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Empirical determinants of relationship lending

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Abstract

This paper analyzes determinants of the incidence of relationship lending. We explore self-assessments of German universal banks with respect to their Hausbank status in corporate lending and relate loan contract and borrower characteristics to this attribution. The analysis shows that Hausbank status is positively related to better access to information and the bank's influence on borrower management. While the duration of the bank–borrower relationship is not related to Hausbank status, banks are more likely to be Hausbanks when their share of borrower debt financing is higher and when the number of bank relationships is lower. We also find that the likelihood of observing a Hausbank relationship is non-monotonically related to bank concentration in local debt markets. For low and intermediate values of concentration, Hausbank relationships become more likely as competition increases. This contradicts the conjecture that relation lending requires monopolistic market structures. Nevertheless, in highly concentrated markets, less competition fosters Hausbank relationships. © 2004 Elsevier Inc. All rights reserved.

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1. Introduction

The theory of relationship lending is based on the idea that close ties between borrowers and banks may be economically beneficial.¹ Accordingly, the empirical literature is mainly

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¹ See, e.g., Fischer (1990), Rajan (1992) and Petersen and Rajan (1994). Ongena and Smith (2000) and Boot (2000) provide recent surveys on relationship lending.

focused on assessing the *consequences* of relationships on loan pricing, credit availability, or efficiency of workout decisions by banks if borrowers face financial distress. However, this assumes we can tell whether a given borrower has a relational or a non-relational (“arm’s-length”) type of debt financing with its bank.

Unfortunately, little is known about how the incidence of relationship lending depends on borrower characteristics, or how it is reflected in loan contract design. Consequently, it is not clear which proxies should be used for relationship lending. Yet, it seems important to understand when a bank will engage in relationship lending, and which borrowers choose to have a relationship lender. Although the relationship intensity between a bank and a borrower is hard to observe directly, examining these issues is ultimately an empirical task.

The question this paper confronts is: What are the factors that determine whether a particular bank lender is a relationship lender? We address this question empirically by using a sample of small- and medium-sized corporate borrowers of five major German universal banks, for which three essential types of information are available:

- the self-assessment of a bank as to whether it is a Hausbank for a given customer or an arm’s-length lender,
- a written explanation by the bank of this assessment, and
- data on loan contract and borrower characteristics collected from credit files of the bank.

As a first step, we explore the banks’ written explanations of their Hausbank status. Since the Hausbank often serves as a prime example of relationship lending (see [Edwards and Fischer, 1994](#)), this reflects the point of view of one party directly involved in such a close lending relationship.

In the second step of the analysis we relate borrower and loan contract characteristics to Hausbank status. Both steps yield insights into the scope and determinants of relationship lending. Our results also have implications for prior and future research because we explore characteristics of commonly used proxy variables in empirical work.

There are potentially three determinants of relationship financing: borrower characteristics (e.g. size or quality of the firm, informational opaqueness, access to public debt, or equity markets), bank characteristics (e.g. type of the bank, such as savings or cooperative banks versus private banks), and market characteristics and conditions (e.g. regulation, market structure, and competition). Our analysis employs measures for all of these groups.

With respect to market characteristics, we emphasize the role of competition in local debt markets. [Petersen and Rajan \(1995\)](#) have argued that competition is generally detrimental to relationship lending. One can also argue that lending relationships are simply efficiency increasing or decreasing and therefore independent of market structure. Or they could be an instrument to deliberately create bank monopoly power and therefore be a substitute for a monopolistic market structure. Our empirical analysis of the role of monopoly power in relationship lending provides a unique test of these conjectures.

Turning to the results, our uni- and multivariate analysis identifies several factors systematically related to Hausbank status. First, variables related to information access of banks and influence on borrower management turn out to be important determinants. In particular, as a bank’s share of debt financing or its share of payment transactions in-

creases, it is more likely to be a Hausbank. Second, the duration of the bank–borrower relationship is not related to Hausbank status. This is interesting because duration is the most commonly used proxy for relationship lending in the literature.

Finally, we find that the association between market concentration and relationship lending is non-monotonic. The likelihood of observing a Hausbank decreases as bank concentration in local debt markets increases. This holds for the most frequently observed low and intermediate levels of bank concentration. This suggests a monopolistic market structure substitutes for relationship lending in creating bank monopoly power in lending relationships. However, in highly concentrated markets, less competition fosters lending relationships since the likelihood of observing a Hausbank increases in market concentration.

The paper is organized as follows. [Section 2](#) provides a brief literature review to define the notion of relationship lending and to characterize variables commonly used to identify lending relationships in empirical work. [Section 3](#) describes the data underlying the subsequent empirical analysis. [Section 4](#) explores the written explanations of the banks regarding their Hausbank status, and explores interdependencies with other measures for relationship lending (like duration and the number of bank relationships). In [Section 5](#), a multivariate analysis of the determinants of relationship lending is conducted, where loan contract, borrower, and market characteristics serve as explanatory variables for Hausbank status.² [Section 6](#) summarizes and concludes.

2. Related literature and identification of relationship lending

2.1. The concept of relationship lending

Relationship lending is defined as a long-term implicit contract between a bank and its debtor. Due to information production and repeated interaction with the borrower over time, the relational bank accumulates private information, establishing close ties between the bank and the borrower. Such ties create well-known benefits from the lending institution suggested in the literature: intertemporal smoothing, increased credit availability, enhancement of borrower's project payoffs, and more efficient decisions if borrowers face financial distress (see e.g. [Fischer, 1990](#); [Sharpe, 1990](#); [Rajan, 1992](#); [Petersen and Rajan, 1995](#), and [Boot and Thakor, 2000](#)).

However, relationship lending is not a dominant type of financing since it is, inevitably, associated with costs. One of such costs is exogenous monitoring costs in the spirit of the costly state verification approach by [Gale and Hellwig \(1985\)](#). More specific are switching costs in the sense of [Sharpe \(1990\)](#) and [Rajan \(1992\)](#). In their models, the information privilege of banks endogenously induces bargaining power, thereby giving rise to a hold-up problem.³

² In [Appendix A](#), we report several robustness tests of our results with respect to the reliability of the banks' self-assessments of their Hausbank status, and in [Appendix B](#), issues of endogeneity.

³ Following [Dewatripont and Maskin \(1995\)](#), another potential cost may arise from inefficient renegotiations in the sense of a "soft budget constraint" for the borrower. Here, the relationship lender would be willing to "throw good money after bad" to recover initial losses. This in turn could undermine entrepreneurial incentives ex ante.

The hold-up problem does not imply that an informed relationship lender earns positive rents over the lifetime of the bank–borrower relationship. Rather, the bank extracts rents over some periods after the loan contract is initiated. This will be anticipated at the contract initiation and therefore competed away. Nevertheless, ex post rents can induce costs. For example, in the model by [Rajan \(1992\)](#), the bargaining power of the relationship lender reduces entrepreneurial incentives to spend effort in a project, which constitutes opportunity costs of having an informed lender.

One remedy against these lock-in costs is to borrow from multiple banks where the presence of (possibly uninformed) banks restricts the bargaining power of the informed lender in an optimal way. A potentially superior solution is analyzed by [von Thadden \(1995\)](#), who shows that using long-term debt contracts with specific features can also circumvent the hold-up problem. More specifically, the long-term contract should resemble a line of credit arrangement that the lending bank may terminate, but if it chooses to continue financing it should do so at ex ante specified terms. This arrangement can optimally limit the informed lender's bargaining power without the need for multiple bank relationships.

2.2. Identification of relationship lending

The brief sketch of the theoretical foundations of relationship lending highlights the key element of the concept, the informational privilege of the bank and the resulting bargaining power vis-à-vis the borrower. This element in turn provides the rationale for several indicator variables frequently used in empirical work to identify relationship lending.

