An Empirical Analysis of the Cost of Borrowing*

Miguel Faria-e-Castro
FRB of St. Louis

Samuel Jordan-Wood
New York University

Julian Kozlowski
FRB of St. Louis

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Abstract

We empirically study firm financing costs using a comprehensive dataset of corporate bonds and bank loans. We construct a measure of financing costs, the Excess Debt Premium, which controls for observable debt characteristics. Within the same firm and quarter, the estimated difference in spreads between bank loans and corporate bonds implies a bond premium of about 39 basis points at the mean loan spread. Borrowing costs also vary across instruments issued by the same firm. After removing quarter and firm averages, 37 percent of the variance in the Excess Debt Premium remains. Lender identity and observable contract characteristics each explain little of this residual dispersion.

JEL Classification: E6, G01 H00

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Corresponding author: Miguel Faria-e-Castro, miguel.fariaecastro@stls.frb.org.

1 Introduction

Firm financing decisions are widely studied in economics and finance, thanks to their relevance for real outcomes such as employment and investment. One key determinant of these decisions is the cost of borrowing. Yet, empirically, most of the research on this topic has been limited in scope to large public firms, due to lack of micro data on interest rates and other characteristics on the borrowing instruments of firms in the United States. This paper fills this gap by analyzing the cost of borrowing of both large and small firms in the United States, using a novel debt instrument-level database that encompasses both bank loans and corporate bond issuances.

We construct a dataset of borrowing instruments for US nonfinancial firms that covers the universe of bond issuances and loans issued by major US bank holding companies (BHC). We then develop a measure of the cost of borrowing at the firm level that extends the Excess Bond Premium (EBP) of Gilchrist and Zakrajsek (2012) (GZ hereafter) to a set up with multiple debt instrument types and that controls for observable characteristics, such as amount, maturity, and firm default probability. We call this measure the Excess Debt Premium (EDP), to reflect the fact that it encompasses borrowing instruments beyond senior unsecured bonds. We use this measure to document two results. First, firms pay lower spreads on bank loans than on corporate bonds issued in the same quarter. At the mean loan spread, the estimated difference is about 38.5 basis points. Second, borrowing costs vary substantially across a firm's debt instruments. This dispersion is especially large among firms that issue several instruments in a quarter.

Section 2 explains how we construct our dataset, by merging individual bond issuance data with regulatory BHC balance sheet data that contains details on individual loan arrangements. Most existing studies on firm borrowing costs rely on syndicated loan data from Dealscan, which only covers large syndicated loans, and firm financial data from Compustat, which contains financial information for US publicly traded firms only. Our main dataset results from merging the Mergent Fixed Income Securities Database (FISD) with the Federal Reserve's FR Y-14Q Schedule H.1, which contains detailed information on loan facilities originated by large US BHCs. Unlike traditional approaches, our data includes detailed information on borrowing by both public and private firms, large and small. Our final dataset encompasses 325 thousand loans and about 17 thousand bonds issued by 156 thousand firms; it effectively covers the universe of bond issuances and 81 percent of commercial and industrial lending undertaken by

major BHCs in the US.

In Section 3, we detail the construction of the EDP. The EDP is the residual credit spread after controlling for many observable instrument characteristics, such as amount, maturity, default probability, loss given default (which reflects seniority) and instrument type, among others. Our measure differs from the EBP along three important dimensions. First, we consider a much larger set of instruments that goes beyond unsecured senior bonds including not only other types of bonds but also multiple types of loans: term loans, credit lines, syndicated and non-syndicated loans, among others. Second, due to the absence of secondary market data on prices for these types of loans, our measure is constructed at instrument origination. Finally, we directly observe banks' estimated probability of default of the firm, which we employ directly instead of relying on distance-to-default measures as in the EBP. When aggregated, the EDP is imperfectly correlated with the EBP, suggesting that our data includes new information about credit conditions that is not captured by looking solely at unsecured bond issuances.

In the raw data, average spreads are about 7 basis points higher for loans than for bonds. However, conditioning on firm and instrument characteristics reverses the observed difference between loan and bond spreads. This difference changes sign when we compare instruments issued by the same firm in the same quarter, controlling for maturity, amount, default probability, and loss given default. The estimated loan coefficient is -0.17 log points, implying that bond spreads are about 39 basis points higher than loan spreads when evaluated at the mean loan spread. This finding extends the evidence on syndicated loans in Schwert (2020) to a broader set of borrowers and loans.

We construct three time series measures of financing conditions, comprising an aggregate EDP based on both bonds and loans and separate measures for each instrument type. The bond EDP is modestly correlated with the EBP, while the loan EDP comoves more closely with the net percentage of banks tightening lending standards in the Senior Loan Officer Opinion Survey (SLOOS). The respective correlations are 0.29 and 0.65. The bond and loan measures also respond differently to credit-market events. These episodes illustrate the value of measuring conditions in each market separately and combining them in an aggregate measure.

Finally, in Section 4, we ask how much of the dispersion in the EDP reflects common credit conditions and persistent differences across firms. After subtracting a quarterly mean and a firm mean, 37 percent of total variance remains. Among firms that issue at least eight instruments in

at least one quarter, the residual share reaches 75 percent even after accounting for instrument type, maturity and amount.

Related Literature. There is a large literature in economics and finance that studies the cost of external finance for firms. Hennessy and Whited (2007) combine data with a structurally estimated model to find significant dispersion in financing costs between small and large firms. More recently, Gormsen and Huber (2025) estimate series for the cost of capital and corporate discount rates from earnings call data. They argue that corporate discount rates are a more proximate driver of investment decisions than the cost of financing. Pengfei Wang (2025) uses aggregate data to document that default risk cannot explain the spread between the average bank loan rate and the interbank rate, and studies its aggregate implications. We view our paper as complementary to theirs, by presenting a new estimated measure for firm-level cost of external financing based on security prices instead of earning call announcements.

Our paper is closely related to Schwert (2020), who studies differences in interest rates between bonds and syndicated loans, finding a significant spread between the two. We extend his analysis beyond large publicly traded firms and syndicated loans, and find similar results. Our methodology to derive the Excess Debt Premium is closely inspired by that of Gilchrist and Zakrajsek (2012), who document a sizable spread that is not explained by individual firm default risk when considering a panel of senior unsecured bonds.

One of the main contributions of our paper is that we use an extremely large panel of loans and bonds to estimate proxies for the cost of external financing. We achieve this by leveraging the Federal Reserve's Y-14 data, which has also been utilized by a series of recent papers. Chodorow-Reich et al. (2022) and Faria-e-Castro et al. (2024) use this data to investigate how lending varies across banks, while Caglio et al. (2021) and Greenwald et al. (2021) study the transmission of monetary policy, and Ivanov et al. (2024) examine how taxes affect corporate borrowing. Bräuning et al. (2021) use the data to motivate a model of heterogeneous firm borrowing to study credit supply shocks. Our contribution is to exploit this micro-level data to derive new estimates of borrowing costs for small and large firms.

2 Data Description

We begin by describing the construction of our main dataset. We build a panel of debt instruments spanning 2013Q1 to 2025Q4 that contains information on borrowing from large bank holding companies (BHC) and corporate bonds.

