Article

Financial Distress and Information Sharing: Evidences from the Italian Credit Register

Lucia Gibilaro [1] **and Gianluca Mattarocci** [2,*]

1   Department of Economics, Politics and Modern Languages, University LUMSA, 00133 Roma, Italy; l.gibilaro@lumsa.it
2   Department of Management and Law, University of Rome Tor Vergata, 00133 Roma, Italy
*   Correspondence: gianluca.mattarocci@uniroma2.it

Abstract: Credit risk exposure evaluation is driven by the quality of the information available on the debtors and customers with multiple lending exposures, which could be evaluated differently by different lenders. The existence of an information asymmetry among lenders can be mitigated using private information sharing instruments, such as the credit registers. The paper analyses the effect of information disclosure through credit registers and evaluates the impact of revising the amount of credit offered to customers served also by other lenders. The results show that the information available for each lender is different and after the disclosure of past due or a default status declared by a financial intermediary, all the other lenders react to the new information available.

Keywords: financial distress; credit registers; risk exposures

1. Introduction

The restructuring of distressed firms by banks can determine the relaxing or the tightening of the financial conditions or a combination of the two actions (Asquith et al. 1994). The success of a restructuring strategy for distressed firms is affected by the debt structure. The asymmetric distribution of information can determine inefficient negotiations in the case of multiple lenders (Bolton and Scharfstein 1996) with the same time horizons in financing the firm (Berglöf and Thadden 1994). A creditor will have less incentive to continue financing the debtor if it believes that other lenders will liquidate their credit exposure even if information shows that the project is viable and private signals are precise, causing a creditor run (Morris and Shin 2004) due to the lack of coordination among banks (Ongena and Smith 2000).

Increased information transparency among creditors reduces the probability that a bank evaluates customers that have multiple lending exposures differently (Anctil et al. 2004).

Among banks actively involved in relaxing the financial conditions for distressed firms, coordination problems arising from decentralized decisions can be addressed through the formation of explicit bank pools that coordinate the interests of the creditors (Brunner and Krahnen 2008). Without the creation of explicit bank pools, transparency among banks can be addressed through information sharing (Houston et al. 2010), representing an effective device against bank-lending corruption by the debtor to relax financial conditions (Barth et al. 2009), but due to the lack of incentives in bank-lending policy coordination, the effectiveness of the coordination mechanism could be affected. Among the few empirical studies on the role of the coordination mechanism and financial distress, Hertzberg et al. (2011) directly analyzed the impact of information sharing on the credit supply at debtor level for the Argentinian market, showing that a higher level of information sharing exacerbates the lenders' coordination and increases the risk of financial distress for the outstanding debtors.

The paper analyses the role of information sharing for evaluating the credit risk exposure for customers that have multiple lending exposures at the time of default, and it tests the hypothesis that the coordination mechanism through information sharing contributes to creditor run by aligning multiple lenders evaluations before the default classification of the debtor, as the private information a lender generates about a firm is less useful when the firm deals with multiple sources of financing (Cole 1998). Using a proprietary database provided by the Bank of Italy, and in light of the relevance of the type and accuracy of exchanged information on the volume of lending extended to debtors (Padilla and Pagano 2000), we empirically test the role of information sharing on the amount of lending extended by multiple lenders at each debtor, by controlling also for the role played by credit risk mitigations as the variability in collateral value affects the borrowing opportunities in an information sharing context (Bennardo et al. 2015).

Moreover, we analyze the impact of reporting different risk levels reflecting European prudential regulation for non-performing loans on the probability of classifying the debtor in default by each lender in a context of information sharing. The results show that the misalignment among the debtors' risk exposure evaluation is a standard condition for the market, but nearer to the default the degree of coordination increases. The amount of lending offered is affected partially by the disclosure of the default status and the effect is less significant, as expected, for guaranteed exposures. The existence of a lag by regulation for the information disclosure about customers' past due or restructuring has an impact on the debtor financial distress, but the reaction of the lenders depends on the severity of the debtor status, showing that they do not take care too much about short-term past due.

The paper is organized as follows: Section 2 highlights the main contributions related to the credit registers and information disclosure effects on the banks' coordination mechanism, while Section 3 presents the empirical analysis on the Italian credit register data. The last section summarizes the main results and highlights the implications for the financial industry.

2. Literature Review

Credit registers collect and ensure the exchange of positive and negative information on the reported lending relationship (Miller 2003). By taking part in mandatory credit registers, banks share their private information (Pagano and Jappelli 1993) that, together with public information, drives credit risk evaluation in relationship banking (Berger and Udell 1995) and it determines which loan applicants should be extended credit, as well the amount of credit (Shaw and Gentry 1988). In a standard credit facility, a borrower may take down any amount of credit up to the commitment (Melnik and Plaut 1986). The commitment represents the output of the credit risk evaluation process conditioned on the borrower specific variables, which for the financial creditors (Liberti and Mian 2009) reflects both standardized and soft information (Karapetyan and Stacescu 2014), and the issuing bank can deny credit if such information shows that the borrower's financial conditions have changed in a material way (Shockley and Thakor 1997).

