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ABSTRACT

This paper analyzes the influence of credit information sharing on how banks set the terms of bank loans and the ownership of the loans. Using a sample of 23,341 bank loans in 44 countries during the period 2005–2019 we examine how interest rates, collateral, maturity, amounts, and ownership of bank loans are influenced by the degree of penetration of credit bureaus and public credit registries. The results show that credit information sharing decreases interest rate spread for high-quality borrowers and decreases loan maturity. Moreover, the amount of credit is negatively affected by the degree of coverage by registries. Finally, we find evidence in line with credit information sharing increasing loan ownership concentration.

1. Introduction

The idea that information problems caused by adverse selection and the moral hazard present in the relationships between lenders and borrowers can be reduced if the lending is done by a bank is one with a long history in the banking literature (Diamond, 1984; Fama, 1985). The activity of banks depends on their ability to collect and process information efficiently in screening credit applicants and monitoring their performance. At the screening stage, the bank can talk to managers, study business plans and investment opportunities, and analyze accounting and financial information. In the monitoring stage, the bank can require a constant flow of information from its borrowers, and take prompt action when there are symptoms of mismanagement.

There are several ways for lenders to obtain information about the credit-worthiness of borrowers such as the provision of other financial products or services and the development of long-term relationships with customers. Banks are able to produce substantial information about borrowing firms that can be useful in the credit decision process. Banks can also monitor a borrower relatively easily by observing the way the borrower manages its demand deposit accounts, bearing in mind that maintaining such an account is common practice for the loan recipient (Black, 1975). Additionally, banks provide other financial services to

corporate clients which can generate valuable information, giving the bank an informational advantage over other potential lenders. Moreover, banks could acquire private information as a result of long-term bank-firm relationships (Fama, 1985).

Alternatively, when a bank evaluates a request for credit, it can source this information from other lenders who have already dealt with that borrower. In the context that borrowers apply for credit with different lenders during their lifetimes, they generate a record of information about repayment punctuality, amount of debt, overdue payments, and defaults, among other things. If all the lenders financing a firm pool their data together, each lender will have a clearer picture of the credit risk posed by lending to that firm. This exchange of information takes place via formal mechanisms such as credit bureaus and public credit registries (Jappelli and Pagano, 2000). The former are mechanisms which work collecting, filing and disseminating information provided by lenders. The latter consists of databases created by public authorities and managed by central banks. While credit bureaus are usually voluntary, the data in public credit registries are compulsorily reported by lenders. Information sharing among creditors helps reduce costly information asymmetries (Djankov et al., 2007).

In this context, our research analyzes how banks and borrowers set ownership, loan amounts and contract terms according to the degree of

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coverage of credit bureaus and public credit registries.¹ Specifically, using a sample of 23,341 loans in 44 countries during the period 2005–2019 we examine how the basic pricing term (the interest rate), two nonprice terms (collateral and loan maturity), the loan amount, and three ownership variables (the number of lenders, the number of lead arrangers and the Herfindahl index of the lead arrangers) are influenced by the degree of penetration of credit bureaus and public credit registries in a particular country. These registries may contain only negative information (information on late payments, defaults and other irregularities) or may also contain positive information such as debts outstanding even if the credit and loans have always been paid on schedule. Miller (2003) shows that most private credit registries collect information on both consumer and commercial loans. This dual focus of private registries internationally is not the case in the US, where credit registries mainly focus on retail and small business loans. Even in this case, private registries may serve as a proxy for information sharing among firms signaling a country's higher levels of transparency. Although information asymmetries are more present in small firms, the literature shows that they persist in large firms. For example, Bharath et al. (2011) and Álvarez-Botas and Gonzalez (2023) found that relationship banking reduces information asymmetries even for large borrowers as both use samples of bank loans to publicly listed corporations.

Our study provides two main contributions to the literature. First, it analyzes the influence of information sharing on the terms and amounts of bank loans. Behr and Sonnekalb (2012) analyze the effects of the introduction of a public credit registry by the Albanian central bank in January 2008 and find evidence that it improves loan performance by reducing the likelihood of being unpaid, although it does not affect access to or cost of credit. Brown et al. (2009) examine the influence of information sharing on the importance of financing for firms in the transition countries of Eastern Europe and the former Soviet Union.² We extend that evidence considering a straightforward measure of the cost of debt, three additional measures of the credit conditions for borrowers (collateral, loan maturity and loan amount), and a wider geographical context. Our sample contains 44 countries, including both developed and developing countries, with varying coverage by credit bureaus and public credit registries. As banks are the main suppliers of debt financing in most countries (Demirguc- Kunt & Levine, 2001), it is important to understand how bank loan characteristics are shaped by credit information sharing.

Second, we study how credit information sharing influences loan syndication structure. Esty and Megginson (2003) argue that legal risk affects syndicate size. Smaller, more concentrated syndicates have better monitoring incentives and greater re-contracting abilities. In this context, Esty and Megginson (2003) and Qian and Strahan (2007) show that syndicates are smaller and more concentrated in countries characterized by strong creditor's rights and legal enforcement. On the other hand, Bae and Goyal (2009) find that poor enforceability of contracts results in smaller, more concentrated syndicates. To the best of our knowledge, this is the first paper in the bank loan literature to analyze the effect of credit information sharing on syndication structure.

The main empirical findings of the paper can be summarized as follows. First, a higher degree of information sharing among creditors has no effect on interest rate spread, although it leads to a reduction in the cost of loans for high quality borrowers. The existence of public registries reduces the probability of pledging collateral. Credit information sharing by credit bureaus reduces loan maturity as it reduces the refinancing risk. Specifically, our results suggest that an increase of one standard deviation in coverage by private registries is associated with a reduction of 5.2 months. We also show that credit information sharing leads to reductions in the amounts of the bank loans. This reduction is lower for high quality firms. An increase of one standard deviation in CRC and CBC is associated with a reduction of 0.30% and 0.45%, respectively, in the mean loan amount. Finally, using three proxies of bank loan ownership structure, we find that credit information sharing increases loan concentration, as it decreases the number of lead arrangers and participants in the loan. In this context, an increase of one standard deviation in CRC and CBC are associated, respectively, with a decrease of 0.62 in the number of lenders and 0.39 in the number of lead arrangers of the loan.

The remainder of the paper is organized as follows. Section 2 reviews the related literature and develops testable hypotheses on the existence of information sharing as a determinant of loan terms, loan amounts, and loan ownership structure. Section 3 describes our data and presents the descriptive statistics of our variables. Section 4 reports the empirical results, and Section 5 provides robustness analysis. Finally, our conclusions are set out in Section 6.

2. Conceptual framework

Banking activity is crucially linked to the ability to collect and analyze borrower information. In credit markets, borrowers typically have more information about their quality, their prior indebtedness and their future opportunities than lenders. This asymmetric information problem between lenders and borrowers gives rise to adverse selection and potential moral hazard of borrowers, leading to inefficient allocation of credit and potentially to credit rationing (Stiglitz & Weiss, 1981). In a recent paper, Crawford et al. (2018) find that adverse selection negatively impacts market outcomes, leading to higher prices, less lending, and more default. In this context, banks can acquire borrower information that they do not possess, spending resources to collect information about borrowers. Financial literature offers support that banks' information production and monitoring leads to an information advantage relative to other markets (Addoum & Murfin, 2020; Altman et al., 2010; Beyhaghi et al., 2023; Heitz et al., 2022; Weitzner et al., 2022). Addoum and Murfin, 2020 find that private lenders possess private information that is not fully integrated into equity prices, revealing tight integration across markets. Altman et al. (2010) show the secondary loan market to be informationally more efficient than the secondary bond market prior to a loan default. Beyhaghi et al. (2023) find that banks' internal assessments provide an accurate measure of future loan non-performance and default, even when they control for observable loan characteristics. Heitz et al. (2022) find evidence of a negative relationship between on-site inspection intensity and loan spreads and fees at origination, and a positive relationship between on-site inspection intensity and loan amount. Additionally, loans of high risk borrowers are monitored more intensely over the course of the loan. Weitzner et al. (2022) show that changes in banks' assessments of their loans' expected losses predict changes in stock and bond prices and analyst earnings surprises.

¹ Our measures of credit information sharing have a limited within-country variation. For instance, the coverage by credit registry in the USA is 0% and the coverage by credit bureau is 100% throughout all sample years. This is also the case for Canada, Iceland, Ireland, Japan, Mexico and Norway, while in Luxembourg, both coverage by credit registry and credit bureau are 0% during the whole sample period. Additionally, registry coverage exhibits monotonic increases in most of the countries. Consequently, our measures of coverage by public or private registries capture cross-country variation better than time variation. Although we control for time effects, the monotonic increases in coverage over time raise concerns about potential confounding factors which may affect our results. We check in the Robustness section whether the results hold when we exclude countries without time variation. Papers such as Houston et al. (2010) also consider the depth of credit information index from the World Bank Doing Business project as a measure of credit information sharing. However, this index was updated in 2015. Before 2014 it ranged from 0 to 6 while since 2014, it ranges from 0 to 8. As our sample covers both periods, before and after 2014, we cannot consider this proxy in our analyses.

² They consider a measure of how problematic the cost of finance is (e.g. interest rates and charges) for the operation and growth of businesses as a dependent variable. The measure for this variable comes from the Business Environmental and Enterprise Performance Survey (BEEPS).

Alternatively, when a bank evaluates a request for credit, it can source this information from institutions that record borrower characteristics, credit history (positive/negative), and debt contracted with other lenders. Theoretically, credit information sharing has several effects on the terms of bank loans. First, information sharing helps lenders to select good borrowers, as it improves the pool of borrowers, diminishes defaults and reduces the average interest rate (Pagano and Japelli, 1993). Second, credit information sharing also overcomes the moral hazard of borrowers, since default information becomes a negative signal for lenders and leads to higher interest rates. In order to avoid higher interest rates, borrowers make more effort, leading to lower default and interest rates (Padilla & Pagano, 2000). Third, the hold-up problem, caused by lenders having private information about their borrowers, will be reduced when credit information is shared (Padilla & Pagano, 1997). As a result, borrowers' incentives to make efforts will increase as the lender's possibilities of capturing the return of borrowers' efforts decreases, and the probability of default and interest rates charged by lenders will fall. Consequently, lenders in countries where information sharing exists may feel confident in providing credit to firms as they can easily have a clear image of the credit risk posed by lending to that firm.

