Collateral, Default Risk, and Relationship Lending: An Empirical Study on Financial Contracting *

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Abstract

This paper provides further insights into the nature of relationship lending by analyzing the link between relationship lending, borrower quality and collateral as a key variable in loan contract design. We used a unique data set based on the examination of credit files of five leading German banks, thus relying on information actually used in the process of bank credit decision-making and contract design. In particular, bank internal borrower ratings serve to evaluate borrower quality, and the bank's own assessment of its housebank status serves to identify information-intensive relationships. Additionally, we used data on workout activities for borrowers facing financial distress.

We found no significant correlation between ex ante borrower quality and the incidence or degree of collateralization. Our results indicate that the use of collateral in loan contract design is mainly driven by aspects of relationship lending and renegotiations. We found that relationship lenders or housebanks do require more collateral from their debtors, thereby increasing the borrower's lock-in and strengthening the banks' bargaining power in future renegotiation situations. This result is strongly supported by our analysis of the correlation between ex post risk, collateral and relationship lending since housebanks do more frequently engage in workout activities for distressed borrowers, and collateralization increases workout probability.

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1. Introduction

Understanding lending decisions by financial intermediaries is a major objective of micro-economic models of banks, as well as macroeconomic models of the monetary transmission mechanism. In both fields, the structure of credit contracts and its role in long-term bank-client relationships occupy center stage in current theoretical work (see, for example, Aoki/Dinc 1997, Boot/Thakor 1997 and Freixas/Rochet 1997).

Due to the almost complete lack of internal data on bank lending decisions, there has been very little empirical work produced to date analyzing contractual design in the credit industry. This paper contributes to the understanding of bank lending, drawing on a unique panel data set, and attempts to answer three related questions on bank lending policies. First, what is the relationship between collateral and risk? Second, what role does collateral play in information-intensive lending relationships? Third, does the extent of collateralization have an impact on how lending institutions behave in borrower distress situations?

The first question refers to the impact of expected credit default risk on the provision of collateral. Theoretical predictions differ considerably according to whether the collateral is postively or negatively related to borrower quality (Bester 1985, 1994). The second and third questions build on recent theoretical work concerning the role of relationship lending (Boot/Thakor 1994, Longhofer/Santos 1998). The issue at hand is whether the decision to become the housebank of a corporate client has an impact on the quality or quantity of collateral demanded. Theoretical predictions in this case depend considerably on the role collateral is believed to play in a possible renegotiation game between the bank and its customer. In our own analysis, we focused on the type of activity a bank undertakes once a borrower is in distress. These post-distress activities can be related to the structure of the bank-client relationship before the distress occurred, in particular to the amount of collateral.

While earlier studies relied mostly on external industry surveys, we were able to base our analysis on first-hand credit-file data collected from five leading universal banks in Germany. The data set is a fairly comprehensive projection of 200 bank credit files into 130 variables which were collected for the five-year period from 1992-1996. This data set potentially offers a number of new insights into the real value of financial relationships. The

banks' internal borrower ratings were used to evaluate borrower quality, and the banks' own assessment of their housebank status served to identify information-intensive financial relationships.

Moreover, our test of the role of collateral in financial relationships utilized information on the specific type of collateral pledged to the bank, its value, and additional data on the banks' workout activities.

The major results of our study support the view that collateral is being used mainly as a tool to control the lenders' strategic position vis-à-vis the borrower in future games of renegotiation. The incidence of collateral, as well as the degree of collateralization, is found to be unrelated to ex ante default risk. However, it is positively related to the intensity of the financial relationship (i.e. the banks' housebank status) which, in turn, increases the likelihood of active workout management by the lender. The result is that collateral may be seen as a strategic instrument to control borrower incentives rather than serving as a signal of borrower quality.

The paper is organized as follows. Section 2 briefly reviews the role of collateral in the theoretical and empirical literature on loan contract design, and this review forms the basis for developing the main hypotheses for the empirical part of the paper. Section 3 contains a description of the data set and a number of descriptive statistics. Sections 4 and 5 comprise econometric tests of our main hypotheses. Determinants of the collateral decision are analyzed in Section 4,while Section 5 looks into the role of lenders in situations of borrower distress. Section 6 contains a discussion of the results and the conclusion.

2. Related Literature and Hypotheses

2.1 Theoretical foundations

According to the recent literature on banks, the development of information-intensive relationships between borrowers and lenders may differentiate the best bank loans from corporate bonds.[1] In a world with asymmetric information flows, relationship lending may restore efficiency by establishing long-term implicit contracts between borrowers and lenders. An

[1] For an overview on the theory of financial intermediation see Bhattacharya/Thakor (1993) or Thakor (1995).

established relationship allows the lender to renegotiate contract terms at low cost, thereby decreasing aggregate financing cost and reducing credit rationing. The financial relationship is effectively a long term commitment in which lenders have an informational privilege vis-à-vis both the market and competing banks, by which they gain some degree of ex post bargaining power (see Greenbaum et al. 1989, Sharpe 1990, Fischer 1990, Rajan 1992, and Petersen/Rajan 1995). The housebank-function of German universal banks is a good example of such a long-term relationship with a corporate client. The housebank is regarded as the premier lender of a firm (Fischer 1990). It usually has access to more intensive and more timely information than a comparable regular bank, allowing it to offer liquidity insurance (Elsas/Krahnen 1998) or better decisions in borrower distress.

Our subsequent analysis is based on the assumption that a housebank is not necessarily the exclusive financier of a firm, but that it is special to the extent that only a housebank may have an implicit contract with the borrower. This assumption is consistent with empirical evidence indicating that firms typically have a multitude of bank lenders (Ongena/Smith 1998, Preece/Mullineaux 1996), but may nevertheless have a single special bank providing, for example, liquidity insurance (Elsas/Krahnen 1998).

a) Screening and monitoring

Collateral plays an important role in many models of bank behavior. Bester (1985) and Besanko/Thakor (1987), building on the ex ante screening model by Stiglitz/Weiss (1981), interpret collateral as a signal which allows a bank to solve the adverse selection problem inherent in debt financing under asymmetric information. In a model with two types of projects, high and low risk, a separating equilibrium is shown to exist. Low-risk borrowers generally choose contracts with a high level of collateral. High-risk borrowers, in contrast, prefer to have loans with no collateral. The signaling models thus predict a negative correlation between loan risk and collateral (see also Stiglitz/Weiss 1986).

Focusing on the ex post monitoring function of banks, Bester (1994) has developed a model of debt renegotiation that predicts a positive correlation between default risk and collateralization. In Bester's model, a creditor cannot observe whether a default is voluntary (i.e. the borrower is cheating), or due to a bad state realization. Therefore, the provision of (outside)

collateral will reduce the debtor's incentive to gamble for resurrection. This argument leads to the prediction of a positive correlation between project risk and loan collateral. Obviously, this prediction corresponds to conventional wisdom in banking, which views the use of collateral as a means to lower the exposure of a bank (Berger/Udell 1990).

