THE EFFECT OF RELATIONSHIP INTENSITY

ON LOAN PRICING

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Abstract

This paper analyzes the effect of bank-firm relationship intensity on loan pricing. Prior research suggests that intensity of bank-firm relationship affects loan pricing. However, prior research is inconsistent about the elements of intensity that have an effect on loan spreads. A large body of earlier studies has found that the element of relationship length is related to loan pricing due to accumulation of private information, often proprietary in nature. Recent studies have found that the length of the relationship is not related to closer ties between borrowers and lenders, but the intensity of relationship is found in variables related to information access of banks and bank's share of financing. This analysis shows that the intensity of bank-firm relationship is affected by the elements of the relationship, namely length, scope and depth. I find that the elements of intensity are associated with loan spreads. More specifically, while length of relationship has no significant effect on loan spread, banks incentives in refining the relationship is found more pronounced in variables of scope and depth of the relationship.

Keywords: Loan pricing, relationship banking

1 INTRODUCTION

The purpose of this paper is to describe and analyze the elements of intensity in bank-firm relationships. The analysis is aimed on the effects of the intensity of bank-firm relationship on loan pricing.

This paper is motivated by current harmonization process within European banking industry. European banks, Central bank of Europe and European Commission aspire to found a Single Euro Payment Area (SEPA)[1]. Transition period for SEPA is planned to be implemented within SEPA-countries in the beginning of year 2008. The European-wide harmonization of payment services would create extended possibilities in providing international services for a bank's customers and also potential penetration into new European markets. Harmonization will obviously express itself in more competition and easier access for multiple service providers in the domestic market. Ergungor (2005) studied the profitability of bank-firm relationships and found that technological advances are lowering the barriers to entry into the relationship lending segment of the market and increasing competitive pressures on banks.

From the bank's perspective the harmonization process is an extensive challenge for preserving customer relationships. Banks will proactively and innovatively respond to the harmonization reforms, and one of the essential issues is customer relationship management. In particular, the intensity of corporate banking relationships will be tested when European-wide market pressure is intensified under SEPA-countries.

Berger and Udell (2006) analyzed different types of financial institutions in using transactional lending technologies and relationship lending. Their conceptual framework presents different transactional lending technologies that can be found in corporate bank-firm finance. The framework is difficult to apply to empirical research due to imperceptibility of the elements of different technologies, because financing decisions are made based on the available information as a whole. However, they pointed that more research is needed on the use of individual lending technologies and how they are affected to lending infrastructure.

Baas and Schrooten (2005) analyzed relationship banking and SMEs. They pointed that the market of SMEs lacks high quality accounting data, which makes these firms more dependent on relationship banking than large firms. It is often argued that this specific lack of information can be compensated by relationship banking. Baas and Schrooten (2005) argued that relationship lending leads to high loan interest rates due to high monitoring costs. They show that there is close linkage between lending technique of a bank and the interest rate offered to a firm.

[1] Single Euro Payment Area (SEPA) includes European Union and European Economic Area -countries and Switzerland altogether 29 countries.

Prior research is inconsistent about the elements of relationship intensity that have an effect on loan spreads. A large body of earlier studies (e.g. Petersen and Rajan 1994) has found that the element of relationship length is related to loan pricing due to accumulation of private information, often proprietary in nature. More recent studies (Ongena and Smith 2001, Elsas 2005) have found that the length of the relationship is not related to closer ties between borrowers and lenders, but the intensity of relationship is found in variables related to information access of banks and bank's share of financing. This study will extend the prior research on analyzing in detail the effect of intensity of bank-firm relationship on loan pricing.

1.1 Definition of a Bank-Firm Relationship

Relationship banking as a term is widely understood in a corporate context as intentionally developed relationship of lender and borrower. Analyzing the relationship of lender and borrower involves several simplifications of reality. The banking relationship has been studied from relationship value perspective (Niskanen and Niskanen 2000; Berger and Udell 2002; Peltoniemi 2004) and relationship closeness or intensity perspective (Hallen 1987; Petersen and Rajan 1994). Most of the studies concentrate on the borrower, although there are some studies (for example Bharath et al. 2004) of the lender.

Peltoniemi (2004) studied the value of relationship banking in Finnish small firms. The conclusion was that duration[2] and scope[3] were the main determinants of relationship banking. Consistent with Degryse and van Cayseele (2000) they find that longer banking relationships decrease the cost of debt and wider scope decreases the collateral requirements. These findings emphasize the effect of a tighter relationship mitigating the problems of asymmetric information. From the lender's point of view, the value of relationship banking consists of present and potential value of the bank-firm relationship. The intensity of the bank-firm relationship is however in some respects different from the value of bank-firm relationship.