By reducing information asymmetries and moral hazard problems, creditors will be able to select lower-risk borrowers, thus the existence of credit sharing information will lead to better bank loan terms. Consequently, our first hypothesis is as follows:

Hypothesis 1. (H1). – Credit information sharing will lead to better conditions (lower loan spread and collateral requirement) in bank loan terms.

We also examine the effect of information sharing on bank loan maturity. The information asymmetry model by Flannery (1986) predicts a linear relationship between a borrower's unobservable credit quality and debt maturity. In this context, borrowers with good future prospects can credibly convey their unobservable quality via choice of their debt maturity, with shorter debt maturity for better-quality borrowers. However, Diamond's (1991) model predicts that corporate debt maturity would exhibit a non-monotonic relationship with borrower quality. Firms with favorable private information and low-risk (high credit ratings) may choose short-term debt at relatively low interest rates because the refinancing risk is small. Firms with favorable private information and intermediate risk may choose long-term debt at a higher rate to reduce their greater liquidity risk of being unable to refinance the debt if they choose short-term debt. Since short-term borrowing exposes firms to the risk of excessive liquidations, firms with high-risks (low credit ratings) prefer long-term debt so as to reduce this refinancing risk. Firms with higher default risk may be unable to borrow long-term because of the high probability of bad projects. Consequently, very low-risk firms and very risky firms borrow short term and firms with intermediate risks are more likely to borrow long term.

Credit information sharing will interact with both models, producing different predictions. In the Flannery (1986) model, information sharing would reduce information asymmetries and consequently there will be less need to signal quality through debt maturity. As a result, information sharing will produce longer loan maturity. In the context of Diamond's model, the reduction of asymmetric information due to information sharing will affect high-quality borrowers. It has two implications for these borrowers. First, high-quality borrowers will move to longer maturities as information sharing avoids the need to borrow on shorter terms to obtain favorable interest rates. Second, the reduction in information asymmetries also reduces the liquidity risk associated with short-term debt, making short-term debt more likely to appeal to high

quality firms. In the case of the lowest quality firms, they are not able to borrow long-term because of the high probability of bad projects and they will obtain shorter debt maturity because it allows more frequent monitoring by the lender. Information sharing diminishes the cost of such frequent monitoring. Consequently, banks will offer shorter maturity with information sharing for low quality borrowers as a result of the lower monitoring costs. Based on these arguments, our second hypothesis is as follows:

Hypothesis 2a. (H2a). – Credit information sharing will lead to reduced maturity for low quality firms.

Hypothesis 2b. (H2b). – Loan maturity could increase or reduce for high-quality firms with credit information sharing.

The effect of information sharing on the amount of credit is ambiguous. On the one hand, in the adverse selection model developed by Pagano and Jappelli (1993), information sharing improves the pool of borrowers, decreases defaults and reduces the average interest. However, the amount of credit can increase or reduce, as the expected increase in lending to safe borrowers may not be enough to compensate for the reduction in lending to risky borrowers. On the other hand, the incentives of borrowers to make more effort as a result of information sharing will increase total lending (Padilla & Pagano, 1997 and 2000). As information sharing may be expected to have both a positive and negative influence on the loan amount, our expectations remain open and so we pose two hypotheses:

Hypothesis 3a. (H3a). – Credit information sharing will increase the loan amount.

Hypothesis 3b. (H3b). – Credit information sharing will decrease the loan amount.

Esty and Megginson (2003) and Qian and Strahan (2007) argue that legal risks also affect loan ownership structures, and they find that strong creditor rights and legal enforcement are associated with smaller, more concentrated syndicates, as they present better monitoring incentives and greater re-contracting abilities. However, when lenders cannot rely on legal enforcement mechanisms to protect their claims, they create larger, more diffuse syndicates as a way to deter strategic default. As credit information sharing provides lenders with better information ex-ante, it will reduce the risk assumed by lenders and will consequently lead to more concentrated ownership of loans. Based on this argument, our fourth hypothesis is as follows:

Hypothesis 4. (H4). – Credit information sharing will increase the ownership concentration of loans.

3. Data, methodology and summary statistics

3.1. Sample and variables

Information on bank loans was collected from the Dealscan database. Provided by Thomson Reuters, this database contains historical information on the terms and conditions of loan transactions in the global commercial loan market. Balance-sheet and income statement information comes from the Global Compustat database. In order to build the final study sample, the observations from the Dealscan and Compustat databases were linked using tables provided by Chava and Roberts (2008). Dealscan observations that remained unmatched were manually linked to the Global Compustat database on the basis of company name. This resulted in a sample of 23,341 loan facilities to 4660 borrowers from 44 countries over the period 2005–2019. Countries making up the sample show differences in the level of credit information sharing.

Borrowers occasionally enter into more than one loan facility on the same date. In this case, in line with previous papers (Qian & Strahan, 2007; Bae & Goyal, 2009), our unit of analysis is each loan facility.³ We consider several dependent variables (LOAN_CHARACT) to test our predictions: (1) the interest rate spread of the loan measured as the natural logarithm of all-in-spread drawn over the London Interbank Offered Rate (LIBOR) or LIBOR equivalent (LN_SPREAD)⁴; (2) the collateral requirement (COLLAT), measured as a dummy variable that equals 1 if the loan was secured and zero otherwise; (3) the maturity of the loan measured as the natural logarithm of loan maturity expressed in months (LN_MAT); (4) the size of the loan measured as the natural logarithm of the loan tranche amount (LN_AMOUNT); (5) the number of lead arrangers measured as the natural logarithm of one plus the number of lead arrangers participating in the loan (LN_NUM_LA); (6) Herfindahl index calculated using each lead arranger's share in the loan (IHERF); and (7) the syndicate size measured as the natural logarithm of the number of banks participating in the loan (LN_SYND_SIZE). These last three dependent variables are our proxies for the ownership structure of the loan.

3.1.1. Measure of credit information sharing

Following Djankov et al. (2007) our proxies for credit information sharing are the coverage by public registries and private bureaus, which collect information on the creditworthiness of borrowers in the financial system and facilitate the exchange of credit information among banks and financial institutions.

A credit registry is defined as a database managed by the public sector, usually by the central bank or the superintendent of banks, which collects information on the creditworthiness of borrowers (individuals or firms) in the financial system and facilitates the exchange of credit information between banks and other regulated financial institutions. A credit bureau is defined as a private firm or non-profit organization that maintains a database on the credit-worthiness of borrowers (individuals or firms) in the financial system and facilitates the exchange of credit information among creditors.

Credit registry coverage (CRC)/ Credit bureau coverage (CBC) reports the number of individuals and firms listed in a public credit registry/credit bureau's database within the past five years with information on repayment history, unpaid debts, or credit outstanding. Both variables are expressed as a percentage of the adult population in the country, the source is the World Bank Doing Business project (http://www.doingbusiness.org/). If credit registries or credit bureaus do not operate, the coverage value is 0.0%.

These proxies for credit information sharing have been used previously in the literature as in Djankov et al. (2007), Houston et al. (2010), Love and Mylenko (2003) and Nketcha Nana (2014), as Miller (2003) shows that most banks use the information provided by these institutions to assess commercial loans.

We also consider a joint measure of the two (IND_CRC_CBC), since both CRC and CBC have the aim of sharing credit information. This measure takes the value of one if the sum of CRC and CBC is equal to or higher than 100%. If the sum of the coverage of both databases is lower than 100%, IND_CRC_CBC takes the value of the sum of the coverage of both databases divided by 100.

3.1.2. Protection of creditors' rights

In financial contracts, formal institutions are important when establishing the conditions of debt. Stronger protection of creditors' rights gives lenders greater power in the case of bankruptcy. When creditors' rights are strongly protected, to the extent that they can replace the management team of a company, bankruptcy generates high costs for the company, and increases the incentives for borrowers to repay loans and avoid bankruptcy. This reduces the likelihood of the company taking high risks, and thus moral hazard problems may decrease. Therefore, lenders will be willing to offer credit at a lower cost. In a way that is consistent with this argument, Qian and Strahan (2007) show that bank loans have longer maturities, and lower interest rates under strong creditor protection.

The protection of creditors' rights variable (CR) is measured by the time creditors have to wait to recover their credit after a default in the borrower's country. The time for creditors to recover their credit is recorded in calendar years, reporting an effective ex-post measure of the protection of creditors' rights. The period of time measured by the Resolving Insolvency indicator runs from the company's default until the payment of some or all of the money owed to the bank. Potential delaying tactics by the parties involved, such as the filing of dilatory appeals or requests for extensions, are taken into consideration. Data are collected from the World Bank Doing Business Database. Lower values of CR mean higher protection of creditors' rights, as creditors recover their money sooner.

3.1.3. Firm controls

In line with previous research analyzing debt conditions (Qian & Strahan, 2007; Bae & Goyal, 2009; Álvarez-Botas & González, 2021), we also include different firm-level variables to assess the effect of relationship banking on bank loan terms. To ascertain whether heterogeneity in borrower risk will affect bank loan spreads, we consider the following explanatory variables: firm size (SIZE); profitability (PROFIT); leverage (LEV); tangibility (TANG); growth (GROWTH); and the borrower's credit rating (VRATING and DRATING).⁵

Firm size (SIZE) is measured as the natural logarithm of total assets. Large firms have easier access to both internal and external financing, longer track records, and lower default risks, as they are normally more diversified. However, small firms suffer from greater information asymmetries. Consequently, larger firms should obtain better bank loan terms. Profitability (PROFIT) is measured as the ratio between earnings before interest and taxes and total assets. Banks face lower probabilities of default when borrowers are more profitable. In this context, firms with higher levels of current profits will be able to borrow from banks on relatively good terms. Leverage (LEV) is measured as the ratio between the book value of financial debt (short- and long-term debt) and the book value of total assets. Given that firms with high leverage face a greater likelihood of future insolvency, moral hazard problems are greater in these firms. We may thus expect the terms of bank loans to worsen with leverage. Higher leverage could also be a proxy for the good reputation of firms in the debt markets, which reduces contracting problems. A negative relationship between leverage and loan spreads would be expected according to this argument. Tangibility (TANG) is measured as the ratio between property, plant, and equipment and total assets. Intangible assets are more difficult to collateralize and suffer higher losses in value when firms experience financial distress. Moreover, the low level of information asymmetry associated with tangible assets makes it easier for lenders to monitor borrowers. Consequently, higher tangibility suggests better bank loan conditions. Growth (GROWTH) is

³ The difference between the loan facility and the loan package is that the loan facility refers to each individual portion of a deal, whereas the deal itself possibly (but not usually) comprises more than one loan facility and covers the full amount of credit granted to the firm on that occasion. A loan-facility analysis is appropriate for the reason that loan facilities may differ in terms of starting dates, maturity, amount, number of lenders, number of lead arrangers, purpose or loan type. Hence, even when in the same loan deal, multiple loan facilities are not fully dependent observations.