Banks are affected by herding behavior and the lending policy of one financial institutions policy may be affected by other lenders' behavior, and information sharing will increase the opportunity that different banks may have access to the same level of information (Haiss 2010). Studies on performing firms point out the linkage between the opportunities related to information sharing and the value of the customer relationship, underlying the degree of coordination among banks could be different in light of the relevance of the borrowers' mobility (Brown and Zehnder 2010), loyalty (Bennardo et al. 2015) and the frequency of roll over in the lenders' credit exposure (He and Xiong 2012), while financiers continue to ask for guarantees also in an information sharing context (Doblas-Madrid and Minetti 2013) as credit registers appear irrelevant in determining loan contract terms (Qian and Strahan 2007). When a debtor enters the distressed status, Hubert and Schäfer (2002) show that each bank has an incentive to promote preemptive actions before other creditors in order to minimize the risk of losses, starting the recovery process

or reducing the exposure before the default becomes public. Brunner and Krahnen (2008) identify the requirements for successful explicit coordination among creditors on the basis of the credit exposure types and the distressed debtors' characteristics. So far, the role of information sharing and the coordination mechanism in the case of financial distress has received limited empirical investigation. Hertzberg et al. (2011) presents the first paper that analyses directly the impact of the information sharing rules on the credit supply considering the Argentinian Public Credit Register as a case study, and the results highlight that higher levels of information sharing exacerbates the lender coordination and increases the risk of financial distress as distressed debtors will be prevented from switching toward new lenders (Bouckaert and Degryse 2006).

Moreover, the literature highlights that the value of the information related to a past due or a default is affected by the concentration of the debt exposure (Bonfim et al. 2012) and a distress with respect to the main lender is normally a signal of probable default of the debtor (Bris and Welch 2005), even though sharing hard information incentives lenders to acquire additional soft information to evaluate the debtor (Karapetyan and Stacescu 2014).

3. Empirical Analysis

3.1. Sample

Our sample is a proprietary database provided by Centrale dei Rischi, the public credit register managed by the Bank of Italy, which collects for each monthly data supplied by banks and financial companies about the credit grant to their customers, and considers all the lenders (banks, factoring companies, leasing companies, etc.) authorized to offer loans in Italy (Italian and foreign ones). Centrale dei Rischi is one of the most complete databases on business loans worldwide, owned by a public credit register (Jappelli and Pagano 2003), because it collects credit exposures accounting for more than 30,000 euros (Banca d'Italia 1991). The information reported by individual financial intermediaries are aggregated for each debtor and disclosed to the banking system two months later with respect to the reporting date (Banca d'Italia 2015). The dataset contains information on a five-years horizon (2006–2010), with the monthly utilization of self-liquidating debt and callable loans by firms featuring multiple credit relationships that entered default status at the end of the period (2010)[1].

For each counterparty, we collect all the information related to exposure with respect to the overall banking system on a monthly basis and we were able to classify these exposures on the basis of the reporting bank, type of credit, and guarantee (Table 1).

Table 1. Sample description.

	Counterparties	Number of Contracts	Number of Banks for Each Customer			Real Guarantee		Type	
			Min	Mean	Max	% With	% Without	% Self-Liquidating	% Callable
2006	77,745	406,789	1	2.92	47	4.54%	95.46%	43.47%	56.53%
2007	86,086	447,427	1	2.94	46	4.57%	95.43%	43.11%	56.89%
2008	91,187	455,008	1	2.88	47	4.87%	95.13%	42.77%	57.23%
2009	107,575	522,242	1	2.95	44	4.77%	95.33%	39.39%	60.61%
2010	96,872	430,099	1	2.76	44	4.86%	95.14%	38.02%	61.98%

Source: Bank of Italy data processed by the authors.

For each year the sample includes more than 77,000 counterparties for an overall number of lending contracts higher than 406,000; therefore, the sample is wider compared with previous studies testing the creditors run through a credit register (e.g., Hertzberg et al. 2011).

The average number of lenders for each customer is greater than two but varies significantly among firms. In fact, in each year the sample includes companies with exposures with only one bank at least and borrowers that collect money from more than 40 lenders in the same month. Following Angelini et al. (1998), the number of lenders could be considered a proxy of bank firm relationships; the wide range of bank relationships for each firm in the sample contrasts with the assumption that multiple banking relationships affect the probability of default, since a large number of creditors decreases the company's incentives

to default strategically (Bolton and Scharfstein 1996). Unlike Hertzberg et al. (2011), we do not find empirical evidence that information sharing causes the increase in the lenders concentration of distressed debtors.

The exposures considered are frequently not guaranteed because the lending policy of the committed lines normally do not frequently request a personal guarantee and, in the sample, real guarantees are offered only for less than 5% of the sample. Even though banks request ex ante riskier borrowers to pledge collateral (Berger and Udell 1990) for reducing the expected losses in the event of default (Jiménez and Saurina 2004), the low relevance in the sample of mitigated self-liquidating and callable loans is coherent with the type of analyzed exposures belonging to short-term loans for which contractual terms are mainly determined by the nature of the transaction (Jiménez et al. 2006) and with the attitude to pledge collateral mainly in favor of the main bank in a multiple lending environment (Ono and Uesugi 2009). Notwithstanding the approaching of the default classification, banks do not increase the usage of real collaterals to secure the exposure to reduce the loss given default (Grunert and Weber 2009), showing that both the expectation that the distressed borrower will be unable to provide new collateral as most of his wealth has already been pledged (Chen 2006) and the potential fraudulent conveyance suits by other creditors (Hart and Zingales 2011) matter in the enhancing of credit risk mitigation.