In this study the relationship banking is analyzed based on the intensity of the bank-firm relationship. The intensity in bank-firm relationship is analyzed consisting of three elements of relationship intensity, namely length, scope and depth.[4]

[2] Duration is the length of the banking relation defined in years.
[3] Scope is basically defined as a number of other banking services than debt.
[4] Depth variable is measured from the lender's point of view. Lender's incentive to refine the bank-firm relationship is in many respects based on the long-term profitability of the borrower-base, while the borrower's incentive may be restricted only to favorable loan conditions.

1.2 Financial and Relationship Information for Loan Decisions

Bank-firm relationships are intentionally developed to gain information advantage on firm-specific financial and relationship information. Financial information in bank-firm relationship is mainly based on yearly financial statements. Firms' statutory reports are publicly available and usually banks require firms to prepare business plans. Business plans are utilized as a description of overall understanding of the business, and also for banks' risk management purposes. Negotiations between lender and borrower create valuable information of firms' operations and more specifically, how the loan repayment will be arranged. However, usually this additional information is not systematically documented and may vary depending on bank's own policies (Berger and Udell 2006). Loan agreements are typically prepared on a going concern assumption. When the loan is for investments, the monitoring cash flows and validity of investment calculations are more carefully reviewed.

Relationship information in bank-firm relationship varies and it is difficult to capture. There is little written information of the bank-firm relationship. Loan negotiations are documented in written form, but these are not usually in a specified form. In addition, the notes usually capture the additional selling potential of the borrower. This hidden relationship information is primarily between loan officer and firm's representative. Berger and Udell (2002) modeled three key characteristics of relationship lending. They identified characteristics of soft information between loan officer and firm's representative that is not easily transferred or even verified. This soft information is difficult to share with other individuals in the bank. Further, their model showed that an agency problem arises between the loan officer and bank management because of the soft nature of relationship information.

A large body of bank-firm relationship literature concentrates on determinants of relationship financing. Potential determinants are found in borrower, bank and market characteristics. The most common proxy for relationship lending is duration of a bank-firm relationship. The main idea is that duration reflects the degree of relationship intensity over time. Duration then accumulates private information and reflects also the switching costs (Petersen and Rajan 1994). However, Ongena and Smith (2001) find that duration itself does not greatly influence the likelihood of ending a relationship.

Financial and relationship information are both important for loan decisions. Financial information builds the basis for risk categorization and relationship information adds on practical details of loan decisions. Both types of information are variously priced in loan contracts.

1.3 Contribution to the Literature

This study focuses on the effect of relationship intensity on loan pricing. Different variables of relationship intensity have been empirically tested, but inconsistent results are still found in prior literature. Recent studies find that duration of bank-firm relationship may not capture the intensity of relationship (Ongena and Smith 2001, Elsas 2005). This analysis complements the results of these studies and analyses the elements of bank-firm relationship intensity on loan pricing.

This study employs a unique data from one major bank in Finland. The data consists of both financial and relationship information. The combination of financial and relationship information enables me to formulate proxies and key ratios that yields several augments on prior literature. This study extends prior literature analyzing the effect of relationship intensity on loan spreads.

2 THEORY AND EMPIRICAL LITERATURE

2.1 Theory on Bank-firm Relationships

Early bank-firm relationship theory focuses on banks' information advantage over other fund providers. Kane and Malkiel (1965) argued that strong deposit relationships also reduce the variability in loanable funds, which in turn increases the return-per-unit-of risk of the bank's loan portfolio. Later Wood (1975) proposed that in order for the bank to have the ability to charge higher rates in the future, some mechanism must lock the customer into the current relationship. The literature speaks about "hold-up problem", which may occur when the borrower faces search costs in transferring business to a competing lender. A widely studied feature of bank-firm relationship is lender's ability to reduce information asymmetries between borrowers and savers. The lender has access to private information about its borrowers (Leland and Pyle 1977; Diamond 1984; Ramakrishnan and Thakor 1984; Fama 1985; Boyd and Prescott 1986). Fama (1985) emphasized lender's role as a provider of short term loans, where periodic evaluation and subsequent renewals are features of a developing bank-firm relationship.

Boot's (2000) study primarily focuses on theoretical insights that relate to relationship banking. The study links the modern literature on financial intermediation[5] to bank-firm relationships. First, considering the origin and scope of bank-firm relationships, Boot (2000) defines relationship banking as the provision of financial services by a financial intermediary that:

- invests in obtaining customer-specific information, often *proprietary* in nature; and
- evaluates the profitability of these investments through *multiple interactions* with the same customer over time and/or across products.

The definition emphasizes the proprietary nature of all available information. This information is borrower-specific and not available from public sources. In addition, the definition emphasizes multiple interactions creating an opportunity to benefit from inter-temporal information reusability. Second, Boot (2000) analyzed the potential benefits and costs of bank-firm relationships. The benefits are found in improved exchange of information and accommodation of several contractual features that can improve or strengthen the bank-firm relationship. These contractual features create flexibility in contracts and also constraints in the form of extended covenants. The

[5] See further Healy and Palepu (2001).

contracts may involve collateral in various forms that needs to be monitored. Inter-temporal transfers in loan pricing can be reflected as smoothing of contract terms. (Berlin and Mester 1998; Petersen Rajan 1995).

