July 2026

Debt and Assets

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ABSTRACT

Prior studies imply that a majority of US corporate debt by value is cash-flow based and only a small fraction of US debt is asset backed. Because corporations often prefer keeping assets unencumbered until creditors insist on security, much unsecured cash flow-based debt is also implicitly asset backed. Moreover, the degree of asset backing varies with a firm's condition and the economic environment. Consequently, asset values affect both the amount and price of unsecured borrowing, with effects amplified in adverse conditions – consistent with financial accelerator theories. Because all corporate debt is supported both by future cash flows and asset values, with the relative support shifting with firm-specific and economy-wide conditions, the industry practice of classifying debt as "asset-based" or "cash flow-based" is overly categorical, especially for long term corporate bonds.

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Many theories of debt and of credit-based macroeconomic fluctuations rest on asset-based borrowing (see, e.g., Braun (2005); Fisher (1933); Hart and Moore (1994, 1998); Kiyotaki and Moore (1997); Williamson (1988)). How important is asset-based borrowing actually?

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. Firms with good prospects of high and stable cash flows should find it easy to borrow. Yet the finance literature also focuses on the importance of the value of a firm's *tangible assets* – property, plant, and equipment (PP&E) – in facilitating borrowing (see, for example, Titman and Wessels (1988)).

One reason is that assets support debt recovery when cash flows prove inadequate. For instance, specific assets such as land or machinery are easily valued, retain value over time, and are straightforward to transfer or sell. Their distinctiveness (think of a demarcated plot of land or the serial number on a motor vehicle) makes them easy to track if a borrower tries to sell them surreptitiously, and their liquid markets mean they will hold their value even if the borrower is incompetent, untrustworthy, or neglects maintenance. Therefore, they require little monitoring (see Jackson and Kronman (1979)). Firm cash flows, by contrast, may be uncertain, unverifiable, and mutable, especially for young or risky firms.

Nonetheless, important recent work by Caglio, Darst, and Kalemli-Özcan (2024), 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. According to Lian and Ma (2021), debt is "cash-flow-based" if debt repayment is "based on the value of cash flows from the firm's continuing operations (i.e., going-concern value)".[2] Furthermore, "creditors' payoffs (in default) are driven by the cash flow value from continuing operations of the restructured firm".[3]

It might seem obvious then that unsecured debt is cash flow-based debt while debt secured by tangible assets such as property, plant, and equipment is asset-based debt. While Lian and Ma (2021) agree with these categorizations, they also classify debt secured by the corporate entity (also known as blanket liens) as cash flow based, while debt secured by assets created or acquired in the course of business such as inventory and receivables is classified as asset-based.

[2] Lian and Ma (2021)
[3] Lian and Ma (2021)

Unfortunately, the definitions in the literature are not uniform. Ivashina, et al. (2022) term asset-based loans as loans secured by hard specific assets like land, while cash flow-based debt consists of all other loans. Caglio, et al. (2024) label debt secured by accounts receivables and inventory as "earnings-based" (their version of cash flow-based debt), precisely because those assets are created in the course of doing business. Lian and Ma (2021), as indicated earlier, classify such debt as asset based.

Notwithstanding these differences in classification, this literature suggests new facts and important implications. Lian and Ma (2021) find using their definitions that 80% of borrowing by US corporations is cash-flow-based, that "the amount of asset-based debt a firm has is positively correlated with the amount of physical assets, whereas the amount of cash-flow–based debt is not (if anything, the correlation is negative)," and that for large established firms, "earnings-based" covenants tie a firm's borrowing to its cash flows.

If, as Lian and Ma conclude, "the liquidation value of physical assets may not be the defining [borrowing] constraint for major U.S. nonfinancial firms", it has profound implications. On the corporate side, as assets become more intangible (Gutierrez and Philippon (2017) and Crouzet and Eberly (2019)), corporate financing need not be held back by the dearth of tangible physical assets. From a macroeconomic perspective, Lian and Ma argue that "asset price feedback through firms' balance sheets could diminish significantly" given "the absence of a direct link between liquidation values and borrowing constraints". Indeed, in a calibration exercise, they argue, "Given that the majority (80%) of U.S. nonfinancial corporate debt by value is not subject to the traditional collateral constraints, the general equilibrium response of … aggregate output … is … only about one-fifth of that under traditional collateral constraints."[4] Consequently, business-cycle amplification through asset-value-based borrowing (of the kind in Fisher (1933), Geanakoplos (2023), or Kiyotaki and Moore (1997)) "may have primary effects through financial institutions and households, rather than major nonfinancial firms."

We are sympathetic to the view that asset-based debt has become less important in the United States – in Benmelech, Kumar, and Rajan (2024), we find that secured debt as a fraction of outstanding debt has declined steadily in the twentieth century. Also, Graham (2022) finds from

[4] Lian and Ma (2021)

surveys of corporate CFOs that the predominant way of assessing borrowing sustainability is to use earnings-based measures like Debt/EBITDA.

Yet, we do not think that the link between assets and most borrowing has been severed. To avoid becoming enmeshed in definitional differences, we focus on tangible assets – property, plant, and equipment – which are clearly hard specific physical assets, core to asset-based borrowing. Furthermore, unsecured debt is clearly cash flow-based debt, and accounts for the predominant share of corporate borrowing. Therefore, our analysis will focus on whether unsecured debt is implicitly backed by tangible assets.

Clearly, debt can be backed by assets even without a formal pledge of security, as Rampini and Viswanathan (2024) emphasize. Large established firms have more choice than small or risky firms that are financially constrained relative to their investment opportunities. The latter want to borrow as much as possible, and since secured debt offers lenders more comfort than unsecured debt, will issue secured debt to maximize borrowing (see Rampini and Viswanathan (2010)). Large established firms' investment needs are more moderate relative to their borrowing capacity, so the benefit (in terms of reducing demanded interest 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.

Indeed, 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 Viswanathan (2010)). Indeed, Benmelech, Kumar, and Rajan (2022) find evidence consistent with such behavior.[5]

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

This suggests that for a range of firms, unsecured debt, perhaps the cleanest form of cash flow-based debt, is also implicitly backed by assets, a possibility overlooked when only some forms of secured debt are labelled asset-based. Yet such backing is hard to discern in traditional regression analysis: consistent with Lian and Ma (2021), regressing a firm's outstanding unsecured debt on tangible assets and usual controls typically yields a statistically insignificant or even a significant negative coefficient estimate on tangibility.

One reason tangible assets do not seem to matter in such regressions is secured debt itself. Outstanding secured debt not only eats up available collateral but may also induce unsecured creditors to demand collateral, obscuring underlying correlations. A second reason is that one would expect a strong correlation between outstanding debt 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. Unconstrained firms, for instance those generating a lot of internal cash flow, may remain well below their borrowing capacity for extended periods. In that case, outstanding debt is a poor proxy for debt capacity. Consistent with the literature, we find little reliable positive correlation between leverage and tangibility among large, highly rated, or financially unconstrained firms.

We address these concerns and unveil implicit asset backing in multiple ways. In the cross-section, we correct for the extent to which collateralizable assets are encumbered by secured debt. The positive correlation between unsecured debt and unencumbered collateralizable assets (which we term "unpledged tangibility") then emerges strongly in the full sample.

To demonstrate implicit asset backing, 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, but predominantly unsecured. More constrained unrated firms tend to issue both secured and unsecured debt following an exogenous increase in the value of their real estate holdings but, once again, more of the latter.

Firms that issue debt reveal a need for financing and are more likely to be near debt capacity. We also know that firms are more likely to be credit constrained when either their own or the general economic situation deteriorates, when asset backing is likely to matter more. We

find that net debt issuances increase more for firms with unpledged tangibility when the macroeconomic environment deteriorates.

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 key overall takeaway is that unsecured debt can be implicitly backed by assets, and the extent of asset backing is not constant but varies with corporate and economic conditions. An important question remains: why does asset backing of debt, implicit or explicit, matter if the predominant way large firms deal with financial distress is through reorganization rather than liquidation (see, for example, Corbae and D'Erasmo (2017))? Shouldn't only the firm's going-concern value matter?

We argue that the availability of assets to back debt can enhance going-concern value. Certainly in normal times, creditors look to the firm's 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 bolster going concern value, especially if the firm's situation or environment deteriorates. A larger collateral base can improve creditor control (on creditor control, also see Nini, Smith, and Sufi (2012)), which also allows creditors to be patient and not invoke their rights quickly. The availability of plentiful collateral prevents a collateral rat race, which may reduce the firm's flexibility as a going concern (see Mello and Ruckles (2017)). 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 so 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 in a reorganization, and enhancing the reorganized firm's value. Consequently, 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 tangible assets, the going concern value it relies on for repayment may be enhanced by the presence of plentiful collateralizable assets – once again a form of implicit asset backing.

In summary, some firms are compelled to issue only secured debt as they maximize borrowing. Others issue what seems to be cash flow-based debt but is 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 such high going concern value at a point in time that cash flows and going concern value, not underlying assets, become the primary basis of debt issuance and repayment.

Importantly, though, membership in these classes is not static. The same debt could be more "cash flow based" in good times but be more 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 evidence that 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 emerging practice of classifying debt as "cash flow-based" and "asset-based" (also see Drechsel (2023) or Hartman-Glaser, Mayer, and Milbradt (2025)) may be too categorical.

Finally, our evidence suggests that even in the United States, asset-price-based macroeconomic fluctuations transmitted through credit fluctuations likely remain relevant. While in good times, the link between debt and asset values may be attenuated (something theories should allow for), it still gets magnified in bad times. Crises such as those seen in Japan in the late 1980s, and emphasized by Fisher (1933) in his "debt-deflation" theory of the Great Depression as well as by Geanakoplos (2023) are likely not passe, nor are the economic fluctuations emphasized by Kiyotaki and Moore (1997), or by Bernanke, Gertler, and Gilchrist (1999) in their financial accelerator theory.

The paper is organized as follows. Section I examines theories of debt dependence on cash flows or assets. Section II describes the data. Section III presents baseline correlations between debt and asset tangibility. Section IV shows that securing debt masks the relationship between unsecured debt and assets, and establishes the link between unsecured debt and unpledged tangibility. Section V examines debt issuance and unpledged tangibility across firms and over time. Section VI establishes causality using the data and methodology from Campello et al. (2022). Section VII shows that unpledged tangibility is also priced in unsecured debt, especially during downturns. Section VIII concludes.

I. Theories

We begin by examining why assets matter for borrowing, and how the option to pledge assets as security shapes borrowing.

A. Cash Flows and Assets

As a firm's cash flows become more sizeable, reliable, and pledgeable, they can support debt financing without asset backing (see Diamond, Hu, and Rajan (2020); Ivashina, Laeven, and Moral-Benito (2022); Lian and Ma (2021)). High cash flows also imply high going concern value, giving borrowers something significant to lose if they undermine creditor rights, while unifying creditors who face the borrower.

Of course, theory does not say assets should become irrelevant (see, e.g., Diamond, Hu, and Rajan (2020) where both assets and pledgeable cash contribute to debt capacity). Borrowers can affect cash flows, or threaten to affect them, by threatening to walk away from the enterprise (or, more generally, by shirking, underinvesting, or risk shifting) as in Hart and Moore (1994, 1998), or by weakening accounting and governance over cash flows as in Diamond, Hu, and Rajan (2020). 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 in some countries and some firms.