Main Datasets and Scope. We rely on two main sources of data: (i) the Federal Reserve's FR Y-14Q H.1 schedule (Y-14), which contains information on loan facilities, and (ii) Mergent Fixed Income Securities Database (FISD), which provides information on corporate bond issuances. Here we briefly describe each of the datasets, and relegate a more detailed explanation of how we assemble the main dataset to Appendix A.

The Y-14 contains detailed data on commercial & industrial (C&I) lending for large BHCs, who are required to report detailed balance sheet data to the Fed for stress testing purposes. For most of our sample, the data includes reporting by the largest 33 BHCs. We observe all loan facilities on the balance sheet that have committed exposures of $1 million or more.[1] We see quarterly loan facility level data on interest rates, maturity, seniority, facility type, committed and utilized exposure, collateral market value, assessed default probability (PD), loss given default (LGD), and syndicated status, among other loan characteristics. Two major advantages of the Y-14 data are the size of the data and the ability to observe both small and large firms. Commonly used loan datasets such as the Shared National Credit database or Dealscan tend to contain only syndicated loans, limiting the analysis to larger firms.

Our second main dataset is the Mergent Fixed Income Securities Database (FISD), which contains information on bond issuances. The FISD covers a significant number of US corporate issuances, and provides information on offering amount, maturity, coupon, seniority, issuer, and a number of bond type flags (callable, putable, covenant, asset-backed, or rule 144a, for example).

To define a firm, we use the S&P Business Entity Cross Reference Service (BECRS). The BECRS creates a linkage between firms and their ultimate parent, allowing us to identify subsidiaries and collapse them under the parent company. This is particularly important given the disaggregated nature of the Y-14 data, where the main firm identifier is the borrower's Tax Identification Number (TIN). Large corporate groups can have dozens or even hundreds of

[1] A loan facility may be comprised of many separate loan types grouped into one facility.

subsidiary companies, each with their own TIN. We create a firm identifier using the 6-digit firm CUSIP, grouping together CUSIPs with the same ultimate parent. Using CUSIPs, we then merge the firm identifier to both the Y-14 and FISD. For firms in the Y-14 without a match to the BECRS data, we rely on the TIN as the firm identifier.[2]

2.1 Descriptive statistics

Table 1 summarizes the instruments at origination and the firms that use them. The dataset contains 428,770 origination observations for 155,779 firms. We identify 324,600 distinct loans and 17,174 distinct bonds.

Panels A and B report contractual characteristics for bonds and loans. Bonds have an average maturity of 11.32 years, more than twice the 4.94 years for loans.[3] Loan maturities range from less than one year at the 10th percentile to ten years at the 90th percentile. The 90th percentile of bond maturity is 30 years.

Second, bond issuances tend to be much larger in dollar amounts than loans: almost $652 million for the average bond versus $10.5 million for the average loan. The 90th percentile of loan sizes is considerably below the median of bond sizes.[4]

Third, the average interest rate at origination is 443 bps for bonds and 412 bps for loans.[5] We compute spreads by subtracting the Treasury yield at the instrument's maturity, averaged over its quarter of origination.[6] Mean loan spreads exceed mean bond spreads by 6.70 bps (207.72 versus 201.02 bps). The difference in medians is larger, at 58.57 bps (200.41 versus 141.84 bps). Section 3.1 compares the two instruments after controlling for borrower and contract characteristics.

Fourth, the loss given default (LGD) is much larger for bonds than for loans. The average LGD is 61 percent for bonds and 31 percent for loans. In the Y-14, we directly observe LGD for each loan. For the FISD, however, there is no such variable. Thus, we use the Moody's

[2]For more details on the definition of a firm see Appendix A.3.

[3]We assign a maturity of seven years to facilities with an open-ended maturity date, including revolving credit lines. This is the average effective maturity for these facilities in our sample.

[4]The amount for loans is the amount utilized, not the amount committed. Many credit lines have considerably larger committed amounts than utilized.

[5]We do not observe borrowing fees.

[6]We use the nominal yield data of Gurkaynak et al. (2007), available from the Federal Reserve Board at https://www.federalreserve.gov/data/nominal-yield-curve.htm.

Annual Default Study to set LGD for bonds (Moody's Investors Service, 2015).[7]

Panel C describes firm-quarters. Firms have bonds outstanding in 2.17 percent of firm-quarters. The loan share, measured as outstanding loans divided by the sum of outstanding loans and bonds, averages 97.79 percent. Among firm-quarters with positive balances of both types, it averages 13.19 percent. The mean one-year probability of default is 1.75 percent, based on lenders' assessments in the Y-14. In summary, few firms issues bonds, but those that do rely on bonds as their primary source of financing.

Issuance is infrequent. Firms issue 0.11 instruments per quarter on average, and even the 90th percentile is zero. For firms with both loans and bonds outstanding in the quarter, mean issuance rises to 1.46 instruments and the 90th percentile is four.

Panel D of Table 1 breaks down the different types of loans that we observe in the dataset. Contrary to standard datasets such as Dealscan or the SNC, the majority of the loans are non-syndicated (74 percent). The data contains slightly more credit lines than term loans (51 vs. 42 percent), both syndicated and non-syndicated. Additionally, about 7 percent of our loans are neither term loans or credit lines, with most of these being classified as capitalized lease obligations.

Appendix A.5 compares the merged data with aggregate balances. Outstanding bonds in our sample exceed the Financial Accounts measure of nonfinancial corporate bonds by 12.5 percent on average. Outstanding loans average 80.6 percent of large banks' C&I lending in the Federal Reserve's H.8 release. At the firm level, the fraction of reported liabilities captured by loans and bonds varies widely.

2.2 Time series for interest rates

Table 1 shows that there is significant cross-sectional dispersion in interest rates and spreads. We now compute three simple, direct measures of firm-level interest rates and analyze their aggregate behavior.

First, we define the *Average Interest Rate* (AIR) as the average interest rate a firm pays on all outstanding instruments in a given quarter, weighted by the size of the debt instrument

[7] Specifically, Moody's Investors Service (2015) provides the average corporate debt recovery rates measured by post-default trading prices between 1982-2014 on bonds by seniority. We use bond seniority to match the average LGD of a bond.

Table 1: Summary Statistics

	mean	sd	p10	p50	p90
Panel A: Bonds					
Maturity (yrs)	11.32	9.74	3.05	8.08	30.04
Amount (mil$)	651.62	692.79	2.13	500.00	1,250.00
Interest Rate (bps)	443.11	187.05	207.00	435.00	687.50
Interest Rate Spread (bps)	201.02	172.69	50.37	141.84	460.77
Loss Given Default (percent)	61	5	47	63	63
Panel B: Loans					
Maturity (yrs)	4.94	4.49	0.94	4.99	10.01
Amount (mil$)	10.54	41.11	0.72	2.69	25.00
Interest Rate (bps)	412.14	186.94	193.00	377.00	685.00
Interest Rate Spread (bps)	207.72	132.85	47.69	200.41	375.70
Loss Given Default (percent)	31	16	8	33	50
Panel C: Firm-quarters					
Bonds outstanding (percent)	2.17	14.56	0.00	0.00	0.00
Loan Share, $l/(l+b)$	97.79	14.31	100.00	100.00	100.00
Loan share, both types outstanding	13.19	17.47	0.28	5.68	38.58
Default probability (percent)	1.75	5.61	0.16	0.76	2.98
Securities Issued	0.11	0.57	0.00	0.00	0.00
Securities issued, both types outstanding	1.46	3.09	0.00	0.00	4.00
Panel D: Loan Types	*Frequency*	*Percent*			
Non-syndicated Credit Line	150,710	38.80			
Non-syndicated Term Loan	138,514	35.66			
Syndicated Credit Line	47,801	12.31			
Syndicated Term Loan	26,065	6.71			
Other	25,370	6.53			

Notes: Panels A and B summarize origination observations. The 428,770 observations cover 155,779 firms, 324,600 distinct loans and 17,174 distinct bonds. Loan shares and default probabilities in Panel C are expressed in percent. Panel D reports frequencies among loan origination observations with a classified facility type.

