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Abstract

This paper adds to the relationship lending debate by investigating detailed contract information obtained from examining nearly eighteen thousand bank loans. The beneficiaries all were very small firms that operate within the continental European bank-based system. That is, with data gathered for Belgium, we investigate price and non-price terms of the loan contract. We test for the possibility of intertemporal rent shifting by banks. The empirical evidence shows two opposing effects. On the one hand, the length of a bank-firm relationship increases the loan rate. On the other hand, widening the relationship by buying other information sensitive products from a bank decreases the loan rate. Thus the effect on the price operates more through the dimension of the relationship than through the length of the relationship. We also find that the length of the financial relationship slightly negatively influences the probability of pledging collateral.

JEL-Classification: G21, G32

I. INTRODUCTION

Is it possible for small firms to borrow at reasonable interest rates? How is the loan rate affected by a bank-firm relationship? Does a firm benefit from establishing a close bank-firm relationship? Are loans less collateralised when a bank-firm relationship is stronger? All these questions are raised as a result of the often-heard complaints by small firms that they can not raise funds at viable loan rates. The increased competition for scarce capital in the banking sector has highlighted these problems and complaints. Moreover, there is a lot of political concern over small business credit availability. This paper empirically investigates whether the price and non-price terms of a loan are affected by establishing a close bank-firm relationship.

Asymmetric information problems tend to be more acute for small firms than for large firms. The latter therefore can more easily obtain credit in public debt markets, whereas the former often depend on institutional investors specialised in dealing with asymmetric information, such as banks. Theory explains that large institutional investors produce information about these firms, and use it in their credit decisions (e.g. Diamond (1984) or Ramakrishnan and Thakor (1984)). One way to produce this information is through the repeated provision of bank services. Over time this may reveal valuable private information about the customer to that bank. That is, some types of loans to small businesses tend to be relationship-driven, as these loans depend upon private information gathered through contact between the bank and the borrower over time.

This paper examines whether firms with a closer relationship to a financial institution have a lower cost of debt than firms without such ties. Furthermore, we analyze the empirical association between the strength of a bank-firm relationship and the probability of pledging collateral. Our empirical analysis uses data on loan rates and collateral requirements on loans issued to very small firms. Our study is of special interest: it is the first that analyzes credit file data concerning very small firms operating within the European bank-dominated system.[1] The bank-dominated system is systematically present all over continental Europe.

Recent empirical evidence suggests that the contribution to the economy by small businesses is extremely important. That observation holds especially for employment in Europe: about 70% of the workforce is employed in companies with less than 500 employees[2] (Schwalbach (1994)), as opposed to about half of the work force in the US (Brown, Hamilton and Medoff (1990)). Consequently, understanding the mechanisms driving the interest rate setting and capital availability via bank-firm relationships deserves to be investigated extensively.

The theoretical literature on relationship banking provides predictions about how loan interest rates should evolve over the course of a bank-firm relationship. Freixas and Rochet (1997) discuss these and other aspects of the borrower-lender relationship at length. Two different patterns are predicted regarding the evolution of interest rates within the relation. On the one hand, the model of Boot and Thakor (1994) demonstrates that loan rates should

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[1] Our sample concerns 98% of firms with less than 10 employees, see also Table 1.

[2] This figure is based on the 12 European Member countries in 1988. The figure for a market-based country U.K. is about 65%. This implies that the importance for bank-based continental European countries is slightly larger than 70%.

decline as a relationship matures. On the other hand, Greenbaum, Kanatas and Venezia (1989) and Sharpe (1990) predict that loan rates should increase over time. The present paper sheds some light on the theoretical predictions for very small firms operating in a bank-dominated financial system from an empirical perspective.

Empirical papers focusing on the impact of firm-creditor relationships can be subdivided into two strands. The first strand provides indirect tests. For instance, they focus whether the existence of a bank-firm relationship increases firm value. They investigate whether banks produce valuable private information about borrowers. The second strand offers direct tests of bank-firm relationships, by using continuous measures of the strength of this relationship. For the US market-dominated system, Petersen and Rajan (1994, 1995) did not find that the strength of the bank-firm relationship influences in a significant way the loan rate. Berger and Udell (1995) show empirical evidence that L/C rates decrease with the strength of the bank-firm relationship. Ongena and Smith (1997) provide empirical evidence on the duration of bank relationships in Norway. They document that the likelihood of ending a bank relationship is increasing in the length of the relationship.

Our analysis follows this second strand of the empirical literature. We also focus on continuous indicators of a bank-firm relationship, as a measure of the strength of a relationship. We provide evidence on very small firms operating in a bank-dominated system, where bank-firm relationships are presumably very important.

Our study differs from the existing empirical literature in three important ways. First, we focus on very small firms operating in the *European bank-dominated* system by analyzing

credit file data. We may expect to measure accurately the importance of relationship lending in such an environment. More importantly, our data are not confronted with the problem that some firms might migrate out of the sample to the public debt market, as firms are very small.

Second, firms may have several loans at a bank. This implies that we have unbalanced *panel data*. Hence we are able to follow firms in the course of the relationship. Third, we analyze the empirical association between relationship lending and the *collateral decision*. This paper provides a new test of the Boot and Thakor (1994) model on the pattern of collateral requirements over the course of a bank-firm relationship.

