

# The Impact of Information Sharing on the Use of Collateral versus Guarantees

Ralph De Haas and Matteo Millone

## Abstract

This study exploits contract-level data from Bosnia and Herzegovina to assess the impact of a new credit registry on the use of borrower collateral versus third-party guarantees. Among first-time borrowers, the introduction of mandatory information sharing leads to a shift from collateral to guarantees, in particular for riskier borrowers. Among repeat borrowers, both collateral and guarantee requirements decline in proportion to the length of the lending relationship. These results suggest that information sharing can both reduce adverse selection among new borrowers and hold-up problems among repeat borrowers.

**JEL classification:** D04, D82, G21, G28

**Keywords:** information sharing, collateral, guarantees

## 1. Introduction

Most small-business lenders require borrowers to pledge real estate, moveable assets, or some other form of collateral. Economic theory suggests two reasons for doing so. First, when borrower quality is unobservable, safe borrowers may pledge collateral to signal their quality (Besanko and Thakor 1987). Second, when quality is observable, collateral boosts borrower effort and discourages strategic default (Boot, Thakor, and Udell 1991). If the first mechanism dominates, riskier borrowers put up less collateral. If the second effect dominates, they pledge more.

Not all potential borrowers have assets to pledge, and even low-risk borrowers can therefore be credit constrained. For this reason many lenders accept not only borrower collateral but also third-party guarantees, where a guarantor or co-signer underwrites the loan. While such social collateral fulfills a similar role as borrower collateral – mitigating adverse selection and moral hazard – there are also differences.<sup>1</sup> Unlike “passive” assets, guarantors actively monitor borrowers to ensure repayment (Banerjee, Besley, and Guinnane 1994) and such monitoring is often leveraged by the threat of social sanctions (Bond and Rai 2008). This makes guarantees particularly effective in alleviating moral hazard (Pozzolo 2004). Moreover,

Ralph De Haas (corresponding author) is the Director of Research at the European Bank for Reconstruction and Development (EBRD) and a Associate Professor at Tilburg University; his email address is [dehaasr@ebrd.com](mailto:dehaasr@ebrd.com); Matteo Millone is an Assistant Professor at the VU University Amsterdam; his email address is [m.millone@vu.nl](mailto:m.millone@vu.nl). The authors thank Borislav Petric and Igor Duspara for their kind help with accessing EKI data. The views expressed are those of the authors and not necessarily of the EBRD. Financial support from the Bocconi Centre for Applied Research in Finance (Baffi CAREFIN) is gratefully acknowledged.

1 Besanko and Thakor (1987) show theoretically that co-signers reduce credit rationing for borrowers without sufficient collateral.

guarantees entail a claim on the entire wealth of the guarantor. Compared with borrower collateral, which only gives a (priority) claim on specific assets, their value is therefore less correlated with the underlying business.

Notwithstanding the widespread use of guarantees, empirical evidence on their role relative to borrower collateral remains scarce. This short paper investigates this role by exploiting the introduction of a credit registry in Bosnia and Herzegovina.<sup>2</sup> The registry required lenders to start sharing borrower information and led to a sudden increase in public information on loan applicants. This provides a good setting to contrast the role of guarantees and borrower collateral as the registry partially shifted the focus of lenders from concerns about adverse selection towards moral hazard.<sup>3</sup>

The study tests two hypotheses. First, for first-time borrowers a shift from collateral to guarantees is expected as the latter may be particularly effective at containing moral hazard. This shift may be more pronounced for riskier borrower categories because the newly available public information reveals most about them. Second, for repeat borrowers, about whom the lender has built up proprietary information, the impact of the registry depends on the extent to which lenders adjust their views about these existing clients. For instance, the registry may reveal outstanding debt or repayment problems at another bank, in which case a lender may tighten its collateral requirements.<sup>4</sup> Conditional on this base effect, however, it is expected that borrowers with a longer lending relationship see a gradual decline in collateral requirements. Their good track record now becomes public information, and this reduces the market power of the incumbent lender (Padilla and Pagano 1997). When the bargaining power of the bank declines, it can require less collateral to extract rents (Chen 2006).

## 2. Data

The Bosnian credit registry (Centralni Registrar Kredita) became fully operational in July 2009 and requires lenders to submit a report for each loan to a firm or private individual that is disbursed, repaid, late, or written off. It contains information on past loan defaults (sometimes called “negative information”), information on outstanding loans (sometimes called “positive” information), and data on whether applicants are a guarantor themselves or have a loan guaranteed by someone else.