(amount outstanding for bonds and amount utilized for loans). This is similar to the "implied average interest rate" that can be computed from Compustat data, by dividing total interest expenditures by debt outstanding.

Second, the *New Interest Rate* (NIR) is the average interest rate a firm pays on all newly issued instruments in a given quarter, again weighted by the size of each instrument. The main difference is that the NIR reflects current market rates, while the AIR takes into account previous issuances as well.

Third, we define the *Marginal Interest Rate* (MIR) as the highest interest rate that a firm pays among all newly issued instruments in a given quarter. Note that the MIR and the NIR coincide if a firm only issues one instrument in a given quarter. In general, the MIR will be higher than the NIR and it captures the highest interest rate that the firm is willing to pay to issue debt in a given quarter.

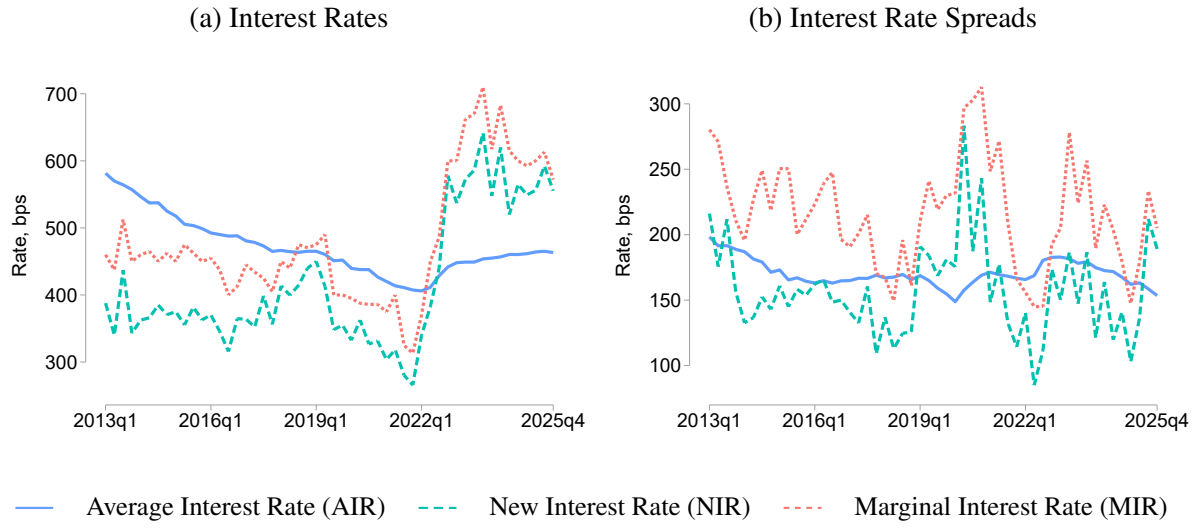
Figure 1 plots quarterly exposure-weighted medians of the three firm-level measures. The weights are outstanding exposure for the AIR, new exposure for the NIR, and exposure on the instruments attaining the firm's maximum for the MIR. Panel (a) shows rates and panel (b) shows maturity-matched spreads. Within a firm-quarter, the maximum is at least as large as the weighted average of its new issues. In panel (a), the two aggregate rate series are about 63 bps apart on average.

The average rate on outstanding debt generally exceeded the rate on new debt before 2022. As rates rose in 2022, new borrowing repriced faster than the stock of outstanding debt. Both the NIR and the MIR rose above the AIR.

Panel (b) shows that the gap also appears in maturity-matched spreads. The marginal spread exceeds the new-issue average by roughly 60 bps in the quarterly series. Differences in maturity alone therefore leave substantial dispersion in the spreads firms pay on new debt.

The gap between a firm's highest and average new-issue rates motivates a closer look at instrument characteristics. We next examine how much of the variation in borrowing costs can be accounted for by contract type, size, maturity and default risk.

Figure 1: Interest Rates and Spreads



3 The Excess Debt Premium

To account for other observable characteristics that could explain within- and across-firm dispersion in the cost of borrowing, we construct a measure of deviations of observed interest rates from what a statistical model that conditions on observable characteristics would predict: the Excess Debt Premium (EDP). We use the EDP as the main indicator for a firm's cost of borrowing. We closely follow Gilchrist and Zakrajsek (2012), who construct a measure based on secondary market bond prices that they call the excess bond premium (EBP). There are, however, some important differences between the measure they construct and ours.

The EDP covers bank loans as well as corporate bonds. Because we observe loan terms at origination, we measure both loan and bond spreads at the time of issuance. We use the yield on a Treasury of comparable maturity as the benchmark. This allows us to include instruments such as floating-rate loans and credit lines for which matching future cash flows would require additional assumptions.

Let $r_{i,f,t}$ denote the interest rate on instrument i issued by firm f in quarter t, and let $r^{treasury}_{t,m(i)}$ be the quarterly average Treasury yield at its matched maturity. The spread at origination is

$$y_{i,f,t} = r_{i,f,t} - r^{treasury}_{t,m(i)}$$

We then follow Gilchrist and Zakrajsek (2012) and estimate the following specification:

$$\log y_{i,f,t} = \sum_j \gamma_j \mathbb{I}(\text{debt type}_{i,f,t} = j) + \Gamma X_{i,f,t} + \varepsilon_{i,f,t} \tag{1}$$

where the indicators distinguish pooled bonds, nonsyndicated credit lines, syndicated credit lines, syndicated term loans and the remaining loan facilities, including nonsyndicated term loans. Bonds are the omitted reference category. The controls in $X_{i,f,t}$ are maturity, amount, firm default probability and instrument loss given default (LGD). LGD captures differences in expected recovery, including differences associated with seniority.

The estimation results are reported in Panel A of Table 2. We consider six alternative specifications. Column (1) includes no fixed effects, column (2) includes sector fixed effects (NAICS 3-digit), column (3) includes firm fixed-effects, column (4) includes time fixed effects, column (5) includes sector-time fixed effects, and finally column (6) includes firm-time fixed effects. Note that the specification with firm fixed effects (column 3) restrict the sample to firms that have issued at least two instruments during the period of analysis, and the specification with firm-time fixed effects (column 6) considers only firms that issue multiple instruments within a quarter, which leads to a lower number of observations (a reduction in the sample size by about 27 and 58 percent, respectively). For that reason, our benchmark is the specification with time-sector fixed effects, column (5). Longer maturities and larger amounts are associated with lower spreads in the benchmark sector-by-quarter specification. Higher default probability and LGD are associated with higher spreads in that column. These coefficients describe equilibrium borrowing terms.[8]

With pooled bonds as the reference, benchmark spreads are lower for syndicated credit lines, syndicated term loans and the remaining loan category. For nonsyndicated credit lines, the estimated difference is small and statistically insignificant (0.01 log points).