A Belgian bank has provided our data. The data set contains extensive information on loan contract terms as well as information on the relationship between this bank and its borrowers. We obtained data on approximately 18000 loans in the bank's portfolio at a given point in time, granted to more than 13000 firms. As a preview on our findings, we find a positive association between the length of this bank-firm relationship and the loan rate. Or the interest rate charged on a loan increases as the relationship lasts. The magnitude however is much larger when the firm does *not* buy other information sensitive products from that bank. Thus the intensity of the relationship with a bank, as determined by buying other (information sensitive) products, decreases the loan rate. Additional public information captured via the age of the firm reduces the interest rate. However the private information component dominates the public information component such that interest rates increase over the course of a bank-firm relationship. The probability of pledging collateral slightly negatively affects the length of a bank-firm relationship.

The paper proceeds as follows. In the next section, we review the theoretical and empirical literature on relationship lending. The data are described in the third section. Section IV presents the empirical results on the borrowing costs and the probability of pledging collateral. Finally, section V concludes. All tables are relegated to the appendix.

II. THEORY AND PREVIOUS EMPIRICAL RESULTS ON RELATIONSHIP LENDING

Banks learn about a firm's ability to meet future obligations through past payment histories. Moreover, financial institutions obtain information through the provision of other services (e.g. deposit accounts, clearing and payment services). Banks may use this information in designing loan contracts to small businesses. Theoretical papers on banking relationships have focused on the effects of the evolution of a bank-firm relationship on the design of these credit contracts (Greenbaum, Kanatas and Venezia (1989), Sharpe (1990), and Boot and Thakor (1994)), as well as on the availability of supplemental financing in a liquidity crisis (Longhofer and Santos (1998)).

Greenbaum, Kanatas and Venezia (1989) and Sharpe (1990) argue that there is a positive dependence between the length of the bank-firm relationship and the cost of debt. The idea is that information acquired by a bank as part of an ongoing relationship can create an

"information monopoly" or hold-up problems in that it is costly for the borrower to switch lender.[3] In Greenbaum, Kanatas and Venezia (1989) firms choose each period to stay with the same bank or to search for a new bank, and incur a search cost. The incumbent bank enjoys some monopoly power due to its informational advantage about the firm and the client's search cost. Outside banks therefore price lower in order to establish a relationship and reap the future monopoly profits. The reasoning in Sharpe (1990) is similar, while he uses a two-period model. In each period banks compete for funding projects of entrepreneurs. However, in the process of lending, the (inside) bank obtains information concerning entrepreneurs. Outside banks only obtain a noisy signal about the quality of an entrepreneur. This implies that banks try to lure borrowers when young with loan rates below cost. This below cost lending when young are compensated by the fact that those borrowers are 'captured' when they are old. Hence, informational rents are extracted later on in the relationship and backloading of rents occurs. Von Thadden (1998) shows that the pure-strategy equilibria computed by Sharpe (1990) do not exist due to a "winner's curse" type phenomenon. However, mixed-strategy equilibria exist predicting a *limited informational capture* of borrowers in bank-firm relationships. This implies interest rates charged above the market rate and occasional switching of borrowers later on in the relationship. And Yosha (1997) shows that the tension between prices and marginal costs of banking services is likely to persist even if the economy grows very large.

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[3] Rajan (1992) also argues that rents can be extracted whenever information generated in prior relationships cannot be verified by new lenders.

Boot and Thakor (1994) argue that there is a negative dependence between the length of a bank-firm relationship and the loan rate. Contracts are written in the loan rate and collateral. The bank chooses the contract that dynamically optimizes the incentives of the borrower without loosing this borrower to another bank. This materializes by taxing the borrower when young, thus charging above cost loan rates, and subsidizing the borrower when old. In that case there is frontloading of rents. The same relationship holds for the collateral decision.

The effect of credit market competition affects the possibilities of intertemporally sharing the surplus between a firm and a bank (Petersen and Rajan (1995)). Credit market competition decreases the value of a lending relationship to the firm, as it cannot expect to get help when most in need. One expects that fiercer credit market competition reduces the possibility of intertemporally sharing surplus in a bank-firm relationship. The extent of credit market competition may differ with the size of firms. Banks as well as public debt markets are competing more intensively to attract large firms. Very small firms benefit less from period by period credit market competition since private information is not easily transferable. Therefore the possibility of intertemporal shifting of rents could be important for very small firms.

At least two dimensions of a relationship should be distinguished (see also Petersen and Rajan (1994)). First, the *length* of a financial relationship is important. The information generated through the interaction over time should influence the cost of debt. This is even more the case whenever the information is not observable or not credibly transferable to outsiders. Second, the *interaction via other products* also can help to design a relationship.

For instance, a bank may maintain the checking accounts and saving accounts of a firm (Nakamura (1991)). This easy access to the information in checking accounts gives this bank a unique advantage in monitoring borrowers. Finally, it allows the bank to spread the cost of information production over several products. The multidimensionality of the relationship should reduce the loan rate.

The empirical papers focusing on the impact of bank-firm relationships address whether or not these relationships are valuable to the economy. As mentioned earlier, the literature can be subdivided into two strands. The first strand provides *indirect tests* of these relationships. For instance, they discuss whether the existence of a bank-firm relationship increases firm value. For the US, several studies found that firms announcing a (renewal of a) L/C from a bank generate positive abnormal stock returns (e.g. James and Wier (1990)). For Japan, Hoshi, Kashyap and Scharfstein (1990a, 1990b and 1991) find that firms with a close bank-firm relationship are less likely to be liquidity constrained.