This leads to our first hypothesis:

H1: *The incidence of collateral, as well as the degree of collateralization, are an increasing function of expected borrower default risk.*

b) Relationship lending

Boot/Thakor (1994) have developed a simple model of relationship lending where two major components of the loan contract, the interest rate and the collateral pledged by the borrower, are determined simultaneously. Collateral is an "all or nothing" variable. For all borrowers with no positive track record, the bank charges high interest rates and requires the provision of collateral. After privately observing the success of the borrower, the bank lowers the interest rate and does not require collateral. The authors thus hypothesize a negative association between relationship intensity and collateral.

In a recent study by Longhofer/Santos (1998), seniority is analyzed in a model of loan contract design. In their model, the seniority of a bank's claim increases the probability that a relationship between bank and borrower can be established. Since a higher seniority may be equivalent to the provision of additional (inside)[2] collateral, the model is closely related to Boot/Thakor (1994). Following Longhofer/Santos (1998), more collateral allows the relationship lender to benefit more from a successful turnaround in bad states of nature. Furthermore, large amounts of collateral forces the firm to internalize the costs of asset substitution. Hence, the model predicts a positive correlation between the degree of collateralization and the intensity of a bank-borrower relationship. This result is similar to the conclusion reached by Welch (1997), who argues that banks wish to improve their seniority in debt contracts in order to avoid costly conflicts among creditors in debt renegotiation situations.

This is our second hypothesis:

H2: *There is a positive relationship between the intensity of a bank-borrower relationship (housebank versus normal bank relationship) and the provision of collateral in loan contracts.*

According to the second hypothesis, housebanks in particular will try to accumulate collateral, thereby improving their bargaining positions in future distress situations. On the basis of a strong collateral position and privileged access to information about the borrower, the bank is expected to play a more active role in a possible restructuring of a distressed borrower. This constitutes our third hypothesis:

H3: *In the case of distressed borrowers, the willingness to engage in workout activities is positively related to the housebank status and the degree of collateralization .*

2.2 Previous empirical evidence

The empirical evidence is less contradictory in its findings, though only little evidence on the use of collateral exists at all, and none of the existing studies analyze our third hypothesis on workout situations. Three studies testing hypotheses 1 and 2 will be discussed in more detail.

In a seminal study, Berger/Udell (1990) empirically analyzed the risk-collateral relationship. They used data from the 1988 "Survey of Bank Lending Terms" in the US and found a consistently positive relationship between risk and collateral. The authors use two alternative proxies for credit risk. The first is the fraction of borrowers with non-performing loans of each of their sample banks, i.e. an ex post measure for borrower quality. The drawback of this risk proxy is that the analysis is not on the level of individual borrowers but on an aggregate bank level. Their second risk proxy is the mark-up of contracted interest rates on loans over a risk-free reference rate. This is an indirect and potentially biased measure of ex

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[2] "Inside collateral" refers to collateral which is owned by the borrowing firm, while "outside collateral" consists of assets not owned by the firm, as for example, a guarantee by an owners.

ante risk since the spread is determined by several factors of which a borrower's default risk is only one (see Harhoff/Körting (1998) and Elsas/Krahnen (1998) for empirical details).

Berger/Udell (1995) extend this analysis to aspects of relationship lending and the financing of small firms by using data from the 1988 "National Survey of Small Business Finance". They use balance sheet ratios (e.g. leverage, profit margin) as risk proxies and duration as a proxy for relationship intensity. The authors claim that their findings support a positive risk-collateral correlation, though leverage is the only significant explanatory variable out of eight risk measures. Duration, as it turns out, has a significant negative coefficient, thereby implying decreasing collateral requirements for more intensive bank-borrower relationships. Harhoff/Körting (1998) replicated this study with German data and have come to identical conclusions.

But, balance sheet ratios may also be a biased measure of credit risk, because they reflect potential risk determinants only partially; for example, they ignore the competitive situation of the firm, a company's governance structure and the relative ability of the management. Moreover, they are subject to window dressing activities by the reporting firm and the outflows of a backward-looking accounting system.

Furthermore, all of these empirical findings with respect to relationship lending are based on the interpretation of duration as an adequate measure for relationship lending. This assumes that duration is to some extent associated with information intensity. Recent empirical evidence disputes the validity of this assumption. Ongena/Smith (1997) find no significant influence of contract duration on the likelihood of relationship termination for the Norwegian market. This finding is not consistent with the idea of a lock-in effect for debtors with a strong relationship, unless duration is no measure for relationship intensity. Elsas/Krahnen (1998) find no significant difference in the mean contract duration between their subsamples of housebank and non-housebank relationships. Additionally, duration is not significant in either of the authors's regressions, though Elsas/Krahnen find evidence for distinct behavior by relationship lenders as providers of liquidity insurance.

The most closely related study to ours with respect to the data set is one by Degryse/van Cayseelen (1998). Like us, they used credit file data (provided by a Belgian bank), and their indicator for relationship lending is a self-evaluation of the bank, i.e. whether it views itself

as the primary bank. The implication of changing the relationship variable is fundamental. The authors find that the probability of pledging collateral increases rather than decreases if the bank is the borrower's main bank. However, their study suffers from the absence of risk proxies apart from company size and loan type.

In summary, only little empirical evidence on the link between relationship lending, risk and collateral exists. The existing studies use unsatisfactory proxies for borrower quality and usually a debatable proxy for relationship lending.

In the remainder of this paper we address the hypotheses outlined above by using banks' internal borrower ratings as a more direct measure of borrower quality and a superior identification variable for information-intensive bank-borrower relationships.

3. Data Set and Descriptive Statistics

3.1 General data description

The data set underlying our analysis includes (medium-sized) corporate debtors of five major German banks: Bayerische Vereinsbank, Deutsche Bank, DG Bank, Dresdner Bank, and West LB.[3] The set of information contains general company characteristics (e.g. legal form, branches), a complete overview on loan contracts and their specific terms (e.g. collateral, maturity, credit volume), balance sheet data and the bank's own risk assessment (internal rating). This information was collected from the banks' credit files.

Our data is a random sample drawn from a population of all corporate customers with some active business at any time between January 1992 and January 1997 who also meet a number of selection criteria.[4] First, companies had to be medium sized, i.e. with an annual turnover between DM 50m and DM 500m. Due to the absence of surveillance by rating agencies and the lack of rigorous disclosure requirements,[5] we expected this company size segment to be subject to a significant degree of asymmetric information between lenders and borrowers, thus constituting a prime population for the analysis of issues related to relation-

[3] These institutions include the three largest German private banks, the (national) apex cooperative bank, and the largest (regional) apex savings banks. In the list of the largest banking firms of the country at year end 1995, they comprise the ranks 1, 2, 3, 5, 8.

[4] For a detailed presentation of the data set, see Elsas et al. (1998).

ship lending and loan contract design. Second, to ensure a minimum level of information on a given customer's indebtedness to competing banks, a minimum total loan size of DM 3m was imposed. Customers fulfilling this requirement are subject to the regulatory notification requirement of Article 14 of the KWG (German Banking Act).[6] Third, clients with registered offices in the former GDR (East Germany) were excluded, and, fourth, inclusion in the population required that the respective client had at least one longer-term investment loan with a fixed interest and repayment schedule.