Differences in seniority are a potential explanation for the lower spreads on bank loans relative to corporate bonds. Higher priority in default can increase expected recovery and reduce the spread required by lenders, even for instruments issued by the same borrower. Table 1 shows a substantial difference in recovery prospects across the two instruments, with average LGD of 31 percent for loans and 61 percent for bonds. Our specification controls for instrument-level LGD alongside the borrower's probability of default, thereby accounting for differences in ex-

[8]That is, they do not describe exogenous variation in terms along the interest rate schedule.

Table 2: Excess Debt Premium Regressions

Panel A: all debt types						
	(1)	(2)	(3)	(4)	(5)	(6)
Maturity	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Amount	-0.78***	-0.86***	-0.81***	-1.02***	-1.15***	-0.52***
	(0.10)	(0.10)	(0.11)	(0.11)	(0.11)	(0.14)
Default probability	1.37***	1.15***	0.88***	1.29***	1.13***	
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	
Loss given default	0.08***	-0.04***	0.01	0.11***	0.02**	0.17***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Other loans	-0.06***	-0.09***	-0.33***	-0.06***	-0.08***	-0.17***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Nonsyndicated credit line	0.02**	0.00	-0.28***	0.01	0.01	-0.07***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
Syndicated credit line	-0.05***	-0.13***	-0.36***	-0.06***	-0.12***	-0.14***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
Syndicated term loan	-0.03***	-0.10***	-0.39***	-0.04***	-0.08***	-0.17***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
Constant	5.25***	5.32***	5.56***	5.25***	5.29***	5.26***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
Observations	276045	275957	202543	276045	275705	116979
Adjusted R^2	0.029	0.066	0.274	0.111	0.181	0.537
Fixed effects	None	Sector	Firm	Quarter	Sector×quarter	Firm×quarter
Panel B: loans vs. bonds						
	(1)	(2)	(3)	(4)	(5)	(6)
Maturity	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Amount	-0.79***	-0.92***	-0.85***	-1.03***	-1.20***	-0.52***
	(0.10)	(0.10)	(0.11)	(0.11)	(0.11)	(0.14)
Default probability	1.37***	1.16***	0.87***	1.29***	1.14***	
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	
Loss given default	0.05***	-0.07***	-0.02	0.09***	-0.00	0.13***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Loan	-0.05***	-0.09***	-0.36***	-0.05***	-0.09***	-0.17***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Constant	5.28***	5.37***	5.61***	5.28***	5.34***	5.30***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
Observations	276045	275957	202543	276045	275705	116979
Adjusted R^2	0.027	0.063	0.273	0.109	0.178	0.535

Notes: The dependent variable is the log of the origination spread in basis points. Maturity is measured in years, amount in tens of billions of dollars, and default probability and LGD as fractions. Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Both panels use the same fixed effects. Sectors are three-digit NAICS industries.

pected recovery, including those associated with seniority. The estimated bond–loan spread therefore persists after conditioning on these differences. To the extent that seniority affects spreads through expected recovery, this channel should be accounted for by inclusion of the LGD control.

3.1 The Bond-Loan Spread

To summarize the bond–loan difference, Panel B of Table 2 pools all loans into one category. The loan coefficient measures the difference in log spreads relative to bonds with the same observable characteristics. Each column uses the same fixed effects and sample as its counterpart in Panel A.

Column (6) compares instruments issued by the same firm in the same quarter, controlling for maturity, amount and LGD. The loan coefficient is -0.17 (standard error 0.02). The implied bond spread is $e^{0.17} - 1 = 18.5$ percent higher than the spread on a comparable loan. Evaluated at the sample mean loan spread of 207.72 bps, this implies a bond premium of about 38.5 bps.[9]

These findings are closely related to, and extend, those of Schwert (2020), who uses data on large public firms and finds that syndicated loans tend to have lower interest rates than bonds issued by the same firm and with equivalent residual maturity. Using a calibrated model of firm default, Schwert (2020) argues that the difference between spreads is actually smaller than what a model would predict (meaning that loan rates are actually higher than what a model would predict), which he attributes to bank market power in commercial & industrial lending. We find that even when controlling for loan seniority and recovery rates, by including LGD as an explicit control, and in a much larger and broader sample, a substantial spread persists between bonds and loans.

3.2 Time series: the EDP for bonds and loans

We now construct the EDP. We use the fitted contribution of observed instrument and borrower characteristics, to obtain $\widehat{\log y}_{i,f,t}$ from the specification with sector-by-quarter fixed effects (column (5) of Panel A). We then subtract the predicted spread in levels from the observed

[9] One potential concern is that this spread is driven by large differences in issuance amounts between bonds and loans. Appendix B reports the same comparison within size bins, showing that the spread persists for most size binds.

spread:

$$EDP_{i,f,t} = y_{i,f,t} - \exp[\widehat{\log y}_{i,f,t}] \tag{2}$$

Panel (a) of Figure 2 plots the unweighted quarterly mean of the instrument-level EDP alongside the excess bond premium (EBP) of GZ, both in basis points. The aggregate EDP rose around the onset of the pandemic, fell into early 2022, and rose again as credit conditions tightened.

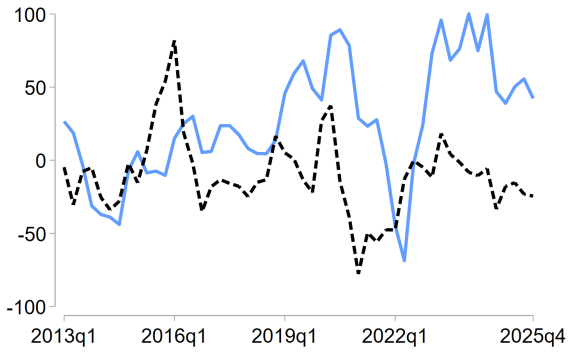
Several differences matter for this comparison. First, the EBP uses secondary-market prices on outstanding fixed-rate senior unsecured bonds, whereas the EDP measures spreads at origination and includes callable bonds and bank loans. Second, the listed bond issuers in the EBP represent a narrower set of borrowers than the 155,779 firms in our underlying sample. Third, we observe banks' own assessments of borrower default risk instead of estimating a distance-to-default model. Fourth, GZ match the cash flows of each bond to a synthetic Treasury security, while we match Treasury yields by maturity.

Panels (b) and (c) use separate spread regressions for bonds and loans. Each panel standardizes its quarterly series to facilitate comparison. Panel (b) compares the bond EDP with the EBP. Both rise at the onset of the pandemic, although spreads on new bond issues and secondary-market prices adjust at different speeds. Panel (c) compares the loan EDP with the net percentage of domestic banks reporting tighter C&I lending standards in the Senior Loan Officer Opinion Survey (SLOOS). Both measures rise during the tightening episode that began in 2022.

