25,979	25,979
Adj. R-squared	0.600	0.645	0.647

Table IA.V

Tangibility and Net Leverage

This table reports the results of regressions relating net leverage to tangibility. Column (1) examines the full sample, columns (2) to (4) divide the sample into three groups, each containing equal number of observations, based on the WW Index, and columns (5) to (7) divide the sample based on credit ratings. The dependent variable used in the regressions is *net leverage*, defined as total debt minus cash and equivalent, scaled by book value of assets. We multiply net leverage by 100 to facilitate easier representation of regression coefficients. All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Full sample	WW Index			Availability of Ratings		
		High	Medium	Low	Unrated	Below IG	IG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tangibility	32.280***	42.226***	36.999***	12.126***	36.872***	25.329***	0.020
	(1.597)	(2.521)	(2.799)	(2.796)	(1.770)	(4.645)	(4.002)
Log(assets)	3.017***	2.289***	5.493***	3.595***	2.638***	1.913**	1.108
	(0.278)	(0.479)	(0.492)	(0.482)	(0.312)	(0.743)	(0.820)
Q	-2.483***	-2.264***	-2.983***	-1.494***	-2.524***	-2.491***	-2.280**
	(0.200)	(0.296)	(0.405)	(0.510)	(0.210)	(0.781)	(0.895)
Profitability	-7.609***	-4.958***	-14.220***	-23.823***	-7.139***	-5.920	-5.837
	(0.762)	(0.941)	(2.657)	(3.812)	(0.772)	(4.919)	(8.962)
Fixed Effects							
Year	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y
Observations	87,570	26,405	26,782	27,407	69,712	9,594	7,881
Adj. R-squared	0.648	0.610	0.680	0.663	0.642	0.671	0.661

Table IA.VI

Tangibility and Net Unsecured Leverage

This table reports the results of regressions relating net unsecured leverage to tangibility. Column (1) examines the full sample, columns (2) to (4) divide the sample into three groups, each containing equal number of observations, based on the WW Index, and columns (5) to (7) divide the sample based on credit ratings. The dependent variable used in the regressions is *net unsecured leverage*, defined as total unsecured debt minus residual cash and equivalent, scaled by book value of assets. Residual cash and equivalent is calculated as cash and equivalent minus secured debt. If secured debt is greater than cash and equivalent, residual cash and equivalent equals zero. We multiply net unsecured leverage by 100 to facilitate easier representation of regression coefficients. All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Full sample	WW Index			Availability of Ratings		
		High	Medium	Low	Unrated	Below IG	IG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tangibility	22.462***	29.181***	25.396***	8.870***	26.429***	14.532***	0.850
	(1.354)	(2.214)	(2.309)	(2.599)	(1.485)	(4.521)	(4.074)
Log(assets)	2.905***	1.785***	4.798***	4.210***	2.134***	3.381***	2.096**
	(0.235)	(0.426)	(0.427)	(0.427)	(0.267)	(0.696)	(0.823)
Q	-1.762***	-1.839***	-2.167***	-0.719	-1.836***	-1.506**	-2.439***
	(0.178)	(0.268)	(0.350)	(0.468)	(0.186)	(0.748)	(0.870)
Profitability	-6.586***	-4.410***	-9.858***	-15.096***	-5.843***	-5.266	-1.931
	(0.683)	(0.850)	(2.255)	(3.509)	(0.691)	(4.451)	(8.401)
Fixed Effects							
Year	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y
Observations	87,570	26,405	26,782	27,407	69,712	9,594	7,881
Adj. R-squared	0.610	0.570	0.600	0.610	0.599	0.594	0.647