The sample used for the subsequent analyses in Chapter 4 consists of 25 customers of each of the five banks, for a total of 125 individual debtors (representative sample R).[7] For each of these credit relationships, the full set of information variables was recorded whenever a credit decision (e.g. loan renewal, change in credit volume) was documented or a new rating was produced by the bank in our observation period from 1992 to 1996. Thus, for example, for a credit relationship with three credit decisions and one additional rating exercise, there are four observations per variable. The advantage of such a procedure is that for all structural variables such as credit volume, collateralization or rating, we know the precise value of the variable at any time from January 1992 to December 1996 after an initial observation. However, the event-oriented data collection procedure may lead to a kind of selection bias if the occurrence of an observation triggering event (i.e. a change in loan structure or credit quality) and the hypotheses to be analyzed are correlated. To avoid this potential bias of nonsynchronous data collection, we stratified our panel data by artificially generating observations for those individuals with real observations missing in a given year of our observation period.[8] These artificial observations are based on the respective preceding real observation, leading to a synchronous panel data set with a theoretical number of 625 observations (5 years x 125 individuals).[9] However, the real number of observations is smaller,

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[5] Note that no company in our sample is listed on a stock exchange, and only 12 out of 200 are public limited companies (AG) under German law.

[6] Art. 14 of the KWG (German Banking Act) requires each bank to report the name and loan terms of each debtor with a consolidated debit balance of DM 3m or above. The Bundesbank, on behalf of the Federal Banking Supervisory Authority (BAKred), collects all notifications and produces a quarterly consolidated statement per customer. These are in turn accessible by all reporting banks.

[7] The data used in this analysis is the representative subsample of the data set described in more detail by Elsas et al. (1998). The complete data set contains an additional subsample of 75 customers who are in potential financial distress. This is used for the analysis of Section 5.

[8] Note that this procedure is not suitable for variables that did not trigger a data collection, but are time-variant with a higher frequency of variation than the structural variables, such as the interest rate. However, we do not use such variables.

[9] If an individual had more than one observation in one specific year, only the last one was used.

because artificial observations are deducible only after a first initial observation has occurred. Missing values for some variables further decrease the number of observations.

The analysis in Section 5 is based on a stratified sample of potentially distressed borrowers. These borrowers meet all of the selection criteria mentioned above, i.e. they belong to the same population. Additionally, all these borrowers faced a negative rating at least once during the observation period. Negative ratings indicate that banks expect these borrowers to be problematic, i.e. potentially distressed. With respect to the standardized rating categories of our data with six different classes of borrower quality (see below), a negative rating is either a rating of 5 or 6. For each bank, 15 cases were drawn from this stratified subset of the population, for a total of 75 borrowers. We labeled this sample PD (potentially distressed). Note that the stratification procedure renders the samples R and PD incompatible (one is representative, the other is not), meaning that empirical analyses must therefore be carried out separately for each sample.

3.2 Housebanks versus non-housebanks: identification

We relied primarily on the self-evaluation of the credit manager in charge of the particular customer at the given bank to differentiate the sample companies with respect to their housebank status. The credit manager was given a questionnaire asking for a housebank-attribution ("Do you feel that your bank is the housebank for that particular client?"). The respondents had to check "yes" or "no", and were further asked to give a brief explanation in writing. As the resulting attributions are based on the banks' role as perceived by the banks themselves, it is the core information for our housebank attribution. It thus differs, substantially from other (indirect) measures of relationship intensity used in the literature, such as duration or the number of bank lenders. We believe our attribution to be a more reliable indicator since it is directly based on the judgment of one of the contracting parties of the implicit contract.

A second variable was used to check the robustness of this attribution. It relies on indirect evidence taken from the credit files. Whenever the credit files documented that a particular decision or activity of the bank in question was explained using arguments explicitly related to a housebank-status (e.g. "we are the housebank", "we are the main bank", "we have a

special responsibility", etc.), the variable "HB_exter" was assigned the value of one; otherwise a zero was assigned. Since this attribution was recorded separately for every credit event, a time series of "HB_exter"-attributions resulted. This dummy variable relies on the interpretation of the researchers collecting the data from the credit files; it is, thus, an *external* and somewhat subjective attribution of the housebank characteristics.

From these two proxies for housebank relations, we constructed a third, modified indicator variable (HBM, modified housebank attribution) which was used for our subsequent regression analyses. HBM attributes in a first step the value 1 and 0 to all relationships that were consistently grouped as either "housebank" or "non-housebank" in both attributions, the bank's own assessment and "HB_exter". Inconsistent attributions were recorded in 24 cases. They are due to changing attributions in the time series of "HB_exter" observations. These inconsistencies were resolved by use of the additional information contained in the written explanation given in the questionnaire.[10]

3.3 Descriptive statistics

This section provides some basic descriptive statistics as a starting point for our analysis. It focuses on the sample of representative borrowers (sample R).[11]

Basically, the degree of collateralization of a loan contract can be characterized using three different measures, each based on a different scale of measurement. The most commonly used variable in the literature is a simple dichotomous variable assigned a value of one if a loan contract is collateralized and zero if it is not. We labeled this variable COLYN. Another possibility is to differentiate between different qualitative types of collateral, if there is collateralization at all. Our variable COLTYPE is assigned a value of zero if a credit relationship is uncollateralized, one if the loan[12] is collateralized only by real securities, two if the loan is secured only by personal securities, and three if the latter two types are combined. Thus, COLTYPE is analogous to COLYN with respect to all debtors, but it contains more information about the type of collateral provided. Please note that real securities denote

[10] A detailed description combined with an analysis of the written explanations in our questionnaires is contained in Rott (1997).

[11] Some descriptive statistics for the PD sample firms are contained in Elsas/Krahnen (1998).

[12] The term "loan" is imprecise because any data on collateral we used relates to a borrower's total credit volume, not to a single loan.

collateral such as land charges, mortgages, assignments of accounts receivable, etc. Personal securities comprise guaranties, underwritings, etc.

A third variable, labeled COLDEGREE, measures the degree of collateralization in terms of value as the ratio of the value of pledged collateral (as evaluated by the bank) to the total credit volume supplied by the bank from which the observation originates. This variable takes on values from zero to one in the closed interval multiplied by a scaling factor of 100. Thus, if for a given observation the COLDEGREE is 100 the total volume of credit provided by the bank is fully secured in terms of value. Hence the bank itself does not feel that this debtor has any exposure in the sense of capital at risk to the bank. However, if COLDEGREE is assigned a value 0; this does not necessarily imply that there are no contractual rights of the bank to have priority access to specific assets of the debtor. Though the bank does evaluate the collateral provided using a value of zero (COLDEGREE = 0), the bank may have property rights on specific assets of the company. This conceptual difference between COLYN and a COLDEGREE of 0 is important, because even zero-valued collateral may change the incentive of a company or manager to behave in an opportunistic way, which of course is not true if no collateral is pledged at all. Typically, observations which are collateralized but show a zero-degree of collateralization in terms of value arise if a bank evaluates personal securities such as a manager's guaranties.

Table I below shows the frequency distribution of observations for COLYN and COLTYPE differentiated first by the dummy-variable LIMLIAB, which takes on a value of one if the legal form of the company ensures that only the company's assets will be subject to the claims of the bank (incorporated companies). It takes on the value of zero if asset liability is unlimited. The second differentiation of the frequency distribution is with respect to the variable BANK, which depicts the bank from which the observation originates; its values range from 1 to 5.