⁴ All-in-spread drawn over LIBOR or LIBOR equivalent has been the most common measure of the cost of bank loans (Qian & Strahan, 2007; Chava et al., 2009; Lin et al., 2011). The results obtained for the natural logarithm of all-in-spread drawn hold when we use this in basis points.

⁵ PROFIT, LEV, TANG and GROWTH are winsorized at the 1st and 99th percentiles to lessen the influence of outliers.

Descriptive statistics.

	Number of observations	Mean	Median	Standard Deviation	First quartile	Third quartile
SPREAD	23,341	192.94	155.00	152.91	90.00	250.00
LN_SPREAD	23,341	4.96	5.04	0.84	4.50	5.52
COLLAT	13,196	0.68	1.00	0.47	0.00	1.00
MATURITY	23,341	50.93	60.00	25.67	36.00	60.00
LN_MAT	23,341	3.79	4.09	0.6223,341	3.58	4.09
AMOUNT	23,341	616.30	225.00	1412.78	75.00	600.00
LN_AMOUNT	23,341	19.11	19.23	1.63	18.13	20.21
LN_NUM_LA	23,341	1.25	1.10	0.60	0.69	1.61
IHERF	13,939	0.75	1.00	0.34	0.50	1.00
LN_SYND_SIZE	23,341	1.89	1.95	0.94	1.39	2.56
FIRM_SIZE	23,341	12.69	13.35	3.26	10.32	15.11
PROFIT (%)	23,341	4.31	4.75	8.41	1.79	8.30
LEV (%)	23,341	28.86	27.44	18.52	15.80	39.32
TANG (%)	23,341	33.56	27.88	24.33	13.29	50.61
GROWTH	23,341	2.46	1.77	3.37	1.10	2.93
VRATING	23,341	2.08	0.00	2.38	0.00	4.00
DRATING	23,341	0.54	1.00	0.50	0.00	1.00
RLOAN	23,341	0.71	1.00	0.45	0.00	1.00
PURP_ACQUIS	23,341	0.13	0.00	0.34	0.00	0.00
PURP_CORP	23,341	0.45	0.00	0.50	0.00	1.00
PURP_WK	23,341	0.16	0.00	0.36	0.00	0.00
PURP_BACKUP	23,341	0.02	0.00	0.14	0.00	0.00
DCREDIT_LINE	23,341	0.53	1.00	0.50	0.00	1.00
D_BRIDGE	23,341	0.02	0.00	0.15	0.00	0.00
TERM_LOAN	23,341	0.42	0.00	0.49	0.00	1.00
SENIOR	23,341	1.00	1.00	0.06	1.00	1.00

The table reports the descriptive statistics of the variables. SPREAD is the interest rate spread (over the LIBOR) plus any associated fees in originating the facility; LN_SPREAD is the natural logarithm of SPREAD; COLLAT is a dummy variable that equals 1 if the loan was secured and zero otherwise; MATURITY is the maturity of the facility in months; LN_MAT is the natural logarithm of MATURITY; AMOUNT is the total amount of the facility in millions of dollars; LN_AMOUNT is the natural logarithm of AMOUNT; NUM_LA is the number of lead arrangers participating in the facility; LN_NUM_LA is the natural logarithm of 1 +NUM_LA; IHERF is the Herfindahl index calculated using each lead arranger's share in the facility; LN_SYND_SIZE is the natural logarithm of number of banks participating in the facility; FIRM_SIZE is the natural logarithm of total assets; LEV is the ratio between the book value of dolt assets; TANG is the ratio between property, plant, and equipment and total assets; GROWTH is the ratio of the market value of equity; VRATING is a firm risk index using Moody's and S&P ratings that ranges from one to six, a value of one being assigned to an Aaa rating, a value of two indicating an Aa rating, ..., and six indicating a B rating or worse – we assign a zero to borrowers without a rating; DRATING is a dummy variable that takes the value of 1 if the facility is a dummy variable that takes the value of 1 when one of the lead arranger in the past within a 5-year window, and 0 otherwise and DSENIOR is a dummy variable that takes the value of 1 if the facility is senior and zero otherwise.

proxied by the ratio of the market value of equity to the book value of equity. Growth firms face greater problems of information asymmetries, leading to higher contracting costs. However, such firms are less likely to engage in risky activities to expropriate creditors. We also include the borrower's credit rating (VRATING and DRATING), given that firms with high credit ratings may obtain more favorable loan terms. We obtain information on Moody's and S&P senior debt ratings at the year of the loan from Dealscan, which we use to control for borrower risk. We focus first on Moody's rating, unless it is missing, in which case we rely on the S&P rating. We construct a firm risk index (VRATING) ranging from one to six using Moody's and S&P ratings. Specifically, we assign a value of one to an Aaa rating, a value of two to an Aa rating, a value of three to an A rating, a value of four to a Baa rating, a value of five to a Ba rating, and a value of six to a B rating or worse. A higher number thus reflects a lower rating and a higher risk. We also assign a value of zero to firms without a rating. Additionally, we include a dummy variable (DRATING) that takes the value of 1 if the firm rating is missing and zero otherwise.

3.1.4. Loan controls

Along with firm-specific variables, we include several loan-specific characteristics in our estimations. We consider the number of banks in the loan (LN_SYND_SIZE), as banks have incentives to syndicate higher risk loans in order to spread the risk across a large number of lenders. This variable is measured as the natural logarithm of the number of banks participating in the loan. The size of the loan (LN_AMOUNT) is the natural logarithm of the amount being loaned in millions of dollars. As greater loan size is associated with better borrowers, we expect that the

greater the size of the loan, the better the bank loan terms will be. We include a dummy variable that identifies whether the loan is senior or not (DSENIOR). This variable takes the value of 1 if the loan is senior and zero otherwise (subordinated, senior subordinated, junior, or mezzanine). We have also controlled for the existence of repeated borrowing from the same lender, as the impact of credit information sharing on bank loans could depend on the presence of alternative mechanisms to reduce asymmetric information. Álvarez-Botas and Gonzalez (2023) and Bharath et al. (2011) show that borrowing from a prior lender provides better loan terms to borrowers even for large corporations. We follow Bharath et al. (2011) to identify loans by a relationship bank. For any particular loan i included in our sample, we search all the previous loans, within a 5-year window, of the given borrower in the Dealscan database. We identify all the lead banks in these prior loans and if at least one of the lead banks for loan i had been a lead bank in the past, we classify loan i as a relationship loan. We measure the existence of relationship lending with a dummy variable that takes the value of 1 when one of the lead arrangers had been a lead arranger in the past within a 5-year window, and 0 otherwise (RLOAN). We also include loan type and loan purpose fixed effects to saturate our model from differences in bank loan conditions due to loan type or purpose.

3.2. Regression specification

The baseline specification relates each of our seven dependent variables for loan i to the information sharing variables, protection of creditors' rights, and a vector of firm and loan characteristics. Spread, maturity and loan size are also included in the estimations when they are not the dependent variables. We also include time (Y_t), borrower country (C_{bc}), lead lender country⁶ (C_{lc}), industry (I_z) and firm effects (B_j) in all the estimations to control for unobservable time, country, industry and firm heterogeneity. Six of the models are estimated using ordinary least squares with standard errors clustered by country level (Cameron & Miller, 2015). When the dependent variable is the requirement of collateral we use a Linear Probability Model (LPM) with robust standard errors clustered by country level. To mitigate endogeneity problems ex-ante, we lag all the country- and firm-variables by one year.

$$LOAN_CHARACT_{i,t} = \alpha_0 + \beta_1 CRC_{c,t-1} + \beta_2 CBC_{c,t-1} + \beta_3 CR_{c,t-1} + \beta_3 CR_CoS_{c,t-1} + \sum_k FirmControls_{j,t-1}^k + \sum_L LoanControls_{i,t}^L + \sum_t Y_t + \sum_{bc} C_{bc} + \sum_{lc} C_{lc} + \sum_z I_z + \sum_j B_j + \varepsilon_{i,t}$$

$$(1)$$

In order to analyze the effect of credit information sharing on the conditions of bank loans we add two variables measuring the quality of the borrowers into Eq. (1). We define low quality firms (LQ) as those with a value of VRATING equal to 5 or 6 (firms with a Ba rating or worse) or without a credit rating. High quality firms (HQ) are borrowers with an investment grade rating (with a Baa rating or better). We add the interaction terms between the proxies of credit information sharing (CRC, CBC and IND_CRC_CBC) and the variables LQ, and HQ, with these interaction terms identifying the effect of credit information sharing for each particular group of borrowers according to their quality.

3.3. Descriptive statistics

Table 1 provides the descriptive statistics of the dependent, firm- and loan-control variables. The mean (median) of the SPREAD and MATU-RITY variables, respectively, is 192.94 (155.00) basis points and 50.93 (60.00) months. The mean (median) facility has a nominal value of 616.30 (225.00) million dollars. Most of the loans are credit lines (53%), secured (68%), senior (99.65%), and for general corporate purposes (45%). The mean bank loan has a Moody's rating of A, as the mean value of VRATING is 2.08% and 54% of the loans do not have a rating. The percentage of loans classified as relationship loans in our paper is 71%.⁷

A wide variation in the country variables can be seen in Table 2. The mean value of CRC is 2.49%, however there are twenty nine countries where the credit registry coverage value is 0.00% and countries with a coverage higher than 50% such as Portugal, Belgium and Brazil. The coverage of credit bureaus is higher as the mean value is 85.99% with several countries with a coverage of 100%, Canada, Iceland, Ireland, Japan, Mexico, Norway, and the USA. The mean value of the measure of protection of creditors' rights is 1.54 years. In Ireland, Japan, Canada, Singapore, Belgium, Finland and Norway the time that creditors have to wait to recover their credit after a default is less than one year, however, it is 5.54 years in Philippines, 4.63 years in Chile, 4.30 years in India, and 4.00 in Brazil.