Tangible assets such as land are harder to impair. Lenders can seize them following default, allowing them to make credible threats that enable them to extract repayment even when cash flows are not verifiable. Tangible assets, being distinctive, may be hard to tunnel out even with accounting and control systems of modest quality (see Myers and Rajan (1998)), providing comfort to lenders when prospective cash flows are uncertain, unverifiable, or volatile, as is typical for small or risky firms.

Explicitly securing debt adds further 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. 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, debt would tend to become secured as bankruptcy nears.

Of course, 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 Viswanathan (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 defaults.

Unused collateralizable assets also constitute financing "slack" (Benmelech (2024), 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 Viswanathan (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 effectively loses asset backing.[6]

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. Thus, even creditors that rely on going concern value for repayment also benefit if asset values are higher, a form of implicit asset backing.

[6] Indeed, it may well be that the "cash flow-based secured" category of debt proposed by Ivashina et al. (2022), 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.

B. Cash flow-based debt and Asset-based debt

It might seem a "no-brainer" that unsecured debt is cash flow-based debt while debt secured by tangible assets such as property, plant, and equipment is asset-based debt. While Lian and Ma (2021) agree with these categorizations, they also classify debt secured by the corporate entity (also known as blanket liens) as cash flow based, while debt secured by assets created or acquired in the course of business such as inventory and receivables is classified as asset-based. As we pointed out earlier, other papers in the literature differ in their classification.

Notwithstanding conflicting definitions, tangible assets – property, plant, and equipment – are clearly hard specific assets, core to asset-based borrowing. Unsecured debt is clearly cash flow-based debt. Therefore, our analysis will focus on whether unsecured debt is implicitly backed by tangible assets.

C. Debt Levels and Asset Levels

Even if debt is asset backed, should we see a correlation between debt levels and asset levels? The standard test regresses debt on assets (tangible assets, intangible assets, receivables and inventories, liquidation value of assets) to infer backing. For the test to be informative, most firms must be either financially constrained or must borrow up to their optimal debt level or debt capacity. Since for such firms assets augment debt capacity, a regression of debt against assets should yield a positive coefficient on assets.

However, if firms are unconstrained (see Rampini and Viswanathan (2010)) and their debt level is more a residual of other decisions such as internal cash generation under a Pecking Order logic (see Myers and Majluf (1984)), their actual debt level may not correlate positively with assets even when borrowing capacity is asset supported. 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 asset value be measured in their current use (usually in the firm as a going concern or at replacement value) or in alternative uses (as redeployed after being seized by creditors or in liquidation)? Rampini and Viswanathan (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 has eroded and the best alternative for the firm is liquidation, then the liquidation value is the appropriate measure.

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, focusing on industrial firms (SIC codes 2000 to 5999). Because several tests require data on secured debt, our sample begins in 1981 – the first year in which Compustat consistently covers the item "debt mortgages and other secured debt" – and runs to 2022 with 88,905 firm-year observations. Appendix A defines variables and Table I reports summary statistics.

Our dependent variable is usually financial leverage – or *leverage*. Following Benmelech, Bergman, and Seru (2021), *leverage* is 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 somewhat lower than that in Benmelech, Bergman, and Seru (2021) because of differences in sample periods and sample construction. Colla, Ippolito, and Li (2013) report an average annual book leverage between 0.226 and 0.308 over 2002 to 2018. We address critiques of using book leverage (e.g., Welch (2011)) in the Internet Appendix.

Secured debt leverage is secured debt divided by total assets.[7] Mean secured debt leverage (Table 1) is 0.101 – similar to the mean 10.6% reported by Benmelech, Kumar, and Rajan (2024) – and the median is 0.026. *Unsecured debt leverage* is unsecured debt divided by total assets with

[7] 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.

mean 0.170, median 0.122, and standard deviation 0.173.[8] Table I also provides descriptive statistics on additional explanatory variables used in the analysis.

Controls follow Rajan and Zingales (1995), including 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). Additional controls include *inventory* as the ratio of inventory to total assets and *receivables* as the ratio of receivables to total assets. We use three traditional 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 Farre-Mensa and Ljungqvist (2016) in classifying firms as financially constrained or unconstrained using all three proxies. We complement these measures with a novel text-based proxy for financial constraints using a Large Language Model (the LLM Index), constructed from firms' Item 7 disclosures; see Internet Appendix IA.A for details. Finally, we also use information on whether a firm is rated investment grade or below investment grade.[9]

We require firms to have positive total assets and non-missing values for leverage, tangibility, profitability, Tobin's Q, and secured debt. We drop firms with leverage greater than 1. We obtain data on firm-level intangible capital stock from Ewens, Peters, and Wang (2024).[10] 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, and 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.

[8] 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.

[9] Rated firms are those that have a credit rating from S&P, Moody's, or Fitch, using data obtained from Compustat and Mergent FISD.

[10] We obtain these data from Michael Ewens's website: https://github.com/michaelewens/Intangible-capital-stocks.

III. Baseline Results: Leverage and Tangibility

A. Overall Leverage and Tangibility

We examine the relationship between firm-level leverage and tangibility using 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.[11] Standard errors are clustered at the firm level.[12]

Column (1) of Table II reports the results from estimating regression (1) without any fixed effects. The rest of the specifications 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

[11] The results throughout the paper are robust to the inclusion of additional controls for R&D intensity and capital expenditures. For brevity, these estimates are not tabulated but are available from the authors upon request.
[12] The results throughout the paper are robust to clustering standard errors by year or two-way clustering by firm and year. For brevity, these estimates are not tabulated but are available from the authors upon request.

9.6% increase in firm leverage.[13] [14] In Figure 1, we plot the average residuals of leverage (obtained using the regression specification of column (6) after excluding tangibility as an explanatory variable) against quartiles of residual tangibility (obtained 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 tangible assets serving as useful collateral, mitigating financing constraints and enhancing firms' debt capacity (Benmelech and Bergman (2009); Rajan and Zingales (1995); Titman and Wessels (1988)). 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 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. Proxies for financial constraints typically measure the gap between investment opportunities and available financing. 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.[15] If tangible assets mitigate financial constraints, the sensitivity of leverage to tangible assets should be greater for firms facing greater financial constraints. We now explore this.

[13] Alternatively, one can interpret the economic magnitude in terms of within-firm changes— a one standard deviation increase in tangibility within a firm is associated with a 0.08 standard deviation increase in leverage within the same firm.

[14] 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.B.I and are similar to those using leverage as the key dependent variable.

[15] 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)).

B.1. Leverage, Tangibility, and Firm Size

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 shares of tangible assets. This accords with studies suggesting smaller firms are more financially constrained (e.g., Hadlock and Pierce (2010); Hennessy and Whited (2007); Whited and Wu (2006)), so we expect the positive correlation of tangibility with leverage should be stronger among smaller firms.

We divide the sample into terciles based on firm size and re-estimate equation (1) for each one of the three subsamples 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 (columns (4) to (6)).[16] The sensitivity of leverage to tangibility is indeed highest for smaller firms. Column (1) of Table III shows that a one standard deviation increase in tangibility for firms in the first (small) tercile of the number of employees is associated with a 15.4% increase in leverage, while for those in the second tercile of number of employees, a one standard deviation increase in tangibility is associated with a 12.1% 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 the 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 four 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); (3) LLM Index, a novel large language

[16] 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.

model (LLM)-based measure of financial constraint developed in this paper; and (4) the availability and level of the credit rating.

We start by splitting the firm-level data into three groups based on either WW, HP, or LLM Index 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 the measures 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.[17]

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 between tangibility and leverage, correcting for year and firm fixed effects.[18] 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 13.7% increase in leverage, firms with medium levels of WW have a somewhat lower sensitivity (12.0% increase in column (2)). For the least constrained firms (column (3)), the partial correlation of tangibility with leverage is close to zero and is statistically insignificant. HP index results are similar (14.2% for most financially constrained firms, insignificant for the least constrained firms).

While both the Whited and Wu (2006) index and the Hadlock and Pierce (2010) index have been widely adopted in the empirical corporate finance literature, they rely on parameter estimates obtained from earlier sample periods.[19] For a more up-to-date measure of financing frictions, we construct an LLM index using a large language model applied to textual disclosures in Item 7 (Management's Discussion and Analysis) of firms' annual 10-K filings. Our sample spans the period 1997–2022, and Internet Appendix A provides a detailed description of the construction and

[17] 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). Finally, although the LLM Index is a categorical rather than a continuous measure, our methodology classifies 35.5% of firm-year observations as financially constrained. Similarly, the WW Index and the HP Index classify about one-third of firm-year observations in our sample as constrained.

[18] 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.B.II for the results.

[19] The WW Index is based on data from 1975 to 2001, whereas the HP Index relies on data from 1995 to 2004.

validation of this measure. Despite its reliance on LLM techniques and more recent data, the LLM index exhibits strong consistency with both the WW and HP measures. As shown in Table IV, the LLM-based results closely mirror our earlier findings: asset tangibility is strongly positively associated with leverage among financially constrained firms, while the relation is weak and statistically insignificant for unconstrained firms.

Finally, 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 (10)), below investment grade firms show weaker sensitivity (3.5% increase in column (11)), and investment-grade 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 pledgeable collateral. Firms also use inventories and receivables (Luck and Santos (2023)), and increasingly, intangibles such as patents and other intellectual property (see, e.g., Mann (2018)). We re-estimate equation (1), introducing each asset individually as the primary explanatory variable, reporting results 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.

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. Column (2) suggests the corresponding sensitivity for inventory is 3.3%. In column (3), the coefficient on receivables is small and statistically insignificant, suggesting that overall 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 (see for example, Gutierrez and Philippon (2017) and Crouzet and Eberly (2019)). 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) estimates the sensitivity of leverage to intangible assets is statistically significant at 3.6%.

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.[20]

[20] 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

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%, 3.4%, and 2.8%, respectively, whereas receivables do not seem significantly associated with leverage. In column (2), the dependent variable is short-term leverage. The coefficient on tangibility suggests that a one standard deviation increase in tangibility is associated with a 6.3% increase in short-term leverage. This is lower than the 9.8% increase in leverage reported in column (1). For inventory, the sensitivity of short-term leverage is 35.9%, considerably greater than the 3.5% increase for overall leverage reported in column (1). For receivables, the sensitivity is 20.2%, while it was close to zero for total leverage. Finally, intangibles are not related to short-term leverage.

In column (3), 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. A one standard deviation increase in tangibility is associated with a 10.5% increase in long-term leverage, greater than the 9.8% increase in leverage reported in column (1) or the 6.3% increase in short-term leverage reported in column (2). The coefficient on inventory suggests a 2.7% reduction in long-term leverage, and on receivables a 3.1% fall in long-term leverage. Liquid short-term assets do not appear supportive of long-term leverage.[21]

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, consistent with maturity matching.

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.

[21] 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.

E. Tangibility and Unsecured Debt

We now turn to the central focus of the paper: do tangible assets implicitly support a firm's unsecured debt capacity (Benmelech, Kumar, and Rajan (2022); Rampini and Viswanathan (2024)). We estimate the following regression specification:

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

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). In the full pooled sample, the point estimate of tangibility is not statistically significant regardless of whether we include industry (Table VII column (1)) or firm (Table VII column (2)) fixed effects.[22]

Next, similar to the analysis in Table III, in columns (3) to (5) of Table VII we divide the firm-year level data into three size terciles, and re-estimate equation (2) for each subsample.[23] The coefficient on tangibility in column (3) suggests that a one standard deviation increase in tangibility for small firms is associated with a 5.2% increase in unsecured leverage compared to the unconditional mean for this firm-group. For medium-sized firms, the coefficient on tangibility in column (4) is positive but not statistically significant, and for large firms in column (5), it is negative but small in magnitude and not statistically significant.