Petersen and Rajan (1994 and 1995) studied the benefits of lending relationships and the effect of credit market competition on lending relationships. They found stronger effects of relationships on the availability of financing than the intensity of relationship. Their interpretation is that the relationship increases its informational monopoly, when the lender generates substantial durable and non-transferable private information during the course of relationship. Further, they studied the credit market competition among banks and found that a young firm in concentrated markets receives more institutional finance than do similar firms in competitive market. Lenders seem to smooth interest rates over the life of the firm in a concentrated market charging a lower-than competitive rate when the firm is young. They expect that they will recover the initial subsidy via higher interest rates in the future.

A well-developed bank-firm relationship allows the lender to make a more precise reaction to firm's operational changes. Binks and Ennew (1997) proposed a comparison across different types of bank-firm relationships suggesting that there are considerable benefits associated with more participative relationships. Information flows between a lender and borrower can be improved creating a closer relationship. In the banking area the importance of active commitment and participation of both parties is vital particularly when the lender does not have control over the decision-making. Adequate collateral can mitigate the problems of asymmetric information by signaling the status of the borrower. The lack the information content of collateral calls for other devices of assuring the debt recovery. While collateral may be one mechanism for reducing the adverse effect of information asymmetries, the development of closer bank-firm relationship is an alternative.

The development of bank-firm relationship is formed to obtain benefits in the form of cost reduction or increased revenues. It is presumable that more and more economic work gets done due to increasing interdependence in such relationships. Knowledge about their basic nature and how they are affected by various factors is needed to understand the motivation at the bottom of developing relationships. An illustrative model of customer-supplier relationship has been developed by Hallén et al. (1987) that relies on the assumption that business transactions are based on information exchange between them. They proposed that business relationships are intensified through interplay between adaptation[6] processes and information exchange processes. Benefits are achieved by tailoring the resources to deal with a specific borrower by making

[6] Adaptation in interpreted as a mutual process in which the parties mutually adapt their operations to each other over time.

"durable transaction specific investments". These investments mark major adaptations by a borrower to the relationship.

In addition, there is wide literature on ending relationship (Silke 2004; Halinen and Tähtinen 2002) and switching costs in bank lending (Vesala 2007). The determinants of relationship commitment can be viewed as the study of the antecedents of the likelihood of relationship dissolution. Hocutt (1998) proposed a relationship dissolution model that defines the relationship commitment as influence of three key constructs: satisfaction with the service provider, quality of alternative providers and investments in the relationship.

2.2 Empirical Literature on Bank-firm Relationships

2.2.1 Characteristics of Bank-firm Relationships

Ongena and Smith (2000) reviewed the empirical bank-firm relationship literature from the perspectives of bank relationships and firm performance (event studies), measures of relationship intensity (duration, scope and extended bank relationships), multiple bank relationships and credit market concentration (total banking system assets accounted for by the largest three banks in 1993) and importance of bank relationships in the macro economy.

Elyasiani and Goldberg (2004) prepared a survey of the relationship lending literature. First, they reviewed literature on the effect of relationship lending on firm value. This literature focuses on event studies and the unique role of the bank in the information exchange process. The banks have an access to inside information and the question is how the exploitation of inside information in bank-firm relationship may increase the firm value. As a solution they proposed that lender's access to such information provides the lender with a comparative cost advantage for information collection about the borrower. This is beneficial regarding to risk assessment, and also monitoring the loan afterwards.

Second, Elyasiani and Goldberg (2004) analyzed the literature on the effect on funding availability, loan rates, and collateral requirements. In particular, funding availability is crucial in small business. Petersen and Rajan (1994) examined the value of bank-firm relationships and find that a relationship with an institutional lender increases the availability of financing to a small business. Cole (1998) examined also the availability of funds and finds that lenders are more likely to extend credit if they

have a pre-existing relationship with a borrower. Literature on loan rates and collateral is very extensive. Berger and Udell (1995) find that lenders offer borrowers with longer relationship lower rates and are less likely to require collateral.

Other characteristics of bank-firm relationship are examined in studies that analyze the impact of the length of the relationship (Berger and Udell 1995; Petersen Rajan 1994; Blackwell and Winters 1997), multiple relationships (Thakor 1996; Cole et al. 2004) and distance from the lender (Petersen and Rajan 2002; Cole et al. 2004). Also there is some literature on the effect of bank consolidation on relationship banking (Cole et al. 2004) and the effects of deregulation and technology on community banks (DeYoung, Hunter and Udell 2004).

Peltoniemi (2004) tabulated the recent studies of the effect of relationship banking on the cost of credit and a wide range of studies of the role of collateral and borrower risk. There seems to be more empirical studies related to effects of relationship banking on the cost of credit, whereas theoretical aspect of the role of collateral and borrower risk is more dominated.

