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Do Lending Relationships Matter? Evidence from Bank Survey Data in Germany

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Do Lending Relationships Matter?

Evidence from Bank Survey Data in Germany

by

Erik Lehmann* and Doris Neuberger**

Abstract

Strong lending relationships between banks and small and medium-sized enterprises (SMEs) play a key role in the bank-based financial system of Germany. So far, they have been mainly described by the notion of a housebank and transactional features of long-term bank-customer relationships. In contrast, the present paper also considers interactional variables which try to measure social relations between loan officer and firm manager. Using bank survey data, the relationship and interaction variables prove to affect loan prices, collateral requirements and credit availability.

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1. Introduction

A financial system consists of institutional arrangements designed to transform savings into investments. These arrangements are determined by legal rules concerning the design of financial instruments and the regulation of banks, but also by banking practices and social customs which affect the relationships between banks and their borrowers. A bank-oriented system as prevalent in Germany is characterized by long-term relationships between banks and firms. These imply bank interests in firms and cross-selling activities of banks as the principal suppliers of credit. A bank is expected to 'lean against the wind' and accommodate its debtors during difficult financial times.

Such flexibility is not available in an anonymous security market. In contrast to the Continental European system, the Anglo-American market-based system exhibits a bias towards short-term or arms' length lending (see Keltner 1995, p. 62).[1] According to Mayer (1988), countries like Germany with a bank-based financial system have experienced higher economic growth than countries with a more advanced and competitive financial market. Close ties between the banks and the corporate sector enhance the availability and reduce the costs of loans to firms. Petersen and Rajan (1994) show that the bilateral credit relationship may be considered as an enduring commitment between a bank and a borrower. Both

[1] Rather than working and growing with small- and medium sized firms, commercial banks use short-term loans to pursue pro-cyclical lending: in times of prosperity, when banks have excess capital at their disposal, they improve their interest offerings and in times of recession, they curtail their lending operations (Business Week, July 18, 1994 pp. 66-67). This explains why in the U.S., the performance of small firms is strongly correlated with the business cycle (Gertler/Gilchrist 1994).

parties have dealt with each other for some time and expect to continue to do so in the future.

Another point of view holds that bank-borrower transactions are not ‘standardized’ in the spirit of Williamson (1985). Unlike the case of standardized transactions, the signing of a loan contract does not represent the end of the relationship between the contracting parties. During the bank-borrower relationship, many events may occur which alter the bank’s cost of providing the credit as well as the borrower's willingness to pay for it. Once the contract has been signed, the borrower and the bank are trapped in a situation of bilateral monopoly. Both parties may reap gains from this relationship. On the one hand, the bank collected information ex ante and ex interim, which would constitute sunk costs, if the borrower leaves the relationship. On the other hand, the ending of the relationship by the borrower is likely to convey a negative signal about its quality to outside banks (Von Thadden 1998). The value generated by the continuation of the relationship represents a quasi-rent which needs to be divided between both parties ex-post. One possibility is an implicit contract of liquidity insurance to small and medium sized firms. Since they are often liquidity constrained, they should be willing to pay a premium for the continuation of the relationship in the hope of further loans or assistance in future times of distress (see Elsas/Krahnen 1998). On the other hand, SMEs are of vital importance for banks, especially in Germany, despite the high cost of gathering information about their creditworthiness (see Dufey/Hommel 1999).

A theoretical framework to study the merits of relationship lending has been provided by the neo-institutional theory which changed the perspective from the

neoclassical interest in the quantitative, strictly economic aspects of the capital market, to those of a qualitative, organizational and social nature (Sjögren 1994, p. 315). Much empirical work has been done to study aspects of long-term relationships between banks and borrowers, but we still know little about the role of social interactions in these relationships. For the U.S., empirical studies on relationship lending focus on effects of transactional variables as the duration of the firm's relationship with the bank or the number of banks from which it borrows (e.g. Blackwell/Winters 1997, Berger/Udell 1995, Petersen/Rajan 1994). For Germany, there is growing evidence about the role of the housebank status (Elsas/Krahnen 1998, Machauer/Weber 1998), while the effects of interaction variables, like mutual trust, are not yet clear (Harhoff/Körting 1998a).[2] A case study suggests that in relationship lending of German banks, credit assessment is more concerned with the behavior of the borrowing firm's insiders which provides information about the reliability and qualifications of the relevant persons, than with the investment program as such (Burghof/Henschel 1998).

While short-term or volume-oriented lending is mostly characterized by transactional features of contract design or bargaining power (e.g. loan rates, collateralization, switching costs), long-term relationships are to a larger extent shaped by social interactions between the bargaining partners.

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[2] For empirical studies on housebanking relationships in other countries see Hoshi et al. (1990, 1991) for Japan and Sjögren (1994) for Sweden. For the number of bank relationships per firm as determinant of relationship lending see the cross-country evidence by Ongena/Smith (1998), Degryse/van Cayseele (1998), and the evidence for Germany by Harhoff/Körting (1998).

In the present paper, we postulate that loan rates, collateral requirements and credit availability may not only be explained by the theory of financial intermediation and the related theory of relationship lending, but also by the theory of social interactions. While transactional relationships are rather anonymous, interactional relationships are shaped by social interactions between people, i.e. loan officer on the one hand and firm manager on the other hand. Although we find almost the same results as Harhoff and Körting (1998), our study differs in two points. First, we surveyed banks and not borrowers. Second, several relationship-specific variables are included to indicate the ‘quality’ of the bank-borrower relationship. The results generally confirm Elsas/Krahnen (1998) and Machauer/Weber (1998) - both concentrating on the role of housebanks for lending conditions.