The most commonly used proxy for relationship lending in applied empirical work is the duration of a bank–borrower relationship (see e.g. [Petersen and Rajan, 1994](#); [Berger and Udell, 1995](#), and [Ongena and Smith, 2001a](#)). The basic idea is that duration reflects the degree of relationship intensity over time. If duration is equivalent to private information accumulation over time, the lock-in of a borrower should increase with duration. Duration then reflects switching costs, the severity of the hold-up problem, and relationship intensity in general.

However, the relation between accumulated information, duration, and borrower lock-in does not have to be monotonic. First, it may take time to establish a valuable information advantage. Second, the value of previously accumulated private information may start to decrease after some time, for example if the borrower establishes an observable track record, as suggested by [Diamond \(1991\)](#). Third, the marginal value of additional information might be decreasing.

Using the number of bank relationships as an indicator for the presence of relationship lending is based on the premise that maintaining an exclusive bank relationship promotes the development of close ties between bank and borrower.⁴ Exclusivity induces a lower degree of direct competition between banks, allows for unique access to valuable information, and eases the realization of the economic benefits associated with relationship lending, like for instance (efficient) renegotiation of loan contracts.

⁴ [Ongena and Smith \(2001b\)](#) provide an overview of theoretical explanations for the optimal number of bank relationships of firms as well as an empirical analysis based on multi-country data.

However, exclusivity of a bank relationship is neither a necessary nor a sufficient condition for relationship lending. First, [Holmström and Tirole \(1997\)](#) have shown that only a fraction of funds needs to be financed by a monitoring lender to deter the borrower from moral hazard. The remaining funds can be raised from the market or uninformed arm's-length banks. Second, the building block of theory is access to valuable private information and its accumulation over time. But, since valuable information is likely to be distributed by the borrower in a strategic way, this can be accomplished even in the context of multiple bank relationships (though possibly harder), and, most importantly, it does not have to happen at all. Hence, the proxy value of the number of simultaneous bank relationships remains unclear, but a negative correlation between the number of banks and the incidence of relationship lending seems plausible.

Similar arguments apply when it comes to the share of the borrower's total debt financing accounted for by relationship lending since this is conceptually the same as the issue of multiple banks, but without the assumption of equal financing provided by all banks. Therefore, it also seems plausible that a higher debt financing share increases the likelihood of relationship lending.

Few studies explore characteristics of these potential indicator variables of relationship lending. [Ongena and Smith \(2001a\)](#) find that the longer the duration, the higher the probability of termination. Furthermore, small, young, and highly levered firms maintain the shortest relationships.⁵ These findings are not consistent with duration being positively related to the severity of the borrower lock-in.

[Houston and James \(2001\)](#) explore the effect of banking relationships for large, exchange-listed US firms on the correlation between firm cash flows and investment expenditures. Their main proxy for relationship lending is the number of bank relationships a firm maintains. Though just a side issue of their analysis, the authors conduct a logit regression relating the number of bank relationships to firm characteristics like the market-to-book ratio (as a proxy for growth firms), size and business risk.

Our analysis complements the results of these studies because we relate all of the aforementioned indicator variables to the Hausbank status and other observable borrower and contract characteristics. Since Hausbank status is based on banks' self-assessments, this improves our understanding of duration, the number of bank relationships, and the share of debt financing regarding their ability to identify relationship lending.

3. Data

The subsequent empirical analysis relies on three types of information:

- (i) the self-assessment by banks as to whether they are the Hausbank of a given customer or not,
- (ii) written explanations for these assessments, and

⁵ This is supported by the findings of [Farinha and Santos \(2002\)](#) in a related study.

- (iii) data on loan contract and borrower characteristics collected from credit files of five major German universal banks: Deutsche Bank, Dresdner Bank, Bayerische Vereinsbank, DG Bank, and WestLB.⁶

All of these banks are universal banks that do corporate lending and belong to the top ten banks in Germany with respect to their size and market share. The first three banks are for-profit private banks, while DG Bank is the apex institution of the cooperatives sector, and WestLB is one of twelve apex banks in the savings banks sector. Hence, the sample of banks represents all relevant sectors of the German banking system.

A random sample of firms was drawn from the portfolios of these banks. The sample size is 200 borrowers, each maintaining a credit relationship with one of the banks sometime during 1992–1996. To be eligible for selection, firms had to meet three selection criteria:

- *Size.* Annual sales was between 50 and 500 million DM (approximately 25–250 million USD) for at least one year of the 1992–1996 observation period.
- *Long-term debt.* Each borrower must have at least one long-term loan to observe pre-specified interest rates and repayment schedules.
- *Registered seat.* The headquarters of each firms is not located in the former Eastern Germany to avoid problems due to the restructuring of the new federal states during German reunification.

Note that the requirement of having a long-term loan does not imply that we take only this type of debt into account. In what follows, our focus is on total debt provided by the observation bank to the firm. Bank debt therefore comprises not only long-term loans, but other loans like lines of credit or guarantees as well.

For all sample firms, panel data collected from bank credit files is available over the period 1992–1996. This data include contractual characteristics (debt volume, type and amount of pledged collateral, duration, etc.), borrower characteristics (the legal form of the firms, location of the headquarter, etc.), and bank-specific information relevant for credit decisions (banks' internal ratings of borrower quality, etc.).⁷

One important feature of the sampling design is that the sample of 200 borrowers consists of two subsets. One is representative of all borrowers matching the above-mentioned selection criteria and consists of 125 firms. The other subset is subject to the additional criterion that each member of the population must have a low quality rating at least once during the observation period. This constitutes a subsample of potentially distressed borrowers. The two subsets are different because one is representative, and the other is stratified to reflect borrowers with a high default risk. We rely on the overall sample when analyzing the written explanations of the banks regarding their Hausbank status. Whenever we are interested in statistical tests of significance, we rely on the representative sample of borrowers.

⁶ Due to mergers, Bayerische Vereinsbank is now HypoVereinsbank, and DG Bank is DZ Bank.

⁷ For a comprehensive overview see Elsas et al. (1998).

Finally, to identify relationship lenders, we use the self-assessments of the banks regarding their Hausbank status. These were collected by questionnaires, where credit officers in charge of the corporate borrowers were asked to assess their bank's status. This means the banks are explicitly indicating their status as a relationship lender. In the literature and public debate, the German notion of the Hausbank is well known and often serves as the prime example for relationship lending. The Hausbank is regarded as the premier lender of a firm with more intensive and more timely information than a comparable "normal" bank (Edwards and Fischer, 1994; Elsas and Krahnen, 1998). It is said to bear a "special responsibility" if its borrowers face financial distress.

The response rate for the questionnaires is a very high 97.5 percent. This is because the survey was conducted within a large-scale joint research project, where all sample banks as well as five academic teams conducted an analysis of credit management processes in Germany.⁸

Our firm sample is well-suited to analyze relationship lending. The sample represents borrowers from a firm segment potentially subject to severe informational asymmetries: None of the sample firms are exchange-listed, and none have issued public debt. Furthermore, the size and legal form characteristics of the sample ensure that equity holdings by banks do not exist.⁹ On average, bank debt accounts for 55 percent of total firm financing in our sample. Hence, debt provision is the only—but potentially a significant—means for banks to exert influence on the management of firms.

4. Characteristics of Hausbank status and indicator variables

4.1. Exploration of self-assessments

Directly asking one of the involved parties is a straightforward way to generate a criterion for assessing whether a given bank–borrower relationship is "special" in the sense of relationship lending. The main advantage of this procedure is that one does not have to rely on observed, potentially endogenous, and noisy borrower or loan contract characteristics. However, even if this can be done in a systematic way for a well-defined sample of borrowers, as we believe we have done in this paper, two caveats remain. First, a necessary condition for meaningful self-assessments is that institutions (or persons within institutions) associate a more or less homogeneous set of characteristics with the term "relationship lending," or in our case the notion of the Hausbank. The meaning of the term Hausbank is well known in Germany and often used in public as well as academic discussion.¹⁰

⁸ It is worth mentioning that in the course of the project, the researchers had complete and unrestricted access to information on these credit customers available to the respective banks.