When we divide firm-year observations into groups based on the LLM 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 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 firms in the medium and low financially constrained groups. For brevity, we report results using WW index and HP index of financial constraints in the Internet Appendix Table IA.B.III, where we find similar results.

Finally, 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

[22] 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.
[23] We obtain similar results by using number of employees as the measure of firm size.

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.[24] This means that a sharper test of whether unsecured debt benefits from asset backing is to correct for secured interests. In Table VIII, we report estimates for equation (2) for firms with different levels of secured debt on their balance sheet.

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 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 sensitivity of leverage to *tangibility* in column (2), the set of firms with secured leverage < 7.3% (the median value among firms with positive secured leverage) at 4.9% is smaller compared to the estimate in column (1) but still statistically significant. It is smaller still at 3.8% in column (3) for firms with an above-median value of secured leverage.

So as a firm encumbers more collateral, 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.[25] Relatedly, it may

[24] Of course, if debt is overcollateralized, the unneeded assets support other debt.

[25] 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)).

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 demands becomes very high (see Benmelech, Kumar, and Rajan (2022)).

B. Unpledged Tangibility and Unsecured Debt

To test these effects directly, we define *Unpledged tangibility* as net property, plant, and equipment (Compustat item *ppent*) minus secured debt (Compustat item *dm*).[26] 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:

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

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 14.6% increase in unsecured leverage compared to the sample mean level of unsecured leverage.[27,28]

In Figure 2, we plot the residuals of unsecured leverage against quartiles of residual unpledged tangibility following a similar methodology as Figure 1. 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

[26] Unfortunately, we cannot separate only debt secured by tangible assets from overall secured debt. As indicated earlier, it is likely to constitute the major portion, however.

[27] Alternatively, one can interpret the economic magnitude in terms of within-firm changes— a one standard deviation increase in unpledged tangibility within a firm is associated with a 0.11 standard deviation increase in unsecured leverage within the same firm.

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

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 6.6% 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 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.[29] 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.B.V.

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 (2007) 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

[29] 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.

and cash as jointly determined as part of a firm's financing and capital structure policy. As a robustness check, we re-estimate our main analyses using net leverage.

Appendix Table IA.B.VI 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.B.VII 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 cash and equivalents is set to zero.[30] Furthermore, Appendix Table IA.B.VIII 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.B.VIX shows that net unsecured leverage is strongly and positively associated with unpledged assets.[31]

Overall, our analysis in this section suggests 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, especially for the largest, least financially constrained, most highly rated firms.

V. Leverage, Issuance, and Tangibility over Time

Large rated firms 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

[30] 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.

[31] 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).

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 Viswanathan (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 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

Among highly rated firms, the absence of a leverage tangibility correlation might reflect an intrinsic attribute of the firm, such as the nature of its business or assets or the likely form of bankruptcy resolution, or it may reflect its distance from distress and other aspects correlated with it. 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 9,600 firm-year observations for below-investment-grade firms in our sample, 2,444 are from firms that were also rated investment grade during the sample period. There are 3,235 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 8.1% 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, 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.

Additionally, 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.[32] 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:

$$\frac{\partial net\ debt\ issuance}{\partial Baa - Aaa\ spread} = -2.028 + 2.669 * unpledged\ tangibility. \quad (5)$$

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 5.8% 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 11.5% increase in net debt issuance when Baa–Aaa is at the 75th percentile level (i.e., when market conditions are relatively tighter).

[32] 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.

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.

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 holding values 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:

$$Debt_{i,t} = \alpha_i + \beta_{l,t} + \gamma RE\ Value_{i,t-1} + \theta Controls_{i,t-1} + \varepsilon_{i,t}, \quad (6)$$

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 personal income growth 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 LLM Index (columns (1)-(2)) or investment grade rating (columns (3)-(4)), and present the results from estimating Eq. (6) in Table XII.[33] Starting with financially unconstrained firms based on LLM 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

[33] 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, WW Index, or HP Index.

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 10% level. The coefficient suggests that a one standard deviation increase in *RE Value*$_{i,t-1}$ increases unsecured debt issuance by 85%. 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.

While our focus is on unconstrained firms, we examine the reaction of financially constrained firms to asset values increase. However, the LLM index classifies only 86 observations as constrained in the Campello et al. (2022) data.[34] The coefficient estimates on *RE Value*$_{i,t-1}$ in columns (5) and (6) are negative but statistically insignificant. However, the paucity of observations suggests these estimates are unreliable. Fortunately, we can use credit rating data as a measure of financial constraints and indeed have many more observations of unrated and below investment grade firms in the sample. In columns (7) and (8), we find the magnitude of the coefficient estimate on *RE Value*$_{i,t-1}$ is 0.303 for the issuance of unsecured debt by these firms and about half that (0.166) for secured debt issuance, with both coefficients being statistically significant. The coefficients suggest that a one standard deviation increase in *RE Value*$_{i,t-1}$ increases secured debt issuance by 37% whereas a similar increase in *RE Value*$_{i,t-1}$ increases unsecured debt issuance by 149%. These results suggest that for constrained firms, there is a greater likelihood that increases in asset values lead to the issuance of secured debt, but the issuance of unsecured debt is higher still.

Finally, we also study how firms with lower levels of unpledged tangible assets behave when faced with asset values increases. We divide firm-year observations into two groups based

[34] Using either the WW Index or the HP Index results in a similarly small number of observations being classified as financially constrained.

on whether unpledged tangibility is below or above the sample median value. In Table XIII column (1), we find that firms with low unpledged tangibility – that is, firms that have used up much of their existing collateral and borrowing capacity –issue significantly more debt when their asset values go up. A one standard deviation increase in $RE\ Value_{i,t-1}$ increases debt issuance by firms in this group by 73%. In contrast, firms with high unpledged tangibility do not issue debt when asset values go up (see column (2)). A natural explanation is that if assets are important in implicitly backing debt, they had the option to issue debt even before the asset value increase and did not. Importantly, firms with low unpledged tangibility tend to issue significantly more unsecured debt when asset values go up (see column (3)). This suggests they are rebuilding collateral slack by issuing debt implicitly backed by assets. A one standard deviation increase in $RE\ Value_{i,t-1}$ increases unsecured debt issuance by 109%. We do not find a statistically significant increase in their secured debt issuance (see column (5)).

VII. Asset Backing and the Pricing of Unsecured Debt

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, 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.[35] 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

[35] 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.

only senior unsecured bonds for this analysis. To examine the effect of available tangible assets on unsecured bond spreads, we estimate the following regression specification:

$$spread_{i,j,t} = \beta_1 * unpledged\ tangibility\ share_{j,t} + \beta_2 * X_{j,t} + \theta * Z_{i,t} + \delta_j + \lambda_t + \varepsilon_{i,t}, \quad (7)$$

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 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.

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.[36] 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

[36] 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.

XIV. 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.B.X, we include one firm characteristic at a time alongside unpledged tangibility share and find that the economic impact of unpledged tangibility share nearly triples.

We then estimate the effect of unpledged collateral on unsecured bond spreads using equation (7). 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, reporting estimates 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 15.1 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.B.XI 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 (7), reporting results 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. 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

Table XIV includes all bonds. To address the concern that the results are driven by non-investment-grade bonds, we focus only on investment-grade unsecured bonds in Table XV but also incorporate the fact that unpledged tangibility matters more for pricing in tough market conditions (a similar table for all unsecured bonds is in Internet Appendix Table IA.B.XII).

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, following the specification of column (3) of Table XIV but restricting the sample to investment-grade bonds. The estimates in column (1) of Table XV in indicate a one standard deviation increase in unpledged tangibility share is associated with a statistically significant 15 basis points lower unsecured bond spread.

In column (2) of Table XV, 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. The coefficient on the interaction term *unpledged tangibility share* × *high Baa–Aaa spread* is also negative and statistically significant, suggesting a one standard deviation increase in unpledged tangibility share is associated with a 26 basis points lower unsecured bond spread when Baa–Aaa spreads are high.[37] The implication from Table XV is that even investment-grade debt benefits from the backing of unpledged assets, especially in tough market conditions.

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

[37] 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).

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 XV. The coefficient estimate is negative but small before the onset of the Covid pandemic, it becomes much more negative after the onset of the pandemic, returning closer 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 still 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 on assets over time.[38]

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 XVI. 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 corresponding sensitivity in column (3) is just 8.6%.

All this suggests 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.

[38] 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.

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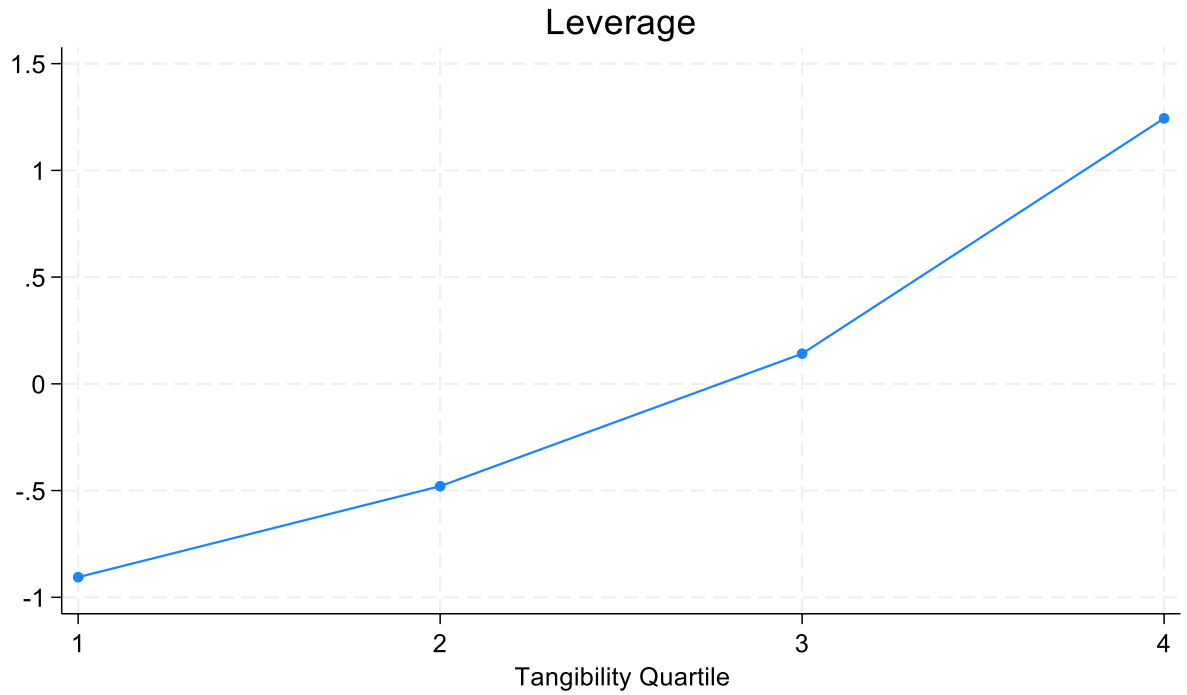