Next, Table 3 compares our three EDP measures with the two external benchmarks of financial conditions. In the full sample, the bond EDP has a modest positive correlation of 0.29 with the EBP, compared with 0.21 for the aggregate EDP. The loan EDP is uncorrelated with the EBP but has a correlation of 0.65 with SLOOS. These relationships persist when we exclude 2020: the bond EDP–EBP correlation is 0.27, and the loan EDP–SLOOS correlation is 0.63. Our contribution is thus a set of three complementary measures of financial conditions within a common framework: a bond EDP that comoves with the bond-market benchmark, a loan EDP that comoves with the bank-lending benchmark, and an aggregate EDP that summarizes conditions across both markets.

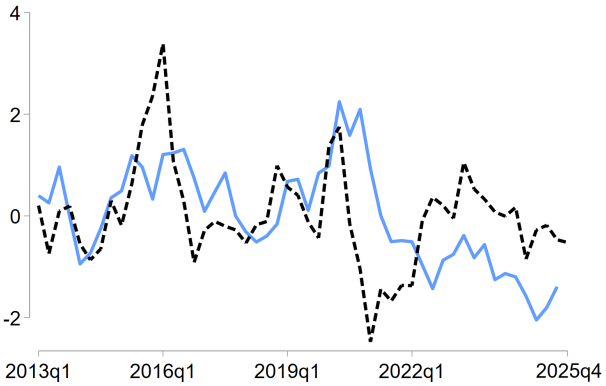
Figure 2: Excess Debt Premium and risk measures

(a) Excess Debt Premium



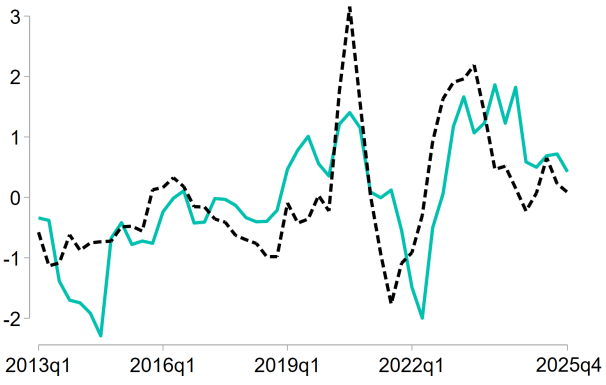
EDP --- EBP from GZ

(b) Bond EDP vs. EBP from GZ



Bond EDP --- EBP from GZ

(c) Loan EDP vs. SLOOS



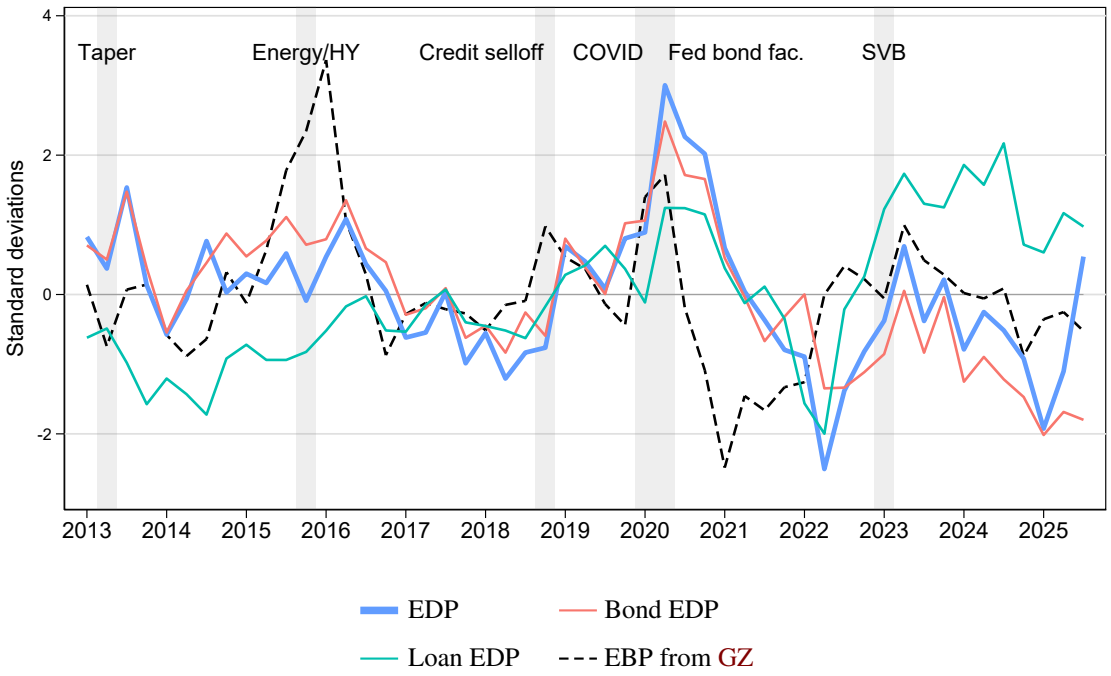
Loan EDP --- SLOOS

Table 3: Correlations among measures

	(1)	(2)	(3)	(4)	(5)
Panel A: full sample ($N = 51$)					
(1) EBP (GZ)	1.00				
(2) EDP, all	0.21	1.00			
(3) EDP, bonds	0.29	0.85	1.00		
(4) EDP, loans	0.00	0.15	-0.23	1.00	
(5) SLOOS	0.26	0.31	0.07	0.65	1.00
Panel B: excluding 2020 ($N = 47$)					
(1) EBP (GZ)	1.00				
(2) EDP, all	0.18	1.00			
(3) EDP, bonds	0.27	0.78	1.00		
(4) EDP, loans	0.00	-0.01	-0.44	1.00	
(5) SLOOS	0.32	-0.03	-0.28	0.63	1.00

Notes: Pairwise correlations of the quarterly series over 2013Q1–2025Q3. Panel B drops 2020Q1–2020Q4, in which the pandemic moved every credit market simultaneously. EDP measures are from equation (2); the EBP is from Gilchrist and Zakrajsek (2012).

Figure 3: Standardized credit-spread measures and credit-market events



Notes: Each series is standardized over the common sample 2013Q1–2025Q3. The vertical axis is in standard deviations of each measure's own distribution. Shaded bands mark quarters of identified credit-market stress: 2013Q2 (taper tantrum), 2015Q4 (energy and high-yield selloff), 2018Q4 (credit selloff), 2020Q1 (pandemic onset), 2020Q2 (announcement of the Federal Reserve's corporate credit facilities) and 2023Q1 (Silicon Valley Bank).

Finally, we standarize the four measures (EBP, aggregate EDP, bond EDP and loan EDP) and compare their time-series dynamics. Figure 3 plots the four standardized series, with shaded bands marking selected events affecting bond markets, bank lending, or both. The EBP and loan EDP behave differently during the 2015 energy and high-yield bond selloff and the 2023 collapse of Silicon Valley Bank, illustrating the distinct financial conditions captured by the two measures. All four measures rise sharply at the onset of the pandemic, but the EBP subsequently declines more quickly, whereas the EDP measures remain elevated for longer. This persistence may partly reflect differences between spreads observed at origination and prices in secondary markets. For loans, another possible explanation is that commitments extended during the pandemic continued to absorb bank lending capacity, keeping conditions for new lending tight. Together, these episodes illustrate the value of measuring bond and loan market conditions separately as well as of combining them in an aggregate measure.