⁹ For large and exchange-listed firms, direct equity stakes and proxy-voting rights of banks are presumed to be important instruments for corporate governance in Germany (see Boehmer (1999) and Franks and Mayer (2000) for an overview).

¹⁰ For examples or references, see Edwards and Fischer (1994).

Second, explanations provided by banks might be biased due to the way the questionnaire is designed. To avoid such biases, the questionnaire consists of only two items:

- (i) *Is your bank the Hausbank of the given customer, yes or no?*
- (ii) *Please provide a written explanation of your assessment.*

By permitting the respondents to provide their own explanations, the form of the questions does not influence the credit officers' responses.

Information on Hausbank status is processed as a dummy variable, equal to one if a bank views itself as the Hausbank of a borrower and zero if not (the respective binary variable is labeled HB). Data processing becomes more complex for the written explanations. These have to be systematically categorized, condensed, and coded for usage in a statistical analysis. Sometimes, this exploration also requires subjective interpretations.

Table 1 shows the result of this process. We define fourteen distinct categories or factors to which all provided explanations can be related. Credit officers regularly provided more than one explanation for the incidence as well as the absence of Hausbank status. Hence, each category can be mentioned at most 195 times, comprising cases with or without Hausbank status. Column 2 of Table 1 indicates the frequency where the respective factor was mentioned, conditional on not being the Hausbank, and column 3 reports the same when the bank is the Hausbank. Both columns are subdivided to distinguish those cases where the factor was mentioned to be absent (e.g. "We do not have a high share of the borrower's debt financing," coded -1) and those cases where the factor was said to be prevalent (e.g. "We have a high share of debt financing," coded $+1$).

Table 1
Categories of explanations for Hausbank status of banks

Factor definition ("the bank has/is...")	Self-assessment		Total frequency of mentioning (out of 195)
	Non-Hausbank ($+1/-1$)	Hausbank ($+1/-1$)	
High share of debt financing	1/37	42/4	84
High share of payment transactions	4/24	35/3	66
High share of short-term financing	0/11	21/1	33
High share of long-term financing	4/3	23/0	30
High business intensity	0/15	13/1	29
Exclusive business	0/11	15/3	29
(Provides) special services	7/4	14/0	25
Long duration	0/6	18/0	24
Influence on the management	0/1	21/0	22
Member of a banking pool	4/5	8/1	18
Low geographical distance	0/3	1/1	5
Good access to information	0/0	4/0	4
High collateralization of loans	0/0	1/0	1
Member of loan syndication	0/0	1/0	1

Notes. Analysis of 195 Hausbank status questionnaires. Factors are sorted by descending frequency of mentioning.

The absolute frequency of mentioning a given category is the main indicator for the relevance of a certain explanation. For example, a high share of debt financing was mentioned in 84 out of 195 cases. In 37 of those cases, where the overall attribution was non-Hausbank, it was mentioned that the banks do not have a high share of debt financing (code –1). In 42 other cases, the attribution was Hausbank, and it was mentioned that the banks do have a high financing share (code HB and +1). Hence, in 79 of 84 cases Hausbank status was consistently related to the prevalence of a high share of debt financing. Since this is the highest observed total frequency and exhibits a logically consistent pattern, one can conclude that a high share of debt financing is an important determinant of Hausbank status.¹¹ It is reasonable to argue that there exists no problem of causality due to the design of the questionnaire. Credit officers were asked to explain their assessment, which implies a direct and unique causality.¹²

The frequencies shown in Table 1 suggest that, from the perspective of the lending banks, nine factors determine the self-assessment of the Hausbank status. If a bank

- (i) has a high share of debt financing,
- (ii) has a high share of payment transactions,
- (iii, iv) has a high share of either long-term or short-term financing,
- (v, vi, vii) undertakes special, exclusive, or intense business with the firm,
- (viii) has a long relationship with the borrower, or
- (ix) has influence on the firm's management,

one should expect to observe a Hausbank relationship with a higher probability.

Many of these factors are related directly or indirectly to either information access or a bank's influence on borrower management. This is obvious for the items "good access to information" and "influence on the management." Also, as mentioned above, a longer duration is usually associated with more information acquisition. But, for example, the high share of payment transactions can also be related to information access. The scarce literature assessing the sources of valuable private information for banks actually engaged in financing borrowers consistently agrees on checking accounts as the primary candidate (see Fischer, 2000, and Mester et al., 1999). It is interesting in this context that a bank's high share of payment transactions is the second most important factor used as an explanation for Hausbank status.

Similarly, a bank's high share of the borrower's debt financing, and the conduct of intensive, exclusive or special business can be related indirectly to both information acquisition and management influence. On the one hand, the bank might acquire valuable private information due to its involvement in these transactions. On the other hand, a more significant role as financier can increase the bargaining power of the bank since its substitution through another bank becomes more costly.¹³

¹¹ We also conducted an unreported non-parametric χ^2 -test of independence between Hausbank status and the frequencies of mentioning each factor. The null of independence can be rejected for all categories, except for the banking pool and categories mentioned less than ten times (i.e. the last four factors).

¹² We elaborate on the endogeneity issue in Appendix B.

It is not obvious, though, that the explicit emphasis on long- or short-term financing is related to information acquisition or influence on management. The same holds for collateralization, membership of a banking pool or a loan syndication, and geographical proximity. Interestingly, these are also the factors with the lowest frequencies in the survey data.

In conclusion, as a first result, several factors systematically affecting Hausbank self-assessments are related to information acquisition or management influence. This is compatible with the theoretical concept of relationship lending and remarkable because we did not impose any structure on potential explanations of the credit officers.

4.2. Hausbank status and alternative indicators

In this section, we relate the self-declared Hausbank status to alternative proxies (or indicators) of the incidence of relationship lending. Common proxies in applied empirical work are duration and the number of bank relationships (see e.g. Petersen and Rajan, 1994; Ongena and Smith, 2001a, and Houston and James, 2001).

Table 2 shows the frequency distribution of duration and the number of bank relationships in our overall sample. The first implication of the frequency distribution is that neither the number of bank relationships nor duration is a perfect predictor of Hausbank status. For example, as shown in column 3 of Table 2, only 30 out of 105 Hausbank borrowers maintain fewer than three banking relationships simultaneously. Hence, Hausbank status is not equivalent to exclusivity. On average, borrowers with a Hausbank relationship have 5 bank

Table 2
Frequency distribution of duration and number of bank relationships

Number of bank relationships			Duration		
Interval	ϕ , 1992–1996 # ($\sum\%$)	thereof <i>HB</i> [#]	Interval [Years]	1992 # ($\sum\%$)	thereof <i>HB</i>
[1; 3[	43 (21.5)	30	[0; 2[	16 (8)	7
[3; 4[	24 (33.5)	16	[2; 4[	18 (17.2)	5
[4; 7[	67 (68)	29	[4; 11[	41 (38.9)	20
[7; 9[	31 (84)	16	[11; 19[	33 (56.1)	16
[9; 25]	30 (100)	14	[19; 101]	84 (100)	53
Mean [Std. dev]	5.7 [4.3]	5.1 [3.5]		18.2 [17.3]	20.2 [18.5]
Median	5.0	4.3		15.04	18.5
No. obs.	195	105		192	101

Notes. # denotes number of observations, $\sum\%$ denotes cumulated percentage points. The number of bank relationships is based on averages of individual firm's time-series observations from 1992 to 1996. The variable *HB* equals one if the bank from which the observation originates claims to be the Hausbank of a given customer and zero if not.

¹³ For example, in an adverse selection setting, an outside bank might interpret a borrower's attempt to substitute a bank that is pivotal to the borrower's financing as a bad signal regarding borrower quality. The outside bank will give this possibility a positive probability, which would translate into a higher demanded risk premium or even rationing. See Dell'Araccia et al. (1999) for an application.

relationships with a median of 4.3. Nevertheless, the lower mean for the Hausbank group compared to the sample of all firms indicates a negative correlation between the number of banks and Hausbank status.

