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Why do borrowers pledge collateral? New empirical evidence on the role of asymmetric information [☆]

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ABSTRACT

An important theoretical literature motivates collateral as a mechanism that mitigates adverse selection, credit rationing, and other inefficiencies that arise when borrowers have *ex ante* private information. There is no clear empirical evidence regarding the central implication of this literature – that a reduction in asymmetric information reduces the incidence of collateral. We exploit exogenous variation in lender information related to the adoption of an information technology that reduces *ex ante* private information, and compare collateral outcomes before and after adoption. Our results are consistent with this central implication of the private-information models and support the economic importance of this theory.

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1. Introduction

Although collateral is a widely observed debt contracting feature, the underlying motivation for collateral is not well understood. An important set of theoretical models explains collateral as arising from *ex ante* information gaps between borrowers and lenders. Specifically, when borrowers have private information regarding their project quality, the equilibrium may be characterized by adverse selection and credit rationing (Stiglitz and Weiss, 1981; Wette, 1983). The pledging of collateral may allow lenders to sort observationally equivalent loan applicants and mitigate these inefficiencies. In particular, lenders may offer a menu of contract terms such that applicants with higher-quality projects choose secured debt at lower premiums, while those with lower-quality projects select unsecured debt at higher premiums (e.g., Bester, 1985, 1987; Besanko and Thakor, 1987a,b; Chan and Thakor, 1987; Boot et al., 1991; Beaudry and Poitevin, 1995; Schmidt-Mohr, 1997).

Recent research, however, suggests that collateral may not always be optimal within the *ex ante* private information framework (Carlier and Renou, 2005, 2006). Furthermore, an expansive theoretical literature invokes alternative frictions that motivate collateral as part of an optimal contract. These frictions include risk-shifting, reduced effort, and other *ex post* moral hazard concerns (e.g., Holmstrom and Tirole, 1997; Aghion and Bolton, 1997), limited contract enforceability (e.g., Banerjee and Newman, 1993; Albuquerque and Hopenhayn, 2004; Cooley et al., 2004), or an inability of lenders to monitor project outcomes at sufficiently low cost (e.g., Townsend, 1979; Gale and Hellwig, 1985; Williamson, 1986; Border and Sobel, 1987; Mookherjee and Png, 1989; Boyd and Smith, 1994; Krasa and Villamil, 2000; Lacker, 2001; Hvide and Leite, 2006).

In this paper, we isolate and test a central empirical prediction that is distinctly generated by the *ex ante* private-information models. In particular, we test whether a reduction in *ex ante* information gaps between borrowers and lenders is associated with a lower incidence of collateral. Our test exploits variation in *ex ante* lender information created by the adoption of an information-enhancing loan underwriting technology. The test isolates the private-information models by focusing only on the *ex ante* information environment (i.e., information gaps that are present when the loan is made), rather than the *ex post* frictions featured in other theoretical models. Thus, a finding that the technology is associated with a lower incidence of collateral may be interpreted as consistent with the central implication of the *ex ante* private-information literature.^{1,2} Of course such a finding cannot rule out a role for *ex post* frictions – such as moral hazard, limited contract enforceability, and/or costly monitoring – in affecting observed collateral pledges.

Our data set provides an advantageous laboratory in which to test the central empirical prediction. We match the contract terms of nearly 14,000 individual newly-issued loans to small businesses between 1993 and 1997 from the Federal Reserve's Survey of Terms of Bank Lending Technology (STBL) with Call Report data on the 37 large U.S. banks that extended these credits. We also include data from a 1998 Atlanta Federal Reserve survey on whether, when, and how these banks employ small business credit scoring technology (SBSC), which provides our measure of asymmetric information. The combined data set allows for a rich set of controls at both the loan and bank level, as well as for bank and time fixed effects to account for unobserved bank heterogeneity and changes in the lending environment, respectively.

Small business credit scoring combines data on the personal credit history of the small business owner with firm financial data to generate a "score" which reflects repayment probabilities.³ The SBSC

¹ The alternative hypothesis, strictly speaking, is a combination of sub-hypotheses that includes: (1) private information contributes to collateral usage, (2) the loan underwriting technology reduces private information, and (3) the regression model is correctly specified. Thus, a finding of no relationship between the loan underwriting technology and the incidence of collateral would also be consistent with the loan underwriting technology having only modest effects on informational asymmetries; it would not determine with certainty that private information is unimportant.

² Inderst and Mueller (2007) provide an alternative model in which collateral arises due to informational advantages of the lending bank vis-à-vis its competitors. The model shares the prediction that an increase in the information available to the lending bank reduces the incidence of collateral.

³ The personal information used in SBSC models (obtained from consumer credit bureaus) may include the owner's monthly income, outstanding debt, financial assets, employment tenure, home ownership, and previous loan defaults or delinquencies (Mester, 1997). Although credit scoring models were applied to consumer loans well before the sample period, their application to business loans was delayed due to concerns regarding firm heterogeneity and nonstandardized documentation across firms (Berger and Frame, 2007).

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