What's different about loans?

An empirical analysis of credit spreads on public debt and bank facilities

Preliminary Draft
January 2005

Abstract

Understanding the determinants of credit spreads has always been an important objective of academic researchers, regulators and practitioners alike. While extensive research has been produced on bonds and loans separately, few studies have analyzed those two classes of debt instruments jointly. The aim of this study is to draw an empirical comparison between the determinants of bond and loan spreads, unifying two streams of research that have grown richer and livelier over the latest years. The empirical analysis is based on a sample of 7,926 Eurobonds and 5,469 syndicated loans originated between 1991 and 2003. Many interesting results emerge from the empirical analysis. First, while spreads increase as ratings worsen for both bonds and loans, the spread/rating link is quite steeper for the former, while the risk premium required by banks on low-quality loans appears much milder than the one demanded by private investors in the bond market. Second, the maturity premium looks much larger for bank facilities than for bonds (where long maturities are more usual than in the syndicated loan market). Third, while larger bond issues tend to be associated with higher spreads, syndicated loans' spreads appear to decrease as size increases: besides liquidity issues, this may reflect the scale economies implied in information-gathering, screening and monitoring costs which are typically associated with lending. Fourth, while subordinated exposures have to pay more than senior ones for both bonds and loans, this is especially true for the latter, and may reflect the fact that senior syndicated loans enjoy higher recovery rates than bonds. Finally, for both bonds and loans, secured exposures appear to pay a higher spread than unsecured ones, consistently with the results of a wide stream of literature.

JEL Classification Numbers: G15, G21, G28

EFM Classification Codes: 510, 550, 570

Keywords: Eurobonds, syndicated loans, credit ratings, spreads, default risk.

1. Introduction

Understanding the determinants of credit spreads has always been an important objective for academic researchers, regulators and practitioners alike. Indeed, a proper understanding of the mechanism underlying credit pricing would allow researchers to estimate the impact on spreads of default risk changes, and to better calibrate credit risk models; also it would enable practitioners to better forecast the evolution of bond markets and to assess the correct pricing of new debt issues; finally, it would help regulators to calibrate risk-based capital requirements and to use capital market signals more effectively, as a market-discipline tool.

While extensive research has been produced on bonds and loans, separately, few studies have analyzed those two classes of debt instruments jointly. The aim of this study is to draw an empirical comparison between the determinants of bond and loan spreads, unifying two streams of research that have grown richer and livelier over the latest years.

Comparing the mechanisms driving the cost of bonds and loans for borrowers of different quality may be of paramount importance to gain a full understanding of the advantages and disadvantages for bank-centered versus market-centered economies. Also, such a comparison may help to assess some of the likely consequences of the growing role played by capital markets in funding the industrial systems of many newly-developed countries.

This paper is structured as follows. Section 2 looks at previous related works on this subject and highlights the main objective and contribution of this empirical study. Section 3 presents the main features of our data sample (a wide dataset including more than 15,000 bond issues and syndicated loans). Section 4 presents the model used for the empirical analysis and reviews the variables used to analyze the behaviour of credit spreads. Section 5 presents some preliminary empirical estimates based on a model that explains more than 75% of the total variance. Section 6 concludes.

2. Literature review

The behaviour of credit spreads (and the spread/rating relationship) has been studied by several researchers over the latest years. However, to our knowledge, empirical analyses have specialized either on loans or on bonds, without trying to draw an overall picture of common *versus* specific spread determinants.

Spreads on syndicated loans were investigated, e.g, by Yi and Mullineaux (2002). Here, a credit spread model is estimated (based on some 500 observations) incorporating bank loan credit ratings and other factors reflecting information asymmetry and agency problems: ratings are found to affect loan rates, as well as some of the borrower's financial ratios (e.g. interest expenses coverage, standard deviation of the equity price), some characteristics of the loan facility (size, maturity, purpose and a dummy for collateralized loans) and some market-environment variables (e.g., average spread on corporate bonds, yearly dummies)[1].

Coleman, Esho and Sharpe (2002) also focus on loan spreads, analyzing the impact on pricing of some features of the lending bank, as well as some borrower characteristics and other loan contract peculiarities. Bank monitoring ability, bargaining power, risk and syndicate structure are found to affect the pricing of a loan, as well as its maturity. Riskier banks and banks with greater bargaining power lend for significantly shorter maturities and at higher yield spreads, while banks with greater monitoring capabilities lend for longer maturities and charge a higher yield spread. Larger banking syndicates lend for longer maturities, but due to a decline in contractual flexibility and monitoring, they lend at lower yield spreads.

