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THE EFFECTS OF THE BANK-INTERNAL RATINGS ON THE LOAN MATURITY.

Abstract

The paper focuses on the effects of three different internal bank ratings – Risk-, Property- and Creditworthiness-Rating – on the loan maturity. We use a sample of about 5,000 loans given to sole proprietors and corporate borrowers by two German banks from January 2003 till July 2005. The estimation results for corporate borrowers are consistent with Diamond's (1991) predictions of non-monotonic relationship between ratings and maturity. The best rated and the worst rated loans tend to have shorter maturities than loans with an intermediate rating. However, our results for sole proprietors conflict with the predictions of Diamond and with the majority of the empirical literature. We find a negative association between ratings and maturity of the loans given to sole proprietors.

JEL: C25, D82, G20

Keywords: loan maturity, internal bank ratings, risk of default, creditworthiness.

1 Introduction

The role of internal ratings in commercial banking has recently received a considerable attention in financial literature. According to Basel Committee on Banking Supervision (Basel - II) borrowers' rating is a criterion for minimum capital requirements imposed on banks. The practice of assigning ratings in banking has expanded significantly over the last 10 years (Krahnen and Weber, 2001). The rational for this expansion lies in the willingness to diminish the impact of asymmetrical information and, therefore, to develop a better bank-client relationship.

Brunner, Krahnen and Weber (2000) emphasize the unique informational role of internal ratings. In comparison to corporate ratings provided by external agencies, like Standard & Poor or Moody, internal ratings give an informational advantage by providing non-public information about lenders. This information is based on hard factors taken from the client's balance sheets and, less frequently, also on soft information like the quality of a firm's management (Grunert, Norden and Weber, 2005). Any company specific information obtained later in the bank-client relationship is also incorporated into the internal rating (Weber, Krahnen and Voßmann, 1998). Furthermore, financial literature points out that internal ratings are adjusted more rapidly than public bond ratings when the general economic situation develops or the details of loan contract such as collateral or covenants change (English and Nelson, 1998). Public debt ratings are based on the long-term risk of default and, therefore, do not tend to change rapidly over a business cycle. In contrast, bank ratings take into account potential losses over a shorter perspective (Treacy and Carey, 2000).

The earliest investigations of internal bank ratings focus on methodology and experiences of deriving internal ratings in the banking lending (Brunner et al., 2000). Recent scientific interest has shifted toward the topics of interdependence between ratings and loan terms like interest rates, collateral and credit lines. Elsas, Krahnen, Rudolph and Weber (1999) show that internal risk ratings influence the price of a loan. However, there are only few studies exploring the relationship of internal borrowers' ratings and the loan maturity. Flannery (1986) and Diamond (1991) present alternative models that

connect the issues of debt terms and ratings theoretically. Flannery suggests an upward-sloping function of debt maturity with respect to risk rating, while Diamond predicts a non-monotonic relationship between maturity and rating of a debt. The few empirical studies on the link between borrowers' ratings and terms of lending also provide opposing evidences with respect to maturity. For example, findings of Barclay and Smith (1995), Saunders and Altman (1997) and Machauer and Weber (1998) are consistent with Diamond's model, while the results of Berger, Espinosa-Vega, Frame and Miller (2005) disagree with both Diamond's and Flannery's predictions.

The aim of this paper is to contribute to the ongoing discussion on the effects of internal risk ratings on the loan maturity. The empirical part of the paper builds on the credit file data of two German banks that contain information on new and restructured loans issued to business clients during 31 months (from January 2003 till July 2005). The data set provides in-depth information on bank-client relationship, including data on loan terms, client specific information and internal ratings. Our results show that the type of borrower matters for the link between ratings and maturity. The assigned rating figures affect the loan maturity of corporate borrowers and sole proprietors differently. In particular, we receive a non-monotonic relationship between loan maturity and ratings for corporate borrowers as predicted by Diamond (1991) and a monotone negative relationship for sole proprietors. Regardless of the mixed evidence on maturities of moderately rated loans, we find that both sole proprietors and corporations have the highest probability to get short-term loans if they have the worst ratings.

The paper proceeds as follows. In the next chapter we review the theoretical and empirical literature on internal ratings in banking. The second chapter presents our working hypotheses. The data are described in the third chapter. The regressions' results and their interpretation follow in the fourth chapter. Finally, the last chapter concludes.

2 How is debt maturity affected by borrower's rating?

Flannery (1986) presents theoretic background for a positive relationship between bor-

rowers' bond ratings and debt maturity. He suggests that riskier borrowers prefer long-term debt despite higher interest rates. Long-term, high-risk projects may face higher transaction costs in case of debt refinancing. Hence, high-risk firms tend to issue long-term debt, while firms with low-risk projects have better chances to issue new debt and choose short-term debt with lower interest rates.