The data consist of all 98,012 loans granted from July 2007 to June 2011 by EKI, a Bosnian small-business lender. This period encompasses the two years before and after the registry introduction. Table 1 shows that almost 40 percent of all loans are secured by some collateral such as movable or immoveable assets.<sup>5</sup> Moreover, almost all loans are guaranteed by at least one guarantor, and the average number of co-signers is 2.4. Clients have typically been borrowing from EKI for 1.4 years.

## 3. Results

### First-Time Borrowers

Table 2 presents ordinary least squares (OLS) regressions to explain for a sample of first-time borrowers the probability that collateral is pledged (columns 1–5) and the number of guarantees (columns 6–10).

2 See Bos, De Haas, and Millone (2016) for additional background.

3 Pagano and Jappelli (1993) provide a theoretical framework in which information sharing reduces adverse selection.

4 Theoretical work by Karapetyan and Stacescu (2014) suggests that information sharing and collateral may be complements as borrowers with a bad credit history face tougher collateral requirements. Doblaz-Madrid and Minetti (2013) provide evidence from the United States on a positive relationship between information sharing and the presence of collateral for low-quality borrowers.

5 As the study analyzes small-business loans to sole proprietorships – where the business owner is personally liable for repayment without a distinction between the assets of the firm and those of the owner – the collateral definition encompasses both (“inside”) business assets and (“outside”) personal assets.

**Table 1.** Summary Statistics and Variable Definitions

	Mean	St. Dev.	Min	Max	Definition
Credit registry	0.37	0.48	0	1	Dummy = "0" for all months from July 2007 to June 2009; "1" for all months from July 2009 to June 2011
Borrower collateral	0.38	0.49	0	1	Dummy = "1" if loan is secured by an administrative ban on salary, mortgage, movable collateral, and/or a bill of exchange; "0" otherwise
Guarantees	2.35	1.1	0	10	No. of guarantees (co-signed promissory note, contract with solidarity guarantor, and/or movable guarantor collateral) pledged to the loan
Loan amount (log)	8.00	0.78	5.70	10.31	Loan amount in BAM (log)
Borrower age	40.81	12.00	18	82	Borrower age in years
Male borrower	0.60	0.49	0	1	Dummy = "1" if borrower is male; "0" if female
Household size	3.37	1.36	0	19	No. of members in the borrower's household
Poverty level	-6.99	0.47	-10.51	-3.91	Minus one * Borrower income in BAM (log)
Rural borrower	0.65	0.48	0	1	Dummy = "1" if borrower lives in a rural area; "0" if in an urban area
Income risk	0.15	0.36	0	1	Dummy = "1" if borrower has no stable employment; "0" otherwise
Low-education borrower	0.11	0.31	0	1	Dummy = "1" if borrower has primary education or less; "0" otherwise
Number of consecutive loans	2.04	1.36	1	7	No. of consecutive EKI loans per borrower
Relationship length	1.35	1.82	0	9	No. of years since the disbursement of the first EKI loan to the borrower
No. of observations	98,012				

Source: EKI.

Note: BAM is Bosnian Convertible Mark. Exchange rate at time of introduction credit registry: 0.73 USD/BAM.

**Table 2.** Information Sharing and the Use of Collateral and Guarantees by First-Time Borrowers

	Borrower collateral					Guarantees				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Credit registry	-0.067*** (0.015)	-0.121*** (0.022)	-0.564*** (0.095)	-0.003 (0.017)	-0.058*** (0.015)	0.055* (0.028)	0.119*** (0.040)	0.663*** (0.201)	0.003 (0.029)	0.060** (0.028)
Credit registry*Income risk		-0.065*** (0.017)					0.076** (0.034)			
Credit registry*Poverty level			-0.071*** (0.014)					0.087*** (0.028)		
Credit registry*Rural borrower				-0.093*** (0.016)					0.076*** (0.028)	
Credit registry*Low-education borrower					-0.091*** (0.017)					-0.055 (0.034)
Borrower covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Branch fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	46,826	46,826	46,826	46,826	46,826	46,826	46,826	46,826	46,826	46,826
R-squared	0.192	0.193	0.193	0.194	0.193	0.361	0.362	0.362	0.362	0.362

Source: EKI.

Note: This table shows ordinary least squares regressions to explain the use of borrower collateral and guarantees in a sample of the first-time loans. Robust standard errors are clustered by loan officer and shown in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively. Before credit registry: July 2007 to June 2009. During credit registry: July 2009 to June 2011. All specifications include branch fixed effects and as additional covariates: *Borrower age, Business registered, Male borrower, Household size, Income risk, Poverty level, Rural borrower, Low-education borrower* and *Loan amount*. Constant not shown.