Harjoto, Mullineaux and Yi (2003) have compared the loan pricing techniques of investment banks that originate syndicated loans to those of commercial bank arrangers. While investment banks (which are relatively new entrants into the commercial lending business) appear to price loans differently on an unconditional basis, such differences

[1] Yi and Mullineaux (2002) set up a comparison between loans and bonds concerning the factors underlying agency ratings (based on an ordered logit model). However, no comparative analysis is presented as far as credit spreads are concerned.

are less robust when loan pricing is conditioned on some fundamental determinants (such as the borrower's sales and return on assets, leverage, rating, and some loan features, like collateral, maturity, seniority and purpose). The hypothesis that loan pricing schemes at commercial banks and investment banks are identical, however, is rejected, with the most significant differences emerging in the relative impacts of leverage and maturity.

Finally, Casolaro et al. (2002) analyze bank loan spreads trying to isolate the effect of the "certification" provided by the arranger of a syndicated credit facility (which is assumed to be proportional to the share of the facility retained by the arranger). They conduct an empirical analysis on a large sample of syndicated credit facilities, granted between 1990 and 2001; the results confirm that, after controlling for a large number of loan and borrower characteristics (mainly: loan purpose, loan rating, currency of denomination, industries, amount, duration, collateral, subordination, optionalities, time dummies), syndicated facilities in which the arranger retains a larger share are charged lower spreads.

Several works have investigated bond spreads. E.g., Morgan and Stiroh (1999) compare bonds issued to banks and to non-financial companies, finding that the bond spread/rating relationship is the same for the two groups, especially among the investment grade issues. Besides ratings, they consider the face value, maturity, and subordination of each issue, as well as a set of time dummies and fixed effects associated with individual issuers.

Elton et al. (2001) decompose the spreads observed on a sample of corporate bonds into three effects, representing expected default rates, tax factors and systematic risk. While expected default rates account for a surprisingly small fraction of the premium in corporate rates over treasuries, state taxes explain a substantial portion of it.

John, Lynch and Puri (2002) study bond yields with a special focus on the effect of collateral, showing that collateralized debt pays *higher* yields, even after controlling for credit rating. Such an effect is stronger for low credit ratings, non-mortgage assets and longer maturities. Their empirical model includes several characteristics of the bonds (maturity, amount, collateral, purpose), some variables relating to the borrower

(industry, rating, a dummy for listed companies) as well as an indicator of the main underwriter's "prestige" on the bond market.

Esho, Kollo and Sharpe (2004) examine the determinants of underwriter spreads on straight/fixed rate Eurobonds issued by U.S. firms between 1990 and 1998. Spreads are found to depend on the governing law (influencing the probability that contract terms may be orderly and promptly renegotiated if necessary), the distribution mechanism (public issues versus private placements), the underwriter reputation and the currency in which bonds are denominated.

Our paper aims at bridging the gap between those two growing streams of literature, comparing spread determinants for bonds and loans, based on a wide, diversified dataset.

3. The empirical sample

Our sample includes 7,926 Eurobonds and 5,469 syndicated loans originated between 1991 and 2003. These are taken from the "Bondware" and "Loanware" database maintained by Thomson Financial. Note that all bonds with special features (e.g. callable bonds, perpetual bonds, floating rate bonds) affecting their price have been discarded.

Table 1 shows a breakdown by year: the number of issues tends to increase over time (note that the last two bands include only two years), even though loans originated during the last months of 2003 are missing from our database.

Table 1:
sample breakdown by time period and exposure type

	Bonds	Loans	Total
1991-93	888	220	1,108
1994-96	1,494	1,169	2,663
1997-99	2,092	1,413	3,505
2000-01	1,662	1,682	3,344
2002-03	1,790	985	2,775
Total	7,926	5,469	13,395

The country of incorporation of the borrower is shown in Table 2: while bonds tend to be almost evenly distributed across the major countries, loan data are taken mainly from the US.