The second strand provides *direct tests* of these bank-firm relationships by using continuous measures of the strength of this relationship. Petersen and Rajan (1994, 1995) found a slight positive but insignificant effect of the length of the bank-firm relationship on the loan rate. Berger and Udell (1995) find that loan rates in the US market-dominated system decrease with the length of the bank-firm relationship. Weinstein and Yafeh (1998) examine the effects of bank-firm relationships on firm performance in Japan. They observe that close bank-firm ties increase the availability as well as the cost of capital. Ongena and Smith (1997) provide empirical evidence on the duration of bank-firm relationships in Norway. They find positive duration dependence; the likelihood that a bank-firm relationship ends is

increasing in the length of that relationship. Elsas and Krahnen (1997), and Harhoff and Körting (1997) investigate lending relationships in Germany. The latter find for small German firms, based on survey data, that relationship variables may have some bearing on the price of external funds, but more so on its availability. Elsas and Krahnen (1997) focus on German firms with moderate size using credit file data. Their results provide no evidence for intra- or intertemporal price differentiation related to housebanking. Our study differs from the previous two, as it uses credit file data *and* focuses on very small firms where the (lack of) banking competition and asymmetric information are expected to be important. Our analysis follows the second strand of the empirical literature by including a continuous measure of a bank-firm relationship. We also analyze the impact of bank-firm relationships on the probability of pledging collateral.

III. THE DATA SET

An important Belgian bank provided our data. The bank operates all over Belgium. The data set consists of 17776 loans given to independents (or single-person businesses), small, medium, and large sized firms[4]. Some borrowers take several loans from this bank; our data cover loans granted to 13104 borrowers which implies that every borrower has on average 1.36 loans at that bank at one point in time. All those loans were in the portfolio of this bank at August 10, 1997. They all started after January 1, 1995. Approximately 81% of the number of firms are single-person businesses (sole proprietorships), 17% are small firms and 1% are medium sized firms. The rest (less than 1%) are large firms. Hence, we have a sample of very small firms. Table 1 describes the variables used in this study, broken down into six sets of characteristics: loan contract characteristics, information/relationship characteristics, interest rate variables, firm characteristics, governance characteristics and industry characteristics.

Consider first the *loan characteristics*. The first one is the interest on a loan until the next revision (INTRATE). For fixed interest rate loans, this is the yield to maturity of the loan. For variable interest rate loans, this is the interest rate until the date at which the interest rate will be revised. The average interest rate on a loan is 8.10%. The variable COLLAT

indicates whether the loan is collateralized or not. Approximately 27% of the loans are collateralized. Another loan characteristic is the repayment duration of the loan (DURATION)[5]. We include the natural logarithm of this variable (LN(DURATION)) in order to proxy for the risk associated with the time until the loan is repaid. We also include dummies capturing the type of loan the firm is taking. Together with the firm characteristics and the industry characteristics, this should proxy for the risk of the borrower.

The *interest rate variables* are incorporated to control for the level of the interest rate in the economy. We incorporate the interest rate on a Belgian government security with the same repayment duration as the loan to the small firm (RATEEQDUR). We know the exact date that the loan rate was decided upon. Moreover, we include a termpremium (TERMSPREAD), defined as the yield on a government bond with repayment duration of 5-years minus the yield on a 3-months Belgian Treasury bill. We also incorporate year dummies to control for possible business cycle effects. The *firm characteristics* include a proxy for the size of the firm. We include dummy variables for large firms (LARGE), medium size firms (MEDIUM) and small firms (SMALL). Our sample contains mainly single-person businesses (SINGLE). Our *corporate governance characteristics* include the legal form of the firm. We distinguish BVBA's (limited partnerships), co-operative

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[4] Independents or single-person businesses are natural persons who run a small business in which they are employed themselves. They have no limited liability. They are comparable to sole proprietorships. The definitions for firm size are as follows: small firm = less than 10 employees and turnover < 250 million BEF, medium size firm = > 10 employees and/or turnover in between 250 million BEF (+/- 6 million ECU) and 1 billion BEF (+/- 25 million ECU), large firm = turnover more than one billion BEF. According to more standard definitions all of the above firms are small businesses.

[5] For all loans to the firms, we know at what 'speed' the loans are repaid. This allows us to exactly compute the repayment duration of a loan.

partnerships (CV) and corporations (naamloze vennootschappen (NV)).[6] Including 50 two-digit NACE code dummies captures the industry characteristics.[7]

The *information/relationship characteristics* are our main concern, and therefore deserve a separate paragraph. The first one is RELAT. It measures the length of the financial relationship in years with that particular bank at the time the loan rate is decided upon. A relationship starts when a firm buys for the first time a product from that bank. RELAT is one measure of the strength of the bank-firm relationship. The length of a financial relationship should be a proxy for the private information the institution has about a firm. The mean value for RELAT is 7.8 years. This implies that the average length of the relationship in the sample is about 8 years. This value is much lower than the one found for instance by Ongena and Smith (1997) or Elsas and Krahnen (1997). The reason is that their focus is on listed firms and medium sized firms, respectively. Our sample consists mainly of very small firms not having experienced a long relationship with a bank. If banks can keep some information about the firm private, the possibility of intertemporal rent shifting could occur. Theory suggests that frontloading as well as backloading of rents might occur. A second measure of the intensity of the financial relationship is MAIN. MAIN indicates whether this bank considers it as the main bank of that firm or not. That is whether this firm also buys other products from this bank and whether this firm executes most of its payments via this bank (see Table 1 for an exact definition). These non-loan services allow the lender to monitor the firm. If these sources of information improve the accuracy of the bank's

[6] BVBA's are partnerships with limited liability. Sole proprietorships can erect a BVBA in order to have limited liability. Co-operative partnerships imply equality among the partners. NV's are corporations having ease of ownership transfer and perpetual succession.

information or reduce the monitoring costs, MAIN should reduce the expected cost of such loans[8]. Hence, MAIN captures to some extent the multidimensionality and scope of a bank-firm relationship.