2.2.2 Empirical Determinants of the Relationship Intensity

Many articles within accounting and banking literature[7] have argued that there is a positive correlation between the length and the intensity of the relationship suggesting that the length variable can be used as a measure of private information that the lender has about the borrower. However, there are contrary arguments on the causality of the intensity in the bank-firm relationship. The empirical statistics of Niskanen and Niskanen (2000) suggest that the length variable is only partly fitted into the theory of bank-firm relationships. In the shortest quartile of firms by the length of the relationship, the interest rate margin is at the firm-specific base level and when one moves to other quartiles with longer length, the interest rate margin first decreases and when the length continues to increase the interest rate margin starts to increase. Finally the highest quartile firms by the length of the relationship pay the highest interest rate margins. There may be multiple explanations for these implications. This unexpected relation suggests that intentionally developed bank-firm relationships exist and deeper understanding of these relationships is needed.

Elsas (2005) studied empirically the determinants of relationship lending in small and medium-sized firms. There are three determinants of relationship financing: borrower, bank and market characteristics. Elsas (2005) study identified several factors that were systematically related to closer bank-firm relationship. First, variables like

[7] For example Petersen and Rajan (1994, 1995).

lender's share of financing or its share of payment transactions turn out to be important determinants. Second, the length of the bank-firm relationship is not related to closer bank-firm relationship. A noticeable observation among others was that the length of the bank-firm relationship does not unambiguously explain the intensity of the relationship[8]. This second notion is opposite to many previous studies that show off with length of the relationship as a commonly used proxy for the intensity of the relationship.

The factors that determine the main bank status: (Elsas 2005)

- high share of debt financing,
- high share of payment transactions,
- high share of either long-term or short-term financing,
- undertakes special, exclusive or intense business with the firm,
- influence on the firm's management.

Length of a bank-firm relationship

Ongena and Smith (2001) summarized the literature on the length of a bank-firm relationship. It seems that duration of Japanese and continental European bank-firm relationships tend to be greater than their counterparts in the US. This reflects the bank-based economies of Japan and Europe. The estimates in the studies of relationship length vary due to the characteristics of the sample firms and how duration is estimated. There is also a censoring problem: inconsistent estimates of duration occur when either the beginning of the relationship, end of the relationship, or both is not observed by the researcher. The benefits from a bank-firm relationship may accrue only in the earlier part of the relationship (Ongena Smith 2001). There are also opposite findings of the effect of the length on bank-firm relationship. Petersen and Rajan (1994) find that length of the relationship has no statistically significant influence on the loan rate offered by a bank to the firm. Meanwhile age is the most important explanatory variable in explaining cross-sectional variation in loan rates, with older firms receiving more favorable terms. Berger and Udell (1995) find that interest rates charged on lines of credit fall as time in a relationship lengthens. Berger and Udell (1995) argued that the reason for the opposite results to Petersen and Rajan (1994) is the ignorance commercial bank lending, lines of credit.

[8] Niskanen and Niskanen (2000) found also similar characteristics of the length variable. They also found evidence that the relation between the length of the relationship and the interest rate margin is not linear.

Scope of the bank-firm relationship

The scope of the bank-firm relationship is usually measured as a number of other banking services than loan. The primary reason for the paucity of evidence stems from the data demands that rigorous analysis of scope requires. Cole (1998) found the dependence between the purchase of financial services and credit availability to be negative. Degryse and van Cayseele (2000) find that purchase of other information-sensitive services from a lender lowers the interest rate charged to the borrower. Angelini et al. (1998) find that members of mutual banks obtain easier access to credit at lower interest rates than non-members.

Depth of the bank-firm relationships

Blackwell and Winters (1997) studied the bank-firm relationship and the effect of monitoring on loan pricing. The firms with more concentrated borrowing at a given lender pay lower interest rates (e.g. Elsas 2005), holding credit risk and other control variables constant. The borrowers with longer relationships are monitored less frequently by lenders and the less frequently monitored firms pay lower interest rates on average. Small borrowers can lower their cost of capital by concentrating most of their borrowing to a single lender. This finding signals the information advantage over other lenders.

Extended bank-firm relationships mean that the relationship can extend beyond the usual banking activities. This may occur as ownership type of control. The corporate borrowing with bank equity ownership has been studied in Niskanen (1999).

2.3 The Effect of Relationship Intensity on Loan Pricing

The bank-firm relationship literature on loan pricing is mixed. Existing theories do not explain completely the nature of relationship intensity and especially its effect on loan spreads. Theory and prior literature suggest my testable hypothesis:

H1: Loan spreads are changing in the level of bank-firm intensity.

The relationship intensity is analyzed as length, scope and depth of bank-firm relationship. It is expected that length of relationship is not related to loan spreads, although continuity of customer relationship is important to bank. Negative signs are expected on scope and depth of bank-firm relationship suggesting that enhanced information access and more concentrated customer behavior decreases the loan spreads.