Figure 1. Residuals of leverage against quartiles of residual tangibility. This figure plots residuals of leverage against quartiles of residual tangibility. We obtain residuals of leverage by running regression specification of column (6) of Table II after excluding tangibility as an explanatory variable.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

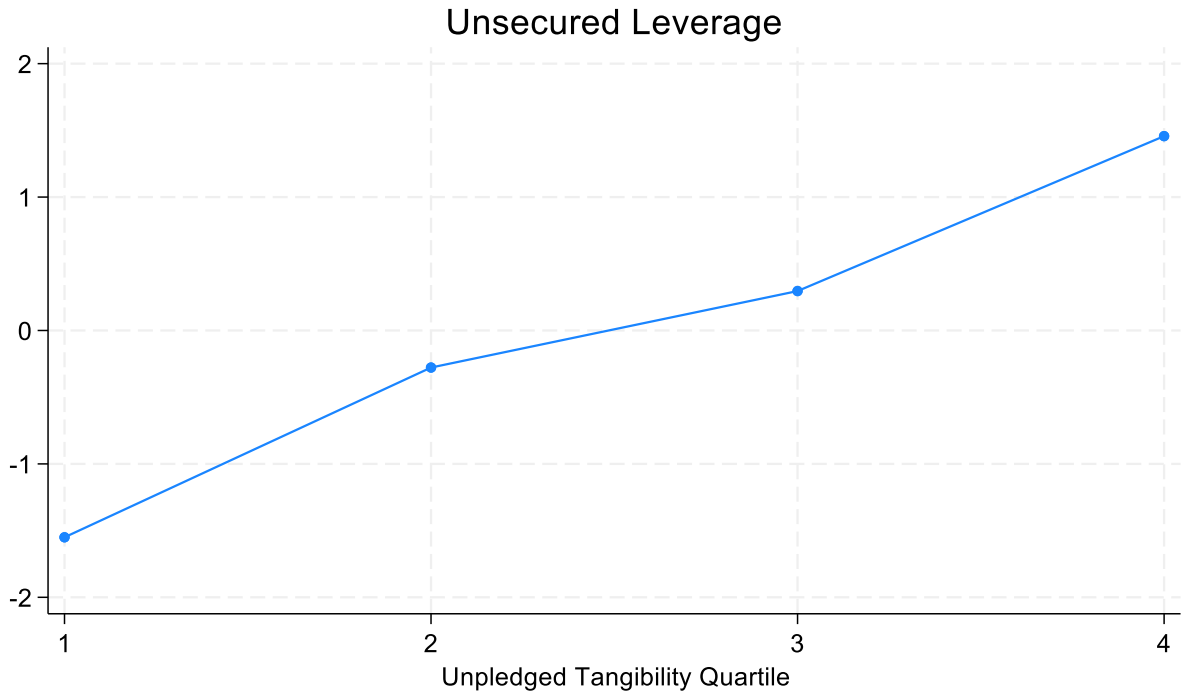

Figure 2. Residuals of unsecured leverage against quartiles of residual unpledged tangibility. This figure plots residuals of unsecured leverage against quartiles of residual unpledged tangibility. We obtain residuals of unsecured leverage by running the regression specification of column (1) of Table 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.

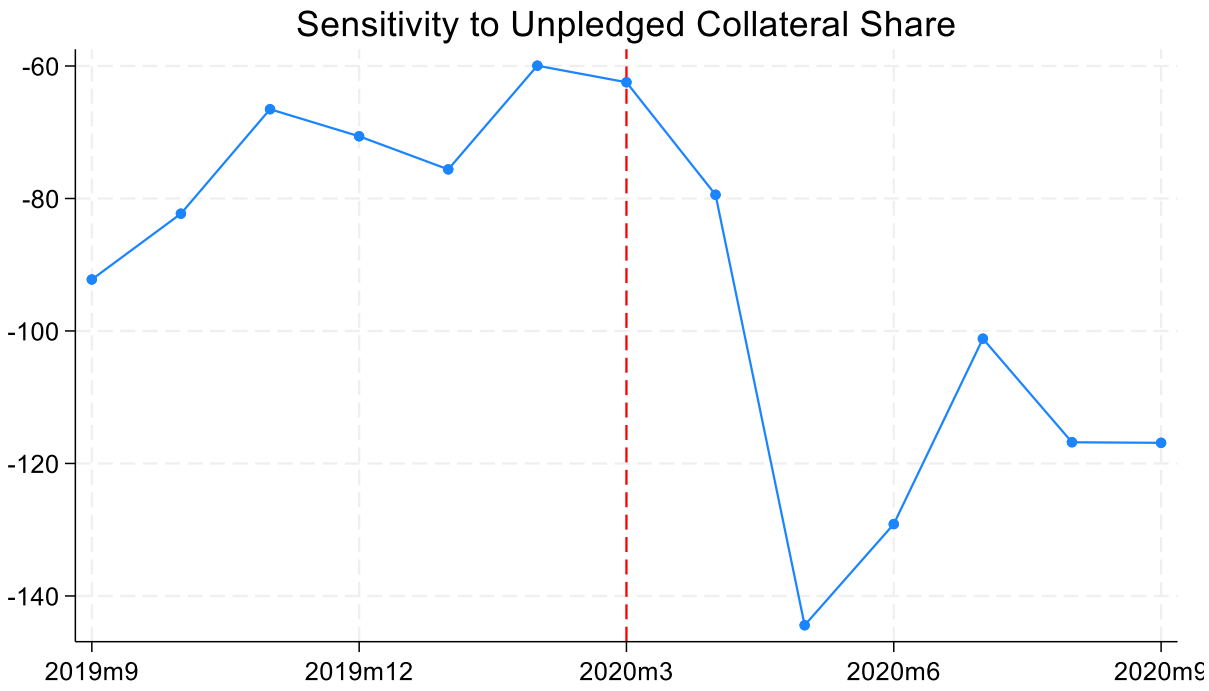

Figure 3. Unpledged tangibility and investment-grade unsecured bond spreads around the Covid-19 pandemic. This figure displays monthly estimates of the sensitivity of spreads on investment-grade unsecured bonds to unpledged tangibility share obtained from the following regression run at the monthly frequency:

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

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	0.394	88,905
Secured debt leverage	0.101	0.147	0.000	0.026	0.150	88,905
Unsecured debt leverage	0.170	0.173	0.021	0.122	0.267	88,905
Short-term leverage	0.041	0.092	0.000	0.000	0.034	87,885
Long-term leverage	0.229	0.196	0.064	0.195	0.344	87,885
Net leverage	0.121	0.320	-0.048	0.154	0.332	88,905
Net unsecured leverage	0.051	0.275	-0.049	0.059	0.217	88,905
Net debt issuance	0.048	0.310	0.000	0.000	0.068	88,841
Log(asset)	5.035	2.266	3.404	4.963	6.608	88,905
Tobin's Q	1.719	1.117	1.034	1.348	1.967	88,905
Profitability	0.012	0.345	0.013	0.105	0.164	88,905
Tangibility	0.278	0.209	0.113	0.230	0.394	88,905
Cash and equivalents	0.160	0.212	0.021	0.072	0.205	88,905
Inventory	0.182	0.156	0.048	0.154	0.279	88,595
Receivables	0.167	0.122	0.070	0.152	0.239	88,429
Intangibles	0.483	0.615	0.141	0.299	0.575	80,597

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	16.694***	16.933***	11.674***	12.020***	11.796***	12.450***
	(0.863)	(0.890)	(1.020)	(1.184)	(1.055)	(1.179)
Log(assets)	0.792***	0.757***	0.547***	2.183***	0.525***	1.727***
	(0.085)	(0.090)	(0.083)	(0.170)	(0.088)	(0.198)
Q	-1.593***	-1.645***	-1.206***	-0.869***	-1.234***	-0.953***
	(0.134)	(0.136)	(0.130)	(0.135)	(0.132)	(0.137)
Profitability	-8.735***	-8.620***	-8.923***	-8.806***	-8.868***	-8.423***
	(0.453)	(0.473)	(0.447)	(0.514)	(0.462)	(0.524)
Fixed Effects						
Year	N	Y	N	N	Y	Y
Industry	N	N	Y	N	Y	N
Firm	N	N	N	Y	N	Y
Observations	88,905	88,905	88,905	87,525	88,905	87,525
Adj. R-squared	0.0479	0.0563	0.110	0.523	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	18.502***	16.326***	0.415	18.004***	14.476***	2.959
	(1.651)	(2.105)	(2.349)	(1.615)	(2.145)	(2.329)
Log(assets)	0.233	3.859***	0.709*	-0.331	4.062***	0.243
	(0.340)	(0.399)	(0.410)	(0.357)	(0.399)	(0.376)
Q	-0.723***	-0.883***	-0.897**	-0.878***	-1.015***	-0.778**
	(0.180)	(0.280)	(0.413)	(0.183)	(0.257)	(0.362)
Profitability	-5.125***	-19.331***	-21.099***	-5.295***	-15.940***	-19.874***
	(0.585)	(1.571)	(3.265)	(0.590)	(1.358)	(3.074)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	27,690	28,132	28,472	28,449	28,654	29,266
Adj. R-squared	0.466	0.654	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, columns (7) to (9) divide the sample based on the LLM Index, and columns (10) to (12) 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	
	High	Medium	Low	High	Medium	Low
	(1)	(2)	(3)	(4)	(5)	(6)
	leverage	leverage	leverage	leverage	Leverage	leverage
Tangibility	18.471***	15.771***	0.744	18.019***	16.342***	2.160
	(1.730)	(2.074)	(2.361)	(1.616)	(2.373)	(2.409)
Log(assets)	1.040***	4.414***	1.507***	-0.416	4.034***	1.518***
	(0.318)	(0.360)	(0.392)	(0.351)	(0.386)	(0.419)
Q	-0.541***	-1.151***	-0.413	-0.883***	-0.354	-0.587
	(0.197)	(0.282)	(0.401)	(0.173)	(0.279)	(0.408)
Profitability	-6.733***	-18.438***	-22.582***	-4.696***	-20.151***	-20.416***
	(0.651)	(1.897)	(3.054)	(0.580)	(1.539)	(2.900)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	26,386	26,765	27,392	28,096	28,697	29,392
Adj. R-squared	0.449	0.640	0.633	0.468	0.693	0.615

Table IV (continued)

	LLM Index			Ratings		
	High	Medium	Low	Unrated	Below IG	IG
	(7)	(8)	(9)	(10)	(11)	(12)
	Leverage	Leverage	Leverage	leverage	Leverage	leverage
Tangibility	15.323***	1.822	3.339	15.756***	7.238*	-8.312**
	(2.722)	(5.283)	(2.463)	(1.273)	(3.761)	(3.541)
Log(assets)	0.994*	1.172	2.539***	1.588***	-0.563	-0.936
	(0.526)	(0.801)	(0.421)	(0.217)	(0.609)	(0.659)
Q	-0.068	-1.473**	-0.436	-1.015***	-0.223	-1.424*
	(0.315)	(0.695)	(0.319)	(0.141)	(0.646)	(0.774)
Profitability	-3.443***	-3.889	-9.211***	-8.064***	-12.943***	-4.627
	(0.978)	(3.250)	(1.944)	(0.528)	(3.970)	(7.855)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	11,902	3,947	18,547	69,644	9,600	7,898
Adj. R-squared	0.543	0.725	0.713	0.518	0.624	0.608