Table 3 presents the correlation matrix. The correlations between LN_SPREAD and CRC and CBC are positive, a finding not in line with information sharing leading to lower spreads. COLLAT correlates

negatively with CRC and positively with CBC, and CR. The correlation of COLLAT with CR is as expected, since higher values of CR denote weaker protection of creditors' rights and this is associated with higher requirements for collateral. Maturity has a negative correlation with CBC and a positive correlation with CR. The positive correlation of loan maturity with protection of creditors' rights is consistent with a higher maturity in countries with lower protection of creditors' rights, since higher values of CR denote weaker protection of rights. The loan amount is positively correlated with credit registry coverage. The proxies for the syndication structure (LN_NUM_LA, IHERF and LN_SYN_SIZE) show that CRC is associated with lower concentration, while CBC is associated with higher concentration.

4. Results

4.1. Credit information sharing and bank loan spread

Table 4 presents the results of the OLS estimation when the dependent variable is the interest rate spread of the loan, the standard errors being clustered at the country-level. Column (1) shows the results when considering CRC and CBC, and firm- and loan-specific variables; column (2) shows the results when we consider the joint measure of the coverage of private and public databases about credit information (IND_CRC_CBC), and firm- and loan-specific variables; column (3) includes the protection of creditors' rights (CR), and firm- and loan specific variables; column (4) presents the results when the proxies of information sharing, CRC and CBC, and protection of creditors' rights are considered jointly with firm- and loan-specific variables; and column (5) shows the results when the proxy for information sharing is IND_CRC_CBC and we also consider the protection of creditors' rights and firm- and loan-specific variables. The results show that the coefficients for our proxies of credit information sharing are not statistically significant, suggesting that credit information sharing has no influence on loan spreads.8 This result is not consistent with our hypothesis but it is in line with the evidence by Behr and Sonnekalb (2012) about the introduction of a public credit registry by the Albanian central bank.

Similarly, the level of protection of creditors' rights (CR) has an insignificant coefficient, showing that the time needed for creditors to recover their credit after a default is not significant to explain the bank loan spread. When the protection of creditors' rights variable is included in the estimations, our proxies of credit information sharing (columns (4) and (5)), maintain their lack of significance. In column (6) we include the interaction terms between the proxies of credit information sharing and borrower's quality. HQ is a dummy variable that takes the value of 1 for those borrowers with an investment grade rating (with a Baa rating or better) and zero otherwise. The interaction terms identify the differential effect of credit information sharing for high quality borrowers. The negative and statistically significant coefficient for CBC*HQ suggests that credit bureau coverage reduces the interest rate spread of bank loans for high quality borrowers.

The signs of the coefficients for borrower-level variables are as expected. Larger or more profitable firms borrow at lower interest rates. High leverage is associated with higher interest rates, which means that

⁶ We follow Beyhaghi et al. (2021) to identify the lead lender. When the loan has only one lender, this is considered the lead. When there are several lenders, we take this information from Dealscan's lead_lender_credit variable. For loans with more than one lead lender, we identify the main lead lender as the one that is also the agent lender. If there are still several lead lenders, we consider the lender with the largest share of the loan as the lead.

⁷ This percentage is similar to the one shown by Bharath et al. (2011), as they classified 14,832 of 21,632 loans (68.75%) for a sample of bank loans to US firms from 1986 to 2003 as relationship loans.

⁸ Additionally, we also included two dummies in the estimations related to changes in coverage by registries over time. First, we identified four countries (Croatia, Cyprus, Qatar and Russia) which implemented a credit registry or a credit bureau during our period of analysis. We define a dummy variable that takes the value of one for the loan facilities in the year after the implementation and zero otherwise. Second, we identified those countries in which coverage by a credit registry or credit bureau has declined significantly. We built a dummy variable that takes the value of one for the year/years with decreases and zero otherwise. The coefficients of these two dummy variables are not statistically significant.

Descriptive statistics by country.

Country	Observations	CRC	CBC	CR
Australia	398	0.00	98.99	1.00
Austria	23	1.36	42.49	1.10
Belgium	58	58.34	0.00	0.90
Brazil	84	50.50	63.77	4.00
Canada	692	0.00	100.00	0.80
Chile	42	30.47	22.20	4.63
China	279	42.70	0.00	1.70
Colombia	6	0.00	66.43	2.13
Croatia	6	0.00	50.00	3.10
Cyprus	7	0.00	5.16	1.50
Denmark	19	0.00	7.53	2.35
Finland	76	0.00	15.49	0.90
France	622	23.70	0.00	1.90
Germany	494	0.77	92.95	1.20
Greece	53	0.00	29.29	2.02
Hong Kong	283	0.00	75.35	1.07
Iceland	7	0.00	100.00	1.00
India	516	0.00	19.90	4.30
Indonesia	100	42.48	0.00	1.10
Ireland	94	0.00	100.00	0.40
Italy	203	12.85	72.45	1.8
Japan	394	0.00	100.00	0.60
Korea	127	0.00	82.96	1.50
Luxembourg	41	0.00	0.00	2.00
Mexico	120	0.00	100.00	1.80
Netherlands	220	0.00	76.01	1.10
New Zealand	27	0.00	97.81	1.30
Norway	68	0.00	100.00	0.90
Pakistan	14	3.90	1.16	2.80
Philippines	37	0.00	0.58	5.54
Poland	23	0.00	46.04	3.00
Portugal	23	72.74	11.95	2.04
Qatar	3	10.73	0.00	2.80
Romania	5	4.46	20.32	3.82
Russia	130	0.00	9.61	2.00
Singapore	130	0.00	41.78	0.80
Spain	268	46.39	8.75	1.50
Sweden	92	0.00	98.85	2.00
Switzerland	186	0.00	24.34	3.00
Taiwan	1761	0.00	71.30	1.90
Thailand	16	0.00	36.32	2.33
Turkey	52	20.75	35.25	3.35
USA	14,594	0.00	100.00	1.46
United Kingdom	948	0.00	90.30	1.00
Total	23,341	2.49	85.99	1.54

The table reports the number of observations and the mean values of CRC, CBC, and CR by country. CRC measures the coverage of credit registries; CBC measures the coverage of credit bureaus; CR measures the protection of creditors' rights as the time, in years, that creditors have to wait to recover their credit after a default.

firms with high leverage face a greater likelihood of future insolvency, leading to higher interest rates. Tangibility reduces the cost of bank loans, since intangible assets experience higher losses of value when borrowers suffer financial distress. The market-to-book ratio (GROWTH) is negatively related to loan spreads, reflecting that growth firms are less likely to engage in risky activities to expropriate creditors as they will need more funds in the future. Safer borrowers (firms with a lower value of the VRATING variable) obtain loans at lower interest rates, while firms without a rating (DRATING) face higher costs.

In addition to firm-specific variables, we also include several loanspecific characteristics in our estimations. Larger loans have lower loan spreads, probably as a result of the diversification of risk across a larger number of lenders. Similarly, loans with a higher number of lenders pay lower bank loan spreads. Relationship loans pay lower spreads than non-relationship loans, suggesting that relationship banking reduces the information asymmetry between lenders and borrowers. Finally, senior loans have lower spreads compared to the remaining categories (subordinated, senior subordinated, junior, or mezzanine).

4.2. Credit information sharing and collateral requirement

Table 5 shows the results when the dependent variable is a dummy variable (COLLAT) that takes the value of 1 if the loan is secured and zero otherwise. In this case, we run a Linear Probability Model (LPM), with robust standard errors being clustered at the country-level. We observe that CRC is associated with lower collateral, while the coefficient of CBC is positive and significant in columns (4) and (6). The coefficient of the interaction effect between CBC and HQ is negative and statistically significant in line with the existence of a reduction in collateral for high quality borrowers compared to low quality borrowers. The coefficient reported in column (4) suggests that a 1% increase in CRC is associated with a 1.23% lower probability of pledging collateral, while a 1% increase is CBC is associated with a 0.18% increased probability of pledging collateral. The coefficient of CR is negative showing that the requirement for collateral is lower in countries with weak protection of creditors' rights, although it is not statistically significant.

Larger or more profitable firms are required to post less collateral. The coefficient of TANG is negative and significant in line with asset tangibility reducing collateral requirements. The market-to-book ratio (GROWTH) is negatively related to collateral requirement, indicating that growth firms are less likely to be required to post collateral. The results for loan-specific characteristics are as follows: (1) larger loans have less collateral requirements, probably as a result of the diversification of risk across a larger number of lenders as syndicate size also reduces collateral requirements; (2) loans with longer maturity require more collateral, indicating that banks view them as riskier; (3) loans paying higher interest rates also require more collateral; (4) relationship loans increase the probability of posting collateral; and (5) senior loans have higher collateral requirements than the remaining categories (subordinated, senior subordinated, junior, or mezzanine).

4.3. Credit information sharing and loan maturity

We analyze the effect of credit information sharing on loan maturity in order to test Hypotheses 2a and 2b. As the expected effect could be different depending on borrower quality, we distinguish between lowand high-quality firms. We define high quality firms (HQ) as those with an investment grade rating (a Baa rating or better), while low quality firms (LQ) are firms with a VRATING equal to 5 or 6 (Ba rating or worse) or without a credit rating. We add the interaction terms between the proxies of credit information sharing (CRC, CBC and IND_CRC_CBC) and the variables LQ and HQ, with these interaction terms identifying the effect of credit information sharing for each particular group of borrowers.

Columns (1) to (4) in Table 6 present the results when different borrower quality is not taken into account in the estimations. The coefficients of CBC and IND_CRC_CBC are negative and statistically significant, showing that loan maturity decreases with the degree of credit information sharing mainly associated with the coverage by credit bureaus. In terms of economic significance, the coefficient reported in column (3) for CBC suggests that an increase of one standard deviation in CBC is associated with a reduction of 5.2 months in the maturity of the loan.