The paper is organized as follows. In chapter 2, we summarize the literature on lending decisions, resorting to the theories of financial intermediation and relationship lending, combined with the interaction theory which has been used to analyze business-to-business markets. Chapter 3 describes data collection, hypotheses and specifications. Econometric results are given in chapter 4. Chapter 5 then presents a concluding discussion. The specific regression results and some descriptive results are included in the appendix.

2. A Brief Survey of the Literature

2.1 The Theory of Financial Intermediation

The theory of financial intermediation suggests that banks specialize in information production and loan contract design to resolve credit rationing problems of SMEs, where asymmetric information is most severe (Fama 1985, Diamond 1984). Their comparative advantage in tackling this task increases with their ability to reap economies of scale and scope in information production. The more information the banks obtain about borrowers, the less they have to improve borrower incentives by setting loan contract terms (interest rates, collateral requirements).[3]

Since information gathering is costly, banks will expand their search for information until the expected marginal benefit of search equals zero. If the remaining information asymmetry induces a risk premium[4], firms with less signalling opportunities will have to pay higher loan rates. The degree of information asymmetry depends on borrower characteristics such as firm size, firm age and governance, or legal form. Typically, small firms provide less information to outside financiers than large firms. This reflects fixed costs of information disclosure, or the absence of disclosure rules. Moreover, the lack of reputation constrains their borrowing (see Martinelli 1997). With growing age,

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[3] For surveys see Swank (1996), Thakor (1995), Neuberger (1998). For an empirical study on the monitoring effects of banks see Udell (1989).

[4] This compensation device has the drawback that rising loan rates aggravate moral hazard and adverse selection problems. Thus the supply curve of loans may bend backwards (Stiglitz/Weiss 1981).

the information asymmetry decreases, and firms may build up reputation by a good credit history. The legal form affects the managers' amount of private information and their incentives and ability to shift risk to the bank as a fixed-claim holder. Limited liability restricts the bank's access to private assets of the owners in the event of distress. Hence, the credit risk tends to be higher in corporations than in unincorporated firms (Elsas/Krahnen 1998). Partnerships and proprietorships with unlimited liability of their owners should be less prone to moral hazard.

The role of collateral in loan contracts reflects the incentive and signaling effects which resolve moral hazard and adverse selection problems under asymmetric information. If a loan is secured by a specific asset that serves as collateral, the borrower's incentive to choose a riskier project after obtaining the loan are deterred. Moreover, collateralization may induce a borrower to reveal its otherwise hidden risks. Distinguishing between borrowers with different risks a borrower's willingness to accept the collateralized loan contract offering lower interest will be inversely related to its default risk (Besanko/Thakor 1987). This follows from the fact that the bank cannot distinguish between borrowers of different risk in designing interest rate offers. In practice, however, banks classify borrowers in risk classes or credit ratings on the basis of their observations. If a firm which provides more collateral is perceived as less risky, it may obtain a better credit rating. Hence, given that a lower observable risk

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However, better information increases the ability to raise loan rates, since the bank's loan offer curve is less likely to bend backwards.

affects the risk premium, collateralization reduces loan rates by reducing observable risk.

The risk of a bank credit further depends on the marketability of the collateral assets in the event of default and on the costs of monitoring credit use. If the credit is used for specific purposes like replacement investments or investments in new plant and equipment, the monitoring costs are low, but the marketability of the assets declines with rising asset specificity. On the other hand, an unspecific credit use (e.g. credit line) implies higher monitoring costs and, in the absence of a tangible collateral, higher credit risk.

2.2 Relationship Lending to SMEs

While the cost of gathering information about a borrower may be prohibitively high if borrower and lender transact only once, it can be reduced by learning in repeated transactions. Each time a bank renews a loan contract, the renewal acts as an acknowledgment of the firm's ability to meet its debt obligation and thus lowers the monitoring cost. Information memory creates economies of scale in information production (Bhattacharya/Thakor 1993, Thakor 1995). Economies of scope arise if the bank resorts to information gathered in other transactions, e.g. deposit accounts (see Petersen/Rajan 1994).

Moreover, relationship lending is explained as an efficient arrangement in a world of incomplete contracts. The private information gathered by a bank over time provides a valuable commitment vis-à-vis the borrower and enables low-cost renegotiations of debt contracts. This should reduce loan rates and credit rationing (Elsas/Krahnen 1998). Yamori and Murakami (1999) provide evidence

of the economic value of bank relationships for client firms. They investigated the effect of a bank's failure in Japan on stock prices of its client firms. Firms with a closer relationship to the failed bank were more likely to record larger negative abnormal returns.

The respective literature measures the intensity of the relationship by the duration of the relationship, the number of banks and the housebank-status (Petersen/Rajan 1994, Berger/Udell 1995, Degryse/Van Cayseele 1998, Elsas/Krahnen 1998, Harhoff/Körting 1998, Angelini et al. 1998). The duration is expected to affect the bank’s stock of private information. If a bank learns about firm quality over time, it may improve contract terms upon having gained proof of successful investment projects. On the other hand, long-term relationships to borrowers may enable a bank to conduct compensatory pricing. At the beginning of a relationship it demands the same price from all new borrowers. It is lower than the price associated with expected average quality in order to avoid an increase in risk by adverse incentive and adverse selection effects. Bankruptcy of the borrowers thus induces losses for the bank. They may be compensated, if the bank is able to bind the remaining borrowers and raise loan rates above the level for high-quality borrowers in a short-term transaction.