Table I

Frequency Distributions of Collateral

		COLYN						COLTYPE				
		1996			1992 - 1996			1992-1996				
		1	0	sum	1	0	sum	0	1	2	3	sum
BANK	1	21	2	23	100	14	114					
	2	14	12	26	65	61	126					
	3	11	14	25	58	67	125					
	4	20	5	25	97	21	118					
	5	20	4	24	79	30	109					
	sum	86	37	123	399	139	592					
LIMLIAB	0							25	79	0	3	107
	1							148	250	2	85	485
	sum							172	329	2	88	592

Focusing first on the distribution with respect to BANK, the table shows that the ratio of collateralized and uncollateralized observations demonstrates a fairly heterogeneous pattern between the banks for the overall sample, as well as for the year 1996. For example, in 1996, only 10% of Bank 1 observations are uncollateralized in contrast to 50% of Bank 2 observations. Thus, it seems to be important to control for effects due to bank heterogeneity in subsequent regression analyses. A comparison of the COLYN distribution for 1996 and the overall sample implies that taking bank heterogeneity into account complicates things significantly, since the absolute number of observations of uncollateralized loans for a given year is extremely small for some banks (e.g. only 2 observations for Bank 1 in 1996). Hence, pooling time series and cross-sectional observations is necessary to carry out econometric tests.

The frequency distribution of uncollateralized observations differentiated by companies with and without limited liability (COLTYPE versus LIMLIAB) implies that the fraction of uncollateralized observations is smaller for companies with unlimited liability (25 out of 107 versus 148 out of 485). There are only two observations in the total sample period with only personal securities, and these companies have limited liability. Moreover, 85 out of 88 ob-

servations with both real and personal securities are companies with a limited liability structure, i.e. are incorporated. This pattern is consistent with the idea that personal securities are used as collateral to either expand the total assets liable for a company's debt or to change the incentive structure for managers, thereby undermining the limited liability structure of a company.

Figure I

Frequency Distribution of COLDEGREE

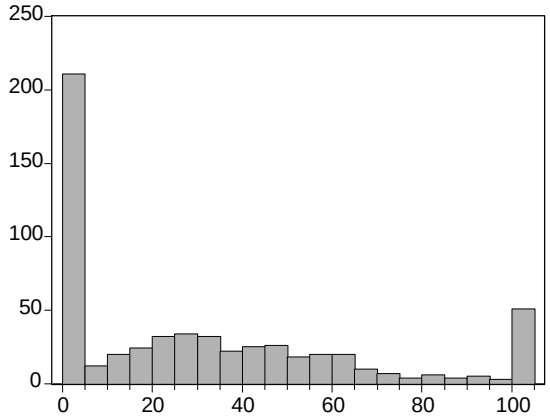

Figure I shows the frequency distribution of COLDEGREE on its range of possible values from 0 to 100 for the total sample period and all individuals. Note that there are two significant peaks at values of 0 and 100, respectively. This pattern highlights the fact that the ratio of collateral value to credit volume is a highly censored variable. COLDEGREE is left censored because a status less than unsecured is simply not observable. The same argument holds for a value of 100 since a collateralization degree in excess of "fully secured" is not observable, although some of the fully secured debtors may have additional company assets at their disposal which are potentially useable as collateral (right censoring). Thus, an analysis using the variable COLDEGREE should control for the censored nature of this variable, for example by employing a TOBIT-like procedure.

Table II shows the different types of collateral (COLTYPE) differentiated by housebank status (HBM) for 1996.[13] Additionally, it shows the mean rating (RATING) and the mean

[13] Only one observation per individual is included if the analysis is restricted to one specific year, if the analysis is for the entire sample period, individuals are repeatedly icluded.

company size (SIZE), the latter measured by total sales of a company per year, for all possible combinations of HBM and COLTYPE. The variable RATING is an ordinal measure of borrower quality or the default probability of a debtor as estimated by the lending bank itself (internal rating). The (standardized) rating scheme used in our analysis has six categories where a rating of 1 is the best quality and a rating of 6 is worst. Note that ratings are not influenced by the provision of collateral; therefore they reflect creditworthiness or borrower quality rather than exposure.

Table II

Descriptive statistics for rating, company size and degree of collateralization differentiated by type of collateral and housebank status for the year 1996

COLTYPE	HBM	Number of observations	RATING	SIZE	COLDEGREE
0	non-housebank	20	3.1	193.4	0
	housebank	10	2.6	132.5	0
	total	30	2.9	173.1	0
1	non-housebank	32	3.2	236.7	40.0
	housebank	21	2.7	164.6	41.6
	total	53	3.0	208.1	40.2
2	total	0	--	--	--
3	non-housebank	12	3.3	177.4	55.4
	housebank	3	4.0	301.8	59.7
	total	15	3.4	202.3	56.7
Total	non-housebank	64	3.2	212.0	32.1
	housebank	34	2.8	167.3	30.3
	total	98	3.0	196.5	31.5

COLTYPE is a qualitative variable indicating the type of pledged collateral; HBM is a dummy variable indicating whether a relationship is a housebank or a non-housebank relationship; RATING is the mean borrower rating; SIZE is the mean annual turnover in DM million; and COLDEGREE is the ratio of collateral value to total credit volume, i.e. the fraction of secured debt in terms of value.

Table II shows that for the year 1996 98 valid observations on collateralization result, of which 34 cases are attributed to housebank and 64 to non-housebank relationships. 30 out of the 98 cases are uncollateralized (i.e. 30.6%). None of the remaining 68 collateralized observations are secured only by personal securities. With respect to housebank status, Table II reveals no obvious difference in the ratio of uncollateralized cases to total cases (10/34 versus 20/64). Observations with both personal and real securities seem to occur less often for housebank than for non-housebank debtors (3/34 versus 12/64). The mean rating across all types of collateral is significantly lower for housebank observations, indicating that housebank borrowers on average rate more highly in terms of quality (2.8 versus 3.2).

There is an insignificant difference between housebank and non-housebank relationships with respect to mean company size (167.3 versus 212) .

Company size does not influence the type of collateral in any way. The mean size is numerically smaller for uncollateralized observations (173.1 versus 208.1 and 202.3), but this difference is not statistically significant. Additionally, there is no significant difference between the mean size of companies pledging only real securities (208.1) compared to companies providing both real and personal securities (202.3).

Finally, there is a statistically insignificant difference in the mean quality (rating) of type 1 and type 3 collateralized loans. The observations with both real and personal securities as collateral on average have a numerically higher rating, i.e. poorer quality, than loans collateralized only by real securities (3.4 versus 3.0).

COLDEGREE increases with different types of collateral, i.e. the categories measured by COLTYPE. Since the mean rating of borrowers pledging both real and personal securities also increases numerically, this implies that the degree of collateralization may be negatively related to borrower quality.

There is no obvious difference in the degree of collateralization with respect to the housebank status.

In short, four key patterns seem to be worth noting:

- The sample is characterized by bank heterogeneity. The small sample size indicates that pooled time series and cross sectional data should be used in subsequent regression analyses.
- The degree of collateralization in terms of value is left and right censored.
- Company size neither seems to influence the collateralization decision per se, nor the decision of which type of collateral is contracted if a loan is collateralized.
- Personal securities are more probably contracted if a company has limited liability and is a non-housebank relationship.