3 EMPIRICAL IMPLEMENTATION

This chapter presents the empirical tests of the hypothesis discussed in Chapter 2. The first part analyzes the data used in the tests. The second part analyzes the measurement of the variable of interest. The third part presents the main results while the fourth part presents additional analyses that investigate the robustness of the main results.

3.1 Sample Selection

The sample in this study is collected from one major commercial bank in Finland. First, I collected borrower-specific information from bank's database. These variables contain basic information of borrower's industry, risk classification, loan spreads and borrower-specific information of bank-firm relationship. Second, I combined the borrower-specific information with financial statement information. Financial statement information contains profit and loss statement and balance sheet figures. Based on financial statement information, certain key ratios are calculated.

The sample consists of private companies in Finland. The sample is cross-sectional period from December 31, 2005, and both the relationship and financial statement information is taken from year-end. Consistent with prior literature, the sample includes only non-financial firms. After merging the borrower-specific data with financial statement data, the sample is reduced to 599 firms (Table 1). The reason for missing observations is due to non-existence of loan from subject bank.

Table 1: Sample Selection

	Firm-year
Sample of non-financial firms	976
Sample of loans of non-financial firms with relationship intensity measures	599

3.2 Variable Measurement

This section provides details on the variable measurement. The first subsection presents variables for the loan data. The second subsection presents the variables for the intensity of bank-firm relationship. The last subsection discusses the control variables used in multivariate tests and finally summarizes the descriptive statistics in Table 2.

3.2.1 Loan Data

The loan data contains information on borrower, terms of the loan and firm characteristics. The loan data consists of long-term and short-term bank loans. The median loan size of long-term loan is 133 thousand euros and for the short-term loan 24 thousand euros, respectively. The median firm size is 820 thousand euros based on turnover.

I use loan spread as a proxy for the loan pricing. Originally, the loan spread is determined separately for short-term and long-term loans. I calculated the loan spread as average spread weighted with proportion of long-term and short-term loan. The spread is presented as percentage unit over the underlying basis interest.

Performance pricing[9] and revolving credits are excluded from the loan data. For relationship value purposes I analyze the realized margin in euros. This variable is based bank's internal calculation of firm-specific margins.

3.2.2 Relationship Intensity Variables

From the lender's point of view, the risk of losing the borrower is a threat that drives all actions. Refining the current bank-firm relationship creates the intensity of the relationship. When negotiations are held with the borrower, the usual outcome is a signed contract of certain product or service. One relevant measure of refining the borrower base is the amount of agreements per the borrower.[10] The intensity of the relationship can be also estimated analyzing the loans to subject bank compared to total liabilities. It is obvious that certain products or services increase the intensity of the relationship more than others. The main idea of creating commitment in relationship is to slow down the potential change of the bank-firm relationship, or even constrain the possibility to change the bank-firm relationship. These constrains are usually technical bonds such as payment software. However, the internal processes between the lender and borrower can be developed so tight that the change of bank would be too costly and harmful to operational affairs.

In this study the bank-firm relationship intensity is measured based on length, scope and depth of the relationship. The first measure, length (L), is duration of relationship and the second measure, scope (S), is number of other banking services than loan. The third measure, depth (D), is percentage of firm's loan to subject bank of total liabilities.

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[9] Performance pricing means that the interest rate is dependent of firm's performance.

[10] This conclusion in based on the interview completed in summer 2005. Also Peltoniemi (2004) used the amount of financial services as a variable of bank-firm relationship.

3.2.3 Control Variables

This study requires a wide set of control variables. Control variables are derived from prior literature. Firm size will probably affect the results and therefore it should be carefully analyzed. Other important control variables are for example industry affiliation and risk categorization.

Industry affiliation is based on the classification of Statistic Finland. Only main branch categories are analyzed consisting of seven[11] industries. The data consists of three legal forms: partnership, limited partnership and limited company. All listed firms are excluded from the sample.

In the following subsections I present further the loan and firm characteristics.

3.2.3.1 Loan Characteristics

Loan Size: In the loan spread equation I use the long-term loan size as a control for the borrower's risk exposure. Smaller loans are expected to be priced with wider spreads to larger ones.

Rating Group: This variable is used to account for the information content of bank's internal ratings. These ratings collect information about firm quality and credit risk and they are automatically determined by firm-specific information. A lower credit quality as reflected in ratings is likely associated with higher loan spread. I transform the letter group ratings into numbers such that loan ratings are set from 1 to 5. Additionally, the data allows me to analyze the loan ratings that are determined by loan officer, so that I can compare automatically and manually determined ratings. Manually determined ratings involve mainly larger companies and therefore firm size is considered.

3.2.3.2 Firm-Specific Characteristics

Firm Size: This variable is computed as the logarithm of total assets. The firm size variable is probably the most important control variable, because larger firms are able to obtain better terms given their reputation and tangible asset size. There is also less information asymmetry associated with them.