All the contracts in our sample can be classified as either self-liquidating exposures or callable loans and, on the basis of the amount of exposure related to each type of contract, the relevance of the different contract types is comparable even if callable solutions are always more relevant (10–20%) than self-liquidating ones, showing that repeated interactions featuring trade credit financing allows to monitor the borrowers' payment behavior and reduce the exposure before the default (Brown and Zehnder 2007).

For each contract we have the monthly status of the exposure (in bonis vs. default[2]) assigned by each of the lenders and the comparison of the risk evaluation made by all the lenders of the same customers, which demonstrates that a misalignment exists between them, and the role of these differences changes near to the default classification and with respect to the number of lenders (Table 2).

Table 2. Classification misalignment over time for customer with different numbers of outstanding lenders.

N° Lender	Risk Evaluation	Years to Default									
		5 Years		4 Years		3 Years		2 Years		1 Year	
		N	%	N	%	N	%	N	%	N	%
Two	Aligned	18,163	95.61%	20,723	95.14%	21,946	92.80%	28,722	81.55%	22,955	76.10%
	Misaligned	833	4.39%	1058	4.86%	1702	7.20%	6500	18.45%	7209	23.90%
Three	Aligned	10,957	95.69%	12,183	95.42%	12,827	92.98%	16,090	82.17%	12,536	78.47%
	Misaligned	494	4.31%	585	4.58%	969	7.02%	3941	17.83%	3439	21.53%
Four	Aligned	6620	96.39%	7352	96.08%	7613	93.64%	7016	79.51%	7026	80.28%
	Misaligned	248	3.61%	300	3.92%	517	6.36%	1808	20.49%	1726	19.72%
Five	Aligned	4254	96.16%	4375	96.26%	4733	94.25%	5191	83.73%	4015	81.82%
	Misaligned	170	3.84%	170	3.74%	289	5.75%	1009	16.27%	892	18.18%
More	Aligned	8689	97.09%	10,119	97.03%	9853	95.10%	9347	85.73%	7428	82.53%
	Misaligned	269	2.91%	310	2.97%	508	4.90%	1556	14.27%	1572	17.47%

Source: Bank of Italy data processed by the authors.

The incidence of the misalignment increases with the approaching of the default classification, showing that in the financial relationship the default classification is affected by the type of facility relationship, and the default status evaluates the debtors default risk differently. The degree of misalignment among the lenders' judgment increases near to the default of the customer and the evidence is clearer for the customers that have only 2–3 reference banks (moving from less than 5% five years before the default to more than 21% the year before the default), while debtors that are using a diversified set of lenders are less frequently evaluated differently by the banks. The results shown are consistent with the hypothesis that in a relationship lending scenario featured by the concentration of financial debt toward a few or one reference lender (Petersen and Rajan 1994), some of

the lenders can have an information advantage with respect to others in developing soft information (Boot and Thakor 2000), while in other transaction lending relationships the information set is mainly represented by hard data (Berger and Udell 2006) available to most lenders (Udell 2008) and our empirical evidences show that evaluation differences are less frequent. Moreover, the higher the number of lenders the lower the incidence of misalignment; in light of the hypothesis that the number of credit relationships proxies the firm's quality (Foglia et al. 1998), the results show that for poor quality counterparties, banks share the evaluation of the distress.

A preliminary analysis of the data considers the differences in the exposure, the number of lenders, the exposure with respect to the main lender and the percentage of guaranteed debt between the origination date and past due or overdraft event date, after the past due or overdraft date and before the disclosure date to other lenders, taking place after two months, and in the remaining years before entering the default permanently (Table 3).

Table 3. Lending policy and past due.

Time Horizon	Stats	Total Debt Outstanding (000€)	Number of Lenders	Debt Concentration (HHI)	Role of the Main Bank (%)	Collateral/Debt
Before Past due	Mean	95.86	2.56	50.32%	69.31%	6.22%
	Median	139.15	2.00	50.01%	67.16%	0.00%
	Dev. St.	787.13	2.63	36.41%	26.13%	19.01%
Past due event not disclosed	Mean	121.22	2.95	52.71%	67.21%	6.55%
	Median	192.21	2.00	50.23%	64.20%	0.00%
	Dev. St.	891.08	2.76	33.72%	25.97%	19.26%
After past due disclosure	Mean	122.13	2.92	52.30%	67.12%	6.59%
	Median	191.17	2.00	50.15%	64.11%	0.00%
	Dev. St.	894.01	2.77	33.85%	25.98%	19.33%

Source: Bank of Italy data processed by the authors.

The summary statistics show that a debtor normally experiences a past due when the exposure is higher than the average (€121,220 with respect to €95,860) and in order to reach the target of higher leverage, normally the policy adopted is to increase the number of lenders (2.95 with respect to 2.56), reduce the exposure with respect to the main lender (from 69.31% to 67.12%), increase the exposure with respect to another lender (the HHI index increases from 50.32% to 52.71%) and offer a higher amount of real guarantees (the average guarantees goes from 6.22% to 6.55%).

When the past-due disclosure is altered, the average number of lenders shows a small decrease (2.92 vs. 2.95), the average debt outstanding remains the same, the role of the main lender is stable (67.12% vs. 67.21%), but the concentration of the exposure decreases (52.30% vs. 52.71%) and the percentage of real guarantee increases (6.55% vs. 6.59%).