Table IA.VII

Tangibility and Net Unsecured Leverage for Different Levels of Secured Leverage

This table reports the results of regressions relating net unsecured leverage to tangibility for different levels of secured debt on firms' balance sheets. The dependent variable used in the regressions is *net unsecured leverage*, defined as total unsecured debt minus residual cash and equivalent, scaled by book value of assets. Residual cash and equivalent is calculated as cash and equivalent minus secured debt. If secured debt is greater than cash and equivalent, residual cash and equivalent equals zero. We multiply net unsecured leverage by 100 to facilitate easier representation of regression coefficients. Column (1) analyzes firm-year observations with zero *secured leverage*. We split the remaining sample of firms into two groups containing an equal number of observations based on secured leverage. Firms with secured leverage < 7.3% (the median value among firms with positive secured leverage) are analyzed in column (2), while firms with secured leverage > 7.3% are analyzed in column (3). All regressions include lagged values of firm tangibility, the log of the book value of firm assets, market-to-book ratio, and profitability as explanatory variables. The regressions also include year and firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	Secured/total assets = 0	*Secured/total assets >0 & <= median*	*Secured/total assets > median*
	(1)	(2)	(3)
Tangibility	31.555***	24.350***	9.051***
	(2.928)	(2.701)	(1.413)
Log(assets)	2.253***	3.494***	2.480***
	(0.535)	(0.437)	(0.259)
Q	-1.377***	-2.406***	-0.627***
	(0.330)	(0.284)	(0.236)
Profitability	-6.715***	-5.104***	-7.213***
	(1.164)	(1.245)	(0.961)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	21,568	31,295	31,343
Adj. R-squared	0.634	0.735	0.625

Table IA.VIII

Unpledged Tangibility and Net Unsecured Leverage

This table reports the results of regressions relating net unsecured leverage to unpledged tangibility. The dependent variable used in the regressions is *net unsecured leverage*, defined as total unsecured debt minus residual cash and equivalent, scaled by book value of assets. Residual cash and equivalent is calculated as cash and equivalent minus secured debt. If secured debt is greater than cash and equivalent, residual cash and equivalent equals zero. We multiply net unsecured leverage by 100 to facilitate easier representation of regression coefficients. The key explanatory variable in column (1) is *unpledged tangibility*. Columns (2) and (3) use *tangibility* and *secured leverage* as key explanatory variables. All regressions include lagged values of the book value of firm assets (in log), market-to-book ratio, and profitability as additional explanatory variables. The regressions also include year fixed effects and either three-digit SIC code or firm fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)
Unpledged tangibility	9.964***		
	(0.934)		
Tangibility		23.299***	32.615***
		(1.350)	(1.555)
Secured leverage		-0.079***	0.147***
		(0.013)	(0.020)
Tangibility × Secured leverage			-0.739***
			(0.044)
Log(assets)	2.853***	2.884***	2.867***
	(0.241)	(0.235)	(0.235)
Q	-1.919***	-1.831***	-1.826***
	(0.183)	(0.179)	(0.178)
Profitability	-6.915***	-6.670***	-6.470***
	(0.704)	(0.687)	(0.683)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	83,038	87,570	87,570
Adj. R-squared	0.610	0.611	0.616

Table IA.IX

Available Collateral and Firm Credit Rating

This table reports the results of regressions relating firm ratings to available collateral. The dependent variable is *Credit Rating Score*, which takes a value of one for an AAA rating, two for AA+, three for AA, and so forth. The key explanatory variable is *Unpledged tangibility share*. The regression also controls, one at a time, for tangibility, interest coverage ratio, profitability, leverage, firm size, debt-to-EBITDA ratio, a dummy indicating negative value of debt-to-EBITDA, cash holdings, capex, and the standard deviation of earnings. The regressions also include year and industry fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Unpledged tangibility share	-1.500***	-1.401***	-1.197***	-1.048***	-1.041***	-1.356***	-1.428***	-1.453***	-1.448***	-1.431***
	(0.235)	(0.218)	(0.204)	(0.166)	(0.210)	(0.214)	(0.220)	(0.219)	(0.227)	(0.223)
Tangibility	2.140									
	(1.330)									
Interest coverage		-0.037***								
		(0.006)								
Profitability			-18.645***							
			(1.763)							
Leverage				0.076***						
				(0.009)						
Log(assets)					-1.267***					
					(0.106)					
Debt/EBITDA						0.145***				
						(0.036)				
Negative Debt/EBITDA							3.722***			
							(0.710)			
Cash								-1.496		
								(1.106)		

Capex									-2.966	
									(3.967)	
Volatility										21.937***
										(3.788)
Fixed Effects										
industry	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
year	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,745	2,727	2,745	2,745	2,745	2,745	2,745	2,745	2,745	2,741
Adj. R-squared	0.419	0.437	0.512	0.497	0.523	0.445	0.429	0.416	0.415	0.431