Table 2:
sample breakdown by country and exposure type

Country	Bonds	Loans	Total
Canada	325	153	478
France	788	36	824
Germany	1,018	14	1,032
Japan	761	36	797
The Neth	579	21	600
UK	969	186	1,155
US	1,767	3,934	5,701
Other	1,719	1,089	2,808
Total	7,926	5,469	13,395

Finally, Figure 1 shows a frequency distribution by rating class, with loans spanning the rating spectrum much more evenly than bonds (for which we observe a stronger concentration in investment-grade classes, mainly AAA).

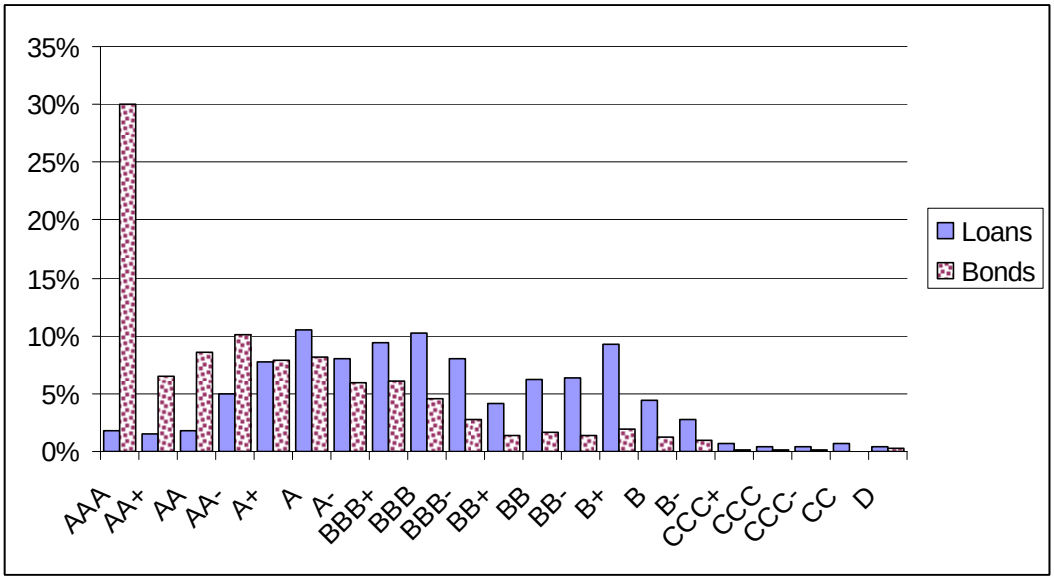

Figure 1: the rating mix of loans and bonds in our sample

4. Model specification and variables

The dependent variable in our model is given by the spread at issuance. The use of secondary-market spreads is avoided because of the relatively poor liquidity of this market for many smaller facilities.

In the case of bonds, spreads will be measured as "nearest-on-the-run" spreads (that is, as the difference between the yield to maturity at issuance of each individual Eurobond and the yield to maturity of the Treasury bond denominated in the same currency and with the nearest maturity). Spreads on loans are computed over Libor base rates; they include the facility fee, when present.

To explain spreads, we will make use of several groups of variables:

a) variables that are common to both bonds and loans. These include a set of rating dummies[2] (see Table 3 below), the original maturity of the bond/loan, the total amount outstanding (expressed as a natural logarithm), two dummy variables for secured and subordinated exposures, the average share underwritten/retained by each financial institution participating in the bond issuance management group or the loan syndicate;

[2] To avoid a severe reduction in our empirical sample, we had to content ourselves with issuer ratings in the case of syndicated loans, where facility ratings were missing for a high share of cases.

b) bond-specific variables, namely the coupon rate and a dummy indicating whether the bonds are registered. These should proxy for the different expected tax treatment;

c) loan-specific variables. These include dummies for multi-tranche/guaranteed/revolving facilities, as well as for loans with a sponsor (e.g., in project financing) and/or on which a utilization fee is required. Other variables relate to the purpose of the loan (including acquisitions, LBOs, refinancing, project finance, trade financing, working capital and "debtor-in-possession") and to the amount of commitment fees charged on it;

d) four sets of dummies associated with the quarter in which credit exposures were originated (to account for overall market conditions), the country of incorporation of the borrower (accounting for different regulatory and fiscal environments), the currency in which the bonds/loans are denominated and the industry in which the debtor operates. These dummies will be shown in more detail in Table 3[3].