IV. ECONOMETRIC SPECIFICATION AND EMPIRICAL RESULTS

In this section, we analyze the empirical results of the determinants of the loan rate. Furthermore the empirical association between the probability of pledging collateral and the intensity of a bank-firm relationship are studied.

A. Determinants of the loan rate

We analyze the determinants of the loan rate by regressing the interest rate on a loan until the next revision (INTRATE), on the loan contract, information/relation, firm, governance, industry characteristics, as well as other control variables.

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[6] The NACE code is the European industrial classification system subdividing industries.

[8] A possible effect of MAIN is that the bargaining power of a firm increases, as it also buys other products at that bank. In other words, cross-subsidization could negatively influence the loan rate.

Thus, using OLS we estimate the following specification that resembles closely the Petersen and Rajan (1994) specification

$$\text{intrate on loan} = \alpha(\text{interest rate}) + \beta(\text{firm}) + \gamma(\text{relationship}) + \delta(\text{loan}) + \gamma(\text{governance}) + \eta(\text{other}) + \varepsilon$$

Table 2 presents the results of our OLS regressions of the interest rate on different sets of variables. We focus on the effects of the information/relation specific characteristics RELAT and MAIN. The interest rate variables are included to control for the underlying cost of debt. We include RATEEQDUR, the interest rate on a government security having the same repayment duration, and a measure for the term premium (TERMSPREAD). In order to control for business cycle effects, we include also year dummies for 95 and 97.

In the second and third column, we show the results of estimating the model with the length of the relationship entering linearly (RELAT). A significant fraction of the variation in the loan rate is explained by economy wide factors. As in Petersen and Rajan (1994) or Ausubel (1992), the change in the loan rate due to a change in the interest rate on a government security with the same duration (RATEEQDUR) is less than one. This can be seen from the coefficient of RATEEQDUR in (1). A one-percent parallel shift of the term structure implies a 0.64 % shift in the loan rate. This is much higher than the coefficient Petersen and Rajan (1994) found (0.28) but still significantly less than one. One explanation is that this bank has access to core deposits permitting it to insulate its borrowers against exogenous credit shocks (see Berlin and Mester (1997a)). Another interpretation is that bank loan-pricing practices may have been inefficient (see Berlin and Mester (1997b)). The termstructure measured by TERMSPREAD positively influences the loan rate. We only

possess partial information concerning the size of the firm; i.e. we know whether a firm is a large, medium size or small, or whether it is a single-person business. The firm size dummies allow a separate intercept effect for each borrower size. The results indicate that large and medium size firms pay a much lower interest rate than single-person businesses. Small firms tend to pay a slightly higher interest rate than single-person businesses. The corporate governance indicators are dummy variables capturing the legal form of a firm. Corporations (NV) pay a smaller interest rate than single-person businesses with unlimited liability for business debts.

The loan characteristics include whether the loan is collateralized or not, as well as the repayment duration of the loan. The coefficient of COLLAT indicates that when a loan is collateralized, the loan rate decreases with approximately 0.5%. This result is in line with the sorting-by-private-information paradigm that safer borrowers pledge more collateral. (see Berger and Udell (1990)). LN(DURATION) is included to account for the possibility of a non-risk term premium incorporated in the dependent variable. Its coefficient is significantly negative: an increase of the duration from 5 to 6 years reduces the interest rate by 0.16%.

We control for regional banking competition effects and regional risks by introducing 8 regional province dummies. Industry risks are taken care of by introducing about fifty two-digit NACE dummies. We do not report the estimated coefficients for these regional and industry effects in Table 2, as our main focus is on the role of bank-firm relationships. However none of the two-digit NACE dummies was significant at the 5% level. Some

regional dummies were significant pointing to regional banking competition effects and/or regional risks.

We capture the role of the bank-firm relationship in two complementary ways. The first one is through the length of the financial relationship RELAT. As discussed in section II, the impact of RELAT on the cost of debt can go either way whenever intertemporal shifting of rents is possible. As mentioned earlier, in regressions (1) and (1') we included RELAT linearly. The results of (1) indicate that the longer the relationship, the higher the interest rate a firm has to pay. An additional year in the length of the financial relationship increases the interest rate with 0.011%. In regression (1') a second variable capturing the effect of a bank-firm relationship is introduced. In this case we focus on whether the bank considers itself as the mainbank of that firm or not (MAIN). The empirical results show that a firm pays a 0.36% lower loan rate, whenever this bank considers itself as the main bank. Thus a bank having a more intense relation for obtaining more precise information about a firm offers loans at a lower interest rate.

Regressions (2) and (2') include the same variables as (1) and (1') respectively, except that we include the length of a financial relationship in a logarithmic way (LN(RELAT)). The reason is that we expect the marginal impact on the loan rate to decrease as the length of the relationship increases. The empirical results go in the same direction as for (1) and (1'). Again, MAIN reduces significantly the interest rate a firm pays. The coefficient of LN(RELAT) is significantly positive. That implies that an increase in the length of the relationship positively increases the loan rate. The logarithmic specification however implies that the marginal increase in the interest is lower the longer the financial

relationship. For instance, based on specification (2'), an increase from 5 to 6 years implies a 0.027% higher interest rate, i.e. an increase with 2.7 basispoints whereas an increase from 20 to 21 years a 0.008% increase.