Table IA.X

Available Collateral and Unsecured Bond Spreads

This table reports the results of regressions relating unsecured bond spreads to available collateral. The dependent variable is *bond spread*, calculated as the difference between the implied yield from secondary trade prices and maturity-matched treasury. The key explanatory variable is *Unpledged tangibility share*. The regression controls for bond characteristics including maturity, callability, issuance amount, and the presence of a covenant in the bond contract. The regression also controls, one at a time, for tangibility, interest coverage ratio, profitability, leverage, firm size, debt-to-EBITDA ratio, a dummy indicating negative value of debt-to-EBITDA, cash holdings, capex, and the standard deviation of earnings. The regressions also include year-month fixed effects. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Unpledged tangibility share	-119.472*** (30.921)	-117.102*** (31.588)	-105.752*** (29.232)	-97.960*** (29.543)	-101.058*** (32.408)	-95.974*** (27.036)	-120.765*** (31.953)	-119.436*** (31.796)	-119.554*** (31.378)	-122.159*** (32.239)
Tangibility	60.181* (32.678)									
Interest coverage		-1.166*** (0.340)								
Profitability			-517.777*** (74.461)							
Leverage				2.347*** (0.784)						
Log(assets)					-67.825*** (7.949)					
Debt/EBITDA						16.091*** (2.743)				
Negative Debt/EBITDA							145.711* (80.010)			
Cash								-28.893 (45.534)		

Capex									371.090**	
									(181.503)	
Volatility										719.727***
										(140.766)
Maturity	0.941*	1.099**	1.234***	1.143***	1.705***	1.199***	1.088**	1.043**	1.000**	1.142**
	(0.488)	(0.474)	(0.458)	(0.441)	(0.421)	(0.440)	(0.477)	(0.477)	(0.479)	(0.471)
Callable	-35.110	-32.453	-29.488	-30.281	-59.754**	-15.626	-33.292	-33.883	-35.186	-36.438
	(27.265)	(26.042)	(23.206)	(22.254)	(26.419)	(20.136)	(25.975)	(26.310)	(26.738)	(25.523)
Amount	-44.560***	-45.106***	-44.104***	-41.502***	1.066	-43.428***	-46.411***	-45.653***	-46.193***	-45.211***
	(8.120)	(7.807)	(7.784)	(7.535)	(6.478)	(6.876)	(7.844)	(7.850)	(7.921)	(7.482)
Covenant	-17.609	-13.424	-9.930	-22.843	-15.978	-15.309	-13.779	-13.988	-13.865	-13.996
	(24.636)	(26.311)	(24.749)	(25.743)	(19.021)	(23.452)	(25.114)	(24.889)	(24.535)	(24.223)
Fixed Effects										
year-month	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,097,126	1,094,659	1,097,126	1,097,126	1,097,126	1,097,126	1,097,126	1,097,126	1,097,126	1,096,671
Adj. R-squared	0.213	0.213	0.272	0.251	0.290	0.305	0.211	0.206	0.211	0.235

Table IA.XI

Market Conditions, Available Collateral, and Unsecured Bond Spreads

This table reports the results of regressions relating the sensitivity of unsecured bond spreads to available collateral during different market conditions. The dependent variable is the bond spread, calculated as the difference between the implied yield from secondary trade prices and maturity-matched treasury. The key explanatory variables are unpledged tangibility share and *High Baa–Aaa spread*, an indicator variable that equals one for months where the Baa–Aaa spread is greater than the median Baa–Aaa spread over our sample period. The regression controls for *predicted credit score* estimated from running a regression specification similar to the one used in column (1) of Table XIII but excluding unpledged tangibility share as an explanatory variable. The regression also controls for bond characteristics including maturity, callability, issuance amount, and the presence of a covenant in the bond contract. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. Variable definitions are provided in Appendix A. * p<0.1, ** p<0.05, *** p<0.01.

	(1) Spread
Unpledged tangibility share	-48.223**
	(20.936)
Unpledged tangibility share ×	-62.075***
High Baa–Aaa spread	(21.935)
Predicted credit score	32.426***
	(7.477)
Maturity	1.771***
	(0.386)
Callable	-41.032**
	(18.525)
Amount	-10.205
	(9.744)
Covenant	-18.431
	(21.073)
Fixed Effects	month
Observations	1,093,725
Adj. R-squared	0.406