The ability of the bank to achieve such a binding depends on its bargaining power vis-à-vis the borrower. If it is the borrower’s sole long-term financier, it obtains an information monopoly and hence a competitive advantage vis-à-vis outside banks (Fischer 1990; Sharpe 1990). An information monopoly is often related to the status of a housebank, which ”... is regarded as the premier lender of a firm, with more intense, and more timely information production than under

a comparable normal debt contract" (Elsas/Krahnen 1998, p. 1286). This ends in a hold-up situation, in which the housebank may extract a rent from its ex-post superior bargaining power. A borrower should be willing to bear these extra costs of lending only if he also expects gains from a housebank relationship. These gains reflect an intertemporal implicit contract: housebanks offer insurance-like services to their borrowers, bearing a special responsibility or lowering loan rates in the event of financial distress (Edwards/Fischer 1994, pp. 8; for a survey see Elsas/Krahnen 1998).

Elsas/Krahnen (1998) and Machauer/Weber (1998) used credit file data of five leading banks in Germany to examine the role of the housebank-status in the provision of loans to SMEs. Their results show that housebanks obtain more collateral and provide more finance. They conclude that housebanks are able to establish specific relationship patterns consistent with the idea of a long-term commitment. Using panel data, D'Auria/Foglia/Reedtz (1999) identify the closeness of lending relationships, measured by a bank's share of customer debt, as the main determinant of individual loan rates in Italy. Larger shares are associated with lower interest rates. However, if this share exceeds 80%, a further rise would be accompanied by an increase in the interest rate. Thus the hold-up problem in a housebank relationship seems to arise only when the relationship with the main bank is almost exclusive.

Since the early 1980s, all German banking groups increasingly attempt to provide comprehensive financial and business services to SMEs, following the one shop-shopping strategy (see Deeg 1998). In order to compete more successfully, banks seek stronger relationships with their clients by cross-selling.

Cross-selling may then additionally explain why loan prices do not perfectly reflect the credit risk. This aspect has not yet been included in empirical work on the effects of lending relationships.

2.3 The Interaction-Based View

Although there is growing evidence about long-term or housebank lending relationships, the role of social interactions in these relationships remains an open issue. Interaction theory considers both sides of a relationship in which individuals are actively involved (for a detailed discussion see Ford 1997 and Axelssohn/Easton 1992). Their cognitive perceptions about the value of the relationship are important for its development. Several studies have tried to find out the determinants of a successful long-term relationship (see Perrien/Ricard 1995). One finding is that trust, confidence and satisfaction play the key role in the development of a relationship (see Ganesan 1994).

Compared to goods markets, the social interactions between the managers of banks and SMEs are less clear and highly variable. While Smith (1989) states that the bank's service quality is important for the quality of the lending relationship, Perrien and Ricard (1995, p.40) conclude that the bank managers differ in their perceptions of the relationship orientation of both their own bank and competitors. Ennew and Binks (1995) report that informal aspects of a lending relationship affect the extent to which firms feel constrained and that the flow of information is important for a mutual understanding of both partners. The return of investing in relationships to small business customers depends on bank

size and on bank-specific measures of loan rate smoothing (Kolari et al. 1996, Berlin/Mester 1998).

A key variable to describe social interactions is trust, which may emanate from positive experience in the past. By lowering moral hazard and hence monitoring cost, trust should imply lower markups. Thus, Harhoff and Körting (1998) examined the role of mutual trust as perceived by firm managers in a lending relationship. A dummy variable indicates whether the respondent in the personal interview thinks that the firm and the bank trust each other very much. It proves to possess a significant negative impact on the line of credit interest rates.

The nature of the relationship will also influence the quantity and quality of information available to the bank. In close relationships the bank understands the operating environment of a particular business. It receives signals concerning managerial attributes and business prospects. Thus, the relationship provides the basis for understanding customer needs and resources. Further, the flow of information implies that both parties will have a better understanding of each other (Ennew/Binks 1995). This decreases monitoring cost and loan rates again. It is not a simple one-way process, but requires a positive contribution from both partners. The bank can only meet customer needs if the firm manager provides appropriate and timely information. This cooperation results in a stable relationship, in which the partners feel obliged to each other. The role of trust and information has been recently examined by Fisman and Khanna (1999) in a cross-country analysis. They distinguish between deterrence-based trust, knowledge-based trust and identification-based trust. The first is based on the threat of punishment if consistent behavior is not maintained. It is derived from

the theory of repeated games. The intuition behind is the positive correlation between trust and information. Trust based on information reduces monitoring cost and induces lower interest rates in the lender-borrower relationship. Knowledge-based trust arises, when a party has enough information about the other to accurately predict its behavior. Finally, identification-based trust applies, when each party has fully internalized the other's preferences (Fisman/Khanna 1999, p. 80). In the latter two cases, better information flows imply more trust by learning about the other’s behavior. This definition is consistent with the theory of social interactions in business-to-business relationships (for a recent survey see Blois 1999). However, as noted by Fisman and Khanna (1999), there may also be a reverse causality between information and trust: less trusting individuals invest in obtaining information and feel the need for monitoring in order to reduce opportunism. Then, information and trust would be negatively correlated.