3.2. Methodology

The analysis of the information sharing starts from the model proposed by Hertzberg et al. (2011), which evaluates the impact of private information disclosure on the amount of lending. In our framework, the analysis is focused on the change in the lending policy for a borrower when it experiences the first past-due event and when this information is disclosed to all other lenders (Figure 1).
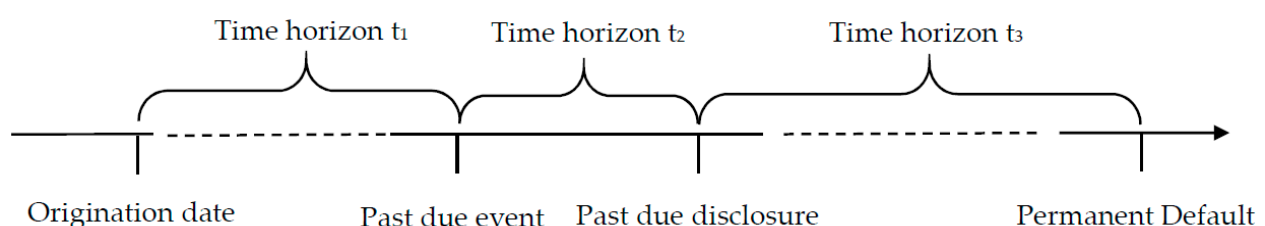

Figure 1. Timeframe of the analysis.

The approach used is a panel linear regression model (fixed effects) in which we adopt a difference-in-differences specification by considering the time lag between the default and the default disclosure[3]. Additionally, in light of the importance of the information provided by the main lender on market reactions (Bris and Welch 2005), we perform the analysis only for the other lenders in the financial system. In the following formula:

$$\ln(Debt_{it}) = \alpha_i + \vartheta_{it} + \gamma_{DP}Threat_{it}DP_{it} + \gamma_{DD}Threat_{it}DD_{it} + \varepsilon \tag{1}$$

$$\ln(DebtOther_{it}) = \alpha_i + \vartheta_{it} + \gamma_{DP}Threat_{it}DP_{it} + \gamma_{DD}Threat_{it}DD_{it} + \varepsilon, \tag{2}$$

where the dependent variable is the log of debt of the firm, i, in the month, t, with respect to the overall financial system ($Debt_{it}$) and all the lenders excluding the main lender ($DebtOther_{it}$). The right-hand variables include both a time and fixed firm effects (ϑ_{it}). The dummy, $Threat_{it}$, is equal to one if the firm is classified as defaulted by at least one lender. The specification includes the interactions between this variable and (1) a dummy equal to one when the default occurs and is still not disclosed to other banks through the credit register (DP or default period), and (2) a dummy equal to one after two months from the default (DD or disclosing period). The coefficient on the first interaction, γ_{DP}, is the DP estimate of the effect of a default, holding available firm information constant. The coefficient γ_{DD} measures the average effect of the default disclosure after two months from the default due the credit register regulation on the data dissemination.

In order to consider the different risks that characterize the banks that experienced past due or defaults with respect to the banking systems, new lenders may require a higher amount of covenants or guarantees (Rajan and Winton 1995). If the firm is able to provide the guarantees requested, the amount of credit offered can be not influenced by the bad credit history of the debtor. In order to the test this assumption we replicate the analysis proposed in the Equations (1) and (2) using only the not-guaranteed debt. In the following formulas:

$$\ln(NGDebt_{it}) = \alpha_i + \vartheta_{it} + \gamma_{DP}Threat_{it}DP_{it} + \gamma_{DD}Threat_{it}DD_{it} + \varepsilon \tag{3}$$

$$\ln(NGDebtOther_{it}) = \alpha_i + \vartheta_{it} + \gamma_{DP}Threat_{it}DP_{it} + \gamma_{DD}Threat_{it}DD_{it} + \varepsilon, \tag{4}$$

where the dependent variable is alternatively the amount of credit non-guaranteed offered by any lender to the i-customer at time t (3) or the amount of credit not-guaranteed offered by any other lender to the i-customer at time t (4); all the other variables are defined coherently with Equations (1) and (2).

The last analysis considers the impact of information sharing on the customer credit worthiness because of changes in the available lending. According to the Italian prudential regulation, different risk classifications are considered (90 days past due or in an overdraft for more than 90 days, 180 days past due or in an overdraft for more than 180 days and restructured) to analyze the role of information sharing by the severity of the bad information being reported and disclosed on the probability of default through the following models:

$$DD_{it}^k = \alpha_i + \vartheta_{it} + \gamma_{DP}Threat_{it}OtherDP_{it}^{90gg} + \gamma_{DD}Threat_{it}OtherDD_{it}^{90GG} + \varepsilon_{it} \tag{5}$$

$$DD_{it}^k = \alpha_i + \vartheta_{it} + \gamma_{DP}Threat_{it}OtherDP_{it}^{180gg} + \gamma_{DD}Threat_{it}OtherDD_{it}^{180GG} + \varepsilon_{it}. \tag{6}$$

The left-hand-side variable is a dummy equal to zero as long as firm i's debt is not restructured for the bank k; it turns to one at default. The specification includes the interactions between the threat variable and (1) a dummy equal to one when the default occurs for other banks and a dummy equal to one after two months from its disclosure (default defined as a past due of 90 days or in an overdraft for more than 90 days in Equation (5), and 180 days past due or in an overdraft for more than 180 days in Equation (6)).