Profitability: this variable is the return on equity (%). It controls for the firm's ability to generate profits to pay back the loans. Firms with low profitability are expected to pay larger interest rates.

[11] Minor branch categories are combined due to lack of observations.

Liquidity: This variable is ratio of income before extraordinary items to loan repayments. It controls for the sufficiency of income financing from the perspective of liability obligation. Firms with low liquidity are expected to pay larger interest rates.

Correlation matrix that includes the dependent variable (loan spread), relationship intensity variables as well as the control variables. The univariate analysis show that loan spreads are negatively and significantly correlated with depth variable (Pearson correlation is -0,09) and control variables. The scope variable seems to have highest correlation with loan size (correlation is 0,35) and firm size (correlation is 0,37) consistent with the notion that the number of banking services increase with the magnitude of firm operations. (correlation matrix is not reported).

Descriptive statistics are presented below in Table 2.

Table 2: Descriptive Statistics

Variable	N	Mean	Median
Relationship Intensity Variables			
Length	976	15,09	14,00
Scope	976	15,31	13,00
Depth	976	26,52	28,40
Loan Characteristics			
Loan Spread	662	1,35	1,30
Loan Size (k€)	599	426,05	133,33
Firm Controls			
Profitability	974	22,52	28,40
Ln (Firm Size)	976	6,54	6,37
Liquidity	958	7,33	2,50
Rating Specialist	976	0,00	0,10
Rating I	976	0,00	0,05
Rating II	976	0,00	0,19
Rating III	976	0,00	0,28
Rating IV	976	0,00	0,23
Rating V	976	0,00	0,11

Summary descriptive statistics of the variables employed in the study for a sample of 599 loans.
Loan size is amount of long-term principal from subject bank in the end of year. Profitability is return on equity. Firm size is natural logarithm of firm's total assets. Liquidity is ratio of income before extraordinary items to loan repayment. Rating variables are internal ratings performed by subject bank. Ratings I-V are generated automatically from borrower-specific information and Rating Specialist is dummy variable taking value 1, if rating is performed by loan specialist, and zero otherwise.

3.3 Main Results

This section provides an empirical test for the hypothesis presented in Chapter 2 by exploring in detail the relation between bank-firm intensity and the pricing of loans as measured by the loan spreads.

3.3.1 Test of the Hypothesis

A multivariate setting is appropriate since relevant firm and loan characteristics can be controlled. The model specification that provides a test for the hypothesis is estimated in Table 3. Loan spread (LS) is analyzed in the following model:

$$LS = \beta_0+\beta_1 Length+\beta_3 Scope+\beta_4 Depth+\beta_5 Loan\ Controls+\beta_6 Firm\ controls+\varepsilon. \quad (1)$$

Dependent variable as well as the loan and firm controls is discussed in the prior section. To account for industry specific impacts, I control for industry effects. The main results are not affected by industry affiliation. There is no influence of foreign currency risk on loan spread, because all loans are in local currency.

Consistent with the hypothesis and prior research (D'Auria et. al 1999), I find that proxy for the depth of bank-firm intensity is significant and negative suggesting that the depth of bank-firm relationship is negatively associated with loan spreads. Column I, Table 3, presents further, that the scope variable is significant and positive. The sign of scope variable was expected to be negative. This result indicates that firm's with high number of financial services from subject bank pay increased loan spreads. Combining these results it seems that there is a group of firms that obtain only low-priced loan while having financial services from another bank.

I formulated rank regressions based on several combinations of the elements of relationship intensity. Column II, Table 3, presents rank regression results on sum of three elements of relationship intensity. Columns III to V, Table 3, presents rank regression results on sum of two elements of relationship intensity, respectively. I find that all coefficients are economically low and only results on sum of two elements of relationship intensity are statistically significant. This finding complements the view that these elements of relationship intensity are associated with loan spread, while their effect on loan pricing is various. This evidence implies that the pricing of loan is conditional on the relationship aspects.

Elsas (2005) find that duration of the bank-firm relationship is not associated with close relationship. Increasing the duration of relationship does not seem to favor the borrower (Petersen and Rajan 1994, D'Auria et. al 1999). Consistent with these findings

I find that duration has no significant effect on loan spread. The median duration in Elsas (2005) study is 15 years, while my sample has median duration of 14 years. In this respect the samples are comparable. Blackwell and Winters (1997) also find that holding the bank's monitoring effort constant, the duration of the banking relationship has no direct effect on loan pricing.

Berger and Udell (1995) find that borrowers with longer banking relationships tend to pay lower interest margins. Their study employed the same data source as Petersen (1994), but the sample in Berger and Udell (1995) consists of small firm's and only lines of credits. The results in these two studies are inconsistent about the role of longer banking relationships. The conflicting result is argued to exist, because of the use of lines of credit. In my study the lines of credit is excluded from the sample and therefore my results are more consistent with the results of Petersen and Rajan (1994).