The dummy *Credit registry* distinguishes between loans granted during the two years before the registry (“0”) and during the two years after its introduction (“1”). All specifications include branch fixed effects, covariates (*Borrower age*, *Business registered*, *Male borrower*, *Household size*, and *Loan amount*) and borrower-risk proxies. These are *Income risk* (a dummy that is “1” if the borrower has no stable employment), *Poverty level* (the inverse of log borrower income), *Rural borrower* (“1” if the borrower lives in a rural area), and *Low-education borrower* (“1” if the borrower has at most primary education). The study first presents a parsimonious regression to look at the base effect of the registry introduction (columns 1 and 6) and then consecutively interacts *Credit registry* with each risk proxy.

Columns (1) and (6) show that the credit registry entailed a shift from borrower collateral to guarantees.<sup>6</sup> The registry introduction was accompanied by a (substantial) 6.7 percentage points lower probability of borrower collateral being pledged and a simultaneous (but limited) increase in the number of guarantees by 0.1 (a Poisson model yields very similar results). Unreported regressions indicate no significant impact on the total number of items pledged (collateral plus guarantees).

The interaction regressions in the subsequent columns consistently indicate that the shift from borrower to social collateral is stronger for riskier borrower types. For instance, while the registry reduces the probability of borrower collateral by 5.8 percentage points for borrowers with at least secondary education, the collateralization rate for less-educated borrowers declines even by 14.9 percentage points. Likewise, the shift towards guarantees is concentrated among rural borrowers for whom the credit registry leads to an additional increase in the expected number of guarantees by 0.1. The effect on the overall number of pledges is again neutral or – in the case of low-income borrowers – slightly negative (unreported).

This shift from borrower collateral to social collateral is in line with the lender focusing more on moral hazard as the new public information on loan applicants reduces concerns about adverse selection. This affects riskier borrowers in particular and is in line with the findings of Pozzolo (2004), who shows that Italian borrowers with a higher ex ante default probability are more likely to have to post third-party guarantees (but not borrower collateral).

### Repeat Borrowers

Table 3 shows regressions for all repeat borrowers that during the sample period received at least two loans from EKI. Borrower fixed effects wipe out time invariant observable and unobservable borrower characteristics.<sup>7</sup> In addition to *Credit registry*, the study includes either *Number of consecutive loans* or *Relationship length*, both proxies for the duration of the lending relationship. These variables are interacted with *Credit registry* to test whether the impact of information sharing differs for lending relationships of different length.

When measuring relationship length as the *Number of consecutive loans* (columns 1 and 3), we observe an overall increase in the probability of borrower collateral by 6.5 percentage points and a rise in the number of guarantees of 0.1 after the introduction of the registry. However, this increase is balanced by a rapid decrease in collateral requirements over the length of the relationship. In fact, even before the registry, for every additional loan the probability that a borrower had to pledge collateral decreased by 3.1 percentage points and the expected number of guarantees by 0.04. This is in line with Boot and Thakor (1994), who argue that repeat interactions help to build trust and reduce moral hazard.

The negative effect of relationship length on collateralization becomes even stronger once the credit registry is in place (an additional reduction of 2.4 percentage points in the probability that borrower

6 The covariates show that collateralization tends to be more common for larger loans and for riskier borrowers, in line with theories that stress the role of collateral in mitigating moral hazard.

7 Borrower fixed effects let all one-time borrowers drop out of these regressions so that the study compares first-time and repeat loans among a set of repeat borrowers.

**Table 3.** Information Sharing and the Use of Collateral and Guarantees by Repeat Borrowers

	Borrower collateral		Guarantees	
	(1)	(2)	(3)	(4)
Credit registry	0.065*** (0.013)	0.383*** (0.011)	0.096*** (0.021)	0.388*** (0.018)
Number of consecutive loans	-0.031*** (0.005)		-0.040*** (0.010)	
Credit registry*Number of consecutive loans	-0.024*** (0.004)		-0.020*** (0.007)	
Relationship length		-0.261*** (0.007)		-0.261*** (0.011)
Credit registry*Relationship length		-0.022*** (0.003)		-0.011** (0.005)
Borrower covariates	No	No	No	No
Borrower fixed effects	Yes	Yes	Yes	Yes
Observations	68,811	68,811	68,811	68,811
R-squared	0.232	0.290	0.196	0.212

Source: EKI.

Notes: This table shows OLS regressions to explain the use of borrower collateral and guarantees in a sample of repeat borrowers. All specifications include borrower fixed effects. Robust standard errors are clustered by borrower and shown in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively. Before credit registry: July 2007 to June 2009. During credit registry: July 2009 to June 2011. Constant not shown.

collateral is present and an additional decline of 0.02 expected guarantees).<sup>8</sup> Using years to measure the duration of the relationship (columns 2 and 4) gives qualitatively equivalent results for both borrower collateral and guarantees.

