



# Does information sharing reduce the role of collateral as a screening device? <sup>☆</sup>



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## ABSTRACT

Information sharing and collateral are both devices that help banks reduce the cost of adverse selection. We examine whether they are likely to be used as substitutes (information sharing reduces the need for collateral) or complements. We show that information sharing via a credit bureaus and registers may increase, rather than decrease, the role of collateral: it can be required in loans to high-risk borrowers in cases when it is not in the absence of information sharing. Higher adverse selection makes the use of collateral more likely both with and without information sharing. Our results are in line with recent empirical evidence.

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## 1. Introduction

Adverse selection is an important issue facing banks (Stiglitz and Weiss, 1981). Not all borrowers and projects applying for bank loans should be funded; however, since banks do not have the same information as their applicants, deciding which of them are creditworthy can be difficult. In this paper, we look at two instruments that banks can use to select their borrowers: collateral requirements and credit records.

Collateral can be used to reduce adverse selection since high-quality borrowers are more likely to pledge assets and thus signal their creditworthiness. This is a well-established result in the theoretical literature (Bester, 1985; Chan and Kanatas, 1985; Besanko and Thakor, 1987). Collateral requirements are widespread in practice (Avery et al., 1998) and have a long history (Bodenhorn, 2003). Empirical studies have found that there is an inverse relationship between collateral and interest rates (Berger

et al., 2011a,b; Cerqueiro et al., 2012), and that collateral does indeed seem to be used to select borrowers ex ante (Jiménez et al., 2006; Berger et al., 2011b,a). Collateral requirements therefore have an important role in credit allocation.

Another useful tool for reducing adverse selection is the information acquired during the lending relationship (Boot and Thakor, 1994). Borrowers' performance over successive loans, for instance, can be used to update the bank's assessment of their value as a client. Low-quality borrowers will gradually be eliminated from the pool of loan applicants.

Some of the information acquired during lending relationships, such as repayment histories, is made available to competing banks through credit bureaus and credit registers (Djankov et al., 2007; Miller, 2003). As a result, banks can use the data received from other lenders to select their potential borrowers (Jappelli and Pagano, 1993). The role and geographical spread of information sharing arrangements have significantly increased in recent years. In a survey of Latin American banks Miller (2003) reports that 93% of the banks used credit information for their commercial loans (84% did so for consumer loans and 100% for mortgage loans).

Both the information received through credit bureaus and 'registers and the more traditional collateral can be used to select loan applicants. Indeed, while credit bureaus are a more recent development in most countries (Djankov et al., 2007) the frequency of their use in lending decisions has become comparable. Miller (2003) finds that, while collateral still remains important

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in granting loans, most bank managers consider payment history as the number one important factor in credit decisions. Information sharing seems to be associated with better credit allocation (Houston et al., 2010).

Due to potential liquidation costs (Gorton and Kahn, 2000; Chen, 2006; Benmelech and Bergman, 2009) and fluctuations in market value (Bernanke and Gertler, 1989; Cerqueiro et al., 2012), the use of collateral can be expensive for banks and borrowers. The availability of additional data via information sharing arrangements may provide a potentially cheaper alternative for borrower selection. When collateral is costly, banks may prefer to reduce the amount required, while still attracting high-quality borrowers. As a result, it may be interesting to check whether the increasing use of shared credit records is likely to reduce the incidence of collateral requirements.

We analyze the use of collateral and credit records in lending decisions. We find that the overall picture is quite different from a simple substitution story. Indeed, we show that information sharing may lead to the use of collateral in circumstances where it would not be required in the absence of a credit bureau. The reason is that information sharing allows banks to distinguish between borrowers with different credit histories. Some borrowers will have a good record, but others will have a poor one. We show that under information sharing there may be a higher incidence of collateral as a result of its concentrated use for borrowers with bad credit histories.

We build a two-period model with two banks competing for high- and low-quality borrowers. The banks compete in interest rates and may use collateral to select loan applications. The use of collateral obviously improves the average borrower quality, but is also costly because of liquidation costs. As in Gehrig and Stenbacka (2007), borrowers face switching costs when moving from one bank to another.

Borrowers' history of successful repayments or default also provides information about their creditworthiness. Under information sharing, these credit histories become available to the bank that has not had a lending relationship with a particular borrower.