4. Determinants of Collateralization

4.1 Methodology

As outlined in Section 2, the relevant literature on collateral in bank loan contracts has focused on the expected default probability of the borrower. According to this literature, credit risk as anticipated by the banks has a significant positive (Bester 1994) or negative (Bester 1985) effect on the amount of collateral required. In this section, we will present our test for risk and effects due to relationship lending as determinants in the banks' decision-making on collateral. This test was done in two steps. First, the determinants of collateral incidence, i.e. whether a loan is collateralized or not, were identified. Second, the determinants of collateral intensity, i.e. the percentage of the amount of the loan contracted, were analyzed. This subsection describes our methodology. It is followed by step one and step two of the analysis.

For an analysis of the incidence of loan collateralization, the dummy variable COLYN is defined as the dependent variable (step 1). It is assigned a value of one if there is collateralization and zero if not. This test will be the starting point for our analysis, thus providing comparability with previous studies.

The second step uses the banks' own assessment of collateral value, where COLDEGREE is the ratio of collateral value to total credit volume (in percentage points). Its values range from zero (no valuable collateral) to a hundred (fully collateralized). COLDEGREE not only contains information on collateral incidence, but also on any remaining bank exposure vis-à-vis the client.

Both models were tested using a panel structure with a random effects specification, thereby extending the small sample size and controlling for unobserved heterogeneity of individuals (see Greene (1997) and Hsiao (1986) for details on this specification). Since COLYN is a dichotomous variable, we used a probit specification for our stage 1 regression. Since COLDEGREE is a censored variable we use a TOBIT-formulation for our stage 2 regression (see Baltagi 1995 for details).

The explanatory variables may be assigned to three groups representing structural variables describing company and loan contract characteristics, expected default risk of the borrower, and the nature of bank-borrower relationship.

Data on observable company and contract characteristics is used to account for heterogeneity in our sample. Bank dummy variables (BANK2 - BANK5) control for the identity of the financial institution granting the loan, where Bank 1 serves as the reference group. MANUFA and TRADE are dummy variables controlling for industry characteristics. Industry classifications are believed to influence the amount of assets potentially available as collateral through differences in the capital intensity of production. MANUFA and TRADE are assigned a value of one if a company is rooted in either manufacturing or trade. While the latter two variables control for differences across industries, POTCOLLAT is an additional proxy for a company's ability to provide inside collateral, measuring differences within industries. It is defined as the ratio of fixed assets to balance sheet total. POTCOLLAT indicates a higher volume of assets potentially available as collateral. It is expected to influence COLDEGREE rather than the dichotomous variable COLYN.

LOGSIZE measures the natural logarithm of a company's sales per year, serving as a proxy for company size. Since company size potentially reflects the bargaining power of the borrower, we expected to find a negative correlation between company size and collateral.

LIMLIAB is another dummy variable, indicating the corporate charter of the borrower. An interaction term between LIMLIAB and type 2 and 3 (personal) collateral, labeled PERSLIAB, describes the specific role of outside collateral. To control for interaction effects between corporate charter and company size, we included the interaction variable SIZELIAB.

The degree of competition on local credit markets may influence the incidence and the value of collateral. A local credit market is defined by the first three digits of the postal code of a company's registered office. The number of subsidiaries of a given bank at this location is used to calculate a Hirshman-Herfindahl Index of concentration (HHI). Higher HHI values reflect lower competition in the local credit market, yielding a predicted positive correlation between HHI and the degree of collateralization.

Expected credit risk is proxied by the banks' internal borrower quality ratings. Since RATING is an ordinal variable with six categories, a dummy variable was assigned to each rating category. Three dummies are included in the regressions: RATING3 to RATING5. Therefore, the prime borrowers (RATING1 and 2) with the lowest default probabilities serve

as the reference group. There was no observation with a distress rating of 6, rendering the inclusion of the respective dummy obsolete. According to Hypothesis 1, there should be a positive and monotonic relation between credit risk and collateral.

To control for the effect of a bank-client relationship on the collateral decision, we included three relationship variables in the regressions. LOGDURAT is the natural logarithm of the duration of the bank-borrower relationship. It is an indirect measure of information intensity, which has been used extensively in the literature (Berger/Udell 1995, Petersen/Rajan 1994). Logs-taking accounts for the marginally decreasing effect of an additional year of customer relationship. We include this variable to establish comparability with previous studies. Our second relational variable, HBM, is a direct measure of information intensity, referring to the housebank status of the lender in a given relationship. Finally, HBPERS is an interaction variable between the housebank status and a dummy indicating whether inside collateral is being provided, or not. According to Hypothesis 2, we expect to find a positive coefficient for all relationship variables.

Table III summarizes our regression variables and specifies predicted signs of regression coefficients.

Table III

Definition of regression variables

Variable	Definition	Expected sign of coefficient
BANK2 - BANK5	Set of dummies, 1 if debtor belongs to bank x (x=2 to 5)	no prediction
TRADE, MANUFA	Dummies, indicating whether a company is active in either manufacturing or trade	no prediction
LOGSIZE	Natural logarithm of a company's annual sales (proxy for size)	negative
HHI	Hirshman-Herfindahl Index measuring concentration on borrower's local credit market	positive
LIMLIAB	Dummy, indicating private limited companies	no prediction
PERSLIAB, SIZELIAB	Interaction variables between limited liability status and company size or collateral type "personal securities"	no prediction
POTCOLLAT	Ratio of borrower fixed assets to borrower total assets (potential ability to pledge collateral)	positive
RATING3 - RATING5	Dummy variables, representing bank internal ratings (1 is best, 6 is worst)	positive
LOGDURAT	Natural logarithm of years of bank-client relationship	(positive)
HBM	Dummy, 1 if housebank	positive
HBPERS	Interaction variable between housebank status HBM and outside collateral	---

4.2 Results

The results of the panel analysis are presented in Table IV. It reports variables, estimated coefficients and corresponding p-values.

Table IV

Determinants of collateralization - panel analysis

Variables	Probit (dependent variable is COLYN)	TOBIT (dependent variable is COLDEGREE)
Constant	2.98 (0.62)	65.73 (0.09)*
BANK2	-8.10 (0.01) ***	-35.58 (0.00)***
BANK3	-7.38 (0.02)**	-24.25 (0.00)***
BANK4	-2.66 (0.39)	6.50 (0.31)
BANK5	-4.88 (0.10)*	2.04 (0.77)
MANUFA	-1.34 (0.12)	-23.45 (0.00)***
TRADE	-3.30 (0.01)***	-31.36 (0.00)***
RATING3	-0.64 (0.47)	-6.78 (0.07)*
RATING4	0.29 (0.75)	-1.25 (0.71)
RATING5	-0.50 (0.78)	-6.53 (0.66)
LOGSIZE	0.57 (0.19)	-1.57 (0.63)
LIMLIAB	4.85 (0.49)	60.51 (0.17)
SIZELIAB	-0.49 (0.40)	-5.92 (0.10)*
PERSLIAB	---	7.49 (0.12)
HHI	-1.37 (0.79)	51.38 (0.09)*
POTCOLLAT	0.02 (0.28)	-0.66 (0.39)
LOGDURAT	-0.42 (0.33)	1.03 (0.65)
HBM	2.15 (0.06)*	17.57 (0.00)***
HBPERS	---	19.28 (0.17)
N	475	475
Chi-Square(Random Effects)	225.14 (0.00)	234.34 (0,00)
Pseudo-R^2	0,56	---

COLYN is a dummy variable, indicating whether or not collateral has been pledged, COLDEGREE is the ratio of collateral value to total credit volume (x 100). For definitions of explanatory variables see Table III. The TOBIT-procedure adjusts for censoring at values of zero.[14]
p-values in parentheses. *,**,***: Significance at the 10%, 5% and 1% level, respectively.