With respect to duration, the observed pattern of the frequency distribution is incompatible with an indicator role for relationship lending. At the beginning of our observation period in 1992, the average duration is 18.2 years with a median of 15 years. These numbers are similar to the Hausbank cases, with an average of 20.2 years and a median of 18.5.

Note that the difference between the number of bank relationships of Hausbank and non-Hausbank borrowers is also statistically significant if tested for the representative subsample (see Table 3). This does not hold for duration.

Table 3, based on the representative subsample on which we rely from now on,¹⁴ further shows that bank debt is much more concentrated for borrowers of a Hausbank than for borrowers of arm's-length banks. The variable *FINSHARE* measures the bank's (from which the observation originates) share of total debt financing of the borrower. According to Table 3, *FINSHARE* of Hausbanks is on average 44 percent while it is only 26 percent for arm's-length banks. This difference is also statistically significant.

The analysis of written explanations for the self-assessment of Hausbank status shows that several factors are directly or indirectly related to information access and influence

Table 3

Relation of alternative indicators to self-assessment, information access, and management influence

Indicator	Self-assessment		Information access		Influence on management	
	<i>HB</i> = 0	<i>HB</i> = 1	<i>INFO</i> = 0	<i>INFO</i> = 1	<i>INFLUENCE</i> = 0	<i>INFLUENCE</i> = 1
<i>FINSHARE</i>	25.98 (20.65)	43.81*** (38.25)	34.65 (27.3)	44.84** (28.6)	35.90 (27.8)	47.54* (27.4)
<i>NUMBANKS</i>	6.38 (6.06)	4.78* (3.19)	6.07 (5.1)	3.80*** (2.9)	5.63 (5.0)	4.52 (2.6)
<i>DURATION</i>	19.21 (17.94)	22.11 (19.78)	20.14 (19.0)	22.73 (19.0)	20.76 (18.6)	20.96 (22.4)
No. of obs.	56	66	92	30	109	13

Notes. Calculations are based on the representative firm subsample and averages of time-series observations for individual firms from 1992 to 1996. Standard deviations given in parentheses. *INFO* is a dummy equal to one if a bank claims to have a high share of payment transactions or good access to information according to the analysis of Section 4.1, and zero if not. *INFLUENCE* is a dummy equal to one according to the item "influence on the management" described in Section 4.1, and zero if not. For definitions of other variables, see Table 4. Significance tests are conducted between the two groups defined by the outcomes of the respective binary indicator variables, and are based on a non-parametric Wilcoxon signed rank test. Results remain unchanged when using a simple *t*-test.

* Significance at the 10% level.

** Idem., 5%.

*** Idem., 1%.

¹⁴ The qualitative results of the previous section remain generally valid if based on the representative subsample only. But, due to the decreased sample size, some factors could not be tested anymore.

on the management of the borrower. Both aspects are, in turn, essential within the theoretical concept of relationship lending (see [Boot, 2000](#)). Hence, it is interesting to relate the Hausbank attribution and alternative indicator variables used in the literature to these aspects.

To measure information access, we construct a binary dummy variable, *INFO*, which equals one if credit officers mention that their bank has either a high share of payment transactions or good access to information. We rely on these two items because they are most directly related to information acquisition. To learn more about the role of payment transactions as a source of information, we also construct the dummy variable *PAY*, which equals one only for the subset of cases where the banks mention to have a high share in payment transactions. *PAY* is used in the multivariate analysis.

A further issue is bank influence on a firm's management, which is related to the monitoring role of relationship lenders and bargaining power over the borrower. Since banks explicitly mention within their explanations whether they have influence on the management, it is interesting to relate all indicators to this issue. Therefore, we construct the binary variable *INFLUENCE*, equal to one if banks explicitly claim to have management influence based on the corresponding item in [Table 1](#), and zero if not. Relating *FINSHARE* to this measure provides a test for the conjecture that a high debt financing share provides bargaining power for the bank.

[Table 3](#) presents univariate significance tests based on the sample of representative borrowers. It shows that there is a strong association between a bank's share of debt financing and information access. For those cases where banks mention either a high share of payment transactions or good access to information, the debt financing share is significantly higher, as compared to the reference group. The same holds for those cases where credit officers mentioned that their bank has influence on borrowers' management. *FINSHARE* is significantly higher if banks claim to have influence on management, as compared to the reference group without that claim.

With regard to the number of bank relationships, [Table 3](#) shows that this number is significantly lower for borrowers whose banks claim to have good information access. There is no significant difference when relating the number of banks to the indicator for influence on management.

Finally, *DURATION* does not appear to be associated with either information access or management influence. There are no significant differences between the comparison groups. Thus duration of the bank–borrower relationships seems to be the least informative of all available measures.

To summarize, in the univariate analysis we observe significant variation in the number of bank relationships and a bank's share of total borrower financing. These measures appear to be systematically related to Hausbank status. Further, Hausbank status, the number of banks, and a bank's debt financing share are systematically related to information access by banks and influence on management.

5. Determinants of relationship lending

5.1. Model setup

In this section, we extend the preceding analysis by relating firm and contract characteristics to Hausbank status within a multivariate framework. Obviously, an empirical model analyzing the determinants of relationship lending should include the potential identification variables discussed before. In this section, we will discuss additional determinants of relationship lending to derive the setup of the empirical model for our subsequent regressions.

The exploration of self-assessments shows that some banks not only emphasize a high share of debt financing but also whether the financing is long- or short-term. To test whether loan maturity structure matters, we construct the variable *LONGDEBT*, calculated as the ratio of long-term bank loans to total bank debt financing of the borrower. Since we already control for the overall financing share by including *FINSHARE* as regressor, this variable will pick up maturity specific effects. For example, a positive coefficient is expected if having a high share of long-term debt is more important than having a high share of short-term debt. Note that the model by von Thadden (1995) suggests a positive impact from long-term debt on relationship lending since long-term debt allows to optimally structure banks' monitoring incentives.

The models of Sharpe (1990), Rajan (1992), Petersen and Rajan (1995), and Boot and Thakor (2000), among others, suggest that borrower quality influences the optimality of relationship lending. We try to measure this by two proxies. The first is the bank's internal rating (*RATING*), which reflects the bank's assessment of the default risk of the borrower. Ratings are standardized into a rating scheme with six categories, where 1 indicates the lowest default risk (highest quality) and 6 the highest default risk or actual default (lowest quality). Note that these ratings are not affected by pledged collateral and, therefore, truly reflect default risk rather than exposure. As an alternative and more standard measure, we use the standard deviation of borrower profitability over our observation period. The corresponding variable, *RISK*, is calculated as the standard deviation of earnings before taxes and extraordinary items normalized by total assets.

The expected association between borrower quality and relationship lending is non-monotonic according to theory. For example, in the model by Rajan (1992), borrowers with high quality prefer arm's-length financing to relationship lending because hold-up costs are too severe. For intermediate levels of quality, relationship lending is optimal. But for very low quality firms relationship lending is not feasible and only arm's-length financing is obtainable.

It is important to keep in mind that our empirical analysis is based on established bank–borrower relationships with an average duration of some 18 years. Theoretical predictions derived from models considering initial financing decisions of firms might not carry over to such a sample. In particular, it is plausible that a positive selection process has taken place within a portfolio of Hausbank relationships over time. To illustrate, assume a bank has two portfolios of borrowers, all of them at their beginning of the credit relationship. One portfolio consists of Hausbank relationships, the other of arm's-length borrowers. For the Hausbank borrowers, the bank accumulates valuable private information over time.