Table 3: The Relation Between Relationship Intensity and Loan Spread

Explanatory Variables	´(1)	(t)	´(2)	(t)	´(3)	(t)	´(4)	(t)	´(5)	(t)	´(6)	(t)
Intercept	3,121 ***	16,94	2,310 ***	14,69	2,517 ***	14,89	2,260 ***	14,75	2,285 ***	15,41	2,916 ***	16,04
Relationship Intensity												
Length	0,001	0,60									0,004	1,20
Scope	0,004 **	2,20									0,000	0,04
Depth	-0,003 ***	-4,35									-0,006 ***	-5,54
Rank Intensity												
L+S+D			0,000	0,81								
L+S					0,000 *	-1,90						
S+D							0,000 *	1,93				
L+D									0,000 ***	2,59		
Loan Controls												
Loan Size	0,000	-1,07	0,000	-0,98	0,000	-1,06	0,000	-0,88	0,000	-0,71	0,000	-0,83
Firm Controls												
Profitability	-0,001 *	-1,67	-0,001 **	-0,23	-0,001 *	-1,96	-0,001 **	-2,27	-0,001 **	-2,27	0,000	-1,20
Ln (Firm Size)	-0,015 ***	-6,89	-0,108 ***	-5,26	-0,124 **	-5,78	-0,107 ***	-5,26	-0,114 ***	-5,65	-0,182 ***	-7,41
Liquidity	-0,003	-1,59	-0,003 *	-1,66	-0,003	-1,59	-0,003	-1,64	-0,003 *	-1,71	-0,002	-1,38
R Spec	-0,345 ***	-3,01	-0,361 ***	-3,10	-0,355 ***	-3,05	-0,361 ***	-3,10	-0,358 ***	-3,08	-0,325 ***	-2,85
R1	-0,650 ***	-3,14	-0,635 ***	-3,01	-0,643 ***	-3,05	-0,650 ***	-3,09	-0,630 ***	-3,00	-0,634 ***	-3,08
R2	-0,403 ***	-3,85	-0,393 ***	-3,69	-0,409 ***	3,84	-0,396 ***	-3,73	-0,384 ***	-3,62	-0,411 ***	-3,97
R3	-0,286 ***	-3,14	-0,271 ***	-2,92	-0,282 ***	-3,04	-0,273 ***	-2,95	-0,268 ***	-2,90	-0,285 ***	-3,16
R4	-0,325 ***	-3,71	-0,305 ***	-3,41	-0,311 ***	-3,48	-0,308 ***	-3,45	-0,306 ***	-3,44	-0,338 ***	-3,87
R5	-0,120	-1,24	-0,105	-1,07	-0,109	-1,10	-0,103	-1,06	-0,109	-1,11	-0,143	-1,49
R6	Ref		Ref		Ref		Ref		Ref		Ref	
Margin dummies												
Length * margin											-0,005	-1,13
Scope * margin											0,005	0,96
Depth * margin											0,004 ***	2,81
Industry dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Adjusted R2	0,238		0,206		0,210		0,211		0,215		0,252	
N	599		599		599		599		599		599	

The table presents results form tests of the relation between relationship intensity and the pricing of loans. Columns present results on loan spread as dependent variable. Spread is loan spread in marginal over underlying basis interest. Length is duration of bank-firm relationship in years. Scope is number of other banking services than loan. Depth is concentration of bank-firm relationship as a ratio of firm's liabilities to subject bank to total liabilities. Margin dummies are analyzed is robustness Section. Realized margins are reformulated so that it obtains the value of 1 if the firm's realized margin is above the sample median, and zero otherwise.
Control variables are described in the Sections above. T-statistics are computed using White's heteroscedasticity adjusted standard errors. All regressions are run using industry fixed effects. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

The control variables are next discussed, because significant fraction of the variation in the loan spreads is explained by them. In general, the signs of the control variables are in the expected direction. Loan spreads are negatively associated with the size of the loan, firm profitability and liquidity.

Internal ratings are significant and negative indicating that firm's with better risk categorization pay lower loan spreads. This result is in line with notion of rating's reflection of firm default risk. Dummy for rating specialist (R Spec) is also significant and negative suggesting that carefully analyzed firms pay lower loan spreads. The economical impact of internal ratings on loan spreads is bigger than the impact of relationship intensity.

3.4 Robustness Checks

3.4.1 Value-based Approach

First, a relationship lender would have a higher probability of cross-selling other products or services. Second, a relationship lender would use the gathered borrower-specific information as increased information monopoly.

The value-based approach tries to validate the elements of relationship intensity based on relationship value. The sample is segregated into two groups based on the intensity of the relationship and the value of relationship (high and low). The proportion of companies in RI_{high} should represent the majority of realized margins in the sample in order to reflect the lender's higher interest in relationship. In other words, the lender is certainly keener on more profitable companies and therefore this should naturally have effect on relationship intensity.