Whether information is shared or not, liquidation costs imply that collateral will only be used if adverse selection is important enough. However, information sharing does have an important effect on the use of collateral, since it allows outside banks to distinguish between pools of borrowers of different quality.

In the absence of information sharing, banks faced with unknown borrowers can choose to require collateral, and face liquidation costs in case of default. In the presence of a credit bureau, banks faced with outside borrowers can distinguish between those with a good credit history, and those with bad credit events on their record. We show that borrowers with a bad credit history are more likely to be faced with collateral requirements than they would be in the absence of information sharing. As a result, the introduction of a credit bureau or a credit register may increase the observed incidence of collateral requirements.

Our theoretical results are consistent with and provide a theoretical explanation for the empirical results in Doblas-Madrid and Minetti (2013). Using contract-level data from a U.S. credit bureau, they find that information sharing does not reduce the incidence of collateral, and that the incidence actually increases for low-quality borrowers.

We also find that, under both information regimes, higher adverse selection makes the use of collateral more likely. Moreover, higher adverse selection also creates incentives for banks to share information and make selective use of collateral, and the two work together – if information sharing is not feasible, then the likelihood of collateral use is lower.

Our study analyzes the bank's choice of instruments to reduce adverse selection. This is an area that has received relatively little

attention in the literature. An important exception is Manove et al. (2001), showing that the availability of collateral may reduce banks' screening incentives. We look at another pair of selection instruments, collateral and credit histories, and also use the idea of cost minimization. The importance of this criterion has been confirmed by the empirical literature: "the evidence suggests that collateral pledging decisions are generally consistent with borrowing cost minimization" (Booth and Booth, 2006).

While the use of collateral induced by information sharing may increase welfare in our model, we show that the surplus accruing to high-quality borrowers may actually decrease. This welfare tradeoff is not necessarily a desirable feature (Gehrig and Stenbacka, 2007). Information sharing can actually increase the holdup problem for high-quality borrowers with an unfavorable credit history. We thus confirm the intuition in Bouckaert and Degryse (2006) in a setup that includes the use of collateral. It can also be noted that, in addition to the liquidation costs we model directly in our paper, lenders face the costs of monitoring the pledged assets (Cerqueiro et al., 2012). Moreover, borrowers' credit availability may change along with the value of the pledged assets (Gan, 2007). When this value is correlated across borrowers, this can amplify the procyclicality of access to credit (Bernanke and Gertler, 1989; Holmstrom and Tirole, 1997; Kiyotaki and Moore, 1997). From this angle, our results could be seen as worrying. We find that information sharing and collateral can be complements: information sharing may increase the likelihood of collateral requirements, and that increase will actually occur for borrower groups faced with higher adverse selection issues. Thus, while both information sharing and collateral are tools that help lending decisions, their mixing may lead to undesirable effects.

We focus on ex ante adverse selection issues rather than ex post moral hazard problems in lending. Both collateral (Chan and Kanatas, 1985; Boot and Thakor, 1994; Rajan and Winton, 1995; Berger et al., 2011a) and information sharing (Padilla and Pagano, 1997, 2000) can be used to reduce moral hazard in lending. Banks' choice between the two as ex post instruments may be an interesting issue for further research.

The closest paper to ours in the area of information sharing is Gehrig and Stenbacka (2007). Looking at a potential downside of credit bureaus, they show that information sharing reduces the returns from establishing banking relationships, and thus weakens competition for the formation of banking relationships. The result may be higher interest rates for young firms without an established credit record. In our paper, we identify another potential pitfall of information sharing: the increase in costly collateral requirements for borrowers faced with significant adverse selection issues.

The rest of the paper is organized as follows. Section 2 describes the setup of the model. Sections 3 and 4 solve for the equilibria under information sharing and in the absence of it, respectively. Section 5 concludes.

## 2. The model

We model the two-period competition between two banks, *A* and *B*. They compete for loan contracts with borrowers who live for two periods, period 1 and 2. Banks raise (unlimited) capital at a fixed cost  $r_0$  per dollar in both periods. In each period they offer a one-period loan contract.

Borrowers form a continuum of length 1. Each of them requires one unit of capital to start a project. Since they have no funding of their own, they have to borrow the capital from one of the banks. There are two types of borrowers, high (*H*) and low (*L*). High-type borrowers have access to a project that returns a verifiable amount  $R$  with probability  $p$  and 0 otherwise. Low-type borrowers have a

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