4 What explains dispersion in the EDP?

We decompose the variance of instrument-level EDPs at origination using successive group averages, following Daruich and Kozlowski (2023). Let EDP_{ift} denote the EDP on instrument i issued by firm f in quarter t. The baseline decomposition is

$$EDP_{ift} = \gamma_t + \beta_f + u_{ift}, \tag{3}$$

where γ_t is the mean EDP in quarter t and β_f is firm f's mean deviation from the quarterly mean across its issues. The residual u_{ift} includes both changes in a firm's relative borrowing costs over time and differences across instruments issued by the same firm in a quarter.

We then ask how much of the remaining variance is associated with the lender or the contract. In one specification we subtract the mean residual for each lender. In another we successively subtract mean residuals by instrument type, maturity bin and amount bin. Appendix A.4 describes the bins. The table reports the variance of each component as a percentage of the total variance in the corresponding sample.

In Panel A of Table 4, quarterly means account for 8.16 percent of total variance and firm means account for 54.37 percent. The remaining 37.47 percent reflects dispersion around those means. Lender identity accounts for a further 0.52 percent of total variance. In the separate

Table 4: Variance decomposition of the EDP

Panel A: Baseline							
	Time	Firm	Bank	Instrument Type	Maturity	Amount	Residual
(1)	8.16	54.37					37.47
(2)	8.16	54.37	0.52				36.95
(3)	8.16	54.37		0.26	0.23	0.19	36.79
112,093 firms, 287,416 origination observations.							
Panel B: By Number of Instruments Issued							
# of Instruments	Time	Firm	Bank	Instrument Type	Maturity	Amount	Residual
2+	9.53	31.80		0.38	0.68	0.29	57.32
4+	9.60	19.31		0.52	0.66	0.34	69.57
6+	9.60	15.72		0.60	0.75	0.39	72.95
8+	9.51	13.60		0.62	0.82	0.38	75.07
2+ sample before requiring a nonmissing EDP: 20,104 firms, 225,680 observations.							
Panel C: Firm-quarters with both loans and bonds outstanding							
	Time	Firm	Bank	Instrument Type	Maturity	Amount	Residual
(1)	6.99	17.77					75.24
(2)	6.99	17.77	3.12				72.12
(3)	6.99	17.77		1.15	0.63	0.50	72.96
1,559 firms, 57,893 origination observations.							

Notes: Entries are percentages of total EDP variance in each sample. Blank cells indicate components omitted from that specification. Panel B groups firms by the maximum number of instruments they originate in any one quarter. Instrument type distinguishes bonds from loans in Panel B and the more detailed contract types in Panels A and C.

specification with contract characteristics, type, maturity and amount together account for 0.68 percent, leaving 36.79 percent unexplained.

4.1 Issuers with multiple instruments

Panel B repeats the decomposition for firms that originate at least two, four, six or eight instruments in any one quarter. Each sample includes all qualifying firms' originations over the sample period. The residual share after accounting for type, maturity and amount rises from 57.32 percent for the 2+ group to 69.57, 72.95 and 75.07 percent for the 4+, 6+ and 8+ groups. Thus, across firms with more frequent multi-instrument issuance, contract characteristics still account for little of the dispersion around firm and quarter averages.

4.2 Issuers with both loans and bonds

Loans dominate the origination sample. To examine whether that composition accounts for the small role of instrument type, Panel C restricts the sample to originations in firm-quarters in which both loans and bonds are outstanding. This includes 57,893 origination observations for 1,559 firms. After removing quarter and firm means, 75.24 percent of variance remains. Adding lender identity reduces the residual share to 72.12 percent. In the separate specification with instrument type, maturity and amount, it is 72.96 percent. Dispersion therefore remains substantial even among borrowers with access to both markets.

5 Conclusion

We combine corporate bond issuances and bank loans to measure borrowing costs across public and private firms. Among instruments issued by the same firm in the same quarter, the estimated difference in spreads implies a bond premium of about 38.5 bps at the mean loan spread. Firm and quarter averages account for much of the dispersion in the Excess Debt Premium, but 37 percent of its variance remains. The residual share is larger among firms that issue multiple instruments. At the aggregate level, the bond and loan measures also capture different movements in credit conditions, particularly during episodes of stress in one market.

These findings have important implications for our understanding of corporate financing decisions, capital structure choices, and the transmission of credit conditions to the real economy. Faria-e-Castro et al. (2025), for example, provide a measurement framework to illustrate how dispersion in borrowing costs affect the allocative efficiency of capital in the US. Our results highlight the importance of monitoring borrowing costs and their dispersion across firms and sectors. Future research could further explore the underlying mechanisms driving the heterogeneity in borrowing costs and their real effects.

References

Bräuning, F., Fillat, J. L., and Joaquim, G. (2021). Corporate finance and the transmission of shocks to the real economic. *Federal Reserve Bank of Boston Research Department Working Papers*, (21-18).

Caglio, C. R., Darst, R. M., and Kalemli-ʹOzcan, Ş. (2021). Collateral heterogeneity and monetary policy transmission: Evidence from loans to smes and large firms. Working Paper 28685, National Bureau of Economic Research.

Chodorow-Reich, G., Darmouni, O., Luck, S., and Plosser, M. (2022). Bank liquidity provision across the firm size distribution. *Journal of Financial Economics*, 144(3):908–932.

Daruich, D. and Kozlowski, J. (2023). Macroeconomic implications of uniform pricing. *American Economic Journal: Macroeconomics*, 15(3):64–108.

Faria-e-Castro, M., Kozlowski, J., and Majerovitz, J. (2025). The cost of capital and misallocation in the united states. Working Papers 2025-013, Federal Reserve Bank of St. Louis.

Faria-e-Castro, M., Paul, P., and Sánchez, J. M. (2024). Evergreening. *Journal of Financial Economics*, 153(C).

Gilchrist, S. and Zakrajsek, E. (2012). Credit spreads and business cycle fluctuations. *American Economic Review*, 102(4):1692–1720.

Gormsen, N. J. and Huber, K. (2025). Corporate discount rates. *American Economic Review*, 115(6):2001–49.

Greenwald, D. L., Krainer, J., and Paul, P. (2021). The credit line channel. Working Paper 2020-26, Federal Reserve Bank of San Francisco.

Gurkaynak, R. S., Sack, B., and Wright, J. H. (2007). The u.s. treasury yield curve: 1961 to the present. *Journal of Monetary Economics*, 54(8):2291–2304.

Hennessy, C. A. and Whited, T. M. (2007). How costly is external financing? evidence from a structural estimation. *The Journal of Finance*, 62(4):1705–1745.

Ivanov, I. T., Pettit, L., and Whited, T. (2024). Taxes depress corporate borrowing: Evidence from private firms. Working Paper 32398, National Bureau of Economic Research.

Moody's Investors Service (2015). Annual Default Study: Corporate Default and Recovery Rates, 1920-2014. Working paper.

Pengfei Wang, Yu Yi, S. Z. (2025). Excess loan premium and business cycle fluctuations. Technical report.