If the bank uses this information to systematically sort out bad borrowers, the average quality of the Hausbank portfolio should improve over time. The underlying idea is that “better” information should on average lead to fewer errors in this monitoring process, as compared to the arm’s-length portfolio. If this process is repeated over time, one should expect to find a higher quality of Hausbank borrowers on average.¹⁵

This argument corresponds to von Thadden (2001), who corrects the game theoretic analysis of Sharpe (1990). He shows that informationally locked-in borrowers switch between the relationship lender and arm’s-length banks in the mixed-strategy equilibrium, and low quality borrowers switch more often than high quality borrowers. Hence, over time, a positive selection process similar to the one described would result. Overall, the expected sign of the rating variable seems indeterminate.

Since most theories rely on informational asymmetries, the degree of informational opaqueness about future prospects of the borrower should be related to the demand for relationship lending. Following the literature, we use firm size as one corresponding proxy. *SIZE* equals the natural logarithm of firm sales. Another proxy for informational opaqueness is research and development expenditures (see for example Ongena and Smith, 2001a). The underlying idea is that new and innovative investment projects are intangible, risky and especially hard to evaluate by outside investors. Hence, the higher *R&D* expenditures, the higher informational opaqueness. No corresponding disclosure rule exists under German accounting standards, and we must rely on a rather crude proxy. The only systematic source of *R&D* expenditures in Germany is provided by the *Stifterverband für die Deutsche Wissenschaft*, in terms of aggregate numbers on *R&D* expenditures differentiated by industries. The corresponding variable is labeled *R&D* and calculated for each firm as the respective industry average expenditures standardized by firm sales.¹⁶

As additional control variables, we use a dummy indicating the legal structure of the borrowers, and a measure of firm leverage. *LIMLIAB* equals one if the borrower is incorporated (limited liability, *Kapitalgesellschaft*) and zero if not.¹⁷ *EQUITY* measures the equity ratio of the firm and is constructed as the ratio of book value of equity to total assets.

Finally, *HHI* is a Herfindahl-index of bank concentration in the local debt market at the registered seat of a firm.¹⁸ The Herfindahl index is calculated as the sum of squared ratios of number of bank branches of bank *i* to total branches of all banks in a given local area.¹⁹ It takes values between zero and one, where increasing values indicate less competition.

Petersen and Rajan (1995) use the degree of bank competition in local debt markets as a proxy for monopoly power within bank–borrower relationships. In their view, bank competition reduces a bank’s ability to extract rents from lending, thereby making it harder

¹⁵ This assumes that newly initiated credit relationships do not suffice to substitute terminated ones. This is consistent with the duration pattern observed for our sample, see Table 2.

¹⁶ Using Tobin’s *Q* is not an alternative since no firms in our sample are publicly traded.

¹⁷ *LIMLIAB* is used for descriptive purposes and for the two-stage estimates reported in Appendix B.

¹⁸ Several studies in corporate finance and banking rely on the market structure of banking markets ever since the seminal study by Petersen and Rajan (1995). See for example Bonaccorsa di Patti and Gobbi (2001) and Cetorelli and Gambera (2001). Fischer (2000) provides an in-depth analysis of the characteristics of *HHI* using our definition for Germany.

¹⁹ Local debt markets are defined by the first three digits of the postal code. Data on bank branches in regional areas is the only available proxy for bank market shares. It is further limited to the year 1996.

to cover information costs associated with establishing and maintaining relationships (see also Caminal and Matutes, 1997). In this sense, competition is detrimental to relationship lending.

However, as shown by Boot and Thakor (2000), when banks can engage both in relationship and arm's-length lending, the two types of lending can be substitutes. In particular, increased bank competition could render relationship lending *more* attractive for banks since it provides better insulation against price competition.²⁰

One can further argue that a monopolistic market structure generally substitutes for relationship lending because this is an instrument to deliberately create bank monopoly power. Hence, less competition would render relationship lending less desirable and vice versa.

Finally, when loan contracts are structured in the way described by von Thadden (1995), lending relationships might be efficiency enhancing without generating ex post rents for the bank. In this case, the likelihood of observing Hausbank relationships would be independent from market structure.

Under the conjecture that competition is detrimental for relationship lending, a positive coefficient on *HHI* is implied. In contrast, if market power and relationship lending are substitutes, we expect to find a negative coefficient on *HHI* and possibly some non-linearity. Overall, the expected coefficient on *HHI* is indeterminate.

Note that borrower size can also be related to the competition issue because larger firms might have access to more funding sources. The most interesting question in this context is what happens once borrowers cross some critical size boundary where access to public markets becomes more readily available. However, we cannot address this issue based on our data. The size criterion that defines the population of borrowers ensures that all borrowers in the sample belong to a fairly homogeneous class of medium-sized firms. No firm has issued public debt and no firm is exchanged-listed. Hence, within-sample differences in borrower size are probably too small to reflect fundamental differences in access to funding sources.²¹ Therefore, our analysis of the competition issue is focused on the impact of bank concentration in local credit markets.

Table 4 summarizes all aforementioned variables.

5.2. Univariate analysis

Table 5 summarizes contract and borrower characteristics, separated by whether or not the bank is Hausbank.²²

²⁰ Boot and Thakor (2000) differentiate between competition arising from other banks and competition arising from capital markets. Competition driven by capital markets makes bank lending in general less attractive (i.e. reducing the number of banks in debt markets). Increased competition from other banks, however, makes relationship lending *relatively* more attractive than arm's-length lending.

²¹ This is consistent with the weak explanatory power of borrower size in the regressions reported in Tables 6 and A.1.

²² Descriptive statistics for *HHI* are reported in Table 5, but we discuss its economic relevance later in Section 5.3.2.

Table 4
Definition of variable

Variable	Definition	Construction	Expected sign
<i>HB</i>	Banks self-assessment of their Hausbank status	Dummy	–
<i>HBM</i> *	Modified self-assessment of Hausbank status	Dummy, 1 if self-assessment and control variable consistently indicate Hausbank	–
<i>SIZE</i>	Firm size	$\ln(\text{Sales})$	–
<i>R&D</i>	Research and development expenditures	Corresponding industry average as a fraction of sales	[+]
<i>EQUITY</i>	Equity ratio	$(\text{Book value equity})/(\text{Total assets})$	–
<i>LIMLIAB</i> *	Borrower has limited liability	Dummy	–
<i>LONGDEBT</i>	Share of long-term bank debt	$(\text{Long-term loans of observation bank})/(\text{Total loans by all banks})$	[+]
<i>RATING</i>	Bank assessment of borrower default risk	Average scale with six categories [1 is best, 6 is worst] over observation period	–
<i>RISK</i> *	Default risk measured by variability of borrower profits	Standard deviation of earnings before taxes and extraordinary items normalized by total assets over observation period	–
<i>PAY</i>	Bank has a high share of payment transactions of the borrower	Dummy, based on written explanations of Hausbank attribution	[+]
<i>INFO</i>	Bank has a high share of borrower's payment transactions and good access to information	Dummy, based on written explanations of Hausbank attribution	[+]
<i>INFLUENCE</i>	Bank has influence on borrower management	Dummy, based on written explanations of Hausbank attribution	[+]
<i>FINSHARE</i>	Bank share of borrower total debt financing	$(\text{Bank loans provided by observation bank})/(\text{Debt})$	[+]
<i>DURATION</i>	Duration of bank–borrower relationship	Duration in years	[+]
<i>NUMBANKS</i>	Number of simultaneous bank relationships	–	[–]
<i>HHI</i>	Herfindahl index of bank concentration in local debt market at borrowers' registered seat	Sum of squared ratios $(\text{Bank branches bank } i)/(\text{Total number of branches})$	–

Notes. *HB* indicates the incidence of Hausbank status according to banks' self-assessment and serves as the dependent variable in subsequent regressions. *HBM* is a modified Hausbank attribution, explained in [Appendix A](#). Variables marked with an asterisk are only used for robustness tests reported in [Appendix B](#). To estimate *RISK*, at least three time-series observations per individual are required. *Expected sign* denotes the expected influence on Hausbank status.