Regressions (3) and (4) show the results of the following experiment. We expect that our two measures of bank-firm relationships MAIN and RELAT are correlated. We noticed in the previous regressions that whenever we introduce MAIN, the coefficient of RELAT increases. We suspect that the impact of RELAT may differ depending on whether MAIN is equal to one or zero. In other words, the impact of the length of a financial relationship may depend on whether the bank considers itself as the main bank or not. Therefore we allow the slope coefficient of RELAT to depend on the value of MAIN by adding an interaction term between both MAIN*RELAT. We include this interaction term in regressions (3) and (4). The results are shown in Table 2. The coefficient of the interaction term MAIN*RELAT in (3) is significantly negative. This implies that the increase in the loan rate due to an increase in the length of a relationship is larger for firms for which this bank is not the mainbank. The impact of the length of a relationship RELAT, however, still slightly positively affects the interest rate. This can be seen for instance from regression (3) by adding up the coefficients for RELAT and MAIN*RELAT. That is 0.037-0.035=0.002. Thus an increase in RELAT of one year implies a 0.002% increase in the interest rate. The coefficient of MAIN remains slightly negative in (3). In (4), the coefficient of MAIN becomes insignificant. Almost the same results are obtained when interacting MAIN and LN(RELAT) (see (4) in Table 2). The performance of the regressions as shown by the

adjusted R^2 improves by introducing this interaction term. Therefore we take (4) as our preferred specification.

The results of (4) suggest that it is more the scope of the financial relationship than the length of the financial relationship that affects the interest rate. Whenever the bank acts as a dual source/new source in providing funds, it extends credit at a higher interest rate. This is empirical evidence supporting the mixed strategy equilibria in von Thadden (1998). In equilibrium, some firms occasionally switch to the outside bank (MAIN=0) and the outside bank charges a higher interest rate, as it takes into account a winner's curse effect.

In regression (5) of Table 2, we include the age of the firm as explanatory variable. The age of a firm captures public information, as suggested by Diamond (1991). Our data set provides us with information on the age of the firm only for the firms having a legal form. Those firms have been granted 3334 loans in our sample. We expect that the older a firm is, the lower the interest rate charged. Our results in (5) confirm this: an increase in age from 5 to 6 years reduces the interest rate with 0.011%.[9] As expected, the results for the length of the financial relationship gain economic significance. An increase from 5 to 6 years increases the interest rate with 0.036% (0.06%) in case the bank is (not) the main bank. Thus our conclusion becomes that the private information component dominates the public information component, as the coefficients of the length of the bank-firm relationship are higher than that of age.

[9] The results concerning the effect of the age of the firm is somewhat smaller than the findings of Petersen and Rajan (1994) or Harhoff and Korting (1998).

Our results show similarities as well as differences with respect to those by Petersen and Rajan (1994), Berger and Udell (1995) and Harhoff and Körting (1998). The first authors as well as Harhoff and Körting (1998) also found a slight positive effect of the length of a financial relationship on the loan rate. Their coefficients however were insignificant. The impact of providing other information intensive products by a lender goes in the same direction as in Petersen and Rajan (1994). That is they reduce the loan rate. Berger and Udell (1995) found that the length of a financial relationship decreases the loan rate. Our findings also suggest the possibility of intertemporal shifting of rents. However, we find backloading of rents whereas Berger and Udell (1995) find frontloading of rents. Let us finish this paragraph by remarking one potential caveat. We did not include accounting data on our firms, as these are not available for most of the firms. We believe this is not a serious problem, as most of those firms are not obliged to make their annual reports public.

Our results reveal a positive relation between the length of the bank-firm relationship and the cost of credit. To verify the robustness of our results, we perform a number of tests. First, as an alternative to our specification, we also present the results where we regress the spread over a government security with the same repayment duration (SPREAD) on the same variables. That is we follow the specification of Berger and Udell (1995) or Harhoff and Körting (1998), but our results concerning the information/relationship variables are not affected. Our estimation results are shown in Table 3. Second, we check whether our regression results still hold whenever we focus on firms having a very short bank-firm relationship. It turns out that this is the case. Third, as we have a kind of unbalanced panel, we aggregated the loans for each firm and reran the regressions. Again this does not change

the qualitative nature of our results and the main finding that there is a positive relation between length of the bank-firm relationship and the cost of credit.

B. Determinants of collateral

In this subsection, we empirically investigate whether the strength of a bank-firm relationship influences the probability of pledging collateral. We use logit regressions to examine the probability of a loan being secured. This subsection offers a new test of Boot and Thakor's (1994) model predicting that borrowers with longer bank-firm relationships will less often pledge collateral. Berger and Udell (1995) found that the probability is decreasing with the length of a bank-firm relationship. That is what the theory and conventional wisdom suggests.

For all loans in our sample we know whether collateral has been pledged or not (see also Table 1). Table 4 shows the results of the logit regressions for the probability of any type of collateral being pledged. As for the loan rate regressions, we control for firm characteristics, loan characteristics and governance characteristics. We also include about 50 industry dummies, 2-year dummies and 8 product dummies. We focus again on the information/relationship variables.

We try different specifications. Specifications (1) and (1') differ in that (1) only includes RELAT whereas (1') also takes into account MAIN. We expect for both a negative sign.

If a bank maintains the account of a firm, the less it costs to monitor that firm, the less need to have collateral pledged. Our findings reveal mixed evidence. The results neither confirm nor reject the theory of Boot and Thakor (1994). The coefficient of RELAT is imprecisely estimated. In (1) it is slightly positive whereas in (1') it is slightly negative. Both estimates are statistically not significantly different from zero. This implies that the decision to collateralize is fairly exogenous. MAIN however increases the probability of pledging collateral. An explanation for the latter effect is a potential lock in by banks via asking collateral.