[14] Robustness tests showed that the qualitative results remain unchanged if one controls for censoring at COLDEGREE equal to 100 as well as if one ignores censoring at all. The scale factor for marginal effects of the regressors is estimated as 0.87.

Column 2 of Table IV depicts the probit regression of COLYN, the incidence of collateral in the loan contract, on a set of explanatory variables. As expected, there is considerable heterogeneity among banks with respect to their collateral decisions. Three out of four bank-dummy coefficients are significantly different from zero. The industry dummy coefficients are negative, indicating a lower probability for companies in these industries to post collateral. As expected, company size (LOGSIZE, SIZELIAB) has no significant influence on collateral requirements. Furthermore, the availability of potential inside collateral, as proxied by POTCOLLAT, does not influence collateral requirements per se.

We now turn to expected default risk, as proxied for by bank internal ratings. Our first hypothesis predicts a positive correlation between credit risk and collateral. The results are not in line with this hypothesis: the coefficients of the rating dummies (RATING3 - 5) have alternating signs and are statistically insignificant. Hence, borrower quality does not influence the decision to collateralize. Similar results were reported in the studies by Berger/Udell (1995), who found only one out of eight risk measures to be a significant explanatory variable, and Harhoff/Körting (1998).

Inspection of the coefficients of our relationship variables reveals that relationship intensity has a systematic effect on collateral. The coefficient of HBM is positive and significantly different from zero. Thus, consistent with our second hypothesis, relationship lenders do behave differently as compared to "normal" bank lenders. The housebank status leads to a higher probability of collateralization. We will give an interpretation of this finding below. Incidentally, the coefficient of LOGDURAT, the second relationship variable in the regression and the most common proxy in the empirical literature on relationship lending, is not significantly different from zero. Excluding the housebank dummy changes the sign of LOGDURAT, but the coefficient remains (highly) insignificant. We interpret this finding as further evidence for the inadequacy of duration, i.e. the length of the bank-client relationship, as a measure of relationship intensity.

Now let us turn to column 3 of Table IV. As mentioned above, the analysis of the dichotomous collateralization variable COLYN uses only little information on collateral being pledged. Column 3 of Table IV reports the results of an extended analysis by using infor-

mation on the value of collateral as assessed by the banks themselves. Since COLDEGREE contains additional information only with respect to collateralized observations, the TOBIT regression provides further insights into collateralized loan contract design.

With respect to most of the structural variables, the implications of the TOBIT regression are similar (in terms of sign and significance) to those discussed above. Hence, we will not provide a separate discussion of bank heterogeneity (BANK2-5), industry rooting (MANUFA, TRADE) and corporate charter (LIMLIAB, SIZELIAB).

PERSLIAB, the interaction effect of limited liability and the type of outside collateral, had been added to the regression.[15] Its coefficient is positive and marginally significant, supporting the idea that outside collateral is of particular importance in the case of a private limited company.

POTCOLLAT, the company's share of fixed assets in total assets, carries again an insignificant and negative coefficient.

HHI proxies for the degree of competition in the local credit market. Its coefficient is positive and significantly different from zero. Thus, increased competition in a local credit market will, ceteris paribus, lower the value of collateral, suggesting a positive role for market power in the explanation of loan contracting.

We now turn to the role of expected default risk, as expressed by internal bank ratings, in explaining collateral value. In the TOBIT model, all rating dummies are negative and — with one exception — insignificant. The one exception is RATING3, which is significant at the 7 percent level. Since the prime rating classes 1 and 2 serve as the benchmark, we interpret this result as evidence against both the risk compensation hypothesis and the signaling hypothesis. According to the former, collateral in debt contracts serves the purpose of neutralizing the exposure of the lender. Thus, collateral is predicted to be a positive function of risk (yielding a more balanced net risk exposure of the bank across customers). According to the latter hypothesis, collateral is predicted to be a negative function of risk, as low risk borrowers signal their quality by offering large amounts of collateral. Our findings are inconsistent with both hypotheses, because collateral values are not monotonic in rating

[15] Since PERSLIAB is a dummy variable with value one if personal securities are pledged jointly with limited liability, it is a perfect pre-

classes. Instead, they appear to be independent, with rating class 3 having a mildly lower collateral level than all other rating categories.

Why is collateral value for rating classes 1 and 2 apparently higher than class 3? A partial explanation that comes to mind quickly is the following: The measures of risk, our rating categories, may incorporate the net default risk, i.e. they may take collateral value into account. Consequently, a high volume of collateral would improve the associated rating and vice versa. Fortunately, this interpretation of our finding can easily be dismissed, as the ratings we use in the analysis are borrower ratings, which have not been not adjusted for any collateral. As explained in Section 3, all of the banks in our sample distinguish between borrower ratings and credit ratings in separate calculations (see Krahnen et al. 1998 for further details on rating systems).

The theoretical literature on collateral as a risk compensation or a signaling device is usually based on outside collateral. We thus checked the robustness of our results by including interaction terms between rating class and the relative magnitude of outside collateral in the TOBIT regression. The qualitative results remained unaffected, however.

If collateral does not compensate for default risk, nor does it signal borrower quality, what is a valid explanation of its role in debt contract design? A clue to answering this question may be derived from looking at the relationship variables. As in the probit specification, we found that relationship intensity has a systematic effect on the degree of collateralization in the TOBIT model as well. Again, the coefficient of HBM is positive and highly significant. In comparison to a "normal" bank, the probability is greater that a housebank is asking for collateral (Column 2 in Table IV) and for a higher amount of collateral. A possible explanation for the revealed preference of housebanks to acquire a relatively large stock of collateral, after controlling for risk, may be found in their role as active monitors of borrowers. Models of relationship lending, as for instance Dewatripont/Maskin 1995 and Boot/Thakor 1997, stress the bank's role in distress situations. In particular, it consists of two contributions, the provision of financial flexibility and the renegotiation of debt contracts. The former implies the willingness to provide additional financing in case of liquidity shocks to the company (Elsas/Krahnen 1998), while the latter may require the housebank to act as a co-

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dictor of the dependent variable COLYN and was, thus, not included in the probit specification. The same holds for HBPERS.

ordinating agent on behalf of or in conflict with several lenders. It is this second function of housebanks, their role as a lead bank in distress situations, that could motivate the ex ante accumulation of collateral (see Welch 1997, Longhofer/Santos 1998). To gain additional insights into this hypothesis, we have to trace whether the strong bargaining position of a housebank and collateral per se leads to differences in credit management activities if a borrower faces financial distress. Such an analysis focuses on aspects of ex post risk as opposed to the relationship between collateral and ex ante risk which was at the core of the preceding analyses. This is the subject of an analysis of our third hypothesis.