Schwert, M. (2020). Does borrowing from banks cost more than borrowing from the market? *The Journal of Finance*, 75(2):905–947.

Appendix

A Data

A.1 FR Y-14Q Data

This section explains the sample selection of the Y-14 data, and the construction of the variables used in the empirical analysis.

A.1.1 Sample Selection

Our sample selection criteria follow standard practice in the literature. We exclude all firm-quarters for which:

(i) The loans are not in the U.S. (`Field 6 Country` is not U.S.).

(ii) Industry is finance or public administration (`Field 8 IndustryCode` is 52, 92, 551111, or 5312).

(iii) Committed Exposure is negative or zero (`Field 24 CommittedExposure` ≤ 0).

(iv) Utilized Exposure is negative (`Field 25 UtilizedExposure` < 0).

(v) Utilized exposure is larger than committed (`Field 25 UtilizedExposure` $>$ `Field 24 CommittedExposure`).

(vi) The posted date is after the maturity date of the facility (`Field 0 D_DT`, the date of observation, is after `Field 19 MaturityDate`).

(vii) The posted date precedes the origination date of the facility (`Field 0 D_DT` is before `Field 18 OriginationDate`).

(viii) The loan is classified as municipal or foreign (`Field 26 LineReportedOnFRY9C` loan type is not 3, 4, 8, 9, or 10).[10]

[10]The codes are: 3) Loans to finance agricultural production and other loans to farmers, 4) Commercial and industrial loans to U.S. addresses, 8) All other loans, excluding consumer loans, 9) All other leases, excluding consumer leases, 10) Loans secured by owner-occupied nonfarm nonresidential properties originated in domestic offices.

(ix) The interest rate reported is 0 (`Field 38 InterestRate` = 0).

(x) The observation date (`Field 0 D_DT`) is before 2013 Q1.

A.1.2 Construction of variables

We construct two types of variables in the Y-14: first, variables at the loan facility level-quarter level, and second, variables at the firm-quarter level, which are constructed by aggregating all loan facilities owed by a firm in a given quarter.

Variables at the facility-quarter level:

(i) Maturity is the time in years from origination (`Field 18 OriginationDate`) to maturity (`Field 19 MaturityDate`). We assign seven years to facilities with an open-ended maturity date.

(ii) Amount: the utilized exposure on a loan (`Field 25 UtilizedExposure`).

(iii) Loan type: we use the credit facility type to create broad categories of revolving credit lines and term loans (`Field 20 FacilityType` - credit lines defined as 1-6, term loans defined as 7-13).

(iv) Syndicated loans: we use a participation flag to classify a loan as syndicated or not (`Field 34 ParticipationFlag` - 1 is not syndicated, 2-5 syndicated).

(v) Interest rate: the interest rate on the loan (`Field 38 InterestRate`).

(vi) To measure the spread at origination, we subtract the average Treasury yield in the origination quarter at the nearest whole-year maturity. We use the one-year yield for maturities that round to zero and the 30-year yield for maturities above 30 years.

Variables at the firm-quarter level:

(i) Loan Share: we define the loan share as the total utilized value of loans divided by the total observed utilized value of loans and bonds. For firms with no bonds, the loan share will be $= 1$. For firms with no loans, the loan share will be $= 0$.

(ii) Probability of default: the median probability of default that is reported across lenders for a firm on a given quarter.

A.2 FISD data

This section explains sample selection in the FISD data, as well as the construction of the variables used in the empirical analysis.

A.2.1 Sample Selection

Our sample selection criteria follow standard practices in the literature. Our period of study is 2013Q1-2025Q4. Since the FISD lists only bonds at origination, we consider all bonds issued after 1990Q1 for purposes of measuring coverage. Thus if a bond has a maturity of 20 years and originates in 2000Q1, we consider this bond in our 2013Q1-2025Q4 sample.

We exclude all firm-quarters for which:

(i) Industry is finance or public administration (`Issuer NAICS_Code` is 52, 92, 551111, or 5312).

(ii) Bond issuer or issue is not in the US (`Issuer or Issue Country_Domicile` not USA).

(iii) Issuer or issue industry was government (`Issue industry_group` is 4).

(iv) The reported currency is other than USD. Issues with a missing currency code are retained.

(v) Bond is not a corporate bond (`Bond_type` not CCOV, CCPI, CDEB, CLOC, CMTN, CMTZ, CP, CPAS, CPIK, CS, CUIT, CZ, RNT, UCID, or USBN).

(vi) Bond is convertible (`convertible` equals yes).

Further, we augment the dataset with information from Bloomberg on whether bonds have been called or not, and the date in which they are called. We retire these bonds after the call period.

A.2.2 Construction of variables

We construct the key variables employed in the empirical analysis as follows.

(i) Maturity is the difference in years between the bond's maturity date and its offering date. We use the delivery date if the offering date is missing.

(ii) Amount: the offering amount of the bond (`Issue Offering_amt`).

(iii) Bond type: we have flags for a number of bond types. Specifically, if a bond is convertible, putable, callable, asset backed, rule 144a, or if it has a covenant (Issue convertible, putable, announced_call asset_backed, rule_144a, and covenants respectively).

(iv) The coupon field (`coupon_type`) distinguishes fixed, floating and zero coupons.

(v) Interest rate: coupon rate.

(vi) Interest rate spread: we follow the same procedure as with the Y-14 data, see previous section.

A.3 Firm-level data

This section explains how we create the final firm identifier and how we assign bonds and loans to a firm. The Y-14's main firm identification variable is the tax identification number (TIN). To begin, we define a firm by grouping TINs. For any loans that are missing TINs, we define the firm by grouping loans that share an `ObligorName`, `ZipCode`, and `IndustryCode`. In order to merge the Y-14 and FISD, we use S&P's Business Entity Cross Reference Service (BECRS). The BECRS contains CUSIP level information, and contains the ultimate parent for each CUSIP. It also contains the start and end date of any relationships. We create an ultimate ID for a firm that contains the ultimate parent, and every CUSIP associated with that firm or its subsidiaries. Then, we merge the BECRS ultimate ID to the Y-14 using the 6-digit firm CUSIP. After merging the BECRS to the Y-14, we carry forward the ultimate ID by firm for any firm missing ultimate IDs. Then, we drop any matches that take place before or after the period of relationship, as reported by the BECRS. To settle any within firm-quarter discrepancies (i.e., a Y-14 firm, as defined by TIN, with multiple CUSIPs in the same quarter, that point to different

ultimate parents in the BECRS), we assign the ultimate ID with the most observations in a firm-quarter to all observations in that firm-quarter. The FISD uses the firm CUSIP identifier, so we can simply merge with the BECRS, and follow the same procedure for dropping relationships outside of the scope. For bonds that are not matched, we define the firm by the issuer identifier provided by the FISD.

A.4 Maturity and Amount Bins

In order to compute the variance decomposition in Section 4, we create categorical bins. Instrument types are already categorical. For instrument maturity and amount, which are continuous variables, we discretize them into buckets. We round maturity to the nearest year and group instruments with less than 3 years, 3–4, 5–6, 7–8, 9–10, 11–28, 29–30, and 31 years or more. The amount cutoffs are \$5, \$10, \$50, \$100 and \$500 million, as in Table B1.