3.3. Results

The analysis of the credit exposure and the information sharing shows some interesting results for past dues both at the reporting and disclosure date (Table 4).

Table 4. Credit exposure and information sharing.

		$Threat_{it}$ DP	$Threat_{it}$ DD	Constant	Time Dummies	Firm Dummies	Obs.	R^2
$\ln(Debt_{it})$	Five YTD	0.30 **	0.31 **	11.98 **	☑	☑	59,013	0.42
	Four YTD	0.21 **	0.21 **	12.27 **	☑	☑	59,273	0.30
	Three YTD	−0.11 **	−0.11 **	12.31 **	☑	☑	64,978	0.32
	Two YTD	−0.11 **	−0.12 **	12.22 **	☑	☑	73,879	0.31
	Default Year	−0.23 **	−0.21 **	11.98 **	☑	☑	73,062	0.30
$\ln(Debt\ Other_{it})$	Five YTD	0.20	0.40	9.97 **	☑	☑	20,132	0.20
	Four YTD	0.10	0.14	10.03 **	☑	☑	22,017	0.16
	Three YTD	−0.12	−0.12 *	10.27 **	☑	☑	28,061	0.11
	Two YTD	−0.11 **	−0.21 **	10.47 **	☑	☑	53,297	0.11
	Default Year	−0.10	−0.11	10.61 **	☑	☑	59,984	0.13

* Statistical significant at 99% level and * Statistical significant at 95% level. Source: Bank of Italy data processed by the authors.

The results show that the past due or restructuring status mostly affects the years nearer to the entering of the default status permanently, while four of the five years before it, the default event and its disclosure have a limited effect on the amount of credit and, notably, the main lender tries to support the borrower by increasing the amount of credit offered to overcome the temporary crisis. Starting from three years before the entering of the default status permanently, banks adopt a stricter lending policy and react by reducing the credit exposure (−23% for the overall lending at the default year). Nonetheless, the main lender exhibits significant reactions to the reported default events all over the analyzed period, thus the changes in the lending policy do not drive to the termination of the financial relationship before the customer enters the default status permanently. Independently of the year considered, the herding incentive appears to prevail when considering the entire financial system. Focusing on the other lenders, the reporting and the disclosure of default events are significant only two years before the entering of the default status permanently, attesting a different weight given by creditors to information depending on the originator. Moreover, it can be observed that the higher the number of exposures, the more significant the effect of the dissemination of bad information on the available funding. Finally, the analysis of the amount of credit offered by the system to debtors experiencing past due or restructuring status demonstrates that at lender level the creditor run hypothesis is not verified, but for years close to the entering of the default status permanently it is able to predict the previous acquisition of guarantees (Elsas and Krahnen 2002), while the disclosure of the default classification is significant for all given years giving relevance of the publicity multiplier of information (Cornand and Heinemann 2008), especially when the information disclosed is originated also by the main lender.

The results related only to the not-guaranteed credits (Table 5) confirm the previous results, even though some differences emerge. When the entire financial system is considered, the reporting of the default status determines an expansion of the lending toward the customer, while the disclosure is prevalently associated with a reduction in the exposure. Only when the debtor is entering the default status permanently, both the reporting and the disclosure of a default event drive to the reduction in the available lending for the customer. When the main lender is excluded, other lenders are more interested to offer loans without guarantees in order to acquire a new customer or to strengthen the customer relationship lending, and they do not significantly reduce the amount offered after the default event or the default disclosure. This finding points out that, excluding the main lender, other

lenders are not encouraged to prematurely liquidate debtor's projects to realize the residual value of the collateral (Franks and Sussman 2005).

Table 5. Not guaranteed credit exposure and the impact of information sharing.

		$Threat_{it}$ $OtherDP$	$Threat_{it}$ $OtherDD$	Constant	Time Dummies	Firm Dummies	Obs.	R^2
$\ln(NGDebt_{it})$	Five YTD	0.21 **	−0.11 **	12.17 **	☑	☑	59,013	0.18
	Four YTD	0.11 **	−0.11 **	12.20 **	☑	☑	64,768	0.14
	Three YTD	0.11 **	−0.11 **	12.25 **	☑	☑	67,850	0.18
	Two YTD	−0.11 **	−0.11 **	12.12 **	☑	☑	73,964	0.17
	Default Year	−0.22 **	−0.21 **	11.87 **	☑	☑	72,919	0.13
$\ln(NGDebt\ Other_{it})$	Five YTD	0.11	0.44 **	9.91 **	☑	☑	18,153	0.14
	Four YTD	0.11	0.22 *	9.94 **	☑	☑	19,840	0.17
	Three YTD	0.11	0.10	10.18 **	☑	☑	25,662	0.10
	Two YTD	0.11 **	0.20 **	10.38 **	☑	☑	50,238	0.11
	Default Year	−0.11	0.00	10.52 **	☑	☑	55,886	0.11

** Statistical significant at 99% level and * Statistical significant at 95% level. Source: Bank of Italy data processed by the authors.

Considering the different regulatory risk classifications, it is possible to identify the role of past-due information in forecasting defaults (Table 6).

Table 6. Default hazard rate and information disclosure.