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	12.450***				12.713***
	(1.179)				(1.242)
Inventory		5.817***			5.987***
		(1.544)			(1.598)
Receivables			0.315		0.826
			(1.600)		(1.663)
Intangibles				1.612***	1.261***
				(0.394)	(0.400)
Log(assets)	1.727***	1.814***	1.680***	2.152***	2.109***
	(0.198)	(0.200)	(0.199)	(0.229)	(0.232)
Q	-0.953***	-1.046***	-1.057***	-1.221***	-1.034***
	(0.137)	(0.138)	(0.137)	(0.143)	(0.144)
Profitability	-8.423***	-8.849***	-8.795***	-8.044***	-7.849***
	(0.524)	(0.524)	(0.528)	(0.641)	(0.647)
Fixed Effects					
Year	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y
Observations	87,525	87,211	87,040	79,466	78,753
Adj. R-squared	0.531	0.527	0.527	0.536	0.538

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	12.713***	1.239**	11.533***
	(1.242)	(0.532)	(1.197)
Inventory	5.987***	9.525***	-3.978***
	(1.598)	(0.932)	(1.461)
Receivables	0.826	6.851***	-5.830***
	(1.663)	(0.813)	(1.483)
Intangibles	1.261***	0.131	0.887**
	(0.400)	(0.199)	(0.368)
Log(assets)	2.109***	0.001	2.043***
	(0.232)	(0.095)	(0.220)
Q	-1.034***	-0.051	-0.999***
	(0.144)	(0.065)	(0.132)
Profitability	-7.849***	-3.289***	-4.165***
	(0.647)	(0.336)	(0.586)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	78,753	77,902	77,902
Adj. R-squared	0.538	0.491	0.550

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 LLM 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)		
			Small	Medium	Large
	(1)	(2)	(3)	(4)	(5)
Tangibility	-0.292	1.543	3.966***	2.921	-0.689
	(0.820)	(1.007)	(1.385)	(1.893)	(2.322)
Log(assets)	1.726***	2.031***	-0.828***	4.273***	2.306***
	(0.071)	(0.166)	(0.298)	(0.346)	(0.358)
Q	0.458***	-0.078	-0.383**	-0.259	0.333
	(0.112)	(0.117)	(0.153)	(0.220)	(0.342)
Profitability	-9.732***	-7.167***	-4.704***	-10.409***	-10.491***
	(0.390)	(0.460)	(0.522)	(1.198)	(2.642)
Fixed Effects					
Year	Y	Y	Y	Y	Y
Industry	Y	N	N	N	N
Firm	N	Y	Y	Y	Y
Observations	88,905	87,525	28,449	28,654	29,266
Adj. R-squared	0.095	0.445	0.384	0.513	0.532

Table VII (continued)

	LLM Index			Ratings		
	High	Medium	Low	Unrated	Below IG	IG
	(6)	(7)	(8)	(9)	(10)	(11)
Tangibility	6.337**	0.040	1.342	4.011***	-1.295	-7.448**
	(2.634)	(5.196)	(2.352)	(1.043)	(4.340)	(3.534)
Log(assets)	0.890**	1.725**	2.516***	1.419***	1.974***	0.463
	(0.434)	(0.769)	(0.370)	(0.183)	(0.677)	(0.700)
Q	0.349	-0.451	-0.077	-0.192	0.814	-1.378*
	(0.276)	(0.550)	(0.297)	(0.119)	(0.665)	(0.743)
Profitability	-3.304***	-2.369	-4.539***	-6.541***	-10.873***	-0.097
	(0.850)	(2.660)	(1.717)	(0.460)	(4.094)	(7.218)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Industry	N	N	N	N	N	N
Firm	Y	Y	Y	Y	Y	Y
Observations	11,902	3,947	18,547	69,644	9,600	7,898
Adj. R-squared	0.433	0.682	0.639	0.423	0.547	0.591

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	7.563***	4.517**	2.145*
	(2.233)	(1.796)	(1.186)
Log(assets)	0.645*	2.297***	2.055***
	(0.351)	(0.282)	(0.227)
Q	-0.377	-0.515***	0.030
	(0.232)	(0.175)	(0.179)
Profitability	-6.029***	-6.567***	-5.863***
	(0.784)	(0.789)	(0.728)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	21,578	31,273	31,319
Adj. R-squared	0.517	0.606	0.512

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	10.988***		
	(0.749)		
Tangibility		5.895***	8.032***
		(0.975)	(1.135)
Secured leverage		-0.399***	-0.347***
		(0.009)	(0.013)
Tangibility × Secured leverage			-0.169***
			(0.034)
Log(assets)	1.957***	1.925***	1.921***
	(0.168)	(0.161)	(0.161)
Q	-0.078	-0.429***	-0.428***
	(0.119)	(0.118)	(0.118)
Profitability	-6.802***	-7.606***	-7.560***
	(0.467)	(0.454)	(0.454)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	82,995	87,525	87,525
Adj. R-squared	0.453	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	15.579**	-2.391
	(7.636)	(6.903)
Log(assets)	-0.263	-0.677
	(1.055)	(0.998)
Q	3.696**	-0.412
	(1.468)	(1.248)
Profitability	-20.851**	-0.533
	(8.967)	(16.015)
Fixed Effects		
Year	Y	Y
Firm	Y	Y
Observations	2,444	3,235
Adj. R-squared	0.587	0.544

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	-0.754	3.909***	1.168**	-1.272	1.769*	-0.479
	(1.081)	(0.607)	(0.466)	(1.351)	(1.011)	(0.898)
Baa–Aaa spread	-2.028***			-2.108***		
	(0.284)			(0.311)		
Unpledged Tangibility ×	2.669***			1.318		
Baa–Aaa spread	(0.932)			(0.996)		
GDP growth		59.136***			28.693***	
		(5.178)			(5.263)	
Unpledged Tangibility ×		-85.527***			-65.198***	
GDP growth		(17.195)			(16.870)	
NBER recession			-3.204***			-2.121***
			(0.246)			(0.239)
Unpledged Tangibility ×			4.297***			3.417***
NBER recession			(0.826)			(0.758)
Log(assets)	-0.236***	-0.161***	-0.229***	-3.094***	-2.986***	-3.041***
	(0.042)	(0.042)	(0.042)	(0.181)	(0.180)	(0.180)
Leverage	-0.149***	-0.150***	-0.148***	-0.458***	-0.457***	-0.456***
	(0.006)	(0.006)	(0.006)	(0.009)	(0.009)	(0.009)
Q	2.761***	2.808***	2.763***	3.852***	3.902***	3.877***
	(0.124)	(0.123)	(0.123)	(0.179)	(0.178)	(0.178)
Profitability	0.436	0.146	0.385	-3.689***	-3.770***	-3.706***
	(0.467)	(0.467)	(0.466)	(0.760)	(0.760)	(0.760)
Fixed Effects						
Firm	N	N	N	Y	Y	Y
Observations	84,347	84,339	84,347	82,973	82,967	82,973
Adj. R-squared	0.0466	0.0477	0.0478	0.185	0.184	0.185

…continued

	(7)	(8)	(9)
Tangibility	1.970*	6.061***	3.809***
	(1.152)	(0.666)	(0.509)
Baa–Aaa spread	-2.209***		
	(0.343)		
Tangibility ×	2.509***		
Baa–Aaa spread	(0.952)		
GDP growth		62.356***	
		(6.681)	
Tangibility ×		-69.255***	
GDP growth		(18.347)	
NBER recession			-3.367***
			(0.313)
Tangibility ×			3.774***
NBER recession			(0.875)
Log(assets)	-0.237***	-0.167***	-0.234***
	(0.040)	(0.041)	(0.040)
Leverage	-0.162***	-0.162***	-0.161***
	(0.006)	(0.006)	(0.006)
Q	2.826***	2.879***	2.827***
	(0.122)	(0.123)	(0.121)
Profitability	0.364	0.054	0.337
	(0.465)	(0.468)	(0.464)
Fixed Effects			
Firm	N	N	N
Observations	88,841	86,750	88,841
Adj. R-squared	0.0471	0.0479	0.0481

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. In Panel A, we restrict the sample to financially unconstrained firms based on LLM Index (columns (1)-(2)) and based on investment grade rating (columns (3)-(4)). Panel B reports results for constrained firms using the same classification criterion. The dependent variable used in the regressions is debt issuance, scaled by lagged fixed assets. Odd-numbered columns use secured debt whereas even-numbered columns use 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.

Panel A: Unconstrained Firms

	LLM Index		IG Ratings	
	Secured	Unsecured	Secured	Unsecured
	(1)	(2)	(3)	(4)
RE Value True	0.080	0.220*	0.004	0.293*
	(0.135)	(0.130)	(0.015)	(0.172)
Cash Flow	0.010	0.112**	0.012	0.137
	(0.026)	(0.044)	(0.009)	(0.126)
Q	0.018	-0.044	-0.011	0.125**
	(0.032)	(0.028)	(0.007)	(0.063)
Size	-0.021	0.150	-0.039**	0.414*
	(0.090)	(0.117)	(0.017)	(0.213)
Establishment-Portfolio Growth	6.765**	-3.160	-0.235	-2.292
	(3.313)	(2.168)	(0.500)	(4.658)
Fixed Effects				
Firm	Yes	Yes	Yes	Yes
CBSA x Time	Yes	Yes	Yes	Yes
Observations	1,896	1,896	1,165	1,165
R-squared	0.46	0.53	0.44	0.62

Panel B: Constrained Firms

	LLM Index		Unrated/Below-IG	
	Secured	Unsecured	Secured	Unsecured
	(5)	(6)	(7)	(8)
RE Value True	-0.266	-0.131	0.166*	0.303*
	(0.261)	(0.114)	(0.096)	(0.174)
Cash Flow	0.008	-0.030	0.007	0.023
	(0.043)	(0.023)	(0.019)	(0.024)
Q	0.406*	0.103	0.005	-0.005
	(0.225)	(0.075)	(0.026)	(0.016)
Size	1.002	0.235	0.152	0.105
	(0.634)	(0.189)	(0.092)	(0.070)
Establishment-Portfolio Growth	-9.135	-4.438	6.031*	-1.264
	(6.431)	(3.475)	(3.087)	(1.232)
Fixed Effects				
Firm	Yes	Yes	Yes	Yes
CBSA x Time	Yes	Yes	Yes	Yes
Observations	86	86	1,996	1,996
R-squared	0.74	0.77	0.4	0.52

Table XIII

Unpledged Tangibility and 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 for firms with low versus high unpledged tangibility. We split the sample into low and high unpledged tangibility groups based on the median value of unpledged tangibility. The dependent variable used in the regressions is debt issuance, scaled by lagged fixed assets. Columns (1) and (2) examine total debt issuance, columns (3) and (4) examine unsecured debt issuance, whereas columns (5) and (6) examine secured debt issuance. 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.