In order to proxy mutual trust in the bank-borrower relationship, the current studies introduce variables concerning experience in the past, the obligation to the partner, the impression of the stability of the relationship and the flow of information. While past experience may reflect the reciprocity in a relationship (Blois 1999, p. 201), obligation to the partner may be a proxy for identification-based trust as suggested by Fisman and Khanna (1999). The stability of the relationship depends on consistent behavior, in the sense of deterrence-based trust. Finally, the flow of information may reflect knowledge-based trust.

The literature suggests that that these variables are significant for the lending relationship. Terms of lending may not only be affected by collateralization and

firm-specific aspects, or by the duration of the lending relationship, but also by such interaction variables.

3. Data, Hypotheses and Specifications

3.1 Data Collection and Measurement

Data has been obtained from a survey of German banks in 1997. Approximately 1200 questionnaires were mailed to banks in towns with a location of a state-owned savings bank (Sparkasse). It was adressed to the wholesale managers of three different bank types: big private banks[5], state-owned savings banks and cooperative banks (Genossenschaftsbanken). The respondents were asked to refer to loan applications of SMEs with a loan volume ranging between DM 100.000 and 10 millions.

In addition to firm characteristics (firm size, firm age, legal form) and contract terms (interest rate, collateral, repayment terms), the questionnaire inquired about the type of credit use (capital expansion, replacement investment, investments in new plant and equipment, credit lines, no special use). Like Elsas/Krahnen (1998) and Machauer/Weber (1998), information about bank-internal credit ratings of the borrowers was also collected. Moreover, a variety of questions related to the methods and costs of information gathering and the nature of the relationship between banks and their small and medium-sized borrowers were included.

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[5] Including Deutsche Bank, Dresdner Bank, Commerzbank, and the now merged Bayerische Vereinsbank and Bayerische Hypotheken und Wechsel-Bank.

Specific aspects of the *bank-borrower relationship* were measured using a set of multi-item scales. The loan officers were asked to indicate their perceptions about these aspects on a range of statements scored on a 5-point Likert scale.

In order to capture the social aspects of the lending relationship, the questionnaire followed the interaction approaches to business-to-business relationships. 'Positive experience in the past', ‘obligation to the partner’, ‘willingness of the borrower to inform about problems’, and ‘stability of the relationship’ were chosen as interaction proxies. The borrower’s willingness to provide information, was measured using a 5-point scale which takes the value 3, if the willingness is perceived as neither better nor worse than that of other borrowing firms and the value 5 (1), if the willingness is perceived as remarkably better (worse) than the average. The same procedure was applied to the costs of loan processing and the economic competence of the borrower’s management as perceived by the bank. These variables were ranked on a 5-point scale which takes the value 1 (5), if the respondent chooses the judgement ”very low” (”very high”).

To avoid ordinal variables, these responses were transformed into dummy variables: for each 5-point-scaled ordinal variable, all values below the median are proxied by the value zero and all values at or above the median by the value one. The same procedure was applied to measure the housebank status. The banker managers had to evaluate on a 5-point scale whether they perceive their bank as the customer’s housebank (1 = does not apply; 5 = applies completely).

An industry bias in the measurement of firm size[6] has been precluded by computing the median of sales volume for each industry and transforming the size variable into a dummy variable.

The grouping of firms into age categories follows the usual classification by banks: young firms of age less than 2 years, middle-aged firms of age between 2 and 6 years, old firms of age 7-10 years, or more than 10 years. This provides a signal concerning credit risk. As shown by the time-series study of Brüderl and Preisendörfer (1998), firms in the age class 2-6 years carry the highest bankruptcy risk, whereas a long-term success cannot be expected before 7 years after birth. For the youngest firms with less than 2 years of age bankruptcy risk tends to be low, because they can often resort to government aid or to own reserves built up in the start-up phase.

Similarly, we grouped the duration of the lending relationship in the following way: new customer (first contract), young relationship with a duration less than 2 years, duration according to the 'problem age class' of 2-6 years and old relationship with longer duration.

Four further control variables are included: (1) bank type to capture differences between banking groups[7], (2) management skill of the borrower as perceived by the bank, (3) industry dummies and (4) regional dummies. The regional dummies reflect differences in credit risk between the "new" and the "old" German states.

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[6] E.g. the minimum efficient size related to the sales volume is higher in the trade sector than in the services sector.

Given that the transformation of the former communist system of the German Democratic Republic to a market economy is not yet concluded, the location of a firm in the 'new' states implies higher information asymmetries and managerial deficiencies. All variables which are included in the estimations are summarized in table 1.

[7] The study distinguishes between the big private banks on the one hand and the savings banks and cooperative banks on the other hand. The last two possess a decentralized organizational structure, as opposed to the centralized structure of the big private banks (see Vitols 1998).