In columns (5) and (6) the coefficients of the interaction terms between CBC and IND_CRC_CBC with HQ and LQ are negative and significant, suggesting that there is a reduction in loan maturity regardless of the quality of the borrower. The negative coefficient for CBC*HQ suggests that credit information sharing reduces the liquidity risk of being unable to refinance the debt for high quality borrowers and it balances out the use of longer maturities as the reduction of information asymmetries avoids the need to borrow on shorter terms. For low quality borrowers, in line with Hypothesis 2a, credit bureaus reduce maturity as a consequence of lower monitoring costs.

Larger borrowers borrow at shorter maturities, while more profitable

Correlations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) LN_SPREAD	1																	
(2) COLLAT	0.48 * **	1																
(3) LN_MAT	0.09 * **	0.14 * **	1															
(4) LN_AMOUNT	-0.31 * **	-0.41 * **	0.03 * **	1														
(5) LN_NUM_LA	-0.16 * **	-0.21 * **	0.10 * **	0.40 * **	1													
(6) IHERF	0.24 * **	0.28 * **	-0.10 * **	-0.34 * **	-0.89 * **	1												
(7) LN_SYND_SIZE	-0.31 * **	-0.30 * **	0.13 * **	0.53 * **	0.53 * **	-0.55 * **	1											
(8) CRC	0.01 *	-0.08 * **	0.01	0.06 * **	0.21 * **	-0.16 * **	0.07 * **	1										
(9) CBC	0.10 * **	0.02 * *	-0.07 * **	-0.01	-0.33 * **	0.31 * **	-0.13 * **	-0.61 * **	1									
(10) CR	-0.00	0.07 * **	0.10 * **	-0.10 * **	0.06 * **	-0.13 * **	0.05 * **	0.14 * **	-0.50 * **	1								
(11) SIZE	-0.25 * **	-0.19 * **	-0.07 * **	0.34 * **	0.06 * **	-0.12 * **	0.24 * **	-0.01	0.01	0.07 * **	1							
(12) PROFIT	-0.27 * **	-0.24 * **	0.09 * **	0.20 * **	0.12 * **	-0.13 * **	0.18 * **	0.04 * **	-0.08 * **	0.02 * **	-0.12 * **	1						
(13) LEV	0.16 * **	0.16 * **	0.06 * **	0.05 * **	0.05 * **	-0.04 * **	0.05 * **	0.02 * **	-0.04 * **	0.06 * **	0.04 * **	-0.19 * **	1					
(14) TANG	-0.01	-0.03 * **	0.00	0.05 * **	0.01	-0.05 * **	0.05 * **	-0.01 * *	-0.06 * **	0.11 * **	0.10 * **	-0.07 * **	0.22 * **	1				
(15) GROWTH	-0.09 * **	-0.10 * **	-0.01	0.08 * **	-0.00	0.00	0.02 * **	-0.00	0.01 * *	-0.02 * **	-0.04 * **	0.23 * **	-0.04 * **	-0.07 * **	1			
(16) VRATING	0.06 * **	-0.03 * **	0.03 * **	0.34 * **	-0.02 * *	0.02 * *	0.19 * *	-0.09 * **	0.23 * **	-0.09 * **	0.32 * **	-0.07 * **	0.23 * **	0.06 * **	-0.02 * **	1		
(17) DRATING	0.11 * **	0.18 * **	0.03 * **	-0.43 * **	-0.03 * **	0.03 * **	-0.25 * **	0.08 * **	-0.22 * **	0.10 * **	-0.38 * **	-0.00	-0.17 * **	-0.07 * **	-0.01	-0.95 * **	1	
(18) RLOAN	-0.16 * **	-0.19 * **	0.00	0.30 * **	0.23 * **	-0.21 * **	0.32 * **	-0.04 * **	0.08 * **	-0.07 * **	0.14 * **	0.07 * **	0.09 * **	0.01	0.01 * *	0.17 * **	-0.21 * **	1
(19) DSENIOR	-0.09 * **	-0.01	-0.07 * **	0.01 * *	-0.00	-0.01	0.04 * **	0.00	0.02 * *	0.02 * **	0.02 * *	0.00	-0.00	-0.00	0.01	0.02 * *	-0.02 * **	0.01 * *

The table presents the correlation matrix. LN_SPREAD is the natural logarithm of interest rate spread; COLLAT is a dummy variable that equals 1 if the loan was secured and zero otherwise; LN_MAT is the natural logarithm of the facility in millions of dollars; LN_NUM_LA is the natural logarithm of one plus the number of lead arrangers participating in the facility; IHERF is the Herfindahl index calculated using each lead arranger's share in the facility; LN_SYND_SIZE is natural logarithm of the number of banks participating in the facility; CRC measures the coverage of credit bureau; CR measures the protection of creditors' rights as the time, in years, that creditors have to wait to recover their credit after a default; FIRM_SIZE is the natural logarithm of the facility is the ratio between earnings before interest and taxes and total assets; LEV is the ratio between the book value of total assets; TANG is the ratio between property, plant, and equipment and total assets; GROWTH is the ratio of the market value of equity to the book value of equity; VRATING is a firm risk index using Moody's and S&P ratings that ranges from one to six, a value of one being assigned to an Aaa rating, a value of two indicating an Aa rating, ..., and six indicating a B rating or worse – we assign a zero to borrowers without a rating; DRATING is a dummy variable that takes the value of 1 if the facility is senior and zero otherwise; *** , **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Credit information sharing and interest rate spread of bank loans.

	(1)	(2)	(3)	(4)	(5)	(6)
CRC	0.0057			0.0061		0.0063
	(1.08)			(1.13)		(1.17)
CBC	0.0008			0.0010		0.0011
	(0.23)			(0.28)		(0.29)
IND CRC CBC		0.1506			0.1753	
		(0.42)			(0.45)	
CRC*HO						-0.0014
c						(-0.61)
CBC*HQ						-0.0005 *
C C						(-1.74)
CR			-0.0450	-0.0796	-0.0759	-0.0781
			(-0.47)	(-0.61)	(-0.58)	(-0.59)
FIRM SIZE	-0.0137 * **	-0.0138 * **	-0.0136 * **	-0.0136 * **	-0.0137 * **	-0.0136 * **
	(-7.99)	(-8.15)	(-7.28)	(-7.59)	(-7.75)	(-7.57)
PROFIT	-0.9569 * **	-0.9572 * **	-0.9711 * **	-0.9613 * **	-0.9614 * **	-0.9638 * **
	(-8.53)	(-8.50)	(-8.97)	(-8.54)	(-8.51)	(-8.57)
LEV	0.2949 * **	0.2938 * **	0.2849 * **	0.2904 * **	0.2894 * **	0.2908 * **
	(3.45)	(3.42)	(3.25)	(3.30)	(3.28)	(3.29)
TANG	-0.2390 * **	-0.2378 * *	-0.2414 * *	-0.2376 * **	-0.2365 * **	-0.2362 * **
	(-2.70)	(-2.69)	(-2.60)	(-2.73)	(-2.72)	(-2.73)
GROWTH	-0.0037 * *	-0.0038 * *	-0.0039 * **	-0.0038 * **	-0.0038 * *	-0.0037 * *
	(-2.67)	(-2.60)	(-2.80)	(-2.71)	(-2.64)	(-2.66)
VRATING	0.1760 * **	0.1768 * **	0.1765 * **	0.1761 * **	0.1768 * **	0.1573 * **
	(19.69)	(19.95)	(19.81)	(19.62)	(19.85)	(10.54)
DRATING	0.7784 * **	0.7815 * **	0.7749 * **	0.7758 * **	0.7790 * **	0.6670 * **
	(14.68)	(15.39)	(15.86)	(14.73)	(15.45)	(8.19)
LN_SYND_SIZE	-0.0411 * **	-0.0415 * **	-0.0419 * **	-0.0410 * **	-0.0414 * **	-0.0412 * **
	(-3.36)	(-3.40)	(-3.47)	(-3.35)	(-3.39)	(-3.36)
LN_MAT	0.0505 *	0.0507 *	0.0498 *	0.0505 *	0.0507 *	0.0502 *
	(1.71)	(1.72)	(1.70)	(1.71)	(1.72)	(1.70)
RLOAN	-0.0340 * **	-0.0348 * **	-0.0332 * **	-0.0336 * **	-0.0345 * **	-0.0340 * **
	(-3.44)	(-3.46)	(-2.99)	(-3.36)	(-3.38)	(-3.37)
LN_AMOUNT	-0.0264 * **	-0.0265 * **	-0.0270 * **	-0.0266 * **	-0.0267 * **	-0.0265 * **
	(-3.65)	(-3.65)	(-3.77)	(-3.72)	(-3.73)	(-3.69)
DSENIOR	-0.7894 * **	-0.7887 * **	-0.7883 * **	-0.7899 * **	-0.7891 * **	-0.7895 * **
	(-5.57)	(-5.56)	(-5.55)	(-5.59)	(-5.57)	(-5.58)
Constant	6.4074 * **	6.3258 * **	6.5445 * **	6.4420 * **	6.3577 * **	6.5668 * **
	(12.31)	(12.01)	(19.82)	(13.11)	(12.75)	(13.28)
Loan purpose variables	Yes	Yes	Yes	Yes	Yes	Yes
Loan type variables	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country effects	Yes	Yes	Yes	Yes	Yes	Yes
Lender country effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
# observations	23,341	23,341	23,341	23,341	23,341	23,341
# firms	4660	4660	4660	4660	4660	4660
Adj R ² (%)	79.3	79.3	79.3	79.3	79.3	79.3

Regressions are estimated using OLS clustered by country. The dependent variable is LN_SPREAD and is measured as the natural logarithm of interest rate spread (over the LIBOR) plus any associated fees in originating the facility. CRC measures the coverage of credit registry; CBC measures the coverage of credit bureau; IND_CRC_CBC measures the joint coverage by credit registry and credit bureau; HQ is a dummy variable that takes the value of 1 if the firm belongs to investment grade-rated (high quality) borrowers and zero otherwise; CR measures the protection of creditors' rights as the time, in years, that creditors have to wait to recover their credit after a default; FIRM_SIZE is the natural logarithm of the firm's total assets; PROFIT is the ratio between earnings before interest and taxes and total assets; LEV is the ratio between the book value of debt and the book value of total assets; TANG is the ratio between property, plant, and equipment and total assets; GROWTH is the ratio of the market value of equity to the book value of equity; VRATING is a firm risk index using Moody's and S&P ratings that ranges from one to six, a value of one being assigned to an Aaa rating, a value of two indicating an Aa rating, ..., and six indicating a B rating or worse – we assign a zero to borrowers without a rating; DRATING is a dummy variable that takes the value of 1 if the rating of the firm is missing and zero otherwise; LN_MAT is the natural logarithm of the facility in months; LN_A-MOUNT is the natural logarithm of the facility in millions of dollars; RLOAN is a dummy variable that takes the value of 1 if the facility is senior and zero otherwise. Country, industry, time and firm effects are included in all the estimations, although we do not report their coefficients. T-statistics are in parentheses. * ** , * *, and * represent significance at the 1%, 5%, and 10% levels, respectively.

firms borrow at longer maturities. High leverage is associated with shorter maturities. Safer borrowers (firms with a lower value for the VRATING variable) obtain loans at shorter maturities, while firms without a rating (DRATING) obtain loans with longer maturities, although this variable is not statistically significant when we consider the interaction between information sharing and borrower credit quality. As for loan-specific characteristics, larger loans and loans with more lenders have longer maturities. Relationship banking also reduces loan maturity, since the risk of being unable to refinance the debt is lower. Finally, senior loans have shorter maturities than the remaining categories (subordinated, senior subordinated, junior, or mezzanine).