5. Main empirical results

Table 3 reports our preliminary estimations. Note that, as in Morgan and Stiroh (1999), some coefficients were estimated separately, by means of a set of multiplicative dummies, for the two subgroups in our sample (bonds and loans); the hypothesis that they are not statistically different is tested (and usually rejected) in the last column of the Table.

[3] The Table does not include coefficients for quarterly dummies (only an overall F-test is reported): however, a dummy was included in the model for each quarter between 1991/II and 2003/IV (1991/I was left out to avoid perfect collinearity). Also, some industry dummies were included that are not reported in the Table to save room, since they were not significantly different from zero. The complete list of industry dummies tested is as follows: Automobile, Building Societies, Banks, Chemicals, Computers, Constructions, Electronics and Electrics, Food and beverages, Financial cos. and holding cos., public entities other than governments and sovereigns, Health and pharmaceuticals, Hotels e Leisure, Industrials, Insurance, Oil and mines, Retail, Telecommunications, Trasportation, Energy and Utilities.

Table 3: multivariate results

Variable	Common Coefficient	Common P-value	Bond-specific Coefficient	Bond-specific P-value	Loan-specific Coefficient	Loan-specific P-value	Test for H0: Bond = Loan P-value
Constant			-190.75	0.0%	-17.89	6.8%	0.0%
Rating A+/A-			22.48	0.0%	-2.00	35.8%	0.0%
Rating BBB+/BBB-			63.31	0.0%	29.88	0.0%	0.0%
Rating BB+/BB-			176.16	0.0%	102.65	0.0%	0.0%
Rating B+ or below			316.87	0.0%	171.04	0.0%	0.0%
Maturity			0.02	6.7%	0.41	0.0%	0.0%
Maturity only if rating < BBB-			0.09	35.7%	-0.15	15.5%	9.4%
Total amount (log)			2.31	0.8%	-6.30	0.0%	0.0%
Subordinated exposures			13.25	0.0%	167.67	0.5%	1.0%
Average share			9.24	0.0%	24.46	0.0%	0.0%
Secured			4.98	25.5%	23.39	0.0%	0.6%
Coupon			25.55	0.0%			
Registered bonds			11.16	0.0%			
Maturity extension					36.79	1.6%	
Multitranche					71.93	0.0%	
Commitment fee					0.80	0.0%	
Utilization fee					-9.19	0.0%	
Guarantees					-10.07	10.5%	
Sponsor					48.84	0.0%	
Revolving					-29.64	0.0%	
Purpose: DIP					47.15	0.0%	
Purpose: acquisitions					23.08	0.0%	
Purpose: LBO					25.89	1.9%	
Purpose: refinancing					5.55	1.5%	
Purpose: project finance					-54.69	0.0%	
Purpose: trade financing					-59.07	0.0%	
Purpose: working capital					-18.77	0.0%	
Joint F-test					39.10	0.0%	
Quarterly dummies	-						
Joint F-test	53.53	0.0%					
Borrower country: US	8.62	0.0%					
Borrower country: UK	-8.26	0.0%					
Borrower country: Can	-1.65	60.2%					
Borrower country: Ger	1.96	30.5%					
Borrower country: Fra	-8.59	0.0%					
Borrower country: Jap	1.93	54.9%					
Borrower country: Net	21.01	30.3%					
Joint F-test	10.14	0.0%					
Currency: USD	5.06	6.3%					
Currency: DM	-10.71	0.0%					
Currency: EUR	15.31	0.0%					
Currency: FF	7.48	0.4%					
Currency: GBP	-10.55	0.1%					
Currency: Can $	10.22	0.0%					
Joint F-test	12.45	0.0%					
Industry*: banks	-18.72	0.0%					
Industry*: chemicals	-15.86	0.0%					
Industry*: computers	-22.70	0.0%					
Industry*: constructions	-14.34	0.2%					
Industry*: public entities	-27.89	0.0%					
Industry*: pharmaceuticals	-9.38	4.7%					
Industry*: industrials	-11.16	0.6%					
Industry*: transportation	-24.61	0.0%					
Joint F-test	11.98	0.0%					
R-square	76.2%						
Adjusted R-square	76.0%						
Log-likelihood	-74371						
F-statistic	354.1	P-value	0.0%				

** only industries for which dummies are 5%-significant have been reported. Coefficient p-values are based on t tests with White heteroskedasticity-corrected standard errors.*

While we would not lay too much emphasis on the differences between the constant terms (given that spreads on loans and bonds are computed through different approaches, and may therefore not be fully comparable to each other), some results appear noteworthy.