Table 1

Definition and Measurement of Variables

	Variable	Explanation and Measurement
Dependent	Interest rate	measured as percentage points above the refinancing interest rate
Firm Characteristics	Age	dummy variable indicating whether the firm is less than 2 years, 2 - 6 years, 7 - 10 years or more than 10 years old
	Firm size	dummy variable indicating whether the firm size is above the median size in that industry. Firm size was measured by turnover-size categories.
	Incorporated firm	dummy variable indicating whether the firm is incorporated (limited liability company, GmbH or stock corporation, AG) or not (KG, OHG, BGR)
Relationship Variables	Experience*	”We made positive experience in the past”
	Obligation*	”We are obliged to the borrower”
	Information*	”The borrower informs us immediately about problems”
	Stability*	”Our relationship is stable under pressure”
Transaction variables	Repayment flexibility*	”The repayment terms are very flexible for the client”
	Credit use	dummy variable, indicating the type of credit use: investment in new plant and equipment, capital expansion, replacement investment, no special use, credit line
	Collateral	measured as percentage of loan volume
	Credit rating	qualitative variable, indicating the credit rating, ranging from 1 (=best rating) to 5 (=worst rating).[8]
	Duration of loan processing	measured in days
	Duration of the relationship	dummy variable indicating to which class the duration of the relationship belongs (new client, less than 2 years, 2 - 6 years, 7 - 10 years, more than 10 years)
	Cross-selling	dummy variable indicating whether cross-selling aspects played a role in lending
Control variables	Bank type	dummy variable indicating whether the bank belongs to the big private banks or not
	Management skill*	”The management skill/competence is ... below one of the large average (1) .... above average (5)”
	Industry	set of dummy variables indicating the industry (manufacturing and production; trade, service, building and construction; others)
	West German firm	dummy variable indicating whether the firm is located in West Germany (old states of Germany)

* Qualitative variable, measured by a Likert scale, based on answers ranging from 1 (=not at all) to 5 (=to a very large extent). The qualitative variable was transformed into a dummy variable, indicating whether its value is below median (0) or not (1).

3.2 Hypotheses and Specifications

Several multivariate specifications measured the influence of transaction and interaction variables. The first specification (I) shows the influence of variables explained by the theory of financial intermediation: firm characteristics (age, size, legal form) as proxies for credit risk, credit rating as result of information gathering and collateral. The degree to which a bank receives and accepts collateral depends on the availability of assets which are suitable for collateralization and on their value to the bank in the event of default. This value would be zero, if the bank had no outside opportunity to resell the collateral. The respective variable takes on the extreme value of zero if there are no such opportunities, or if the lender cannot provide collateral. A value of 100 (percent) indicates that the credit is fully covered. The 'classical' view of lending is tested by:

H1: Small and young firms and firms with a bad credit rating have to pay higher loan rates, provide more collateral and have less access to external finance than larger, older and better rated firms

The second specification (II) combines the variables of credit use and relationship lending like housebanking, duration of the relationship and of loan processing and cross-selling. This allows to formulate:

H2: Firms with housebank relationships, longer lending relationships, lower duration of loan processing and cross-selling have to pay lower loan rates, provide less collateral and have better access to external finance.

Based on the interaction theory, the third (III) specification intends to test:

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[8] See Altman/Saunders (1997).

H3: Interaction specific variables play an important role in the lending relationship. A stable relationship may lead to lower loan rates, lower collateral requirements and better access to external finance (credit availability).

These specifications were exposed to OLS-estimation with the loan rate as dependent variable. In addition, the study performs a two-sided censored Tobin-estimation of collateralization and a probit-estimation of credit availability. Since we are well aware of possible interdependencies between the explanatory variables, we proceed sequentially to observe how coefficients react to the inclusion of further variables.

4. Empirical Results and Discussions

4.1 Loan Pricing

Table 2 shows the results of our simple OLS-estimation. We take the difference between the loan rate and refinancing rate as dependent variable (‘interest rate’). As expected, there is a negative correlation between firm size and interest rate, which is significant on the *0.1*-level only in the third specification. This result, also found in other empirical studies (e.g. Harhoff/Körting 1998), indicates that banks may use firm size as a proxy for credit risk. Other firm-specific variables like firm age or legal form have no significant influence on loan pricing. An exception are the firms in the age class from 2 to 6 years in the first specification. Interest rates are significantly higher for such firms. As discussed by Brüderl/Preisendörfer (1998), this may reflect an increased likelihood of failure in this particular age class of firms.

Like Machauer/Weber (1998), the current study confirms a highly significant impact of credit rating on loan prices, with a better rating lowering the cost of capital. Moreover, the value of the respective coefficient is almost identical in all three estimations.

Collateral also reduces interest rates, however, it looses its significant impact in the second and third specification. The second specification confirms a significant effect of credit use on loan pricing. In particular, it shows a strong positive impact when the credit is used for unspecific purposes and a negative impact when it is used for a replacement investment. Unspecific loans ceteris paribus imply increased monitoring efforts or higher risk to the bank, which is compensated by a higher premium. In contrast, a replacement investment reduces the moral hazard problem to the bank and the monitoring costs due to past experience. Also the repayment terms have a significant influence on loan pricing, more flexible terms being compensated by higher loan rates.

In contrast to Berger and Udell (1995), there is no significant impact of the duration of the lending relationship on loan pricing. These findings are consistent with those of other studies (Harhoff/Körting 1998, Machauer/Weber 1998, Angelini et al. 1998, Petersen/Rajan 1994).

The main hypothesis concerns the impact of social interactions on loan pricing. If mutual trust may be expressed by positive experience in the past and a stable relationship, these interaction variables should have a negative impact on interest rates. This is confirmed, although only the variable ‘stability’ has a significant t-value, with the test-statistic indicating significance at the $p<0.05$ level. The willingness of the borrower to immediately inform its bank about problems

exerts a significant positive influence on the loan rate. This result cannot be explained by a higher cooperation from the side of the borrower. Rather it must be due to the expectation of financial distress when problems are reported (see also Harhoff/Körting 1998). Cross-selling activities have a negative impact on loan prices, but the t-values are not significant at the $p<0.1$ level.