Note that all reported statistics are based on averages of the time-series observations available for each firm. Therefore, we take into account cross-sectional as well as time-series information but do not fully exploit the panel structure of our data. We do this because bank self-assessments are based on our 1997 survey and therefore time-invariant (which also holds for *HHI*). We discuss the development of Hausbank status over time in detail in [Appendix B](#), but note that it does not affect the validity of our results.

Table 5
Descriptive statistics of Hausbank cases and associated firm and contract characteristics

Variable	Non-Hausbank			Hausbank			Significance [<i>t</i> -test]/[Wilcoxon]
	Mean	Median	Std. dev.	Mean	Median	Std. dev.	
SIZE	11.53	11.68	1.76	11.47	11.55	1.64	0.84 / 0.75
LIMLIAB	0.84	1.00	0.37	0.80	1.00	0.40	0.61 / 0.73
EQUITY	21.27	18.58	15.39	18.26	17.85	14.97	0.28 / 0.45
RATING	3.04	3.00	0.92	2.74	3.00	0.91	0.07* / 0.03**
RISK	6.30	3.40	13.62	7.87	4.37	13.45	0.54 / 0.09*
R&D	1.59	0.60	2.06	2.04	0.85	2.36	0.26 / 0.13
LONGDEBT	9.88	7.24	10.37	14.71	12.99	12.12	0.02** / 0.004***
HHI	0.18	0.16	0.07	0.17	0.15	0.09	0.56 / 0.20
No. of obs.	56			66			

Notes. All calculations are based on averages of time-series observations for individual firms from 1992 to 1996. $N = 122$, except for *RISK* which is based on 114 observations. For variable definitions, see Table 4. Significance denotes the p -values of a simple t -test of differences in means, t -test, and of differences in medians, based on a non-parametric Wilcoxon signed rank test (*Wilcoxon*), respectively.

* Significance at the 10% level.

** Idem., 5%.

*** Idem., 1%.

The univariate analysis suggests that customers with and without a Hausbank relationship are similar with respect to size, limited liability, R&D expenditures, and the degree of bank competition in local debt markets. We find significant differences between borrower and contract characteristics for Hausbank and non-Hausbank customers with respect to the proportion of long-term debt and the average borrower quality. The findings with respect to *RISK* are not conclusive, but it seems plausible that banks' internal ratings include information that goes beyond the historic volatility of profits.

5.3. Multivariate analysis

5.3.1. Baseline results

We now turn to the multivariate analysis of the determinants of relationship lending (or Hausbank status). Since the Hausbank variable *HB* is binary, we employ probit regressions. The observed dependent variable is assumed to take the value of one if an underlying latent variable (here, relationship intensity) exceeds a critical threshold value and zero if not. The model is thus:

$$y^* = f(X_{\text{borrower}}, X_{\text{contract}}, X_{\text{market}}) \quad \text{and} \quad y = \begin{cases} 1 & \text{if } y^* > 0, \\ 0 & \text{else.} \end{cases} \quad (1)$$

In this notation, y is the observed binary variable *HB*, y^* is the latent variable "relationship intensity," and X_i are explanatory variables.

We report results for two specifications in Table 6. We focus on the baseline specification, Model I, in this section.

The estimated coefficient on *R&D* expenditures is insignificant. The coefficient on *SIZE* is positive and significant, but this result is tenuous (see Model II). Since both variables are crude measures for informational opaqueness, these results should be interpreted with

Table 6
Probit analysis of determinants of Hausbank status

Expl. variables	Expected sign	Model I	Model II
Constant	–	–2.04 (0.11)	1.72 (0.47)
SIZE	–	0.23 (0.05)*	0.14 (0.44)
R&D	[+]	0.04 (0.53)	0.08 (0.23)
EQUITY	–	–0.03 (0.02)**	–0.03 (0.02)**
RATING	–	–0.38 (0.02)**	–0.39 (0.03)**
PAY	[+]	1.38 (0.00)***	1.45 (0.00)***
LONGDEBT	[+]	–0.02 (0.30)	–0.02 (0.24)
FINSHARE	[+]	0.028 (0.003)***	0.03 (0.003)***
ln(DURATION)	[+]	–0.01 (0.96)	–0.02 (0.91)
HHI	–	–	–29.56 (0.005)***
HHI ²	–	–	69.24 (0.01)**
N	–	122	122
Pseudo- <i>R</i> ²	–	0.26	0.32
<i>p</i> -value LR-test	–	(0.00)***	(0.00)***

Notes. Probit analysis of Hausbank status. The dependent variable *HB* is based on bank self-assessments and a value of one indicates a Hausbank relationship. For definitions of regressors see Table 4. *p*-values are in parentheses.

* Significance at the 10% level.

** Idem., 5%.

*** Idem., 1%.

caution. The control variable *EQUITY*, however, is significant and negative, implying that a lower degree of debt financing in general reflects less relationship lending.²³

The coefficient on *RATING* is negative and significant, confirming the univariate result that Hausbank borrowers tend to have lower default risk. However, as argued above, it is not clear whether this result stems from the fact that relationship lending is not feasible for very low quality borrowers (ex ante) as in the Rajan (1992) model, or from a quality selection process over time due to the information privilege of the Hausbank. We are not able to differentiate between these two explanations because we have too few observations with a short duration (say, below 4 years).

We now turn to the key variables of our analysis, the bank's share of total debt financing of the firm (*FINSHARE*), duration (*DURATION*), and access of the bank to private information.

The estimates in column 2 of Table 6 suggest that *FINSHARE* is an important determinant of Hausbank status. The respective coefficient is positive and highly significant. The higher a bank's share of total debt financing, the more likely the bank is the Hausbank. The bank's pivotal lending position might establish access to special sources of information, reduce competitive pressure from other banks with an ongoing relationship with the customer, and so forth. This result is also consistent with the analysis of the banks' explanations in Section 4.1, where a bank's debt financing share is the single most important

²³ This contradicts the finding of Houston and James (2001) for large and exchange-listed firms in the US, which may be due to differences in the financial system and in the size segment of the sample firms.

factor, and where the debt financing share is related to information acquisition and a bank's influence on borrower management.

Two issues are important when interpreting the eminent role of the debt financing share. First, we are concerned about endogeneity between Hausbank status and the financing share. We analyze this issue in full detail in [Appendix B](#). Second, one may be tempted to interpret the strong relationship between Hausbank status and the debt financing share as a tautology. We do not believe this is true, since according to our results, the financing share is not the only determinant of Hausbank status, and it is not uniquely related to the self-assessed status of the banks. For example, as shown in [Table 1](#), out of 105 self-assessments of being a Hausbank, the debt financing share was mentioned only in 46 cases. Moreover, some Hausbanks indicate that they do not have a high financing share. Hence, the financing share is apparently a good indicator for the incidence of relationship lending due to the reasons outlined before, but it is not a perfect predictor.

Consistent with the univariate analysis, a longer duration does not affect the likelihood of observing a Hausbank relationship. The coefficient on duration is insignificant in [Table 6](#). Taken together with our previous results on duration, we believe that this variable should be used with caution in empirical work on relationship lending, especially if the sample exhibits a high average duration as our sample does.

To focus the analysis of the information issue on the role of payment transactions, we included the dummy variable *PAY*, which equals one for those cases where banks explicitly mention to have a high share of payment transactions and zero else, instead of *INFO*. The significantly positive coefficient indicates that checking accounts or payment transactions provide private information.²⁴

In the next section, we explore the role of competition in local debt markets and bargaining power by banks over borrowers.

5.3.2. The role of exogenous competition and robustness

To explore the relationship between competition in local debt markets and Hausbank status, we extend Model I by including the Herfindahl index of concentration in local debt markets (*HHI*). To allow for non-linear effects, we include *HHI* as well as its square, *HHI*². Estimation results are reported in column 4 of [Table 6](#), labeled Model II.