Spreads increase as ratings worsen. This is true for both bonds and loans; however, the spread/rating link is quite steeper for the former, while the risk premium required by banks on low-quality loans appear much milder than the one demanded by private investors in the bond market.

On the other hand, the maturity premium looks much larger for bank facilities than it is for bonds (where long maturities are more usual than in the syndicated loan market[4]). Note that, consistent with Fons (1994), we tested the hypotheses that the spread/maturity link be different for poorly-rated exposures: our data, however, seem to lend very little support to this assumption.

Regarding the amount, opposite results emerge for bonds and loans. The coefficient is significantly positive for the former, suggesting that a supply-side effect (due to the rigidity of the demand, larger issues are harder to place and have to pay a relatively higher spread) may prevail over liquidity issues. This sounds plausible for the Eurobond market, where many investors tend to hold securities until their final maturity, and are therefore, to some extent, indifferent to their secondary-market liquidity. As regards loans, spreads appear to decrease as size increases: besides liquidity issues, this may reflect the scale economies implied in information-gathering, screening and monitoring costs which are typically associated with lending.

Subordinated exposures have to pay more than senior ones. This is especially true for loans, and may reflect the fact that senior syndicated loans enjoy higher recovery rates than bonds (Acharya et al., 2004), so that there is more scope for larger losses in the case of subordinated exposures.

The average share's coefficient is positive and statistically significant, suggesting that, on average, a low number of arrangers denotes higher spreads (as stronger difficulties in placing the loan/bond are probably being experienced). The effect is stronger for loans, as banks participating in the syndicate are likely to end up retaining the purchased

[4] The average maturity for the bonds in our sample is 98 months, as opposed to 39 months for loans.

exposure on their own balance sheets (while arrangers on the bond market only face a temporary underwriting risk). Larger syndicates may be associated with lower spreads also because (as pointed out by Coleman et al., 2002) they suffer from a decline in contractual flexibility.

Secured exposures appear to pay a higher spread than unsecured ones. While this may look a somewhat counterintuitive result, it is fully consistent with a wide stream of literature, including Casolaro et al. (2002), Yi and Mullineaux (2002), and dating back to Berger and Udell (1990)[5]. In fact, higher spreads and collateral tend to complement – rather than offset - each other in rewarding/limiting higher credit risk; riskier borrowers are therefore charged higher rates, while being asked to provide extra collateral. This is true even within our multivariate framework, which already controls for ratings; a similar result was found, for bonds only, by John, Lynch and Puri (2002).

As regards bond-specific variables, coupon rates and registered issues work as expected. Holders of registered bonds may find it more difficult to avoid being taxed, therefore ask for higher premia; moreover, since in most countries capital gains are taxed at the time of sale, bonds with lower coupons may be more valuable because some taxes are postponed.

Turning to loan-specific features, maturity extension clauses increase the cost to the borrower (which looks correct, since they embed an option); also, multitranche facilities tend to pay higher rates (probably because they include one or more junior tranches facing speculative risks). Commitment fees tend to move together with spreads; this represents an expected result, as a higher level of risk (as well as a stronger bargaining power by the lending syndicate) is likely to affect the cost of both the drawn and the undrawn part of a loan. On the other hand, utilization fees (linked to the average level of utilisation during a specified period of time, and intended as a disincentive for the borrower to drawdown a back up line beyond a certain point) reduce spreads, as they help to reduce risk; personal guarantees are also found to have a (very weak) negative effect on spreads.

[5] Based on bank loans data, the paper shows that interest rates on secured loans are on average higher than those on unsecured exposures; this suggests guarantees are not enough, by themselves to offset a higher credit risk, and hence may be associated with higher spreads. See also Pozzolo (2001) and the references therein.

The presence of a sponsor (that is, a party wishing to develop the project being funded by the loan, often a public sector entity) is associated with higher spreads. This may be due to a mechanism like the one discussed for secured exposures: higher rates and the presence of a sponsor may be complementary devices used to reward/limit high risks.

Finally, revolving loans are found to be less expensive than term facilities (in line with Coleman, Esho and Sharpe, 2002), as they give the bank an extra monitoring tool (payments flowing in and out of the credit line) and make it easier for credit officers to trigger prompt recovery actions[6].