	Time Horizon									
	Five YTD		Four YTD		Three YTD		Two YTD		Default Year	
	(5)	(6)	(5)	(6)	(5)	(6)	(5)	(6)	(5)	(6)
$Threat_{it}OtherDP_{it}^{180gg}$		−0.76 **		−0.52 **		−0.41 **		−0.28 **		−0.40 **
$Threat_{it}OtherDP_{it}^{90gg}$	0.90 **		0.83 **		0.04		0.48 **		0.05	
$Threat_{it}OtherDD_{it}^{180GG}$		2.18 **		2.11 **		2.00 **		1.73 **		1.64 **
$Threat_{it}OtherDD_{it}^{90GG}$	0.63 *		−0.13		0.80 **		−0.04		0.23 **	
Constant	−2.76 **	−3.10 **	−3.02 **	−3.03 **	−3.01 **	−2.86 **	−2.35 **	−2.41 **	−2.14 **	−2.35 **
Time Dummies	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Firm Dummies	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Observations	59,013	59,013	59,273	59,273	64,978	64,978	73,879	73,879	73,062	73,062
Chi^2	473.89 **	209.35 **	27.26 **	253.37 **	54.25 **	316.74 **	37.45	649.20 **	11.61 **	760.00 **

** Statistical significant at 99% level and * Statistical significant at 95% level. Source: Bank of Italy data processed by the authors.

The data show that the past-due status declared by another lender affects significantly the default status declared by a lender, especially nearer to the entering of the default status permanently and for long-term past dues/overdrafts. The analysis of 90 days of past dues and overdrafts does not provide the same results especially demonstrating that the debtors' risk profile for the banking system is not affected by such short-term liquidity problems. The analysis of the 180 days past dues/overdrafts demonstrates that objective risk assumed by the lenders is not perceived in the same way by all the lenders (the probability of default assignment is negative affected) due to the high monitoring costs associated with multiple credit relationships (Carletti et al. 2007), while the default disclosure speeds up the default declaration by other lenders to terminate the financial relationship with the distressed debtor (Koziol 2006).

Because the borrowers' exposure reported in the credit registers is affected by the type and the accuracy of the information exchanged by the creditors (Padilla and Pagano 2000), our results show a higher magnitude of the disclosing of the default status on the credit availability and a higher default hazard rate at debtor level than the creditor run compared

with Hertzberg et al. (2011). Moreover, our results show that the reaction of other banks is not generally driven by the nature of the information being disclosed, which is bad/good, but the severity of the informational content affects the reactions. Because the information content is precise, the information publicity does not reduce the ex ante welfare (Cornand and Heinemann 2008).

4. Conclusions

Financially distressed firms are exposed to creditor run. Lenders can obtain signals on other lenders' actions toward the financially distressed counterparty through the participation in credit registers. As a matter of fact, they are created for supporting the access to credit in the market to foster proper allocation of scarce resources available for lenders. During the financial crisis, banks' failures ascribed to improper risk evaluation of debtors demonstrate the usefulness of any instrument available for supporting the information sharing mitigating information asymmetries and favoring the proper evaluation of counterparty risks.

Empirical evidence shows that information asymmetry can affect significantly the lending policy adopted by financial intermediaries, which frequently assign a different level of risk for the same debtor who has multiple exposures with respect to the system. The disclosure of past dues related to existing financial exposure affects significantly both the size of the exposure and the counterparty risk evaluation, demonstrating that the existence of a credit register reduces the risk assumed by the lenders. Nonetheless, the reaction of the lender is affected by the severity of the information being disclosed, showing the irrelevance of short-term past dues.

Our results are relevant in different perspectives. First of all, they contribute to the impact of information sharing and financial distress in an ongoing concern, so interpretation of the results is not affected by the variations in the reporting framework; secondly, they offer novel evidence on the relationship between the information publicity multiplier and the information content in the banking system; and lastly, the paper contributes to the relationship between multiple lenders and the calibration of the exposure for distressed debtors before the default classification.

A further analysis on the characteristics of the lender, who is able to identify in advance the risk of the debtors, may allow to test empirically the assumption of a different coordination incentive based on specific features of the creditor in an information sharing context where creditors invest in soft information. Moreover, an analysis of the type of contracts established with defaulted counterparties may allow evaluating if those near to the default debtors are able or not to take advantage of the information asymmetry context in order to raise money only from lenders that have the lower quality set of information available. Finally, an analysis of the tenure of a loan may be interesting in order to identify which time horizon of credit line will be affected the most from a default of a borrower with respect to one of its lenders.

Notes

1. According to the regulation of Centrale dei Rischi in force at the time of the sample collection (Banca d'Italia 1991), an exposure is classified in the default status when the classification variable "relationship status" takes on different domains from "other credits", therefore it encompasses the following: doubtful loans; restructured loans; doubtful loans—past due and overdue credits by more than 90 days and not more than 180; doubtful loans—past due and overdue credits loans past due for more than 180 days; doubtful loans—restructured loans; not doubtful loans—loans past due or overdue more than 90 days and not more than 180 days; not doubtful loans—loans past due for more than 180 days. Data provided externally for research purpose normally have some years of lags with respect to the last available ones, and so at the time of the database construction the mot updated information provided was related to 2010.