Regressions (2) and (2') are identical to (1) and (1') respectively, except that we included the length of the financial relationship in a logarithmic way (LN(RELAT)). Our main results are confirmed. The length of the financial relationship negatively influences the probability of pledging collateral (significant at the 10% level). Evaluated at the mean, and based on (2'), an increase of the financial relationship with ten years decreases the probability of pledging collateral with 3.7%. This number is substantially lower than the one found in Berger and Udell (1995), i.e. an increase of ten year of financial relationship decreases the probability of pledging collateral with 16%.

As for the loan rate, we again include an interaction dummy between MAIN and RELAT. The purpose is to detect whether there is a differential impact of the length of a financial relationship whenever the bank is the mainbank or not. The results of (1), (1'), (2) and (2') suggest that there could be a differential impact, as the sign of the length of the financial relationship changes when MAIN is introduced. Our results for (3) and (4) however do not confirm this possibility. In other words, the interaction between length of financial

relationship and mainbank generates no significant differential impact upon the probability of pledging collateral. The length of the relationship negatively affects the probability of pledging collateral. MAIN again increases the probability of pledging collateral.

Only two control variables are systematically significant: the size of the loan (LN(SIZE)) and the indicator for small firms (SMALL). The sign for loan size (LN(SIZE)) is positive. That is larger loans are more often collateralized. Small firms have to pledge collateral more often than single-person businesses, which could be due to their limited liability.

As for the loan rate regressions, we included the age of the firm whenever that information was available. We expect that the older a firm becomes, the less likely it has to pledge collateral. The results are shown in column (5) of Table 4. The age of a firm reduces the probability of pledging collateral though not in a statistically significant way.

V. CONCLUDING REMARKS

Small businesses often complain to be unable to borrow at reasonable loan rates. Theory suggests that engaging in a bank-firm relationship can mitigate this problem. We empirically investigated how bank-firm relationships affect the loan rate setting, and the probability of pledging collateral. That is how the price and non-price terms of a loan depend on the intensity of the bank-firm relationship. Our data set concerns credit file data of small firms in a European bank-dominated (B-system) economy. Our study is of particular interest, as it is among the first to study the loan contract setting behavior in a bank-dominated economy. Particularly in those countries, relationship banking is of great importance.

Our findings point out that the intensity of a bank-firm relationship affects the loan rate a small firm pays to a bank. We expect that intertemporal shifting of rents is possible whenever some of the information remains private to the bank. Our data set consists of very small firms for whom the public debt market is no outside option. Our empirical results indicate the following. The length of a bank-firm relationship significantly increases the loan rate. That is a firm having a longer financial relationship pay a higher interest rate on their loans. However, another indicator of the intensity of a bank-firm relationship indicates the opposite. That is the interest rate on a loan significantly decreases when a firm buys also other products and/or performs most of its payment transactions via that bank. This shows that relationship lending is a multidimensional concept. In order to determine

what is driving the results, we interacted both dimensions of bank-firm relationships. The results reveal that the loan rate sharply increases for firms *not* having the lender as its mainbank. The interest rate is only slightly increasing in the length of the financial relationship when the firm has this lender as its main bank. Our evidence provides empirical support for the limited informational capture result of von Thadden (1998) with interest rates charged above the market rate and occasional switching of borrowers in equilibrium. Public information measured via the age of the firm reduces the interest rate. However this effect is dominated by the lock-in effect of a bank-firm relationship.

Our second focus concerns the association between pledging collateral and the bank-firm relationship. Theory and conventional wisdom suggest that there should be a negative relation between the strength of a financial relation and the probability of pledging collateral. Our empirical results provide mixed evidence. They indicate that the length of a bank-firm relationship marginally decreases the probability of pledging collateral. The results concerning buying other information sensitive products show that such activities significantly increase the probability of pledging collateral.

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APPENDIX

Table 1: Variable description

Variable name	Description	Mean	Minimum	Maximum
Loan contract characteristics				
INTRATE	% interest rate on a firm's loan until next revision	8.10	1.56	22.37
COLLAT	=1 if is secured	0.27	--	--
SIZE	size of loan in thousands BEF[10]	920	50	93227
DURATION	repayment duration of loan in years	2.39	0.08	20
information/relationship characteristics				
RELAT	length of relationship with current lender in years	7.82	0	26.46
MAIN	= 1 if bank considers itself as mainbank[11]	0.58	--	--
interest rate variables				
RATEEQDUR	% interest rate on a Belgian government security with equal repayment duration as loan to small firm	3.89	3.05	8.05
TERMSPREAD	yield on Belgian government bond of 5-years-yield on treasury bill with maturity of 3-months	1.79	1	2.68
firm characteristics*				
SINGLE	= 1 if single-person business	0.81	--	--
SMALL	= 1 if size is small	0.17	--	--
MEDIUM	= 1 if size is medium	0.01	--	--
LARGE	= 1 if size is large	0.01	--	--
"governance" characteristics				
BVBA	= 1 if limited partnership	0.12	--	--
CV	= 1 if firm is limited partnership with equal sharing	0.01	--	--
NV	= 1 if corporation	0.04	--	--
Industry characteristics				
series of two-digit NACE-code dummies*	= 1 if in two-digit NACE code			

* small: <10 employees and turnover <+/- 6 million ECU, medium sized firm: > 10 employees and/or turnover in between 250 million BEF (+/- 6 million ECU) and 1 billion BEF (+/- 25 million ECU), large firm: turnover more than one billion BEF.

** NACE = European Industrial classification code

[10] 1$ was approximately 35 BEF.

[11] The definition used by the bank to determine whether it is the main bank is : for single person businesses and small firms, have a 'turnover' of at least 100.000BEF per month and buy at least two products from that bank; for medium and large firms, the bank performs at least 30% of all payment transactions of that firm and is regularly 'consulted' for the firm's financing needs.