As in Harhoff and Körting (1998), West German firms experience significantly lower capital costs than firms in the new states. Ceteris paribus their interest rates are about *0.4* percent lower.[9] This can be interpreted as a risk premium charged by banks in East Germany. Controlling for differences in management skills, firms with a better management pay lower interest rates. This may reflect either a higher bargaining power of the management in the renegotiation process and/or better information of the bank about the ‘type’ of the borrower. Both implies reduced risk. Industry-specific variables appear to possess no significant impact on capital costs.

4.2 Collateralization

Collateral ensures that the bank has guaranteed access to assets even in the event of the borrower’s default. According to Berger/Udell (1990), only high risk projects or borrowers necessitate collateral agreements. This is denoted 'sorting by observed risk', in contrast to the ‘sorting by private information’ of Besanko/Thakor (1987).

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[9] Harhoff and Körting (1998) report an interest rate differential of 0.92%.

Table 3 shows the results of our Tobit-estimation. If credit rating signals the riskiness of the project and/or the borrower, the hypothesis is confirmed by the significant negative impact on collateralization (Machauer/Weber 1998 found this only for the best three rating classes). High risk borrowers pledge less collateral. This result is consistent with the 'sorting by private information'. Another explanation is that borrowers who provide more collateral receive a better rating. Hence, credit rating may in fact be endogenous.

The ‘sorting by observed risk’ is supported by the result that firm characteristics (as proxies for observed risk) affect collateral requirements. In all specifications, bigger firms and incorporated firms provide less collateral. Including the relationship-specific variables, young firms have to supply more collateral. The other firm specific variables remain their significance. This reflects the argument of information concerning the failure risk which is more effective for young firms. According to Stiglitz/Weiss (1981), banks cannot compensate an increased failure risk by charging higher interest rates. Thus, they request more collateral. In the case of loans with an unspecific use, banks cannot resort to this mechanism, however. Thus, banks charge a risk premium which is significantly higher compared with specific credits (see table 2).

Housebanks receive more collateral than non-housebanks, as also found by Machauer/Weber (1998). Since they tend to be the first lenders of a firm, they are more likely to get the best collateral. Also, they possess a comparative advantage in evaluating assets for collateralization. Thus, if the firm subsequently applies for a credit at another bank, it may not be able to provide collateral of the same quality or the same extent.

Including the interaction variables, the higher collateralization by housebanks remain highly significant. Yet, the coefficient decreases considerably. The positive impact of ‘stability’ may be due to a higher stability of housebanking relationships. Nevertheless the complete cluster of interaction variables exhibits no significant impact on collateralization.

4.3 Credit availability

One of the most important problems for SMEs concerns the availability of external finance. Building on the seminal work of Stiglitz and Weiss (1981), there exists broad literature about credit rationing and redlining. We conducted a binary probit estimation of credit availability, measured by the probability of credit approval. The results are reported in table 4. The results exhibit again a significant influence of credit rating. A worse credit rating reduces the probability of a credit approval. Firm characteristics like age and size show no impact on credit availability. Furthermore, the results contradict Harhoff/Körting (1998) who use fast payment discounts taken as a share of fast payment discounts offered to the firm in order to proxy for the availability of external finance. Also applying a probit regression, they find that firm age significantly affects credit availability, while the duration of the lending relationship is irrelevant. Within the current framework this applies to all firm characteristics and to credit use. A significantly negative impact can only be associated with young relationships. The probability to get no credit is highest in the absence of a credit relationship. There exist a number of explanations for these findings, which are generally consistent with the literature on credit rationing due to asymmetric information.

Switching banks may be perceived as a negative signal by the new bank. A reduction of informational asymmetries by the banks' credit rating efforts explains why borrowers with a better rating are more likely to obtain a loan.

Another explanation for a credit refusal by a 'new' bank reflects the hold up problem in a housebank relationship, which results from their higher stock of collateral (see table 3). Ceteris paribus, switching cost for the borrower increase due to less available collaterals to the other bank. In the second specification, the availability of collateral shows a significant positive impact on the probability to obtain a credit (see table 4).

In contrast, a housebank may also serve as a credit insurance. The variable indicating the housebank status is strongly positive significant. Further, the full set of relationship variables possess a significant impact on credit availability. This particularly applies to positive experiences in the past and in the case of a high flow of information from the borrower to the bank, even when the borrower may be in a situation of distress.

In contrast to the other estimations, industry variables matter. Credit availability in the trade and service industry is significantly below average. This may reflect a higher risk of bankruptcy in these industries in Germany and higher information asymmetries because of less tangible assets compared to manufacturing industries. At the same time, West German firms do not experience improved credit availability yet. However, the results from this probit estimation are less convincing than those presented before, since we have only 34 observations for a credit refusal.

5. Conclusions

A lending relationship depends on transactions as well as interactions between the bargaining partners. The empirical analysis of bank lending to small and medium-sized firms in Germany has confirmed that availability and terms of loans are not only influenced by firm characteristics and credit risk variables, but also by social interactions between loan officer and bank manager.

Using a different data compared to Harhoff/Körting (1998) and Machauer/Weber (1998), the current study also provides evidence that loan rates do not depend on the duration of the lending relationship. Further, housebanks play a significant role in supplying loans when firms are in distress. These findings represent stylized facts of the German banking system.

Unlike the relationships between suppliers and buyers in the manufacturing sector, the relationships between banks and their customers in small business lending have not been sufficiently analyzed yet. Social interactions which may indicate mutual trust are advantageous to both the borrower and the bank. Nevertheless, the present study remains as well incomplete. In particular, it cannot address the possible interdependencies between the regression variables. Also, the social dimensions of a lending relationship are more complex than captured by the current variables. This is suggestive for future research. Given that Germany's financial system is the prototype of a bank-based system, the nature and role of its bank-borrower relationships should motivate still more detailed investigations.