Table 4: The Intensity and Value of Relationship

Panel A: The Intensity of relationship (high)

	Equal	Full Weight on Single Element		
	Weigths	Length	Breadth	Depth
Proportion of Companies (%)	31 %	29 %	25 %	18 %
Proportion of Margins (%)	68 %	56 %	65 %	15 %

Panel B: The Intensity of relationship (low)

	Equal	Full Weight on Single Element		
	Weigths	Length	Breadth	Depth
Proportion of Companies (%)	69 %	71 %	75 %	82 %
Proportion of Margins (%)	32 %	44 %	35 %	85 %

Table 4 presents the intensity of relationship based on relationship value. In panel A the intensity of relationship is defined high, when the sum of weighted elements of relationship intensity exceeds 50 % of total intensity. The main analysis is based on equal weights of the elements of relationship intensity. Full weights on single element of relationship intensity is presented for comparative purposes. Panel B presents the results when the intensity of relationship is defined low, respectively.

Table 4 provides proportions of companies and related margins based on above mentioned categorization. In panel A using equal weights on measuring the bank-firm intensity, the proportion of companies categorized to high intensity of bank-firm relationship represents 31 % of all companies. The proportion of margins is 68 % of all margins, respectively. This finding is consistent with the view that low number of companies provides the majority of margins. Table 4 provides also similar analysis based on one component of relationship intensity at a time. In panel B provides the proportion and margins of the companies categorized to low intensity of bank-firm relationship. Panel B shows that single components of bank-firm relationship intensity do not individually reflect properly the intensity based on this analysis, but the combination of these three components provides better proxy for relationship intensity. I tested also other weights on the components of relationship intensity and found the results qualitatively similar (not reported).

Further, I reformulated the realized margin variable so that it obtains the value of 1 if the firm's realized margin is above sample median, and zero otherwise. I added cross products of the new dummy and the variables describing relationship intensity into the model.

The results in column VI, Table 3, indicate that the scope of the bank-firm relationship is no longer significant, but the depth variable is still significant. The sign

of the original depth variable is negative, while the cross product of higher realized margins and depth is positive. This result can be broken into two parts. First, in the whole sample, the coefficient on the depth of bank-firm relationship is statistically significant and negative. That is, the more concentrated the relationship, the lower loan spread is paid by the borrowing firm. Second, the cross product between the depth of the relationship and the realized margin dummy has a positive sign. This indicates that for more valuable firms the concentration of borrowing relationship increases the loan spread and thus weakens the credit terms. This result is consistent with the notion that the benefits of intensive bank-firm relationships remain within the bank and the benefits are not shared with more valuable firms. These firms may have well-established bank-firm relationship and the loan spread may be insignificant for the decision of relationship continuity. Concentrating the loan with one bank while having relationships also with other financial institutions seems like an optimal arrangement for the borrower. The main bank would have an informational advantage that would allow it to offer lower interest rates, and the multiple lenders would alleviate the potential hold-up problem.

3.4.2 Two Stage Heckman Methodology

One concern in this study is potential endogeneity problem. There is potential endogeneity between studied variables and relationship intensity. 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 I apply a two-stage estimation procedure as described in Heckman (1979).

The Two Stage Heckman methodology controls for bias in the average treatment effect due to self-selection. Self-selection is based on unobservable variables that drive the intensity of bank-firm relationship. The approach of Heckman (1979) involves a two-stage estimation: the first stage probit equation that models the decision to involve in intensive bank-firm relationship and the second stage OLS equation that explains the loan spreads.

This Section is under progress.

4 SUMMARY AND CONCLUSIONS

The purpose of this paper is to describe and analyze the essence of bank-firm relationships. I identify determinants of the intensity of bank-firm relationship based on prior literature and analyze the intensity of bank-firm relationship. From the bank's perspective there are basically two channels of information flows in order to gain useful information on borrower's loan repayment. First, the financial statement information will found a basis for continuous customer evaluation, and second the firm-specific information of the intensity of relationship will provide useful information on intensity and sustainability of relationship.

In this study I analyze the firm-specific financial and relationship information to gain understanding of the elements of bank-firm relationship. These elements of relationship intensity are analyzed based on length, scope and depth of the bank-firm relationship. Further, this study analyses the effect of relationship intensity on loan pricing.

The results of this study provide useful information on the intensity of bank-firm relationships. This analysis shows that the intensity of bank-firm relationship is affected by the elements of the relationship, namely length, scope and depth. I find that the elements of intensity are associated with loan spreads. More specifically, while length of relationship has no significant effect on loan spread, banks incentives in refining the relationship is found more pronounced in variables of scope and depth of the relationship. Combining these results it seems that there is a group of firms that obtain only low-priced loan while having financial services from another bank.

From the bank's perspective, the customer relationship information may guide banks to improvements, in order to proactively respond to the harmonization process within SEPA-countries. This evidence implies that the pricing of loan is conditional on the relationship aspects. Further, the findings on the intensity of bank-firm relationship are combined with further dissertation work to measure accounting conservatism in relationship banking and its effect on loan pricing.

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