	Total debt		Unsecured		Secured	
	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)
RE Value True	0.577**	0.096	0.405**	0.014	0.172	0.082
	(0.242)	(0.081)	(0.181)	(0.050)	(0.132)	(0.065)
Cash Flow	0.050	-0.118	0.041	-0.019	0.009	-0.099*
	(0.036)	(0.074)	(0.026)	(0.048)	(0.022)	(0.051)
Q	-0.049	0.058***	-0.036	0.038**	-0.013	0.019*
	(0.042)	(0.020)	(0.033)	(0.015)	(0.028)	(0.011)
Size	0.496***	0.138**	0.272**	0.095**	0.224**	0.043
	(0.175)	(0.064)	(0.125)	(0.044)	(0.107)	(0.048)
Establishment-Portfolio Growth	1.528	-0.080	-1.720	-0.528	3.248	0.448
	(5.099)	(1.723)	(2.288)	(1.146)	(4.070)	(1.440)
Fixed Effects						
Firm	Yes	Yes	Yes	Yes	Yes	Yes
CBSA x Time	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,672	1,423	1,672	1,423	1,672	1,423
R-squared	0.44	0.47	0.53	0.53	0.38	0.41

Table XIV

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	-0.498***	-59.345**	-71.270***
	(0.144)	(23.475)	(26.560)
Tangibility	0.443	47.102	
	(1.087)	(29.692)	
Interest coverage	0.001	0.322	
	(0.004)	(0.240)	
Profitability	-18.296***	-468.144***	
	(1.509)	(96.918)	
Leverage	0.051***	1.531**	
	(0.007)	(0.602)	
Log(assets)	-1.203***	-62.651***	
	(0.081)	(6.609)	
Debt/EBITDA	0.066***	10.709***	
	(0.023)	(2.601)	
Negative Debt/EBITDA	0.167	117.939*	
	(0.866)	(67.623)	
Cash	-0.377	63.418	
	(0.918)	(43.853)	
Capex	1.100	391.361*	
	(2.996)	(207.248)	
Volatility	12.773***	10.705	
	(3.519)	(193.555)	
Predicted credit score			32.059***
			(7.424)

Maturity		1.838***	1.758***
		(0.363)	(0.387)
Callable		-39.928**	-39.150**
		(17.481)	(18.561)
Amount		2.403	-12.240
		(5.716)	(9.514)
Covenant		-22.834	-18.359
		(18.117)	(21.050)
Fixed Effects	industry, year	year×month	year×month
Observations	2,729	1,098,969	1,098,984
Adj. R-squared	0.691	0.452	0.399

Table XV

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	-112.361**	-76.134**
	(47.620)	(34.261)
Unpledged tangibility share × High Baa–Aaa spread		-100.528**
		(45.404)
Predicted credit score	28.243***	28.200***
	(3.751)	(3.747)
Maturity	2.498***	2.503***
	(0.259)	(0.259)
Callable	-1.703	-1.626
	(10.933)	(10.899)
Amount	-6.796	-6.676
	(5.193)	(5.194)
Covenant	-17.286	-17.484
	(13.983)	(13.966)
Fixed Effects	year×month	year×month
Observations	904,274	904,274
Adj. R-squared	0.382	0.385

Table XVI

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	15.661***	13.412***	6.607***
	(1.261)	(1.214)	(1.343)
Log(assets)	3.510***	2.268***	-0.051
	(0.291)	(0.280)	(0.277)
Q	0.363	-0.480*	-0.473***
	(0.285)	(0.255)	(0.154)
Profitability	-7.674***	-9.915***	-4.135***
	(1.099)	(1.138)	(0.586)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	25,505	25,845	26,448
Adj. R-squared	0.565	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

IA.A. Construction and Validation of the LLM Index
Description of data, classification procedure, and validation of the LLM Index.

IA.B. Additional Tables and Robustness Tests
Supplementary empirical results and robustness analyses.

Internet Appendix A. Construction and Validation of the LLM Index

IA.A.1 LLM Index Construction

We construct the LLM Index using textual analysis of firms' disclosures in Item 7 (Management Discussion and Analysis) of annual 10-K filings. Our sample covers the period 1997–2022. We begin in 1997 because this is the first year in which firms consistently report a distinct Item 7 section in their 10-K filings, and end in 2022, the final year of our sample.

We extract Item 7 text from filings available on the SEC EDGAR database and use ChatGPT 5.1 to classify each firm-year observation according to its financial constraint status. To guide the classification, we provide the model with a detailed prompt describing the conceptual characteristics of financially constrained and unconstrained firms (see Section A.4 for the full prompt). Based on the Item 7 disclosure, ChatGPT assigns each firm-year to one of four categories: financially unconstrained, neutral, potentially financially constrained, or financially constrained.

We aggregate these classifications into a three-level index:

- LLM Index = 1 if the firm is classified as financially unconstrained
- LLM Index = 2 if the firm is classified as neutral
- LLM Index = 3 if the firm is classified as potentially financially constrained or financially constrained

Higher values of the LLM Index therefore indicate a greater degree of financial constraint.

IA.A.2 Classification Results

Our sample contains 51,137 firm-year observations over the period 1997–2022. We are able to successfully retrieve Item 7 disclosures from EDGAR for 37,267 firm-years (73%). Table IA.A.1 reports the distribution of firm-year observations across the LLM Index classifications.

Table IA.A.1: Classification Results

This table reports the distribution of firm-year observations across LLM Index categories over the 1997–2022 sample period. The LLM Index is constructed from Item 7 disclosures in 10-K filings. The table reports both the number and percentage of observations in each category.

	# firm-year obs.	% of obs.
LLM Index=1 (Financially Unconstrained)	19,448	52.2%
LLM Index=2 (Neutral)	4,590	12.3%
LLM Index=3 (Financially Constrained)	13,229	35.5%

Approximately a third of all firm-year observations are classified as constrained or potentially constrained. This proportion is in line with our alternative classification approaches, which classifies one-third of observations as financially constrained based on either the WW Index or the HP Index.

IA.A.3 Relation to Existing Measures of Financial Constraints

Next, we examine how the LLM Index relates to other proxies for financial constraints used in the paper. Specifically, we compare our classification with four widely used attributes:

- Firm size
- Whited–Wu (WW) Index
- Hadlock–Pierce (HP) Index
- Credit ratings

For firm size, WW Index, and HP Index, we divide the sample into three equal-sized bins (terciles) based on the value of the attribute. In the case of credit ratings, we classify firms into investment grade (IG), below investment grade (Below IG), and unrated categories.

For each bin, we compute the fraction of firms classified by ChatGPT as having LLM Index values of 1, 2, or 3. The results are reported in Table IA.A.2 below. The results show strong consistency between the LLM Index and established measures of financial constraints.

Across firm size terciles, the fraction of firms classified as unconstrained declines sharply as firm size decreases. Among large firms, 68% are classified as financially unconstrained, while only 15% are classified as constrained. Among medium-sized firms, 51% are classified as unconstrained while 37% are constrained. In contrast, among small firms only 24% are classified as unconstrained, while 69% are classified as financially constrained.

A similar monotonic pattern emerges when using the WW Index and HP Index. Firms in the lowest constraint tercile according to these indices are predominantly classified as unconstrained by the LLM Index (69% and 68%, respectively), with only 14–15% classified as constrained. Conversely, among firms in the highest constraint tercile, the share classified as constrained rises to 63% using the WW Index and 72% using the HP Index.

Finally, the results also align closely with credit ratings. Among investment-grade firms, 67% are classified as financially unconstrained and only 3% as constrained. In contrast, 31% of below-investment-grade firms and 41% of unrated firms are classified as financially constrained according to the LLM Index.

Table IA.A.2: Relation to Other Measures

This table reports the fraction of firms classified into each LLM Index category across terciles of firm size, WW Index, and HP Index, as well as across credit rating categories. For continuous measures, firm-year observations are sorted into three equal-sized groups. Entries report the percentage of firm-year observations in each LLM category.

Attribute	Value	LLM Index=1	LLM Index=2	LLM Index=3
Size	large	68%	16%	15%
Size	medium	51%	11%	37%
Size	small	24%	7%	69%
WW Index	low	69%	17%	14%
WW Index	medium	56%	11%	32%
WW Index	high	30%	7%	63%
HP Index	low	68%	17%	15%
HP Index	medium	54%	11%	36%
HP Index	high	22%	6%	72%
Rating	IG	67%	29%	3%
Rating	Below IG	60%	9%	31%
Rating	Unrated	49%	11%	41%

To further assess the relation between the LLM Index and existing measures of financial constraints, we also compute pairwise Spearman rank correlations, which are appropriate given the ordinal nature of the LLM Index. The results are reported in Table IA.A.3 below. The LLM Index is positively correlated with both the WW Index and the HP Index, with correlations of 0.353 and 0.375, respectively, and negatively correlated with firm size, with a correlation of −0.368. All correlations are statistically significant at the 1% level. Notably, the magnitude of the correlations between the LLM Index and these measures is smaller than the pairwise correlations among the traditional proxies themselves, which are all constructed from financial statement variables. This suggests that while the LLM Index captures the same broad concept of financial constraints, it also incorporates additional information from firms' narrative disclosures that is not fully reflected in standard accounting-based measures.

Table IA.A.3: Correlation between LLM Index and Existing Measures

This table reports Spearman rank correlations between the LLM Index and commonly used proxies for financial constraints, including the WW Index, HP Index, and firm size. The LLM Index is ordinal, taking values from 1 (unconstrained) to 3 (constrained). All correlations are statistically significant at the 1% level.

Variables	(1)	(2)	(3)	(4)
(1) LLM Index	1.000			
(2) WW Index	0.353	1.000		
(3) HP Index	0.375	0.708	1.000	
(4) Size	-0.368	-0.787	-0.823	1.000

We further examine the relation between the LLM Index and existing proxies using an ordered logit specification and report marginal effects for the probability of being classified into each LLM category. We estimate separate regressions including one proxy at a time. Each specification includes industry and year fixed effects. To facilitate interpretation, we report marginal effects for the probability of being classified into each LLM category. The results are reported in Table IA.A.4. Consistent with the Spearman correlations, higher values of the WW Index and HP Index are associated with a higher likelihood of being classified as financially constrained. To gauge economic magnitudes, we scale the marginal effects by the standard deviation of each explanatory variable. A one standard deviation increase in the WW Index increases the probability that a firm is classified as financially constrained (LLM = 3) by approximately 4.6 percentage points and reduces the probability that the firm is classified as unconstrained (LLM = 1) by about 5.2 percentage points. The effects are larger for the HP Index: a one standard deviation increase raises the probability of being classified as constrained by roughly 16.0 percentage points and lowers the probability of being classified as unconstrained by about 17.3 percentage points. In contrast, firm size is negatively related to financial constraints. A one standard deviation increase in log assets increases the probability that a firm is classified as unconstrained by approximately 17.1 percentage points and reduces the probability of being classified as constrained by about 16.0 percentage points. All marginal effects are statistically significant at the 1% level. Overall, these results provide further evidence that the LLM Index aligns with established proxies for financial constraints while also capturing additional information derived from firms' narrative disclosures that is not fully reflected in traditional accounting-based measures.

Table IA.A.4: Ordered Logit Regression

*This table reports marginal effects from ordered logit regressions of the LLM Index on alternative measures of financial constraints. Each column reports results from a separate regression including one proxy at a time, with industry and year fixed effects. Entries report marginal effects on the probability of being in each LLM category. All regressions are estimated with heteroscedasticity robust standard errors that are clustered by firm and are reported below the coefficients in parentheses. * p<0.1, ** p<0.05, *** p<0.01.*

	(1) WW Index	(2) HP Index	(3) Size
Pr(LLM=1)	-0.101***	-0.190***	0.078***
	(0.008)	(0.005)	(0.002)
Pr(LLM=2)	0.010***	0.014***	-0.005***
	(0.001)	(0.001)	(0.000)
Pr(LLM=3)	0.090***	0.176***	-0.073***
	(0.007)	(0.004)	(0.002)
Observations	35,599	37,256	37,267

IA.A.4 ChatGPT Prompt

We reproduce the exact prompt provided to ChatGPT below:

****

Task Description

You are a finance expert tasked with classifying a firm's financial constraint status based only on the provided 10-K excerpt. Your assessment must rely exclusively on the text provided.