4.4. Credit information sharing and the amount of credit

Table 7 shows the results when the dependent variable is the amount of credit. The size of the loan is measured as the natural logarithm of the loan tranche amount (LN_AMOUNT). The coefficients for CBC, CRC, and IND_CRC_CBC are negative and statistically significant. Those

Credit information sharing and collateral requirement.

	(1)	(2)	(3)	(4)	(5)	(6)
CRC	-0.0128 * **			-0.0123 * **		-0.0111 * **
	(-3.58)			(-3.45)		(-3.22)
CBC	0.0010			0.0018 *		0.0019 * *
	(1.49)			(1.99)		(2.32)
IND_CRC_CBC		0.0239			0.0962	
		(0.16)			(0.60)	
CRC*HQ						-0.0004
						(-0.13)
CBC*HQ						-0.0024 * **
-						(-9.32)
CR			-0.1362	-0.1724	-0.1659	-0.1635
			(-1.08)	(-1.42)	(-1.34)	(-1.32)
FIRM SIZE	-0.0028 * **	-0.0028 * **	-0.0027 * **	-0.0027 * **	-0.0027 * **	-0.0025 * **
	(-3.33)	(-3.72)	(-3.13)	(-3.06)	(-3.44)	(-2.92)
PROFIT	-0.1272 * **	-0.1272 * **	-0.1357 * **	-0.1333 * **	-0.1329 * **	-0.1391 * **
	(-5.05)	(-4.98)	(-8.19)	(-6.78)	(-6.63)	(-6.37)
LEV	0.0109	0.0135	0.0059	0.0037	0.0067	0.0103
	(0.72)	(0.78)	(0.46)	(0.34)	(0.51)	(1.03)
TANG	-0.1249 * **	-0.1226 * *	-0.1215 * *	-0.1239 * **	-0.1217 * *	-0.1034 * *
	(-2.88)	(-2.68)	(-2.64)	(-2.86)	(-2.65)	(-2.56)
GROWTH	-0.0033 * **	-0.0032 * **	-0.0033 * **	-0.0033 * **	-0.0032 * **	-0.0033 * **
	(-7.57)	(-6.81)	(-7.03)	(-7.46)	(-6.77)	(-7.87)
VRATING	0.0777 * **	0.0758 * **	0.0761 * **	0.0781 * **	0.0763 * **	-0.0080
	(10.44)	(8.17)	(8.63)	(11.46)	(8.74)	(-0.74)
DRATING	0.3411 * **	0.3330 * **	0.3292 * **	0.3387 * **	0.3307 * **	-0.1556 * *
	(10.43)	(8.66)	(8.50)	(10.60)	(8.73)	(-2.16)
LN_SYND_SIZE	-0.0162 *	-0.0158 *	-0.0155 * *	-0.0160 *	-0.0156 * *	-0.0170 * *
	(-1.97)	(-2.01)	(-2.04)	(-1.98)	(-2.03)	(-2.18)
LN_SPREAD	0.0900 * **	0.0890 * **	0.0894 * **	0.0905 * **	0.0894 * **	0.0884 * **
	(7.21)	(6.81)	(7.00)	(7.51)	(7.05)	(7.83)
LN_MAT	0.0354 * **	0.0358 * **	0.0353 * **	0.0353 * **	0.0358 * **	0.0330 * **
	(5.56)	(5.39)	(5.47)	(5.54)	(5.37)	(4.87)
RLOAN	0.0119 * **	0.0126 * **	0.0134 * **	0.0123 * **	0.0131 * **	0.0114 * **
	(3.35)	(4.00)	(4.29)	(3.44)	(4.12)	(3.44)
LN_AMOUNT	-0.0082 *	-0.0083 *	-0.0088 * *	-0.0088 * *	-0.0089 * *	-0.0086 * *
	(-1.89)	(-1.91)	(-2.19)	(-2.21)	(-2.25)	(-2.27)
DSENIOR	0.2395 * **	0.2372 * **	0.2364 * **	0.2395 * **	0.2372 * **	0.2389 * **
	(4.25)	(4.18)	(4.20)	(4.24)	(4.17)	(4.18)
Constant	-0.0814	0.0144	0.1416 *	-0.0330	0.0621	0.4281 * *
	(-0.55)	(0.07)	(1.79)	(-0.28)	(0.35)	(2.69)
Loan purpose variables	Yes	Yes	Yes	Yes	Yes	Yes
Loan type variables	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country effects	Yes	Yes	Yes	Yes	Yes	Yes
Lender country effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
# observations	13,916	13,916	13,916	13,916	13,916	13,916
# firms	3440	3440	3440	3440	3440	3440
Adj R ² (%)	78.9	78.8	78.8	78.9	78.8	79.3

Regressions are estimated using LPM clustered by country and robust standard errors. The dependent variable is COLLAT and is a dummy variable that equals 1 if the loan was secured and zero otherwise. CRC measures the coverage of credit registry; CBC measures the coverage of credit bureau; IND_CRC_CBC measures the joint coverage by credit registry and credit bureau; HQ is a dummy variable that takes the value of 1 if the firm belongs to investment grade-rated (high quality) borrowers and zero otherwise; CR measures the protection of creditors' rights as the time, in years, that creditors have to wait to recover their credit after a default; FIRM_SIZE is the natural logarithm of the firm's total assets; PROFIT is the ratio between earnings before interest and taxes and total assets; LEV is the ratio between the book value of debt and the book value of total assets; TANG is the ratio between property, plant, and equipment and total assets; GROWTH is the ratio of the market value of equity to the book value of equity; VRATING is a firm risk index using Moody's and S&P ratings that ranges from one to six, a value of one being assigned to an Aaa rating, a value of 1 if the rating of the firm is missing and zero otherwise; LN_MAT is the natural logarithm of the facility in months; LN_AMOUNT is the natural logarithm of the facility in millions of dollars; RLOAN is a dummy variable that takes the value of 1 when one of the lead arrangers had been a lead arranger in the past within a 5-year window; and DSENIOR is a dummy variable that takes the value of 1 if the facility is senior and zero otherwise. Borrower country, lead arranger country, industry, time and firm effects are included in all the estimations, although we do not report their coefficients. T-statistics are in parentheses. *** , **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

coefficients hold when the protection of creditors' rights is included in the estimations. The protection of creditors' rights has a negative and significant relationship with the loan amount, in line with smaller amounts being loaned in countries where the protection of creditors' rights is weak. In column (4) we include the interaction term between the coverage by registries and the dummy variable HQ. The coefficient for CBC*HQ is positive and statistically significant, in line with a lower reduction in the loan amount for high quality borrowers. The coefficients reported in column (2) for CRC, CBC and CR suggests that an increase of one standard deviation in these variables is associated with a reduction of 0.30, 0.45% and 2.61%, respectively, in the mean value of the dependent variable.

Larger or more profitable borrowers borrow larger loans. Firms without a rating obtain smaller bank loans, although the coefficient of DRATING is not statistically significant when we consider the interaction between information sharing and borrower credit quality. Large

Credit information sharing and loan maturity.