Model II leaves the major results of Model I unaffected.²⁵ Therefore, we focus the discussion only on the Herfindahl index.

The coefficient on *HHI* is negative and significant, while the coefficient of the squared term is positive and significant. Hence, two opposing effects are at work. For low and intermediate values of concentration in local debt markets (which represent the majority of actual observations), we find that the likelihood of observing a Hausbank relationship decreases with increasing concentration. For high *HHI* values, the coefficient of the squared term dominates, meaning that the Hausbank likelihood increases with market concentration.

²⁴ Using the related variable *INFO*, which equals one if either the banks indicate that they have a high share of payment transactions or that they have good access to information, would not change any of our qualitative results.

²⁵ The lone exception is the coefficient on *SIZE*, which is now insignificant.

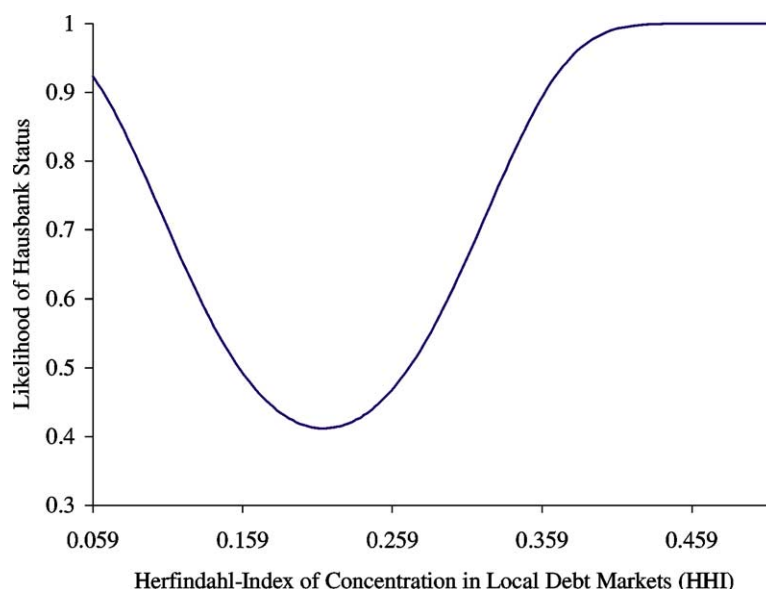


Fig. 1. Probability response curve of Hausbank status. Plot of predicted probabilities of Hausbank status ($HB = 1$) over the range [0.059, 0.515] for the Herfindahl index of concentration in local debt markets, HHI . All calculations are based on Model II in Table 6. Other regressors are set equal to their unconditional sample means.

To clarify this interpretation, predicted probabilities from Model II for different values of the HHI over the observed range [0.059, 0.515] are plotted in Fig. 1. All other variables are held constant and set equal to their unconditional means.

Figure 1 illustrates our interpretation of HHI in Model II.²⁶ Exogenous and endogenous sources of monopoly power substitute for one another. In other words, if the market structure provides for enough commitment between the bank and the borrower, additional bargaining power created by entering a lending relationship is less necessary.²⁷

However, for very concentrated markets, an increase in market concentration increases the likelihood of a Hausbank relationship. We interpret this as the other side of the same coin: exogenous monopoly power is a substitute for relationship lending, but may help to establish close ties between a bank and its borrower, as well.²⁸ This finding is consistent with theoretical models where monopoly power provides incentives for banks to engage in costly information production (see for example Caminal and Matutes, 1997). Taken together, however, our findings contradict the view that relationship lending requires the absence of competition.

²⁶ Note that if one estimates Model II without the square of HHI , the (single) coefficient for HHI becomes negative and remains significant.

²⁷ 67 percent of sample borrowers are in debt markets with HHI s below 0.2, with a conditional average Herfindahl index of 0.13.

²⁸ I am indebted to Hans Degryse for this explanation.

To summarize, we find evidence suggesting that Hausbank status is consistent with the theoretical concept of relationship lending. Of all potential factors, a bank's share of the borrower's total debt financing appears to be the most important determinant of being a Hausbank. Furthermore, Hausbank status is positively related to information access by banks and competition in local debt markets, as long as markets are not too concentrated.

We also ran a number of unreported robustness checks for the multivariate results:

- *Robust inference.* We reran all regressions using Hubert/White robust standard errors.
- *Borrower quality and risk.* We used the standard deviation of profits (RISK) as an alternative measure for borrower quality.²⁹
- *Industry affiliation.* We included dummy variables to control for different industry affiliations of borrowers. These turned out *not* to be significant.
- *Bank type.* We included dummies controlling for the bank from which the observation originates.
- *Invariance of Hausbank attribution.* We tested whether the fact that bank self-assessments were measured at only one point in time affects our results by using additional information from credit files that is time variant. See [Appendix A](#).
- *Endogeneity.* We discuss two-stage estimates of the regressions of [Table 6](#) in [Appendix B](#), which are based on instrumental variable techniques.

All of these robustness exercises did not affect the validity of our key results.

6. Conclusion

This paper empirically analyzes determinants of Hausbank status of German universal banks, thereby identifying factors determining the likelihood that a bank is a relationship lender for corporate borrowers. In contrast to the majority of existing empirical studies on relationship lending, we do not focus on the consequences of relationship lending, given that it is identified. Rather, we focus on the identification issue itself.

As a first step, we explore written explanations by banks for their self-assessment of Hausbank status for a representative sample of small and medium-sized corporate borrowers in Germany. We find that several factors used to explain Hausbank status by the banks themselves are related to information access and influence on borrower management. This is consistent with the theoretical concept of relationship lending.

We further relate observed borrower and loan contract characteristics to those explanatory factors, to Hausbank status, and to different alternative identification variables for relationship lending suggested in the literature. It turns out that the number of bank relationships and a bank's share of total debt financing of a firm is related to Hausbank status and to a bank's information access and management influence. Accordingly, these variables may serve as identification variables in applied empirical work. However, the duration of the bank–borrower relationship, which is a commonly used proxy variable for

²⁹ This variable is insignificant while all other coefficients and *p*-values remain virtually identical.

relationship lending in the literature, is not associated with Hausbank status. Based on our sample, where the average duration of bank–borrower relationships is rather high (roughly 18 years), there is no systematic difference in duration between firms involved in a Hausbank relationship and firms that are not.

Finally, a multivariate analysis confirms these results and highlights two further points. First, we find evidence that observing payment transactions of borrowers provides valuable private information for banks. Second, our evidence is consistent with bank monopoly power being an essential feature of relationship lending. The degree of bank competition in local debt markets affects the likelihood of observing Hausbank relationships non-monotonically. For low and intermediate concentration values (which are the most common in our sample), Hausbank likelihood decreases as the concentration in local debt markets increases. This contradicts the conjecture that relationship lending requires monopolistic market structures. However, for very concentrated markets, the likelihood of relationship lending increases as concentration increases, consistent with the view that monopoly power can foster the establishment of lending relationships.

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Appendix A. Reliability: modified Hausbank attribution

One potential caveat for the suitability of our identification criterion for relationship lending is that we asked banks about their Hausbank status at only one point in time: in 1997, at the end of our observation period. Our credit file data originates from 1992 to 1996, and even long-term credit relationships can be terminated by either of the involved parties at some point in time. Hence, we cannot be sure that those customers who were classified as non-Hausbank borrowers in 1997 were not in fact Hausbank customers in (say) 1993. The same problem holds the other way around, such that borrowers classified as Hausbank customers in 1997 may in fact have been non-Hausbank borrowers sometime before.