2. The default status used for Table 2 includes both the past dues and overdrafts (90 or 180 days) and the restructured credits;

3. The panel data regression model is necessary in order to consider the heterogeneity of the sample on the basis of the debtor and the time of the event because customers in the sample may be have different fundamentals (like total assets, revenue, etc.) that may affect their access to the credit market and even in the five-year horizon considered for the analysis the market, conditions are slightly different month by month and they may affect the frequently of past dues and overdraft.Data on the dependent variables used in the analysis are winsorized in order to avoid some outliers (threshold 99%).

References

Anctil, Regina M., John Dickhaut, Chandra Kanodia, and Brian Shapiro. 2004. Information transparency and coordination failure: Theory and experiment. *Journal of Accounting Research* 42: 159–95. [CrossRef]

Angelini, Paolo, Roberto Di Salvo, and Giovanni Ferri. 1998. Availability and cost of credit for small businesses: Customer relationships and credit cooperatives. *Journal of Banking and Finance* 22: 925–54. [CrossRef]

Asquith, Paul, Robert Gertner, and David Scharfstein. 1994. Anatomy of Financial Distress: An Examination of Junk-bond Issuers. *Quarterly Journal of Economics* 109: 625–58. [CrossRef]

Banca d'Italia. 1991. Centrale dei Rischi. Istruzioni per gli Intermediari Creditizi, Circular no.139 and further updates. Available online: https://www.bancaditalia.it/compiti/vigilanza/normativa/archivio-norme/circolari/c139/index.html (accessed on 1 May 2021).

Banca d'Italia. 2015. Foglio Informativo, Centrale dei Rischi. Available online: www.bancaditalia.it (accessed on 1 May 2021).

Barth, James R., Chen Lin, Ping Lin, and Frank M. Song. 2009. Corruption in bank lending to firms: Cross-country micro evidence on the beneficial role of competition and information sharing. *Journal of Financial Econom.* [CrossRef]

Bennardo, Alberto, Marco Pagano, and Salvatore Piccolo. 2015. Multiple Bank Lending, Creditor Rights, and Information Sharing. *Review of Finance* 19: 519–70. [CrossRef]

Berger, Allen N., and Gregory F. Udell. 1990. Collateral, loan quality and bank risk. *Journal of Monetary Economics* 25: 21–42. [CrossRef]

Berger, Allen N., and Gregory F. Udell. 1995. Relationship Lending and Lines of Credit in Small Firm Finance. *Journal of Business* 68: 351–81. [CrossRef]

Berger, Allen N., and Gregory F. Udell. 2006. A more complete conceptual framework for SME finance. *Journal of Banking and Finance* 30: 2945–66. [CrossRef]

Berglöf, Erik, and Ernst-Ludwig Von Thadden. 1994. Short-term versus long-term interests: Capital structure with multiple investors. *Quarterly Journal of Economics* 109: 1055–84. [CrossRef]

Bolton, Patrick, and David S. Scharfstein. 1996. Optimal Debt Structure and the Number of Creditors. *Journal of Political Economy* 104: 1–25. [CrossRef]

Bonfim, Diana, Daniel A. Dias, and Christine Richmond. 2012. What happens after corporate default? Stylized facts on access to credit. *Journal of Banking & Finance* 36: 2007–25.

Boot, Arnoud W. A., and Anjan V. Thakor. 2000. Can relationship banking survive competition? *Journal of Finance* 55: 679–713. [CrossRef]

Bouckaert, Jan, and Hans Degryse. 2006. Entry and strategic information display in credits market. *Economic Journal* 116: 702–20. [CrossRef]

Bris, Arturo, and Ivo Welch. 2005. The optimal concentration of creditors. *Journal of Finance* 60: 2193–212. [CrossRef]

Brown, Martin, and Christian Zehnder. 2007. Credit Reporting, Relationship Banking, and Loan Repayment. *Journal of Money, Credit and Banking* 39: 1883–918. [CrossRef]

Brown, Martin, and Christian Zehnder. 2010. The emergence of information sharing in credit markets. *Journal of Financial Intermediation* 19: 255–78. [CrossRef]

Brunner, Antje, and Jan Pieter Krahnen. 2008. Multiple lenders and corporate distress: Evidence on debt restructuring. *Review of Economic Studies* 75: 415–42. [CrossRef]

Carletti, Elena, Vittoria Cerasi, and Sonja Daltung. 2007. Multiple-bank lending: Diversification and free-riding in monitoring. *Journal of Financial Intermediation* 16: 425–51. [CrossRef]

Chen, Yehning. 2006. Collateral, loan guarantees, and the lenders' incentives to resolve financial distress. *Quarterly Review of Economics and Finance* 46: 1–15. [CrossRef]

Cole, Rebel A. 1998. The importance of relationships to the availability of credit. *Journal of Banking and Finance* 22: 959–77. [CrossRef]

Cornand, Camille, and Frank Heinemann. 2008. Optimal degree of public information dissemination. *Economic Journal* 118: 718–42. [CrossRef]

Doblas-Madrid, Antonio, and Raoul Minetti. 2013. Sharing information in the credit market: Contract-level Grunert evidence from U.S. firms. *Journal of Financial Economics* 109: 198–223. [CrossRef]

Elsas, Ralf, and Jan Pieter Krahnen. 2002. *Collateral, Relationship Lending and Financial Distress: An Empirical Study on Financial Contracting.* CFS Working Paper, no. 17. Frankfurt am Main, Germany: Goethe-Universität.