Table 2: Borrowing costs and the role of bank-firm relationships

The dependent variable is the interest rate until next revision on a firm's loan (yield until next revision) (INTRATE). Standard errors are reported in parentheses.

Variable	(1)	(1')	(2)	(2')	(3)	(4)	(5)
interest rate variables							
RATEEQDUR	0.635***	0.642***	0.634***	0.640***	0.639***	0.639***	0.734***
	(0.062)	(0.062)	(0.062)	(0.062)	(0.062)	(0.108)	(0.141)
TERMSPREAD	0.313***	0.311***	0.320***	0.322***	0.305***	0.317***	0.232
	(0.083)	(0.083)	(0.084)	(0.083)	(0.083)	(0.083)	(0.190)
firm characteristics							
SMALL	0.350*	0.359*	0.373**	0.400**	0.351*	0.379**	0.453**
	(0.185)	(0.184)	(0.185)	(0.184)	(0.184)	(0.184)	(0.209)
MEDIUM	-1.199***	-1.159***	-1.173***	-1.106**	-1.155***	-1.114***	-1.000***
	(0.232)	(0.232)	(0.232)	(0.232)	(0.232)	(0.232)	(0.261)
LARGE	-1.349***	-1.537***	-1.298***	-1.464***	-1.489***	-1.433***	-1.312***
	(0.437)	(0.436)	(0.437)	(0.436)	(0.435)	(0.435)	(0.449)
LN(AGE)	-	-	-	-	-	-	-0.074**
							(0.037)
information/relationship characteristics							
MAIN	-	-0.356***	-	-0.395***	-0.093	-0.020	-
		(0.034)		(0.035)	(0.057)	(0.088)	
RELAT	0.011***	0.019***	-	-	0.037***	-	-
	(0.003)	(0.003)			(0.004)		
LN(RELAT)	-	-	0.093***	0.172***	-	0.242***	0.390***
			(0.020)	(0.022)		(0.026)	(0.069)
MAIN*RELAT	-	-	-	-	-0.035***	-	-
					(0.006)		
MAIN*LN(RELAT)	-	-	-	-	-	-0.194***	-0.153***
						(0.042)	(0.054)
loan characteristics							
COLLAT	-0.557***	-0.502***	-0.558***	-0.496***	-0.509***	-0.501***	-0.141
	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.135)
LN(DURATION)	-0.870***	-0.871***	-0.868***	-0.867***	-0.869***	-0.866***	-0.396***
	(0.056)	(0.056)	(0.056)	(0.056)	(0.056)	(0.056)	(0.100)
governance characteristics							
BVBA	-0.420**	-0.372**	-0.430**	-0.385**	-0.388**	-0.395**	-
	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)	(0.180)	
CV	-0.431*	-0.408*	-0.459*	-0.457*	-0.415**	-0.451**	-0.023
	(0.236)	(0.235)	(0.236)	(0.235)	(0.236)	(0.235)	(0.156)
NV	-1.248***	-1.206***	-1.264***	-1.229***	-1.219***	-1.234***	-0.812***
	(0.201)	(0.200)	(0.201)	(0.200)	(0.201)	(0.200)	(0.099)

Table 2 continued on next page

Table 2 (Continued)

Borrowing costs and the role of bank-firm relationships

Other							
Industry dummies	yes	yes	yes	Yes	yes	yes	yes
Year dummies	yes	yes	yes	Yes	yes	yes	yes
Product dummies	yes	yes	yes	Yes	yes	yes	yes
# obs	17776	17776	17776	17776	17776	17776	3334
Adjusted R^2	0.215	0.220	0.216	0.221	0.221	0.222	0.302

*, ** and *** = significant at 10%, 5% and 1% level, two-tailed. The definition of the variables can be found in Table 1. LN(RELAT) and LN(AGE) are the natural log of one plus the length of the financial relationship and one plus the age of the firm respectively. All regressions also include 4 dummies capturing the effect of the revisability of a loan, a dummy capturing whether the goal of the loan was the prepayment of a previous loan, as well as an intercept. Column (5) presents the regression results for those loans we have data about the age of the firm.

Table 3: The spread and the role of bank-firm relationships

The dependent variable is the spread over a government bond loan with the same repayment duration (SPREAD). Standard errors are reported in parentheses.

Variable	(1)	(1')	(2)	(2')	(3)	(4)	(5)
interest rate variables							
TERMSPREAD	0.210**	0.209**	0.217***	0.221***	0.202***	0.214***	0.186
	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.189)
firm characteristics							
SMALL	0.337*	0.345*	0.360**	0.387**	0.337*	0.366**	0.448**
	(0.185)	(0.184)	(0.185)	(0.184)	(0.184)	(0.184)	(0.209)
MEDIUM	-1.194***	-1.155***	-1.167***	-1.101***	-1.150***	-1.109***	-0.997***
	(0.233)	(0.232)	(0.232)	(0.232)	(0.232)	(0.232)	(0.261)
LARGE	-1.358***	-1.546***	-1.306***	-1.472***	-1.499***	-1.442***	-1.299***
	(0.437)	(0.436)	(0.437)	(0.436)	(0.436)	(0.436)	(0.449)
LN(AGE)	-	-	-	-	-	-	-0.073**
							(0.037)
information/relationship characteristics							
MAIN	-	-0.355***	-	-0.395***	-0.093*	-0.020	-
		(0.034)		(0.035)	(0.057)	(0.088)	
RELAT	0.010***	0.019***	-	-	0.037***	-	-
	(0.003)	(0.003)			(0.005)		
LN(RELAT)	-	-	0.092***	0.171***	-	0.241***	0.387***
			(0.020)	(0.022)		(0.026)	(0.060)
MAIN*RELAT	-	-	-	-	-0.035***	-	-
					(0.006)		
MAIN*LN(RELAT)	-	-	-	-	-	-0.194***	-0.151***
						(0.042)	(0.054)
loan characteristics							
COLLAT	-0.559***	-0.503***	-0.559***	-0.497***	-0.510***	-0.502***	-0.148*
	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.135)
LN(DURATION)	-1.076***	-1.075***	-1.074***	-1.072***	-1.074***	-1.071***	-0.521***
	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)	(0.042)	(0.077)
governance characteristics							
BVBA	-0.418**	-0.369**	-0.428**	-0.383**	-0.385**	-0.392**	-
	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)	
CV	-0.419*	-0.396*	-0.447*	-0.445*	-0.403*	-0.438**	-0.026
	(0.236)	(0.235)	(0.236)	(0.235)	(0.236)	(0.235)	(0.156)
NV	-1.247***	-1.205***	-1.262***	-1.228***	-1.219***	-1.233***	-0.816***
	(0.201)	(0.201)	(0.201)	(0.201)	(0.201)	(0.200)	(0.099)