	(1)	(2)	(3)	(4)	(5)	(6)
CRC	-0.0026		-0.0025			
	(-1.07)		(-1.05)			
CBC	-0.0040 * **		-0.0040 * **			
	(-5.45)		(-4.85)			
IND_CRC_CBC		-0.3820 * **		-0.3811 * **		
		(-5.71)		(-5.10)		
CR			-0.0023	-0.0026	-0.0003	0.0001
CPC*HO			(-0.05)	(-0.05)	(-0.01)	(0.00)
ene no					(-1.14)	
CRC*LO					-0.0023	
c c					(-0.96)	
CBC*HQ					-0.0046 * **	
					(-4.44)	
CBC*LQ					-0.0040 * **	
					(-4.99)	
IND_CRC_CBC*HQ						-0.4344 * **
						(-4.72)
IND_GIG_GDG EQ						(-5.26)
FIRM SIZE	-0.0047 * *	-0.0047 * *	-0.0047 * *	-0.0047 * *	-0.0047 * *	-0.0047 * *
	(-2.07)	(-2.08)	(-2.06)	(-2.08)	(-2.05)	(-2.06)
PROFIT	0.4637 * **	0.4637 * **	0.4636 * **	0.4636 * **	0.4606 * **	0.4610 * **
	(6.93)	(6.95)	(6.97)	(7.00)	(6.76)	(6.79)
LEV	-0.1358 * **	-0.1361 * **	-0.1359 * **	-0.1363 * **	-0.1353 * **	-0.1358 * **
	(-3.95)	(-3.99)	(-4.04)	(-4.08)	(-4.09)	(-4.13)
TANG	-0.0368	-0.0366	-0.0367	-0.0366	-0.0354	-0.0357
CROWTH	(-0.47)	(-0.47)	(-0.47)	(-0.47)	(-0.45)	(-0.45)
GROWIH	0.0008	0.0008	0.0008	0.0008	(0.0008)	0.0008
VRATING	0.70)	0.0509 * **	0.0509 * **	0.0509 * **	0.0303 * *	0.0304 * *
Vicinity	(3.75)	(3.76)	(3.76)	(3.77)	(2.24)	(2.23)
DRATING	0.1878 * **	0.1881 * **	0.1878 * **	0.1880 * **	0.0679	0.0692
	(3.01)	(3.03)	(3.01)	(3.03)	(0.85)	(0.86)
LN_SYND_SIZE	0.0865 * **	0.0863 * **	0.0865 * **	0.0863 * **	0.0862 * **	0.0861 * **
	(3.01)	(2.99)	(3.01)	(2.99)	(3.01)	(2.99)
LN_SPREAD	0.0705	0.0707	0.0705	0.0707	0.0701	0.0704
	(1.53)	(1.54)	(1.53)	(1.54)	(1.52)	(1.53)
RLOAN	-0.0470 * **	-0.04/2 * **	-0.04/0 * **	-0.0472 * **	-0.0473 * **	-0.0475 * **
IN AMOUNT	(-3.04) 0.0747 * **	(-5.10)	(-5.08)	(-5.14)	(-5.07)	(-5.15)
LIN_AMOUNT	(10.08)	(10.06)	(10.11)	(10.09)	(10.13)	(10.11)
DSENIOR	-0.2889 * **	-0.2886 * **	-0.2889 * **	-0.2886 * **	-0.2887 * **	-0.2883 * **
	(-2.88)	(-2.88)	(-2.89)	(-2.89)	(-2.89)	(-2.89)
Constant	1.8012 * **	1.7781 * **	1.8022 * **	1.7792 * **	1.9418 * **	1.9160 * **
	(3.90)	(3.88)	(3.95)	(3.93)	(3.96)	(3.95)
Loan purpose variables	Yes	Yes	Yes	Yes	Yes	Yes
Loan type variables	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country effects	Yes	Yes	Yes	Yes	Yes	Yes
Lender country effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	1 CS Vec	1 CS Vec	1 CS Vec	1 CS Vec	1 CS Ves	1 ES Vec
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
# observations	23.341	23.341	23.341	23.341	23.341	23,341
# firms	4660	4660	4660	4660	4660	4660
Adj R ² (%)	46.7	46.7	46.7	46.7	46.8	46.8

Regressions are estimated using OLS clustered by country. The dependent variable is LN_MAT measured as the natural logarithm of the maturity of the facility in months. CRC measures the coverage of credit registry; CBC measures the coverage of credit bureau; IND_CRC_CBC measures the joint coverage by credit registry and credit bureau; CR measures the protection of creditors' rights as the time, in years, that creditors have to wait to recover their credit after a default; HQ is a dummy variable that takes the value of 1 if the firm belongs to investment grade-rated (high quality) borrowers and zero otherwise; LQ is a dummy variable that takes the value of 1 if the firm lack a credit rating (low quality) or its credit rating is below investment grade and zero otherwise; FIRM_SIZE is the natural logarithm of the firm's total assets; PROFIT is the ratio between earnings before interest and taxes and total assets; LEV is the ratio between the book value of debt and the book value of total assets; TANG is the ratio between property, plant, and equipment and total assets; GROWTH is the ratio of the market value of quity to the book value of equity; VRATING is a firm risk index using Moody's and S&P ratings that ranges from one to six, a value of one being assigned to an Aaa rating, a value of two indicating an Aa rating, ..., and six indicating a B rating or worse – we assign a zero to borrowers without a rating; DRATING is a dummy variable that takes the value of 1 when one of the lead arrangers had been a lead arranger in the past within a 5-year window and DSENIOR is a dummy variable that takes the value of 1 when one of the lead arrangers. * ** , * *, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Credit information sharing and the amount of credit.

	(1)	(2)	(3)	(4)
CRC	-0.0067 *	-0.0057		-0.0061
	(-1.82)	(-1.66)		(-1.68)
CBC	-0.0037 * *	-0.0029 * *		-0.0030 * *
	(-2.41)	(-2.21)		(-2.23)
IND_CRC_CBC			-0.3275 * *	
			(-2.59)	
CR		-0.2542 * *	-0.2574 * *	-0.2567 * *
		(-2.11)	(-2.12)	(-2.12)
CRC*HQ				0.0014
				(0.48)
CBC*HQ				0.0007 *
				(1.94)
FIRM SIZE	0.0183 * **	0.0187 * **	0.0188 * **	0.0187 * **
	(5.95)	(6.21)	(6.34)	(6.21)
PROFIT	0.3048 * **	0.2898 * **	0.2894 * **	0.2932 * **
	(4.62)	(4.58)	(4.58)	(4.59)
LEV	0.1287	0.1144	0.1151	0.1137
	(1.36)	(1.17)	(1.18)	(1.17)
TANG	-0.0022	0.0019	0.0011	0.0004
	(-0.02)	(0.02)	(0.01)	(0.00)
GROWTH	0.0000	-0.0002	-0.0001	-0.0002
	(0.01)	(-0.05)	(-0.03)	(-0.06)
VRATING	-0.0130	-0.0128	-0.0132	0.0126
	(-0.96)	(-0.92)	(-0.96)	(0.70)
DRATING	-0.1871 * **	-0.1948 * **	-0.1965 * **	-0.0476
	(-3.11)	(-3.24)	(-3.28)	(-0.51)
LN_SYND_SIZE	0.2945 * **	0.2946 * **	0.2949 * **	0.2948 * **
	(18.88)	(18.78)	(18.57)	(18.82)
LN_SPREAD	-0.1027 * **	-0.1033 * **	-0.1038 * **	-0.1029 * **
	(-2.68)	(-2.72)	(-2.73)	(-2.70)
LN_MAT	0.2081 * **	0.2080 * **	0.2079 * **	0.2083 * **
	(7.37)	(7.38)	(7.38)	(7.40)
RLOAN	0.0480 *	0.0491 *	0.0496 *	0.0496 *
	(1.88)	(1.96)	(2.00)	(1.99)
DSENIOR	0.2538	0.2518	0.2509	0.2515
	(1.30)	(1.29)	(1.28)	(1.29)
Constant	17.7397 * **	17.8443 * **	17.8957 * **	17.6694 * **
	(43.65)	(43.06)	(43.19)	(39.39)
Loan purpose variables	Yes	Yes	Yes	Yes
Loan type variables	Yes	Yes	Yes	Yes
Borrower country effects	Yes	Yes	Yes	Yes
Lender country effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
# observations	23,341	23,341	23,341	23,341
# firms	4660	4660	4660	4660
Adj R ² (%)	78.8	78.8	78.8	78.8

Regressions are estimated using OLS clustered by country. The dependent variable is LN_AMOUNT and is measured as the natural logarithm of the loan tranche amount. CRC measures the coverage of credit registry; CBC measures the coverage of credit bureau; IND_CRC_CBC measures the joint coverage by credit registry and credit bureau; HQ is a dummy variable that takes the value of 1 if the firm belongs to investment grade-rated (high quality) borrowers and zero otherwise; CR measures the protection of creditors' rights as the time, in years, that creditors have to wait to recover their credit after a default; FIRM_SIZE is the natural logarithm of the firm's total assets; PROFIT is the ratio between earnings before interest and taxes and total assets; LEV is the ratio between the book value of debt and the book value of total assets; TANG is the ratio between property, plant, and equipment and total assets; GROWTH is the ratio of the market value of a quity to the book value of equity; VRATING is a firm risk index using Moody's and S&P ratings that ranges from one to six, a value of one being assigned to an Aaa rating, a value of two indicating an Aa rating, ..., and six indicating a B rating or worse – we assign a zero to borrowers without a rating; DRATING is a dummy variable that takes the value of 1 if the rating of the firm is missing and zero otherwise; LN_MAT is the natural logarithm of the facility in months; RLOAN is a dummy variable that takes the value of 1 if the facility is senior and zero otherwise. Borrower country, lead arranger country, industry, time and firm effects are included in all the estimations, although we do not report their coefficients. T-statistics are in parentheses. *** , ** , and * represent significance at the 1%, 5%, and 10% levels, respectively.

Credit information sharing and loan ownership structure.

	(1)	(2)	(3)	(4)	(5)	(6)
CRC	-0.0050 *		0.0008		-0.0093 * **	
	(-1.83)		(0.95)		(-2.88)	
CBC	-0.0038 * **		0.0012		-0.0023 *	
	(-2.77)		(1.33)		(-1.75)	
IND CRC CBC	(2007)	-0.4110 * **	(1100)	0.1213	(100)	-0.3349 * *
		(-3.65)		(1.38)		(-2.23)
CB	-0.1192	-0.1186	0.0097	0.0093	0.0259	0.0207
	(-1.28)	(-1.28)	(0.25)	(0.24)	(0.26)	(0.20)
FIRM SIZE	0.0010	0.0010	-0.0002	-0.0002	0.0137 * **	0.0138 * **
	(0.81)	(0.84)	(-0.19)	(-0.20)	(9.32)	(10.15)
PROFIT	0.2384 *	0.2374 *	-0.1259 * **	-0.1258 * **	0.3930 * **	0.3923 * **
1.10111	(1.98)	(1.98)	(-3.74)	(-3.73)	(3.01)	(3.02)
LEV	-0.0845	-0.0846	0.0157	0.0158	-0.1011	-0.0996
	(-1.16)	(-1.17)	(0.56)	(0.56)	(-0.98)	(-0.96)
TANG	-0.0674	-0.0683	0.0505	0.0509	0.0202	0.0182
	(-0.99)	(-1.01)	(0.95)	(0.95)	(0.21)	(0.19)
GROWTH	-0.0005	-0.0005	-0.0025 * **	-0.0025 * **	0.0025	0.0026
Gitowin	(-0.95)	(-0.91)	(-3.17)	(-3.16)	(1.14)	(1.22)
VRATING	0.0003	-0.0001	0.0061	0.0062	-0.0482	-0.0492
viernito	(0.01)	(-0.00)	(0.37)	(0.37)	(-1.27)	(-1.32)
DRATING	0.0194	0.0179	0.0187	0.0186	-0 3260	-0 3301
Diutinito	(0.13)	(0.12)	(0.18)	(0.18)	(-1.60)	(-1.65)
IN SPRFAD	-0.0095	-0.0096	0.0043	0.0042	-0 1115 * **	-0 1127 * **
	(-0.26)	(-0.27)	(0.12)	(0.12)	(-3, 23)	(-3.29)
IN MAT	0.0621 * **	0.0620 * **	-0.0341 * **	-0.0340 * **	0 1775 * **	0 1774 * **
	(5.98)	(5.96)	(-5.66)	(-5.65)	(3.50)	(3.49)
RLOAN	0.0747 * **	0.0750 * **	-0 0241 * **	-0 0241 * **	0.2106 * **	0 2118 * **
	(3.41)	(3 30)	(-3.55)	(-3.55)	(11.88)	(11.97)
DSENIOR	-0.0321	-0.0324	-0.0490	-0.0490	0 2042	0 2024
DENION	(-0.42)	(-0.42)	(_0.95)	(_0.95)	(1.24)	(1.2024)
Constant	1 0527 * **	1 0025 * **	0.3875 * *	0.3870 * *	2 2016 * **	0 4005 * **
Constant	(5.46)	(6.22)	(2.53)	(2.50)	(6.53)	(7 54)
Loan nurnose variables	(J.40) Vec	Vec	(2.55) Vec	(2.50) Vec	(0.55) Vec	(7.54) Ves
Loan type variables	Vec	Vec	Vec	Vec	Vec	Vec
Borrower country effects	Ves	Ves	Vec	Ves	Vec	Ves
Lender country effects	Ves	Ves	Vec	Ves	Vec	Ves
Time effects	Vec	Vec	Vec	Vec	Vec	Vec
Industry effects	Vec	Vec	Vec	Vec	Vec	Vec
Firm effects	Vec	Vec	Vec	Vec	Vec	Vec
# observations	23 341	23 341	13 030	13 030	23 341	23 341
# firms	4660	4660	2012	2012	4660	4660
$\Lambda di P^2 (0/4)$	73.0	73.0	69 5	68 5	62.3	62.3
AUJ N (70)	13.9	/3.9	00.0	00.0	02.3	02.3