5. Collateral Accumulation, Relationship Lending and Workout Activities

5.1 Methodology

The preceding section indicated that relationship lenders tend to accumulate more collateral than normal lenders, after controlling for risk and company characteristics. We interpret this finding as follows: A strong position with respect to collateral, relative to the position of other financiers, will allow the housebank to play an important role in future situations of borrower distress. Thus, collateral may be instrumental in preparing for active involvement in the restructuring of distressed companies. In this section we will make an initial attempt to understand the role of lenders vis-à-vis their distressed borrowers. While in the last section our focus was on risk, and thus dealing with the expectation of default, the focus in this section is on actual distress according to the bank's own judgment. In concentrating on the role played by the housebanks, we will undertake a more direct test of the renegotiation hypothesis developed in Section 4.

If a borrower is in distress, either liquidation or restructuring is efficient. What will the bank do? In many cases, restructuring will not be possible unless there are additional financial resources forthcoming. Each bank among the company's creditors will therefore have to evaluate the private benefits of prolonging or increasing its financial commitment to the company. If this evaluation is positive, a restructuring or workout can be undertaken. Otherwise the bank will pull back and possibly trigger the liquidation of the company. One may hypothesize that additional investments by banks in situations of borrower distress are more likely if (i) its claims have priority over the claims of other creditors, and (ii) if its expected cost of renegotiation (and, possibly, creditor coordination) are relatively low compared to

other creditors. Both assumptions describe a situation where the free-riding problem is relatively small. Relationship lending and the accumulation of collateral may thus be seen as possibly complementary instruments that contribute to solving the free-riding problem inherent in many distress situations.

According to this view, collateral gives some bargaining power to lenders in renegotiation situations. For our empirical test, we therefore hypothesized a positive relation between the incidence of workout activities and the accumulation of collateral. As we have shown elsewhere, a housebank (or relationship lender) provides liquidity insurance due to the implicit contract between bank and borrower (Elsas/Krahnen 1998). We may combine the bargaining power argument with the liquidity-providing function of relationship lending. The relevant hypothesis claims a positive correlation between all three variables: the occurrence of workout activities, the accumulation of collateral, and the existence of a lending relationship.

For a formal test, we relied on our sample of potentially distressed companies. As stated previously, we had data on 75 potentially distressed companies for a five-year period (1992 to 1996). Whenever during this period the loan contract (or the rating) was changed, information on all of the variables in our data set were collected. This information included terms of loan contract, balance sheet data and risk assessment, as well as information on specific, distress-related activities by the bank. This information is mostly of a qualitative nature, indicating the incidence of a distress event and its nature or rationale according to the credit file, as well as any action undertaken by the bank. Such actions comprise the pledging of additional collateral; any change of credit outstanding, including debt forgiveness; credit rationing; redemption of loans and the granting of additional loans. Furthermore, our data indicated activities which would terminate a bank-borrower relationship, for example the commencement of bankruptcy proceedings, realization of collateral and so on.

The structure of the data used in this section of the paper (the PD sample, "potentially distressed") is different in several respects from the representative sample (R-sample) used in Section 4. First, observations for a given individual are significantly more frequent than in the R sample, e.g. some companies have up to six contract modifications, or rating changes in a single year. Moreover, the survivorship rate is much lower in the PD sample, due to liquidation and relationship termination. Third, there are significantly more missing observa-

tions in the data set since loan contract changes are more severe and often difficult to realize in situations of financial distress. In this context, and since the PD-sample has only 75 observations, we did not conduct a panel analysis. Instead, we relied on a comprehensive proxy variable that is intended to capture the level of involvement of the bank over the period of a borrower's distress.

This variable is labeled WORKOUT and is assigned a value of one

- if qualitative bank actions typically related to workouts are documented. Such activities are, for example, the constitution of a bank pool serving as a reorganization syndicate, the company's usage of consultancy services initiated by the bank itself, or a bank's active search for merger candidates.
- if financial support for workout activities are observed. These activities are assumed to occur, if additional credit is made available to the company, indicated by a simultaneous increase of credit volume (in absolute terms) and a bank's share of the total debt financing of a given company.

Our data comprises censored observations, since for some companies in our sample, workout activities may have occurred before or after the end of our sample period. As a consequence, we restricted the WORKOUT indicator variable to individuals with at least two years of observations after the onset of financial distress. Companies with contract termination during the initial two years of our sample period were also excluded from the analysis.

This left us with 69 observations for an analysis of bank workout activities. Our main focus is on aspects of collateral and relationship lending. Hence, we employed a probit analysis, where the WORKOUT binary dependent variable is regressed on our housebank attribution, HBM, and the degree of collateralization, COLDEGREE, as well as the interaction term of these two variables, HBCOLLAT, to control for specific effects of collateral caused by relationship intensity. In addition, we controlled for company heterogeneity by using BANK2 - BANK 5, LOGSIZE and TRADE as structural variables.[16] All variables were defined as in the preceding section. For all variables, the observation at or, in case of missing observations, immediately before the distress event were used.

[16] We dropped the industry variable MANUFA, since about 80% of the sample companies belong to this single industry.

FINSHARE measures the relative importance of a bank in a given company's debt financing. It is defined as the ratio of total credit volume to the borrower's total debt financing. HBFIN is the respective interaction term used to separate out the effects of FINSHARE based on relational aspects.

Finally, we include a measure of the importance of bank debt in total financing for a given borrower, labeled LEVERAGE. It is defined as the ratio of total debt financing to balance sheet total in percentage points. Again, we controlled for differences due to the housebank status by constructing the respective interaction term, labeled HBLEVERAGE.

Table V shows the frequency distribution of WORKOUT over housebank status, indicating sufficient variability to conduct the probit analysis.

Table V

Frequency Distribution of WORKOUT

		HBM		
		0	1	sum
WORKOUT	0	24	10	34
	1	23	12	35
	sum	47	22	69

WORKOUT is a binary variable, indicating whether workout activities occurred or not; HBM is housebank attribution dummy.

5.2 Results

Results of the probit estimation on determinants of the workout incidence are presented in Table VI.

Table VI

Probit regression of workout incidence on a set of explanatory variables

Variables	Probit (dependent variable: WORKOUT)
constant	5.08 (0.09)*
BANK2	0.05 (0.47)
BANK3	0.24 (0.62)
BANK4	0.03 (0.94)
BANK5	-1.77 (0.01)***
TRADE	0.74 (0.40)
LOGSIZE	-0.37 (0.08)*
HBM	4.01 (0.02)**
LEVERAGE	-0.01 (0.35)
HBLEVERAGE	-0.03 (0.09)*
COLDEGREE	0.02 (0.07)*
HBCOLLAT	-0.02 (0.20)
FINSHARE	-1.37 (0.03)**
HBFIN	-1.47 (0.31)
N	69
LR-statistic	25.05 (0.02)**
Pseudo-R^2	0.26[17]

The dependent variable is WORKOUT which is assigned a value of one if workout activities occurred, and zero otherwise; BANK2 to BANK5 are dummies, 1 if the debtor belongs to bank x (x=2...5); LOGSIZE is the natural logarithm of a company's annual sales; HBM is binary: 1 if housebank; LEVERAGE is the ratio of total debt financing to balance sheet total, HBLEVERAGE the corresponding interaction term with HBM; COLDEGREE is the ratio of collateral value to total credit volume in percentage points, HBCOLLAT the corresponding interaction term with HBM; FINSHARE is the ratio of total credit volume supplied by the respective bank to total debt financing of a borrower, HBFIN the corresponding interaction term with HBM.