Foglia, Antonella, Sebastiano Laviola, and P. Marullo Reedtz. 1998. Multiple banking relationships and the fragility of corporate borrowers. *Journal of Banking and Finance* 22: 1441–56. [CrossRef]

Franks, Julian, and Oren Sussman. 2005. Financial Distress and Bank Restructuring of Small to Medium Size UK Companies. *Review of Finance* 9: 65–96. [CrossRef]

Grunert, Jens, and Martin Weber. 2009. Recovery rates of commercial lending: Empirical evidence for German companies. *Journal of Banking and Finance* 33: 505–13. [CrossRef]

Haiss, Peter. 2010. Bank herding and incentive systems as catalysts for the financial crisis. *IUP Journal of Behavioral Finance* 7: 30–58.

Hart, Oliver, and Luigi Zingales. 2011. A New Capital Regulation for Large Financial Institutions. *American Law and Economics Review* 13: 453–90. [CrossRef]

He, Zhiguo, and Wei Xiong. 2012. Dynamic debt runs. *Review of Financial Studies* 25: 1799–843. [CrossRef]

Hertzberg, Andrew, Jose Maria Liberti, and Daniel Paravisini. 2011. Public Information and Coordination: Evidence from a Credit Registry Expansion. *Journal of Finance* 66: 379–412. [CrossRef]

Houston, Joel F., Chen Lin, Ping Lin, and Yue Ma. 2010. Creditor rights, information sharing, and bank risk taking. *Journal of Financial Economics* 96: 485–512. [CrossRef]

Hubert, Franz, and Dorothea Schäfer. 2002. Coordination failure with multiple-source lending: The cost of protection against a powerful lender. *Journal of Institutional and Theoretical Economics* 158: 256–75. [CrossRef]

Jappelli, Tullio, and Marco Pagano. 2003. Public Information: A European Perspective. In *Credit Reporting Systems and the International Economy*. Edited by Margaret J. Miller. Cambridge: MIT Press.

Jiménez, Gabriel, and Jesus Saurina. 2004. Collateral, type of lender and relationship banking as determinants of credit risk. *Journal of Banking and Finance* 28: 2191–212. [CrossRef]

Jiménez, Gabriel, Vicente Salas, and Jesús Saurina. 2006. Determinants of collateral. *Journal of Financial Economics* 81: 255–81. [CrossRef]

Karapetyan, Artashes, and Bogdan Stacescu. 2014. Information sharing and information acquisition in credit markets. *Review of Finance* 18: 1583–615. [CrossRef]

Koziol, Christian. 2006. When does single-source versus multiple-source lending matter? *International Journal of Managerial Finance* 2: 19–48. [CrossRef]

Liberti, Jose M., and Atif R. Mian. 2009. Estimating the Effect of Hierarchies on Information Use. *Review of Financial Studies* 22: 4058–90. [CrossRef]

Melnik, Arie, and Steven Plaut. 1986. Loan commitment contracts, terms of lending, and credit allocation. *Journal of Finance* 41: 425–35. [CrossRef]

Miller, Margaret. 2003. Credit Reporting System around the Globe: The State of the Art in Public Credit Registries and Private Credit Reporting. In *Credit Reporting Systems and the International Economy*. Edited by Margaret J. Miller. Cambridge: MIT Press.

Morris, Stephen, and Hyun Song Shin. 2004. Coordination risk and the price of debt. *European Economic Review* 48: 133–53. [CrossRef]

Ongena, Steven, and David C. Smith. 2000. What Determines the Number of Bank Relationships? Cross-Country Evidence. *Journal of Financial Intermediation* 9: 26–56. [CrossRef]

Ono, Arito, and Iichiro Uesugi. 2009. Role of Collateral and Personal Guarantees in Relationship Lending: Evidence from Japan's SME Loan Market. *Journal of Money, Credit and Banking* 41: 935–60. [CrossRef]

Padilla, A. Jorge, and Marco Pagano. 2000. Sharing default information as a borrower discipline device. *European Economic Review* 44: 1981–50. [CrossRef]

Pagano, Marco, and Tullio Jappelli. 1993. Information sharing in credit markets. *Journal of Finance* 48: 1693–718. [CrossRef]

Petersen, Mitchell A., and Raghuram G. Rajan. 1994. The Benefits of Lending Relationships: Evidence from Small Business Data. *Journal of Finance* 49: 2–37. [CrossRef]

Qian, Jun, and Philip E. Strahan. 2007. How laws and institutions shape financial contracts: The case of bank loans. *Journal of Finance* 62: 2803–34. [CrossRef]

Rajan, Raghuram, and Andrew Winton. 1995. Covenants and collateral as incentives to monitor. *Journal of Finance* 50: 1113–46. [CrossRef]

Shaw, Michael J., and James A. Gentry. 1988. Using an expert system with inductive learning to evaluate business loans. *Financial Management* 17: 45–56. [CrossRef]

Shockley, Richard L., and Anjan V. Thakor. 1997. Bank Loan Commitment Contracts: Data, Theory, and Tests. *Journal of Money, Credit and Banking* 29: 517–34. [CrossRef]

Udell, Gregory F. 2008. What's in a relationship? The case of commercial lending. *Business Horizons* 51: 93–103. [CrossRef]