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Table 2

Determinants of Loan Pricing: The Influence of Transactions and Interactions

Dependent Variable: Interest rate
OLS Regression Coefficients (White Heteroskedasticity-consistent t-Value)

	(I) (N=332)	(II) (N=318)	(III) (N=308)
Firm Characteristics:			
Age: < 2 years	0.143 (0.757)	0.289 (1.402)	0.244 (1.138)
2 - 6 years	0.407 (2.466)**	0.392 (1.486)	0.343 (1.500)
7 - 10 years	0.272 (1.354)	0.281 (1.320)	0.282 (1.280)
Firm size	-0.167 (1.270)	-0.199 (1.521)	-0.234 (1.768)*
Incorporated firm	0.083 (0.673)	0.033 (0.274)	0.098 (0.784)
Credit rating	0.306 (3.459)***	0.327 (3.906)***	0.315 (3.567)***
Collateralization	-0.009 (3.580)***	-0.004 (1.381)	-0.003 (1.151)
Credit use:			
New		-0.172 (1.226)	-0.133 (0.941)
Expansion		-0.152 (1.221)	-0.166 (1.258)
Replace		-0.356 (2.353)**	-0.281 (1.778)*
Unspecific		0.720 (2.439)**	0.765 (2.62)***
Housebank		-0.0267 (0.5292)	-0.0564 (0.421)
Interaction Variables			
Experience		--	-0.100 (0.772)
Obligation		--	0.088 (0.700)
Information		--	0.319 (1.840)*
Stability		--	-0.367 (2.431)**
Lending Variables			
Duration: First contract		-0.187 (0.703)	-0.099 (0.356)
< 2 years		-0.087 (0.389)	-0.096 (0.429)
2 - 6 years		0.0633 (0.316)	0.097 (0.481)
7-10 years		-0.028 (0.156)	0.010 (0.058)
Repayment flexibility		0.281 (2.374)**	0.309 (2.539)**
Duration of loan processing		-0.001 (0.588)	-0.002 (-0.841)
Cross-Selling		-0.229 (1.258)	-0.212 (1.46)
Control Variables			
West German firm	-0.338 (1.740)*	-0.484 (2.478)**	-0.423 (2.056)**
Bank type	-0.041 (0.849)	-0.037 (0.767)	-0.048 (0.966)
Management skill	-0.269 (2.318)**	-0.275 (2.241)**	-0.292 (2.137)**
Production Industry	0.093 (0.511)	0.107 (0.553)	0.079 (0.412)
Trade Industry	0.225 (0.894)	0.346 (1.225)	0.360 (1.277)
Service Industry	0.169 (0.840)	0.166 (0.732)	0.117 (0.514)
Building Industry	0.042 (0.189)	-0.051 (0.222)	-0.065 (0.287)
Constant	1.653***	1.796 (3.144)***	1.657 (3.135)***
Adj. R-square	0.161	0.244	0.263
Test-Statistics: $\chi^2(d.f.)$			
Firm Characteristics:	8.47 (5)	5.75 (5)	6.82 (5)
Credit use:	--	15.14 (4)***	14.09 (4)***
Interaction Variables	--	--	9.39 (4)**
Lending Variables (Duration)	-	0.575 (4)	0.507 (4)
Control Variables#	23.05 (7)***	17.79 (7)***	16.77 (7)***
Industry Dummies	6.15 (4)	2.63 (4)	

Note: *, **, ***: Significance at the 10%, 5% and 1% level, respectively, #with industry dummies

Table 3

Determinants of Collaterization

Dependent Variable: Collateratization
Censored (0,100) Normal Tobit (z-statistics in parantheses)

		(I) (N=354)	(II) (N=339)	(III) (N=329)
Firm Characteristics:				
Age:	< 2 years	8.449 (1.586)	14.079 (1.962)**	14.847 (2.452)
	2 - 6 years	3.226 (0.719)	14.455 (2.452)**	1390 (1.881)*
	7 - 10 years	0.631 (0.122)	6.735 (1.148)	6.464 (1.267)
Firm size		-10.264 (2.808)***	-8.335 (2.347)***	-9.540 (3.229)***
Incorporated firm		-11.299 (3.245)***	-6.138 (2.173)**	-5.882 (2.073)**
Credit rating		-5.719 (2.529)***	-3.886 (1.761)*	-5.437 (2.824)**
Credit use:				
	New		0.192 (0.058)	-0.219 (0.063)
	Expansion		2.764 (0.929)	3.970 (1.333)
	Replace		5.198 (1.167)	5.888 (1.425)
	Unspecific		-20.365 (4.286)***	-21.205 (4.460)***
Housebank			11.947 (3.472)***	4.146 (3.93)***
Interaction Variables				
	Experience			-2.820 (0.892)
	Obligation			-2.507 (0.908)
	Information			-4.676 (1.331)
	Stability			6.966 (1.987)**
Lending Variables				
Duration: First contract			-8.949 (1.308)	-5.134 (0.892)
	< 2 years		-11.972 (1.829)*	-7.628 (1.364)
	2 - 6 years		-14.209 (2.459)**	-12.004 (2.455)**
	7-10 years		1.025 (0.168)	-1.362 (0.251)
Repayment flexibility			3.457 (1.098)	2.897 (1.087)
Duration of loan processing			-0.045 (0.600)	0.003 (0.956)
Cross-Selling			1.699 (0.397)	1.288 (0.352)
Control Variables				
West German firm		-13.002 (2.431)***	-10.556 (2.012)**	-8.677 (2.015)**
Bank type		-11.127 (2.785)***	-5.176 (1.343)	0.784 (0.678)
Management skill		-7.686 (2.085)**	-5.415 (1.629)	-2.636 (0.944)
Production Industry		-0.027 (0.005)	-0.641 (0.129)	0.244 (0.058)
Trade Industry		6.172 (0.880)	1.907 (0.296)	-0.391 (0.076)
Service Industry		-10.0.39 (1.62)	-7.956 (1.364)	-6.017 (1.243)
Building Industry		-0.915 (0.154)	0.233 (0.042)	4.177 (0.892)
Constant		91.264 (8.235)***	82.069 (7.163)***	68.675 (6.153)***
Adj. R-square		0.172	0.294	0.337
Log likelihood		-1480.495	-1378.368	-1334.637
Test-Statistics: $\chi^2(d.f.)$				
Firm Characteristics:		23.830 (5)***	20.068 (5)***	22.507 (5)***
Credit use:			29.554 (4)***	30.970 (4)***
Interaction Variables				6.697 (4)
Lending Variables (Duration)			7.694 (4)*	8.092 (4)*
Control Variables		35.423 (7)***	17.880 (7)**	18.282 (7)**
Industry		7.317)(4)	3.343 (4)	5.146 (4)