6. Concluding remarks

Our empirical analysis has highlighted four main results.

First, while spreads increase as ratings worsen for both bonds and loans, the spread/rating link is quite steeper for the former, while the risk premium required by banks on low-quality loans appears much milder than the one demanded by private investors in the bond market.

These different spread/rating relationships have been visualized in Figure 2, where the equations estimated in Table 3 are used to simulate spreads on bonds with different ratings and on the corresponding loans. As can be seen, "typical" spreads on bank facilities and public debt tend to diverge as default risk increases; notwithstanding the huge growth experienced by capital markets (and their increased ability to finance riskier/younger companies), banks still prove more efficient in deploying those screening and monitoring abilities which help them select and protect their credit exposures, funding riskier customers at more sustainable rates.

[6] Note that a dummy representing covenants was excluded from our model as it did not prove statistically significant (with a p-value of almost 40%). This may be due to the large variety of covenants included in loan contracts and their different effectiveness, as well as to their ambiguous effect on spreads: on one hand, they reduce risks, so may prompt lower rates; on the other hand, they are imposed on the most risky transactions, so, like collateral, they may be associated with higher spreads.

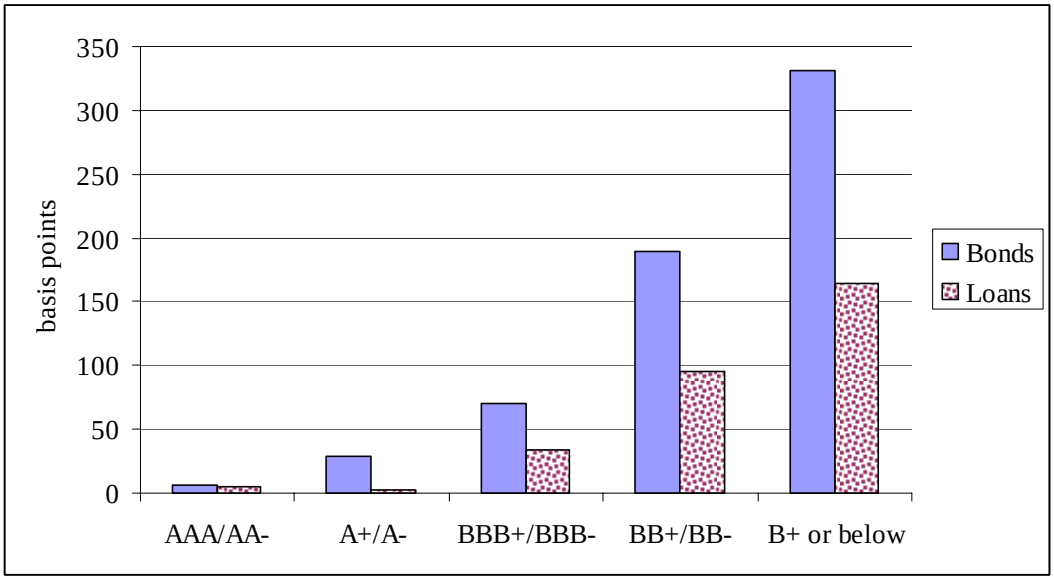

Figure 2: rating buckets and "typical" spreads

Second, the maturity premium looks much larger for bank facilities than for bonds (where long maturities are more usual than in the syndicated loan market); this is consistent with the fact that banks can express superior monitoring abilities only if the analysis of issuing companies is renewed over time, strengthening the bank/customer relationship by means of a repeated game.

Third, while larger bond issues tend to be associated with higher spreads, syndicated loans' spreads appear to decrease as size increases: besides liquidity issues and supply-side effects, this may reflect the scale economies implied in information-gathering, screening and monitoring costs, which are typically associated with bank lending.

Fourth, while subordinated exposures have to pay more than senior ones for both bonds and loans, this is especially true for the latter, and may reflect the fact that senior syndicated loans enjoy higher recovery rates than bonds, therefore have more to lose from an increase in the expected loss rate given default.

Overall, such findings lend a strong empirical support to the view that banks and capital markets are not perfect substitutes in funding non-financial companies, but rather specialize in different market niches. Bonds can be more effective in financing investment-grade companies in their long-term projects, while bank loans can bridge the

gap separating riskier producers from private savings, but use shorter maturities as a monitoring device to reduce the risks incurred and the spreads charged to borrowers.

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