A.5 Coverage

Figure A1 compares outstanding balances in the merged dataset with national aggregates. For bonds, we compare FISD balances with the Financial Accounts measure of corporate bonds outstanding for nonfinancial corporate business (FRED series CBLBSNNCB). Across the 52 quarters, FISD balances exceed that benchmark by 12.5 percent on average.

For loans, we compare utilized Y-14 balances with C&I lending by all commercial banks (BUSLOANS) and by large domestically chartered commercial banks (CIBOARD). The mean of the quarterly coverage ratios is 47.3 percent for all banks and 80.6 percent for large banks. The Y-14 reporting and facility-size thresholds limit the coverage of smaller banks and facilities.

Figure A2 measures coverage at the firm-quarter level where the Y-14 reports total liabilities. We divide outstanding loan and bond balances by reported liabilities. The histogram trims the bottom and top percentiles and displays coverage below 100 percent. Firm-quarters are concentrated toward the lower end, but the distribution spans the full range shown. Trade credit and accounts payable are examples of liabilities outside our debt measures.

Figure A1: Aggregate Data vs. Merged Y-14/FISD dataset

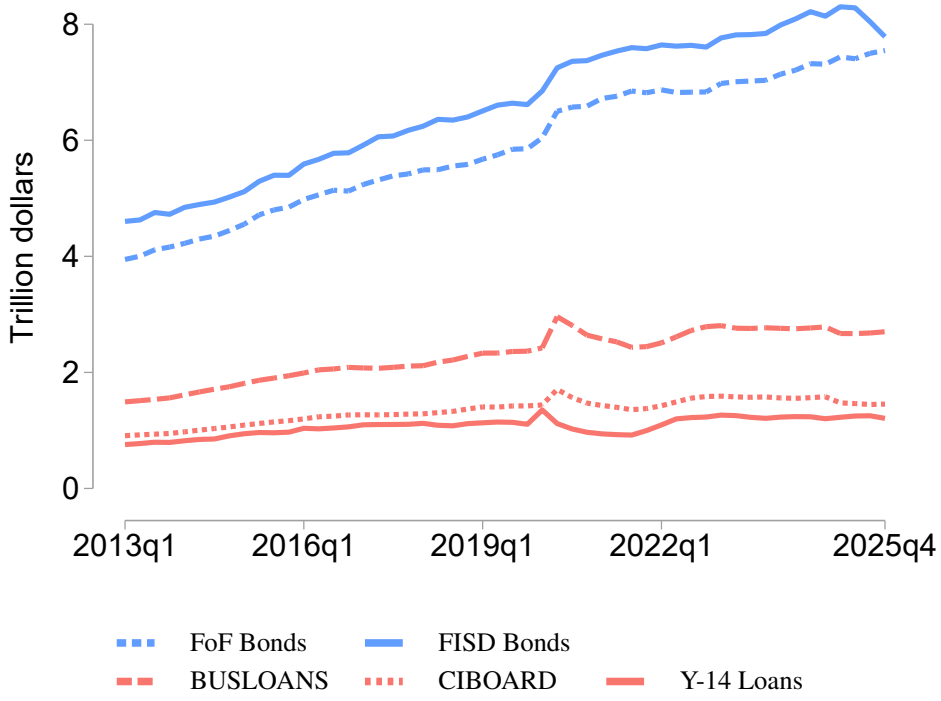
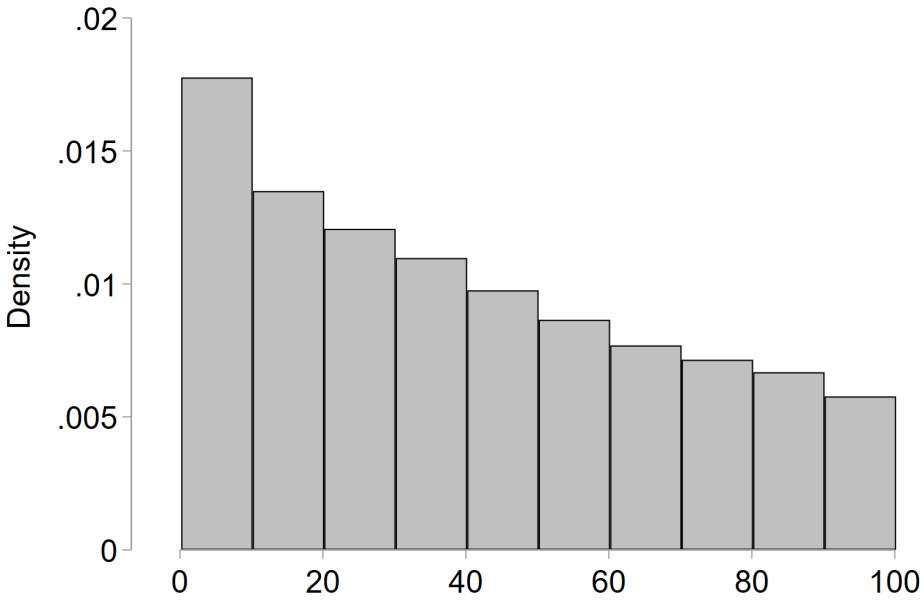


Figure A2: Outstanding loans and bonds as a percentage of firm liabilities



B EDP: Robustness

Because bonds are typically larger than loans, we repeat the firm-by-quarter regression separately within six instrument-size bins. Table B1 shows that the sign depends on instrument size. Below $5 million, loan spreads are higher (0.38 log points). Between $5 million and $10 million, the loan coefficient is -0.45 and is significant at the 5 percent level. Loans also have significantly lower spreads in the three bins from $10 million to $500 million. The $100–500 million bin, with 1,075 loans and 1,648 bonds, gives a loan coefficient of -0.75. At $500 million and above, there are only 77 loans, and the estimated difference is statistically insignificant.

Table B1: The Bond-Loan Spread: similar sized instrument bins

	(1)	(2)	(3)	(4)	(5)	(6)
Maturity	-0.03***	-0.05***	-0.02***	0.00	0.01***	0.02***
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Amount	-383.79***	13.52	-14.79***	-1.73	-7.56***	-0.05
	(30.21)	(60.08)	(4.00)	(6.77)	(2.01)	(0.18)
Loss given default	0.24***	0.26***	0.03	-0.05	-0.16	1.61***
	(0.03)	(0.07)	(0.03)	(0.07)	(0.13)	(0.28)
Loan	0.38***	-0.45**	-0.83***	-1.17***	-0.75***	0.06
	(0.09)	(0.22)	(0.15)	(0.29)	(0.12)	(0.25)
Constant	4.99***	5.63***	5.95***	6.05***	5.41***	3.68***
	(0.09)	(0.23)	(0.15)	(0.29)	(0.12)	(0.18)
Observations	46834	6351	21826	2836	2723	6230
Adjusted R^2	0.467	0.628	0.789	0.882	0.733	0.740
Firm-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N Loans	45013	6209	21719	2793	1075	77
N Bonds	1821	142	107	43	1648	6153
Amount bin ($m)	< 5	5-10	10-50	50-100	100-500	≥ 500

Notes: The dependent variable is the log of the origination spread in basis points. Maturity is measured in years, amount in tens of billions of dollars, and LGD as a fraction. Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.