The strengthening of the negative effect of relationship length on collateralization rates, once the credit registry is in place, suggests a decline in switching costs. Without information sharing, repeat borrowers that try to switch to a competing lender get pooled with low-quality firms and may therefore only receive unattractive outside offers. With information sharing, outside lenders can now observe good borrower performance. This reduces the market power of the incumbent lender while boosting the bargaining power of reputable borrowers.<sup>9</sup> As a result, lengthening lending relationships lead to an even faster reduction of both borrower collateral and guarantees.

#### 4. Conclusions

An increasing number of emerging markets regard public credit registries that collect, consolidate, and distribute reliable borrower information as a potentially effective tool to counterbalance weak creditor protection and inadequate bankruptcy laws. This study finds that the introduction of a credit registry in Bosnia and Herzegovina entailed a shift from borrower collateral to third-party guarantees among first-time borrowers. This holds in particular for riskier borrower types, such as low-income clients, for whom mandatory information sharing substantially reduced the likelihood that they would need to pledge “hard” collateral. This reduction is only partially offset by a limited increase in the number of required co-signers. The study also documents a gradual decline in both types of collateral for repeat borrowers, and this decline is proportional to the duration of the lending relationship.

8 Taking all three coefficients in column (1) into account, it can be seen that the combined effect on first-time loans after the credit registry is not significantly different from zero for personal collateral, while it is positive and significant for guarantees.

9 The loss of market power also reduces the incentives to offer favorable conditions to first-time borrowers.

These results suggest that mandatory information sharing, and the resulting decline in adverse-selection problems, can reduce banks' focus on traditional collateral. This can broaden the set of borrowers that banks can service – provided that the (limited) increase in required guarantees does not lead to the exclusion of borrowers without social capital. At the same time, the increased transparency introduced by a credit registry can force incumbent banks to reduce collateralization rates even faster than normal, as good borrowers can now more easily “shop around” and look for better deals elsewhere. This is a second channel through which information sharing can benefit borrowers.

## References

- Banerjee, A. V., T. Besley, and T. W. Guinnane. 1994. “Thy Neighbour’s Keeper: The Design of a Credit Cooperative with Theory and a Test.” *Quarterly Journal of Economics* 109 (2): 491–515.
- Besanko, D., and A. V. Thakor. 1987. “Collateral and Rationing, Sorting Equilibria in Monopolistic and Competitive Credit Markets.” *International Economic Review* 28 (3): 671–89.
- Bond, P., and A. S. Rai. 2008. “Cosigned or Group Loans.” *Journal of Development Economics* 85 (1-2): 58–80.
- Boot, A. W., and A. V. Thakor. 1994. “Moral Hazard and Secured Lending in an Infinitely Repeated Credit Market Game.” *International Economic Review* 35 (4): 899–920.
- Boot, A. W., A. V. Thakor, and G. F. Udell. 1991. “Secured Lending and Default Risk: Equilibrium Analysis, Policy Implications and Empirical Results.” *Economic Journal* 101 (406): 458–72.
- Bos, J., R. De Haas, and M. Millone. 2016. “Show me Yours and I’ll Show you Mine: Sharing Borrower Information in a Competitive Credit Market.” EBRD Working Paper No. 180, European Bank for Reconstruction and Development, London, UK.
- Chen, Y. 2006. “Collateral, Loan Guarantees, and the Lenders’ Incentives to Resolve Financial Distress.” *Quarterly Review of Economics and Finance* 46 (1): 1–15.
- Doblas-Madrid, A., and R. Minetti. 2013. “Sharing Information in the Credit Market: Contract-Level Evidence from US Firms.” *Journal of Financial Economics* 109 (1): 198–223.
- Karapetyan, A., and B. Stacescu. 2014. “Does Information Sharing Reduce the Role of Collateral as a Screening Device?” *Journal of Banking & Finance* 43 (C): 48–57.
- Padilla, J., and M. Pagano. 1997. “Endogenous Communication among Lenders and Entrepreneurial Incentives.” *Review of Financial Studies* 10 (1): 205–36.
- Pagano, M., and T. Jappelli. 1993. “Information Sharing in Credit Markets.” *Journal of Finance* 48 (5): 1693–1718.
- Pozzolo, A. F. 2004. “The Role of Guarantees in Bank Lending.” EFMA 2004 Basel Meetings Paper, European Financial Management Association, Basel, Switzerland.