Table 3 continued on next page

Table 3 (Continued)

The spread and the role of bank-firm relationships

Other							
Industry dummies	yes	yes	yes	Yes	yes	yes	yes
Year dummies	yes	yes	yes	Yes	yes	yes	yes
Product dummies	yes	yes	yes	Yes	yes	yes	yes
# obs	17776	17776	17776	17776	17776	17776	3334
Adjusted R^2	0.358	0.362	0.358	0.363	0.363	0.363	0.401

*, ** and *** = significant at 10%, 5% and 1% level, two-tailed. The definition of the variables can be found in Table 1. LN(RELAT) and LN(AGE) are the natural log of one plus the length of the financial relationship and one plus the age of the firm respectively. All regressions also include 4 dummies capturing the effect of the revisability of a loan, and a dummy capturing whether the goal of the loan was the prepayment of a previous loan, as well as an intercept. Column (5) presents the regression results for those loans we have data about the age of the firm.

Table 4: Pledging collateral and the role of bank-firm relationships

Dependent variable: Collateral was required to obtain loan or not (1/0) (COLLAT). Logit Regression Coefficients, Standard errors are reported in parentheses.

Variable	**(1)**	**(1')**	**(2)**	**(2')**	**(3)**	**(4)**	**(5)**
Firm characteristics							
SMALL	1.204**	1.277**	1.207**	1.250***	1.279*	1.249**	0.941*
	(0.528)	(0.538)	(0.529)	(0.537)	(0.539)	(0.538)	(0.540)
MEDIUM	0.632	0.668	0.636	0.642	0.671	0.642	0.635
	(0.579)	(0.589)	(0.579)	(0.588)	(0.589)	(0.588)	(0.613)
LARGE	-0.479	-0.093	-0.463	-0.153	-0.076	-0.148	-0.393
	(0.933)	(0.947)	(0.935)	(0.947)	(0.948)	(0.947)	(1.044)
LN(AGE)	-	-	-	-	-	-	-0.117
							(0.074)
Information/relationship characteristics							
MAIN	-	0.556***	-	0.584***	0.599***	0.607***	0.563**
		(0.087)		(0.090)	(0.131)	(0.189)	(0.294)
RELAT	0.005	-0.008	-	-	-0.004	-	-
	(0.008)	(0.008)			(0.012)		
LN(RELAT)	-	-	0.034	-0.083*	-	-0.077	-0.003
			(0.047)	(0.050)		(0.065)	(0.146)
MAIN*RELAT	-	-	-	-	-0.007	-	-
					(0.015)		
MAIN*LN(RELAT)	-	-	-	-	-	-0.013	-0.080
						(0.096)	(0.197)
Loan characteristics							
LN(SIZE)	0.602***	0.581***	0.603***	0.578***	0.582***	0.578***	0.336***
	(0.060)	(0.061)	(0.060)	(0.061)	(0.061)	(0.061)	(0.100)
Governance characteristics							
BVBA	-0.574	-0.709	-0.579	-0.702	-0.715	-0.704	-
	(0.526)	(0.536)	(0.527)	(0.536)	(0.537)	(0.536)	
CV	-0.448	-0.535	-0.456	-0.506	-0.537	-0.506	0.129
	(0.594)	(0.605)	(0.595)	(0.604)	(0.605)	(0.605)	(0.312)
NV	-0.881	-1.015*	-0.888	-1.000*	-1.020	-1.002*	-0.276
	(0.549)	(0.559)	(0.549)	(0.559)	(0.560)	(0.559)	(0.198)
# obs	17776	17776	17776	17776	17776	17776	3334
-2logL	4201	4160	4201	4158	4160	4158	1285
χ^2 covariates	16411	16873	16411	16454	16453	16454	2160

*, ** and *** = significant at 10%, 5% and 1% level, two-tailed. The definition of the variables can be found in Table 1. LN(RELAT) and LN(AGE) are the natural log of one plus the length of the financial relationship and one plus the age of the firm respectively. Each regression also includes 50 two-digit NACE industry dummies, 8 regional dummies, 2 year dummies, 4 dummies capturing the effect of the revisability of a loan, 8 product dummies, and a dummy capturing whether the goal of the loan was the prepayment of a previous loan, as well as an intercept. We could have estimated this logit regression jointly with the loan rate regressions in a Seemingly Unrelated Regression model. As the exogenous variables are almost the same in both equations, there would be little gain in jointly estimating those

equations (see also Berger and Udell (1995)). Column (5) presents the regression results for those loans we have data about the age of the firm.

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