Classification Question

Is this firm financially constrained?

You must select one of the following four classifications:

1. **Financially Unconstrained**
2. **Financially Constrained**
3. **Potentially Financially Constrained**
4. **Neutral**

A firm is considered financially constrained if its ability to raise funds or finance its current or future operations or investment is constrained.

The guidance below outlines the four classification choices. These descriptions are not exhaustive and do not cover all possible scenarios, but they provide a general sense of the circumstances associated with each option.

Classification Guidance

1. Financially Unconstrained

Core interpretation:
The firm has sufficient liquidity or is in a strong financial position, with no indication of difficulty in meeting current or future financing needs.

Evidence may include:

- Explicit statements of financial slack or flexibility, including usage of keywords such as "sufficient," "adequate," "strong balance sheet," "enough," "great deal of flexibility."
- References to strong liquidity, balance sheet strength, or adequate resources

Illustrative examples:

- "Management believes these resources are more than sufficient to meet planned short-term financing and investment needs and provide for working capital requirements associated with projected growth."
- "Our balance sheet remains strong and gives us a great deal of flexibility."
- "It is expected that operating cash flows, supplemented as needed with financing arrangements, will be sufficient to meet the firm's needs."
- "Management believes that the present working capital as well as its available line-of-credit is adequate to conduct its present operations."

Important condition:
The firm should *not* make any qualifying statement suggesting potential difficulty in financing future operations or investment.

---

2. Financially Constrained

Core interpretation:
The firm is facing difficulty raising financing, experiencing liquidity stress, or expressing concerns that financing constraints may impair operations or investment. This category includes firms in, or at risk of, financial distress.

Evidence may include:

- Failure to generate sufficient cash flows or obtain financing that would impair operations, investment, or survival
- Ongoing operating losses that adversely affect liquidity
- High leverage that limits borrowing capacity or financial flexibility
- Aborted or postponed equity or debt offerings (e.g., "In December 2001, the firm aborted this offering due to unfavorable market conditions.")

- Statements such as “We were unable to complete a successful financing.”
- Covenant violations that threaten acceleration of debt or loss of access to credit
- Loss of customary sources of capital or being effectively “cut off” from financing markets
- Renegotiation or restructuring of debt obligations
- Forced reductions in investment due to liquidity or financing difficulties
- “Going concern” audit opinions
- Executives or directors advancing personal funds to support operations

Important Caution on Covenant Violations

Do **not** treat the following as evidence of financial constraint:

- Boilerplate risk disclosures regarding potential covenant breaches
- “Technical” covenant violations that have been waived by creditors and do not impair liquidity or operations

Example of boilerplate disclosure (ignore): “The breach of any covenants or obligations in our indentures or credit facilities, not otherwise waived or amended, could result in a default under the applicable debt obligations and could trigger acceleration of those obligations … which in turn could trigger cross-defaults under other agreements.”

Examples of technical violations with waivers (ignore): “As of December 31, 2024, the Company was in technical violation of the fixed-charge coverage ratio … Subsequent to year-end, the lenders granted a waiver of this covenant breach. Accordingly, the accompanying financial statements continue to classify the related borrowings as long-term.” - “As a result of the Company’s technical breach of the net-leverage covenant at December 31, 2024, the outstanding borrowings under the Revolving Credit Facility have been classified as current liabilities … Management expects the matter to be resolved without material impact to operations.”

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3. Potentially Financially Constrained

Core Interpretation:
This category captures firms that appear to be operating without immediate constraint, yet exhibit vulnerabilities (in operating performance, cash-flow generation, or financial position) that could plausibly translate into financing problems if conditions deteriorate. These firms are not currently in distress, but their financial cushion is thin, weakening, or highly sensitive to adverse shocks.

Evidence may include:

- Weak or declining operating cash flows that are sufficient at present but leave little margin for error
- Low liquidity buffers (e.g., limited cash balances, tight working capital) without explicit statements of distress
- High leverage or rising debt burdens that are not yet binding but could constrain future borrowing capacity
- Dependence on continued favorable market conditions or ongoing access to external financing to sustain operations or investment
- Statements indicating that future investments, growth plans, or operations are contingent on maintaining cash flow or access to financing, without asserting that such access is assured
- Language suggesting heightened sensitivity to economic conditions, interest rates, or revenue volatility, even if no immediate financing problem is reported

Important distinction:
Firms in this category do not state that they are currently unable to raise funds, violate covenants, or face immediate liquidity stress. Instead, their disclosures suggest that future financing capacity may become constrained if adverse conditions materialize.

---

4. Neutral

Core interpretation:
The text does not provide a clear signal that the firm is either financially constrained or unconstrained.

This category broadly covers the following (not mutually exclusive) cases:

- **Unrelated or insufficient information:** The text does not meaningfully address financing or liquidity
- **Ambiguous or mixed signals:** Evidence of both financial strength and potential constraint, making classification unclear
- **Neutral language:** The firm does not express financial strength but also does not indicate current or future financing difficulty
- **Boilerplate risk disclosures:** Generic statements such as "we may not be able to obtain financing in the future," without firm-specific evidence

Illustrative boilerplate examples:

- "Funds raised in past periods should not be considered an indication of additional funds to be raised in any future periods. There is no assurance that such funds will be available to us on acceptable terms, if at all."

- "There is no guarantee that the Company will be able to obtain the necessary financing."

Output Requirements

For each firm, select one of the four classifications and provide a one-sentence explanation supporting your choice.

Results must be reported in a spreadsheet with two columns: - choice
- explanation (include page number, section reference, or paragraph number).

Format example:

Choice: Financially Unconstrained
Explanation: The text explicitly states that management has "more than sufficient" resources to meet planned short-term needs and projected growth (p. XX).

Internet Appendix B. Additional Tables and Robustness Tests

Table IA.B.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	13.201***	16.983***	16.176***	7.509***	2.405**	3.959***	3.738*	2.382
	(1.233)	(1.496)	(2.484)	(2.411)	(0.980)	(1.167)	(2.046)	(2.260)
Log(assets)	3.016***	2.430***	5.910***	1.626***	2.810***	1.112***	5.275***	3.383***
	(0.208)	(0.347)	(0.437)	(0.414)	(0.161)	(0.288)	(0.375)	(0.333)
Q	-5.411***	-3.605***	-5.218***	-7.063***	-3.010***	-2.154***	-2.567***	-4.599***
	(0.132)	(0.156)	(0.258)	(0.378)	(0.096)	(0.122)	(0.192)	(0.273)
Profitability	-10.925***	-5.349***	-25.389***	-44.482***	-7.869***	-3.841***	-15.748***	-24.441***
	(0.468)	(0.473)	(1.442)	(3.341)	(0.374)	(0.407)	(1.116)	(2.371)
Fixed Effects								
Year	Y	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y	Y
Observations	86,912	28,073	28,575	29,113	86,912	28,073	28,575	29,113
Adj. R-squared	0.613	0.577	0.677	0.685	0.497	0.446	0.547	0.566

Table IA.B.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, columns (4) to (6) divide the sample based on the WW Index, columns (7) to (9) divide the sample based on the HP Index, and columns (10) to (12) divide the sample based on the LLM Index. We first calculate firm-level averages for size, WW Index, HP Index, and LLM Index and then assign firms to one of the three groups based on firm-level average values for each cut. 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	17.527***	14.075***	4.388*	16.144***	16.707***	2.626
	(1.664)	(2.327)	(2.313)	(1.715)	(2.199)	(2.305)
Log(assets)	0.525	3.786***	0.840**	1.195***	3.004***	0.968***
	(0.351)	(0.360)	(0.336)	(0.332)	(0.354)	(0.336)
Q	-0.864***	-1.018***	-0.943***	-0.743***	-1.029***	-1.148***
	(0.183)	(0.262)	(0.343)	(0.186)	(0.271)	(0.360)
Profitability	-5.751***	-14.485***	-17.448***	-6.327***	-14.677***	-17.632***
	(0.606)	(1.307)	(2.757)	(0.620)	(1.401)	(2.593)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	28,842	29,189	29,494	28,835	28,907	29,051
Adj. R-squared	0.450	0.564	0.588	0.443	0.582	0.606

Table IA.B.II (continued)

	HP Index			LLM Index		
	Small	Medium	Large	High	Medium	Low
	(7)	(8)	(9)	(10)	(11)	(12)
	leverage	leverage	leverage	leverage	leverage	leverage
Tangibility	17.490***	17.502***	1.752	16.606***	8.145**	3.733
	(1.638)	(2.226)	(2.395)	(2.698)	(3.229)	(3.247)
Log(assets)	0.616*	3.298***	1.367***	1.172**	2.500***	2.171***
	(0.329)	(0.353)	(0.362)	(0.524)	(0.594)	(0.553)
Q	-0.842***	-0.915***	-0.710*	-0.362	-0.945**	-0.814*
	(0.177)	(0.283)	(0.410)	(0.307)	(0.415)	(0.435)
Profitability	-5.632***	-14.642***	-21.845***	-4.929***	-9.976***	-13.792***
	(0.588)	(1.535)	(3.131)	(0.920)	(2.215)	(3.002)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	28,663	29,259	29,603	11,767	11,965	12,406
Adj. R-squared	0.459	0.598	0.541	0.534	0.609	0.698

Table IA.B.III

Tangibility and Unsecured Leverage – Subsample Analysis

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) to (3) divide the sample into three equal groups based on WW Index, and columns (4) to (6) divide the sample into three groups based on HP Index. 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		
	High	Medium	Low	High	Medium	Low
	(1)	(2)	(3)	(4)	(5)	(6)
	leverage	leverage	leverage	leverage	leverage	leverage
Tangibility	3.299**	3.938**	-1.837	5.020***	3.858**	0.040
	(1.508)	(1.882)	(2.279)	(1.419)	(1.881)	(2.427)
Log(assets)	0.819***	4.128***	2.772***	-0.922***	3.988***	2.975***
	(0.276)	(0.316)	(0.366)	(0.292)	(0.349)	(0.381)
Q	-0.096	-0.183	0.670*	-0.313**	0.318	0.306
	(0.169)	(0.232)	(0.363)	(0.147)	(0.257)	(0.385)
Profitability	-5.870***	-14.012***	-11.980***	-4.046***	-14.136***	-11.229***
	(0.578)	(1.588)	(2.768)	(0.513)	(1.498)	(2.463)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	26,386	26,765	27,392	28,096	28,697	29,392
Adj. R-squared	0.369	0.498	0.544	0.394	0.563	0.540

Table IA.B.IV

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. Columns (5) and (6) analyze unconstrained firms based on the HP Index, while columns (7) and (8) analyze unconstrained firms based on the LLM 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	14.380***	18.118***	12.349***	15.548***
	(1.063)	(1.409)	(1.092)	(1.522)
Log(assets)	2.065***	2.139***	2.545***	2.732***
	(0.199)	(0.355)	(0.160)	(0.366)
Q	0.206	0.345	0.545*	0.672*
	(0.330)	(0.345)	(0.317)	(0.372)
Profitability	-15.361***	-15.150***	-14.709***	-15.115***
	(2.424)	(2.695)	(1.527)	(2.900)
Fixed Effects				
Year	Y	Y	Y	Y
Industry	Y	N	Y	N
Firm	N	Y	N	Y
Observations	28,286	27,890	26,770	25,799
Adj. R-squared	0.183	0.549	0.198	0.558