Regressions are estimated using OLS clustered by country. The dependent variables are LN_NUM_LA is the natural logarithm of one plus the number of lead arrangers participating in the facility (columns (1) and (2)); IHERF is the Herfindahl index calculated using each lead arranger's share in the facility (columns (3) and (4)); and LN_SYND_SIZE is natural logarithm of the number of banks participating in the facility (columns (5) and (6)). CRC measures the coverage of credit bureau; IND_CRC_CBC measures the joint coverage by credit registry and credit bureau; CR measures the protection of creditors' rights as the time, in years, that creditors have to wait to recover their credit after a default; FIRM_SIZE is the natural logarithm of the firm's total assets; PROFIT is the ratio between earnings before interest and taxes and total assets; LEV is the ratio between the book value of debt and the book value of total assets; TANG is the ratio between property, plant, and equipment and total assets; GROWTH is the ratio of the market value of equity to the book value of equity; VRATING is a firm risk index using Moody's and S&P ratings that ranges from one to six, a value of one being assigned to an Aaa rating, a value of 1 if the rating of the firm is missing and zero otherwise; LN_MAT is the natural logarithm of the facility in millions of dollars; RLOAN is a dummy variable that takes the value of 1 if the facility in millions of dollars; RLOAN is a dummy variable that takes the value of 1 if the facility is senior and zero otherwise. Borrower country, lead arranger country, industry, time and firm effects are included in all the estimations, although we do not report their coefficients. T-statistics are in parentheses. * ** , **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

loans are associated with a higher number of lenders. Loans with higher interest rate spreads are smaller, while loans with longer maturity are larger. Relationship loans are larger than non-relationship loans.

4.5. Credit information sharing and loan ownership structure

The relationship between credit information sharing and loan ownership structure is analyzed considering three measures of loan ownership: (1) the number of lead arrangers measured as the natural logarithm of one plus the number of lead arrangers participating in the facility (LN_NUM_LA); (2) the Herfindahl index calculated using each lead arranger's share in the loan (IHERF); and (3) the syndicate size measured as the natural logarithm of the number of banks participating in the loan (LN_SYND_SIZE). The results obtained for these three measures of the loan ownership structure are shown in Table 8.

The coefficients for CBC and CRC are negative in columns (1) and (5), respectively. The coefficient for IND_CRC_CBC is negative and significant in columns (2) and (6). These coefficients are consistent with credit information sharing increasing loan concentration, as it reduces the number of lead arrangers and participants in the loan. The results when we use IHERF as a proxy for the degree of concentration show positive coefficients, also in line with credit information sharing increasing the concentration of lenders, but they are not statistically significant. In terms of economic significance, the coefficient of CBC in column (1) of Table 8 suggests that an increase of one standard deviation in this variable is associated with a decrease of 0.39 in the number of lead

Robustness analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CRC	0.0017	-0.0055 * *	-0.0014		0.0042	-0.0039 * *	0.0011	-0.0075 * **
	(0.89)	(-2.23)	(-0.97)		(1.38)	(-2.36)	(1.01)	(-3.43)
CBC	-0.0031 * *	-0.0011	-0.0022 * *		-0.0005	-0.0037 * **	0.0001	-0.0027 *
	(-2.21)	(-1.05)	(-2.30)		(-0.25)	(-2.85)	(0.11)	(-1.67)
CRC*HQ				-0.0015				
				(-0.74)				
CRC*LQ				-0.0015				
				(-1.01)				
CBC*HQ				-0.0017				
				(-1.43)				
CBC*LQ				-0.0022 * *				
				(-2.34)				
CR	0.0390	-0.0390	0.0183	0.0192	-0.0656	0.1249 * **	0.0197	0.2126 * **
	(0.57)	(-0.40)	(0.34)	(0.36)	(-0.52)	(2.75)	(0.67)	(3.20)
Constant	6.7771 * **	-1.0464 * **	2.7107 * **	2.6384 * **	19.8188 * **	-1.1995 * **	1.6924 * **	-2.3129 * **
	(16.49)	(-3.22)	(5.66)	(5.43)	(33.27)	(-3.04)	(6.28)	(-4.59)
Firm-control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan-control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan type effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# observations	7331	2701	7331	7331	7331	7331	4136	7331
# firms	1527	724	1527	1527	1527	1527	1128	1527
Adj R ² (%)	80.9	84.4	44.9	45.0	82.8	69.5	65.7	63.0

Regressions are estimated using OLS clustered by country. The dependent variables are: LN_SPREAD in column (1), COLLAT in column (2); LN_MAT in columns (3) and (4), LN_AMOUNT in column (5), LN_NUM_LA in column (6), IHERF in column (7), and LN_SYND_SIZE in column (8). CRC measures the coverage of credit registry; CBC measures the coverage of credit bureau; IND_CRC_CBC measures the joint coverage by credit registry and credit bureau; CR measures the protection of creditors' rights as the time, in years, that creditors have to wait to recover their credit after a default; Firm- and loan-control variables, and borrower country, lender country, industry, time and firm effects are included in all the estimations, although we do not report their coefficients. T-statistics are in parentheses. * ** , * *, and * represent significance at the 1%, 5%, and 10% levels, respectively.

arrangers of the loan, while an increase of one standard deviation of CRC in column (5) of Table 8 is associated with a decrease of 0.62 in the number of lenders.

As for the effect of firm- and loan controls, loan concentration decreases with firm profitability, loan maturity and relationship loans. Additionally, the number of lenders increases with firm size and decreases with interest rate spread, while the concentration decreases with growth opportunities when the proxy is IHERF.

5. Robustness analysis

This section focuses on whether the composition of the sample could affect our results. The Dealscan database has a larger coverage of loans for US firms than non-US firms. In our sample, 62.63% of the loans are to US firms.⁹ Additionally, there are some countries not showing within-country variation for our proxies of credit information sharing, such as USA, Canada, Iceland, Ireland, Japan, Mexico, Norway and Luxembourg. We excluded countries not exhibiting within-country variation for credit information sharing from our sample and checked the robustness of our results.

The results are presented in Table 9. Our results are robust in regard to maturity (columns (3) and (4)), the number of lead arrangers (column (6)), the Herfindahl index (column (7)) and the number of banks participating in the loan (column (8)). In fact, the results show that credit information sharing decreases loan maturity, while the ownership concentration of the loans increases with credit information sharing. The coefficient for CBC is negative in column (1), revealing that the cost of bank loans decreases when the coverage by credit bureaus increases,

while in Table 4 this relationship only applies for high quality firms. The coefficient of CRC is negative in column (2), as it is in Table 5, suggesting that a greater degree of information sharing reduces the probability of pledging collateral. The main difference in the results when we exclude those countries not showing within-country variation for our proxies of credit information sharing is that the relationship between information sharing and loan amount is not statistically significant, while the relationship was negative with CBC in Table 6.

6. Conclusions

This paper shows that the degree of coverage of public credit registries and credit bureaus shapes the characteristics of bank loans. The use of borrower-level data instead of aggregated data allows us to test the direct effects of credit information sharing on loan characteristics. We also use straightforward measure of the cost of debt and other characteristics of bank loans. Additionally, we study how credit sharing information influences loan syndication structure. We consider a sample of 23,341 bank loans in 44 countries during the period 2005–2019 to analyze the influence of credit information sharing on interest rates, collateral, maturity, loan amounts, and the ownership structure of the bank loans.

A higher degree of sharing information between creditors is associated with a lower interest rate spread for high-quality borrowers. The existence of public registries reduces the probability of pledging collateral. Credit information sharing also reduces loan maturity for borrowers, regardless of their credit quality. This result is consistent with credit information sharing reducing the refinancing risk associated with short-term debt.

Credit sharing information also leads to reductions in the amount of bank loans, as increases in coverage by credit bureaus is associated with reductions in loan amounts. However, this effect disappears when

 $^{^{9}}$ Bae and Goyal (2009), for example, show that almost 70% of the loan tranches included in their sample correspond to US firms.

countries without cross-country variation for credit information sharing are excluded from the sample. Finally, our paper also shows that improvement in credit sharing information increases loan concentration, as the risk perceived by lenders is lower due to the reduction of asymmetric information.

Declaration of Competing Interest

There is no financial/personal interest or belief that could affect the objectivity of the authors.

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