Note: *, **, ***: Significance at the 10%, 5% and 1% level, respectively

Table 4

Credit availability

Dependent Variable: credit approval
Binary Probit (z-statistics in paranthese)

		(I) (N=389)	(II) (N=389)	(III) (N=359)
Firm Characteristics:				
Age:	< 2 years	-0.345 (1.121)		
	2 - 6 years	-0.020 (0.072)		
	7 - 10 years	0.001 (0.003)		
Firm size		0.003 (0.012)		
Incorporated firm		-0.004 (0.019)		
Credit rating		-0.887 (5.607)***	-0.879 (5.470)***	-1.026 (4.265)***
Credit use:				
	New		-0.055 (0.235)	
	Expansion		0.274 (1.084)	
	Replace		-0.067 (0.182)	
	Unspecific		0.378 (0.889)	
Housebank				0.986 (3.231)***
Interaction Variables				
	Experience			0.710 (2.088)**
	Obligation			0.632 (1.243)
	Information			7.597 (15.410)***
	Stability			0.271 (0.748)
Collateral			0.009 (2.596)***	-0.000 (0.065)
Lending Variables				
Duration: First contract			-1.386 (3.636)***	
	< 2 years		-0.850 (1.998)**	
	2 - 6 years		-0.483 (1.130)	
	7-10 years		-0.750 (1.421)	
Control Variables				
West German firm		0.235 (0.863)		
Bank type		0.200 (0.890)		
Management skill		0.206 (0.875)		
Production Industry		-0.239 (0.460)		
Trade Industry		-1.207 (2.450)**		
Service Industry		-0.900 (1.833)*		
Building Industry		-0.303 (0.595)		
Constant		4.179 (5.247)***	4.691 (6.261)***	..4.131 (4.959)***
McFadden R-squared		0.343	0.371	0.429
Log likelihood		-75.673	-115.334	-48.724
Test-Statistics: $\chi^2(d.f.)$				
Firm Characteristics:		1.848 (5)		
Credit use:			2.533 (4)	
Interaction Variables				365.748 (4)***
Lending Variables (Duration)			17.001 (4)***	
Control Variables		18.021 (7)**		
Industry		15.707 (4)***		

Note: *, **, ***: Significance at the 10%, 5% and 1% level, respectively

Table 5

Descriptive Statistics for Regression Variables

		Mean* (Cases)**	Valid Cases***
Firm Characteristics:			
Age:	< 2 years	0,137 (49)	357
	2 - 6 years	0,286 (103)	357
	7 - 10 years	0,123 (44)	357
	> 10 years (reference)	0,354 (151)	357
Firm size		0,678 (242)	357
Incorporated firm		0,560 (200)	357
Credit use*:			
	New	0,322 (115)	357
	Expansion	0,384 (137)	357
	Replace	0,115 (41)	357
	Refunding (reference)	0,171 (61)	357
	Unspecific	0,275 (98)	357
Interaction Variables			
Housebank		0,589 (203)	348
Experience		0,397 (137)	345
Obligation		0,343 (121)	344
Information		0,232 (80)	345
Stability		0,351 (125)	357
Transaction Variables			
Repayment flexibility		0,496 (173)	349
Credit rating (1 to 5)		2,5 (median)	356
Collateralization (in%)		56,80 (median 60)	356
Duration:			
	First contract	0,180 (67)	357
	< 2 years	0,143 (51)	357
	2 - 6 Years	0,275 (99)	357
	>6 Years (reference)	0,402 (140)	
Duration of loan processing		14,2 (median 8)	353
Cross-selling		0,826 (295)	357
Control Variables			
West German firm		0,801 (286)	357
Bank type		0,435 (155)	356
Management skill		0,465 (166)	357
Production Industry		0,381 (137)	357
Trade Industry		0,213 (77)	357
Service Industry		0,112 (40)	357
Building Industry		0,179 (64)	357
Others (reference)		0,104 (38)	357

Note: * Mean = in percent above the median; ** Cases with dummy = 1*** without the 34 cases with a credit refusal.