Table IA.B.IV (continued)

	HP Index		LLM Index	
	(5)	(6)	(7)	(8)
Unpledged tangibility	10.535***	16.370***	12.161***	17.169***
	(1.136)	(1.368)	(1.084)	(1.368)
Log(assets)	2.843***	2.941***	3.343***	2.664***
	(0.158)	(0.378)	(0.128)	(0.371)
Q	0.311	0.295	0.493**	-0.104
	(0.376)	(0.390)	(0.234)	(0.294)
Profitability	-16.480***	-13.977***	-3.858***	-5.868***
	(2.415)	(2.497)	(1.300)	(1.705)
Fixed Effects				
Year	Y	Y	Y	Y
Industry	Y	N	Y	N
Firm	N	Y	N	Y
Observations	28,239	27,986	19,066	18,159
Adj. R-squared	0.204	0.555	0.282	0.653

Table IA.B.V

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	8.060***		
	(1.142)		
Tangibility		4.455***	9.298***
		(1.698)	(2.075)
Secured leverage		-0.333***	-0.272***
		(0.013)	(0.016)
Tangibility × Secured leverage			-0.248***
			(0.050)
Log(assets)	1.815***	1.723***	1.754***
	(0.315)	(0.297)	(0.295)
Q	0.473**	0.203	0.206
	(0.208)	(0.203)	(0.203)
Profitability	-3.972***	-4.823***	-4.766***
	(0.704)	(0.676)	(0.675)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	25,489	25,981	25,981
Adj. R-squared	0.598	0.644	0.645

Table IA.B.VI

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, columns (5) to (7) divide the sample into three groups based on the HP Index, columns (8) to (10) divide the sample into three groups based on the LLM Index, and columns (11) to (13) 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			HP Index		
		High	Medium	Low	High	Medium	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tangibility	32.269***	42.310***	36.685***	12.014***	38.301***	38.453***	15.489***
	(1.595)	(2.521)	(2.818)	(2.798)	(2.287)	(3.086)	(2.970)
Log(assets)	3.038***	2.327***	5.480***	3.573***	0.079	5.829***	3.514***
	(0.278)	(0.480)	(0.495)	(0.482)	(0.534)	(0.519)	(0.529)
Q	-2.492***	-2.250***	-2.990***	-1.508***	-2.430***	-1.460***	-2.039***
	(0.200)	(0.297)	(0.411)	(0.512)	(0.257)	(0.385)	(0.524)
Profitability	-7.749***	-5.118***	-14.518***	-23.997***	-4.077***	-19.731***	-19.172***
	(0.765)	(0.948)	(2.668)	(3.834)	(0.860)	(2.193)	(3.722)
Fixed Effects							
Year	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y
Observations	87,523	26,386	26,765	27,390	28,096	28,697	29,390
Adj. R-squared	0.649	0.612	0.680	0.663	0.623	0.769	0.660

Table IA.B.VI (continued)

	LLM Index			Availability of Ratings		
	High	Medium	Low	Unrated	Below IG	IG
	(8)	(9)	(10)	(11)	(12)	(13)
Tangibility	37.626***	12.672*	13.775***	36.876***	25.257***	-0.387
	(3.853)	(6.525)	(3.396)	(1.768)	(4.641)	(4.011)
Log(assets)	2.294***	2.841***	5.207***	2.673***	1.914**	1.197
	(0.678)	(1.087)	(0.620)	(0.312)	(0.743)	(0.820)
Q	-1.428***	-3.140***	-2.033***	-2.530***	-2.492***	-2.257**
	(0.444)	(1.019)	(0.500)	(0.211)	(0.781)	(0.896)
Profitability	-2.831**	0.563	-2.285	-7.287***	-6.001	-5.769
	(1.400)	(4.389)	(3.201)	(0.776)	(4.923)	(8.973)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	11,902	3,947	18,546	69,644	9,599	7,897
Adj. R-squared	0.736	0.791	0.778	0.642	0.671	0.659

Table IA.B.VII

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, columns (5) to (7) divide the sample into three groups based on the HP Index, columns (8) to (10) divide the sample into three groups based on the LLM Index, and columns (11) to (13) 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			HP Index		
		High	High	High	High	Below IG	IG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tangibility	22.593***	29.584***	25.220***	8.735***	26.717***	27.173***	12.465***
	(1.351)	(2.202)	(2.342)	(2.601)	(1.983)	(2.412)	(2.823)
Log(assets)	2.923***	1.826***	4.823***	4.176***	-0.491	5.329***	4.322***
	(0.235)	(0.427)	(0.432)	(0.427)	(0.461)	(0.436)	(0.459)
Q	-1.762***	-1.811***	-2.183***	-0.739	-1.896***	-0.905**	-1.452***
	(0.179)	(0.268)	(0.357)	(0.470)	(0.230)	(0.354)	(0.479)
Profitability	-6.701***	-4.517***	-10.115***	-15.331***	-3.496***	-15.685***	-12.135***
	(0.686)	(0.857)	(2.261)	(3.526)	(0.779)	(1.985)	(3.301)
Fixed Effects							
Year	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y
Observations	87,523	26,386	26,765	27,390	28,096	28,697	29,390
Adj. R-squared	0.610	0.570	0.600	0.610	0.588	0.709	0.619

	LLM Index			Availability of Ratings		
	High	Medium	Low	Unrated	Below IG	IG
	(8)	(9)	(10)	(11)	(12)	(13)
Tangibility	30.288***	10.339*	12.560***	26.612***	14.458***	0.443
	(3.565)	(5.569)	(2.960)	(1.479)	(4.515)	(4.068)
Log(assets)	1.965***	3.303***	4.822***	2.163***	3.372***	2.180***
	(0.604)	(0.996)	(0.555)	(0.267)	(0.696)	(0.822)
Q	-1.032**	-2.346**	-1.795***	-1.831***	-1.539**	-2.418***
	(0.403)	(0.936)	(0.468)	(0.187)	(0.747)	(0.870)
Profitability	-2.973**	1.898	0.387	-5.960***	-5.271	-1.860
	(1.290)	(4.077)	(3.103)	(0.694)	(4.456)	(8.413)
Fixed Effects						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Observations	11,902	3,947	18,546	69,644	9,599	7,897
Adj. R-squared	0.676	0.769	0.745	0.599	0.595	0.644

Table IA.B.VIII

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	31.459***	24.441***	9.336***
	(2.932)	(2.698)	(1.402)
Log(assets)	2.266***	3.498***	2.501***
	(0.534)	(0.437)	(0.259)
Q	-1.389***	-2.402***	-0.611***
	(0.330)	(0.284)	(0.237)
Profitability	-6.799***	-5.222***	-7.349***
	(1.169)	(1.248)	(0.970)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	21,578	31,272	31,318
Adj. R-squared	0.635	0.735	0.626

Table IA.B.IX

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	10.097***		
	(0.933)		
Tangibility		23.451***	32.574***
		(1.347)	(1.555)
Secured leverage		-0.082***	0.138***
		(0.013)	(0.020)
Tangibility × Secured leverage			-0.723***
			(0.045)
Log(assets)	2.874***	2.901***	2.885***
	(0.241)	(0.236)	(0.235)
Q	-1.921***	-1.835***	-1.831***
	(0.184)	(0.180)	(0.179)
Profitability	-7.034***	-6.792***	-6.594***
	(0.708)	(0.691)	(0.687)
Fixed Effects			
Year	Y	Y	Y
Firm	Y	Y	Y
Observations	82,993	87,523	87,523
Adj. R-squared	0.611	0.611	0.615

Table IA.B.X

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***	-1.196***	-1.058***	-1.042***	-1.356***	-1.426***	-1.452***	-1.446***	-1.429***
	(0.235)	(0.218)	(0.204)	(0.168)	(0.210)	(0.214)	(0.220)	(0.219)	(0.227)	(0.223)
Tangibility	2.181									
	(1.372)									
Interest coverage		-0.037***								
		(0.006)								
Profitability			-18.592***							
			(1.767)							
Leverage				0.075***						
				(0.009)						
Log(assets)					-1.262***					
					(0.105)					
Debt/EBITDA						0.143***				
						(0.036)				
Negative Debt/EBITDA							3.726***			
							(0.710)			
Cash								-1.479		
								(1.087)		

Capex									-3.149	
									(4.029)	
Volatility										21.923***
										(3.789)
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	2,751	2,733	2,751	2,751	2,751	2,751	2,751	2,751	2,751	2,747
Adj. R-squared	0.419	0.437	0.511	0.496	0.524	0.445	0.429	0.416	0.416	0.431

Table IA.B.XI

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	-118.797***	-116.221***	-104.576***	-96.805***	-100.172***	-94.309***	-119.967***	-118.639***	-118.844***	-121.453***
	(30.669)	(31.311)	(28.932)	(29.310)	(32.122)	(26.708)	(31.679)	(31.523)	(31.121)	(31.981)
Tangibility	60.136*									
	(32.643)									
Interest coverage		-1.161***								
		(0.339)								
Profitability			-514.685***							
			(73.270)							
Leverage				2.325***						
				(0.778)						
Log(assets)					-67.512***					
					(7.933)					
Debt/EBITDA						15.788***				
						(2.672)				
Negative Debt/EBITDA							145.759*			
							(80.065)			
Cash								-28.904		
								(45.491)		

Capex									370.214**	
									(181.114)	
Volatility										721.049***
										(140.537)
Maturity	0.955**	1.107**	1.229***	1.147***	1.710***	1.181***	1.098**	1.054**	1.013**	1.154**
	(0.485)	(0.472)	(0.457)	(0.440)	(0.419)	(0.440)	(0.475)	(0.474)	(0.477)	(0.469)
Callable	-34.335	-31.486	-28.099	-28.913	-58.521**	-13.842	-32.425	-33.002	-34.392	-35.666
	(26.930)	(25.725)	(22.931)	(22.008)	(26.105)	(20.032)	(25.665)	(25.994)	(26.418)	(25.227)
Amount	-44.524***	-45.272***	-44.771***	-41.899***	0.885	-44.598***	-46.484***	-45.730***	-46.169***	-45.200***
	(8.008)	(7.692)	(7.693)	(7.405)	(6.386)	(6.852)	(7.732)	(7.739)	(7.807)	(7.370)
Covenant	-17.608	-13.575	-10.482	-23.013	-16.275	-16.139	-13.864	-14.075	-13.875	-14.015
	(24.602)	(26.259)	(24.689)	(25.675)	(18.961)	(23.399)	(25.077)	(24.851)	(24.500)	(24.190)
Fixed Effects										
year-month	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,101,891	1,099,424	1,101,891	1,101,891	1,101,891	1,101,891	1,101,891	1,101,891	1,101,891	1,101,436
Adj. R-squared	0.213	0.212	0.272	0.251	0.289	0.302	0.211	0.206	0.211	0.234

Table IA.B.XII

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	-47.312**
	(20.782)
Unpledged tangibility share ×	-62.640***
High Baa–Aaa spread	(22.030)
Predicted credit score	32.026***
	(7.407)
Maturity	1.764***
	(0.387)
Callable	-38.758**
	(18.390)
Amount	-12.040
	(9.489)
Covenant	-18.732
	(20.974)
Fixed Effects	month
Observations	1,098,490
Adj. R-squared	0.401