We apply the following procedure to overcome concerns regarding the reliability of the self-assessments. During data collection from the credit files, an additional information variable with respect to the incidence of relationship lending was collected. Whenever, in the credit files, a particular decision of the bank was internally reasoned by arguments related to the notion of relationship lending, a control variable was set equal to one, and equal to zero, if no such argument was made. For example, if the credit file contained a reasoning like “we are the Hausbank,” or “we have a special responsibility,” and so forth, the control variable was set to one. Since this additional attribution was recorded separately for every event during the observation period whenever a key variable of loan contracts

(e.g. credit volume, collateralization, internal rating, etc.) was altered, we gain a time-series of an alternative Hausbank attribution. Of course, this attribution is to some extent based on the subjective interpretation of the person conducting the data collection (that is, academic researchers, not bank officers). But it is as well based on information generated and used by the banks themselves.

This additional time-series information allows us to analyze the consistency of the bank self-assessments. We construct a modified Hausbank indicator, *HBM*, equal to one if both criteria consistently indicate the incidence of relationship lending. For all cases where the two criteria are contradictory, or consistently classify a borrower as being non-Hausbank, the variable equals zero.³⁰

This procedure significantly decreases the number of borrowers classified as being within a Hausbank relation with their observation bank. While the previously used raw self-assessment *HB* classified 105 out of 195 cases as being Hausbank relationships, this number decreases to 68 cases according to the modified criterion *HBM*. For the subsample of representative borrowers, the corresponding number decreases from 66 cases (*HB*) to 41 according to *HBM*.

The idea underlying the modified criterion is to minimize those cases where borrowers are erroneously classified as belonging to the group of borrowers within a Hausbank relationship, if in fact they do not. Model III reported in Table A.1 shows the estimation results of a probit regression with a similar structure of regressors as in Model II of Table 6, our primary specification. The only difference is that we use *HBM* instead of *HB* as the dependent variable.

Comparing Model II to Model III shows that the qualitative results of our analysis remain unchanged: Hausbank status is systematically related to the debt financing share (*FINSHARE*), borrower quality (*RATING*), the equity ratio (*EQUITY*), and the degree of bank competition in local debt markets (*HHI*). All coefficients have the same sign and approximately the same magnitude, but—as a general pattern—estimated standard errors of coefficients are lower, leading to smaller *p*-values. This pattern implies that the modified Hausbank attribution is indeed a less noisy indicator for Hausbank status. The only change concerns the coefficient of *PAY*, the indicator for a high share of payment transactions, which is now insignificant.

Interestingly, the coefficient on *SIZE* is insignificant, as in Model II. Therefore, we do not consider *SIZE* an important control variable in our sample, where borrowers are randomly selected from a rather homogeneous population of small and medium-sized firms. We will use this result for the two-stage estimation discussed in the next section.

To summarize, the time invariance of our Hausbank attribution does not affect the validity of our qualitative results. To the contrary, when taking time-variance of the Hausbank status into account, most of the results are even more pronounced.³¹

³⁰ If the time-series of the control attribution was not unique with respect to its classification, we classified the borrower as being non-Hausbank.

³¹ As a side issue, the results suggest using the modified Hausbank attribution in empirical work on relationship lending based on the same data set, as for example in Elsas and Krahnen (1998).

Table A.1
Robustness regressions for determinants of Hausbank status

Expl. variables	Expected sign	Model III	Model IV
Constant	–	3.62 (0.17)	3.44 (0.007) ***
SIZE	–	0.08 (0.69)	–
R&D	[+]	0.06 (0.36)	0.07 (0.33)
EQUITY	–	–0.04 (0.00) ***	–0.02 (0.11)
RATING	–	–0.74 (0.00) ***	–0.47 (0.014) **
PAY	[+]	0.39 (0.25)	1.44 (0.00) ***
LONGDEBT	[+]	–0.02 (0.21)	0.02 (0.55)
FINSHARE	[+]	0.03 (0.00) ***	0.43 (0.77)
ln(DURATION)	[+]	–0.17 (0.29)	–0.01 (0.94)
HHI	–	–30.38 (0.00) ***	–25.04 (0.014) **
HHI ²	–	64.10 (0.01) **	58.45 (0.03) **
N	–	122	114
Pseudo- <i>R</i> ²	–	0.36	0.21
<i>p</i> -value LR-test		(0.000) ***	(0.000) ***

Notes. Model III: probit analysis of Hausbank status. The specification is similar to Model II in Table 6, except for the dependent variable. The dependent variable is the modified bank self-assessments of their Hausbank status, *HBM*, equal to one for Hausbanks. Model IV: probit analysis of Hausbank status based on a two-stage estimation to control for endogeneity between *HB* and *FINSHARE*. Instruments for *FINSHARE* are *SIZE*, *LIMLIAB* and *RISK*. Estimation according to Maddala (1983, pp. 244–245). For definition of regressors see Table 4. *p*-values are in parentheses.

** Significance at the 5% level.

*** Idem., 1%.

Appendix B. Endogeneity

One potentially crucial concern with respect to the design of our empirical analysis is that it ignores the potential endogeneity between a bank's share of debt financing (*FINSHARE*) and Hausbank status.

One may ignore this issue because the banks' explanations implied a one-way causality in line with our model specification. That is, establishing a Hausbank relationship is easier if a bank has a high share of debt provision. But if a bank is in a strong position vis-à-vis a borrower due to its Hausbank status, this might in turn lead to a higher participation in overall borrower financing Weinstein and Yafeh (1998). Hence, both variables may be endogenous. In statistical terms, endogeneity means that a regressor is correlated with the error term of the regression, leading to inconsistent estimates of parameters and biased inference for *all* estimates of the model.

To control for endogeneity with respect to the single most important regressor of our Models I–II, *FINSHARE*, we apply a two-stage estimation procedure as described in Maddala (1983, pp. 244–245). The model underlying this two-stage procedure is as follows:

$$\begin{aligned}
 y_1^* &= \gamma_1 y_2^* + \beta_1 X_1 + u_1 \quad \text{and} \quad y_1 = y_1^*; \\
 y_2^* &= \gamma_2 y_1^* + \beta_2 X_2 + u_2 \quad \text{and} \quad y_2 = \begin{cases} 1 & \text{if } y_2^* > 0, \\ 0 & \text{else.} \end{cases}
 \end{aligned} \tag{B.1}$$

According to (B.1), we assume that both endogenous variables y_1^* (*FINSHARE*) and y_2^* (relationship intensity) affect each other, but we can only observe the binary variable y_2 (Hausbank status) rather than the latent y_2^* . The variables $X_{1/2}$ denote the respective exogenous variables of the debt financing share and the Hausbank status regressions, respectively. Identification of the model follows the same rules as for two-stage-least squares without latent variables. To estimate the second equation in (B.1), we need at least one instrument in the first equation not specified in the second equation.

Finding suitable instruments which are correlated with *FINSHARE* but not with the Hausbank status is very difficult, as both are economically closely related. We use three variables to this end, which either were not specified in the preceding regression models or turned out to be unrelated to Hausbank status: *SIZE*, *LIMLIAB* and *RISK*. Unreported regressions show that these variables are related to *FINSHARE*, which holds the most for *SIZE*.

The results of this two-step procedure are shown in Table A.1, labeled as Model IV. Note that for ease of comparison we rely again on the raw bank self-assessments, *HB*. The table shows that our key results with respect to the degree of bank competition in local debt markets (*HHI*, HHI^2), a bank's share of payment transactions (*PAY*), and borrower quality remain valid.³² The only change is with respect to the coefficient of *FINSHARE*. It is now insignificant with a *p*-value of 0.77. Hence, it appears that the significance of the debt financing share as a determinant of the Hausbank is due to an endogeneity problem rather than an economic one-way causation. This contradicts the explanations of the banks credit officers, but these may also have been confused regarding the underlying causality. However, the result may also be attributed to the “weak-instruments” problem of two-stage estimations.

Regardless of the potential endogeneity though, the debt financing share can serve as an identification variable for relationship lending if the status is not observable directly since the Hausbank status and *FINSHARE* are highly correlated.

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³² Note that the number of observations underlying the regression of Model IV is smaller, since the two-step procedure uses the variable *RISK* as regressor (instrument), which requires at least 3 observations per individual firm.

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