All observations of the explanatory variables were taken at or immediately before the distress event. p-values based on Huber/White robust standard errors in parentheses. *, **, ***: Significance at the 10%, 5%, and 1% level, respectively.

[17] The indication of a reasonable good model fit is supported by an unreported Homer-Lemeshow-test which does not indicate misspecification of the model. Furthermore, the comparison of the predicted classification based on expected values and constant probabilities indicates an improvement in the predictive ability of the model by roughly 30%.

Considering the structural variables first, Banks 1 through 4 yielded roughly similar results with insignificant dummies. Bank 5 stands out, its coefficient is negative and significant, indicating that Bank 5 engages in workout activities with a lower probability than all other banks in our sample.

While TRADE is insignificant, LOGSIZE has a negative and significant coefficient. Thus, the probability of workout activities is higher for smaller companies.

The coefficient of LEVERAGE, the measure for the relative importance of debt as a funding source, is negative but insignificant (see below).

At the core of our analysis are the variables COLDEGREE and HBM. COLDEGREE is positive and significant. An increase of collateral value thus strengthens workout efforts by the bank. This interpretation is consistent with our results in Section 4. As the coefficient of HBCOLLAT is insignificant, this holds for both housebank and normal bank lenders. Thus, up to this point, the results support the hypothesis that collateral increases a bank's willingness to engage in renegotiations, once distress occurs. On the basis of what we have found in Section 4 of this paper, the coefficient of the housebank variable HBM deserves special attention. The coefficient of HBM is positive and significant, indicating a higher probability of workout activities being undertaken in the case of housebank relationships. This finding is additional evidence in support for both, the idea of a relationship lender as a provider of liquidity insurance, and the presumed importance of collateral as an ex ante device to increase bargaining power and to lower expected costs of credit coordination and contract renegotiations. Since the housebank has already accumulated collateral, it is more likely to profit directly from workout investments after the distress event. Thus, it engages more often in workouts, as is indicated by our regression results.

Finally, for both housebanks and normal banks, the involvement in workouts is inversely related to their financing share. The coefficient of FINSHARE is negative and significant, and the interaction term does not indicate a special role for housebanks here. An in-depth exploration of this effect is beyond the scope of this paper.[18]

[18] We tested for multicollinearity between HBM and FINSHARE. The fairly low value of the correlation coefficient rejects multicollinearity as the reason for this counterintuitive result. Note, that the coefficient of FINSHARE is insignificant if one uses normal rather than Huber/White standard errors. We prefer to report the latter ones since these are robust to misspecifications of the underlying distribution of the dependent variable.

6. Conclusions

According to the recent literature on financial intermediation, the evolution of contractual relationships between a lender and borrower is a key element in understanding what differentiates bank loans from corporate bonds. These financial relationships are built over time as has been shown by Rajan (1992), Boot/Thakor (1994) and Petersen/Rajan (1995), among others, and they consist in the build-up of (mutual) trust, based on private information in games of reputation. Benefits of such relationships are hypothesized to exist mainly in two areas: the provision of insurance against unexpected shocks to the borrower's liquidity and the provision of efficient investment decisions (workout or liquidation) in distress situations. The role of financiers in a borrower's distress is of special importance when the company has many lenders. In this case, a housebank relationship provides the proper incentives to overcome potential free riding problems.

To date, there is very little empirical evidence on the evolution of financial relationships and on their role in situations of borrower distress. Lack of data is probably the most serious reason for our limited understanding of the role of housebanks, and more generally, of information-intensive borrower-lender relationships.

This paper draws on a unique set of credit-file data that includes observations on borrower-related bank decisions, on contract design, on the bank's own assessment of individual borrower risk and, most importantly, on bank decision-making after the occurrence of financial distress. The five-year panel structure allows a dynamic analysis of the problem.

The first important question addressed concerns the relation of collateral, both in terms of incidence and in terms of value, to the ex ante default risk of the borrower. There are opposing predictions in the literature. Signaling models predict a negative relation between the value of collateral and default risk, while risk compensation models predict a positive correlation between collateral and default risk. Our findings do not lend support to any of these predictions. The incidence of collateral, i.e. the choice between an unsecured and a secured loan, is statistically independent of the borrower's default risk. Similarly, there is no statistically significant difference in collateral value between prime borrowers and low-quality borrowers (with the highest default expectation). In summary, the use of collateral in bank loan contracts does not seem to be consistent with its role of a signaling device. Equally, it is not

consistent with its role as a means to counterbalance expected default risk, or as a means to achieve a target level of default risk per borrower.

If collateral does not perform the function ascribed to it in much of the theoretical literature, what function *is* consistent with our data? Our analysis of relational effects on collateral is based on some recent models of the dynamic behavior of financial intermediaries. In these models (Welch 1997, Longhofer/Santos 1998), the relationship between borrowers and a lender develops over time such that the risk of inefficient coordination between creditors in a future distress situation is minimized. In order to achieve this objective, the housebank builds up ("accumulates") collateral over time, possibly as a means to increase the lock-in of borrowers and to strengthen the bank's future position in contract renegotiations. We found evidence consistent with this line of reasoning. Housebanks do require collateral more frequently and in larger amounts, relative to the loans outstanding, as compared to normal banks.

Using a complementary data set of distressed loans, we were able to further pursue the analysis of workout activities by lending institutions. Using a probit model, we identified the determinants of workout intensity by banks. The latter variable proxies for the number and frequency of activities undertaken by the respective bank in order to support the borrower as a going concern, as opposed to liquidation. Our findings indicate that the degree of collateralization is positively correlated with future workout activities. In addition, we find the housebank to be significantly more active in company restructuring than a "normal" lender. Both results support the Longhofer/Santos (1998) model on the dynamics of relationship lending. Strong financiers, housebanks, accumulate collateral in "good" times, and get actively involved in company restructuring in "bad" times. In this sense, collateral serves a strategic function in that it shapes the bank's future position in a renegotiation process. In particular, the accumulation of collateral serves not only as a pledged asset against the loan outstanding, but it also restricts the borrower and other creditors in a desirable way.

A host of additional research questions arises from the findings reported in this paper. In particular, an analysis of the details of the renegotiation process between a borrower and a lender in distress would be desirable. The sequence of actions taken, the provision of additional credit, the direct impact of company management, and the eventual takeover of management responsibility by banks has to be analyzed on a time line. A more detailed analysis

of credit management such as this will eventually reveal whether housebanks indeed perform an efficiency-enhancing function, i.e. providing support for an efficient restructuring of insolvent companies, or whether their relationship to the borrower leads to inefficient postponement of liquidation.

The results reported in this paper strengthen the understanding of the real effects of relationship lending. Needless to say, we feel that a more detailed analysis of credit management in situations of borrower's distress and of debt renegotiation are a very promising field for future research.

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