An alternative model is presented by Diamond (1991). Low-risk borrowers issue long-term debt in order to signal their low probability of default. Firms, which are initially low-rated may simply face a refusal of long-term debt. At the same time, a company might finance a long-term project with short-term debt if it expects increasing profits and is able to pay back a loan when it matures, and then take a fresh one. Hence, not only riskier firms, but also low-risk firms may get short term credits. The intermediate risky firms issue long term credits in order to reduce the refinancing risk. Thus, in contrast to Flannery, Diamond argues that debt maturity is a non-monotonic function of the borrowers' risk rating. High-risk and low-risk firms issue short-term debt, while medium-risk firms contract long-term debt.

Guedes and Opler (1996) test the models of Diamond and Flannery on a large sample of public debt issues of the US corporations between 1982 and 1993. They find that firms with the best risk borrow on a long term and on a short term base, while medium-risky firms issue the longest possible debt in order to avoid the risk of high refinancing costs. Firms with the worst risk issue short term debt, which, according to the authors, is due to moral hazard problems. Hence, the study provides evidence on the non-monotonic relationship between the maturity of publicly issued debt and firms' rating as predicted by Diamond (1991). Barclay and Smith (1995) also find a non-monotonic effects of firms' bond rating on debt maturity investigating the US industrial corporations from 1974 to 1992. In particular, they show that lower-rated firms issue more long-term debt than higher-rated firms. However, small firms with the lowest credit standing have more short-term debt. Stohs and Mauer (1996) provide empirical support for Diamond's hypothesis by examining the maturity structure of entire debt obligations, including bank loans issued by 328 US firms from 1980 to 1989.

The main disadvantage of the above mentioned studies is that they do not distinguish between stock debt and bank loans. According to the economic literature the maturity structure of bank loans and the average maturity of public debt are different. Datta, Iskandar-Datta and Raman (2005) report that, on average, at least 61 per cent of debt matures in 3 and more years, and 43 per cent in 5 or more years. Johnson (2003) finds that about 46 per cent of public debt is due in more than 3 years. In contrast, empirical studies on bank loans report shorter maturities. Berger et al. (2005) find an average loan maturity of 1.5 year. One explanation of this phenomenon is that bank loans have lower issuing costs and show therefore a wider spectrum of maturities at the lower end. Firms usually approach banks if they need additional money to finance some short-term projects (e.g. for the purpose of a temporary increase in inventories or to purchase new equipment). Such loans may mature within few months, weeks or even days (e.g. overnight loans or evergreen credits with no fixed maturity). However, banks also offer medium-term loans that typically mature within 3 or 4 years, and long-term credits which are due in 5 and more years. In fact, those loans are quite common in the German banking system.

The obvious distinctions between bank loans and public debt require a separate examination of the loan maturity. Dennis, Nandy and Sharpe (2000) focus on the effects of ratings on maturity of bank loans. However, instead of using internal bank ratings they account for the borrowers' credit quality only indirectly by using three proxies: the borrower's profit, retained earnings and working capital. The results predict a non-monotonic relationship between borrowers' credit standing and loan maturity. Borrowers with intermediate credit standing have long term credits, while riskier and less-riskier firms borrow on a short term base. The authors also show a strong influence of firms' size on the loan maturity. Small firms generally have significantly shorter loan maturity than larger firms. In contrast, Berger et al. (2005) examine the relationship between loan maturity and internal bank ratings based on commercial loans' data of the US banks. The results coincide with both the predictions of Diamond and Flannery for the low-risk loans. This class of loans shows with 0.67 years the lowest maturity of all loans.

However, the results for medium-risk, high-risk and extremely high-risk loans disagree with Diamonds' findings. The respective maturities are 1.36, 1.58 and 1.67, predicting an up-ward relationship between risk and maturity which is consistent only with Flannery's model. The key question is whether the results received for loans of banks that are rooted in the market-based anglo-saxon financial system apply universally because the scope and extent of informational asymmetries depend on financial institutions. Accordingly, one might expect that loans made by German house-banks follow different rules with respect to the link between maturity and rating.

Our research is closely related to these papers examining the link between bank-internal ratings and loan maturity. We test the predictions of Diamond (1991) and Flannery (1986) in order to check the character of relationship between ratings and maturity. At the same time, our study differs from the previous research in three important ways. First, the paper contributes to the research on loan maturity by using unique and recent data of German banks. Second, we link the loan maturity to internal ratings that are assigned by the banks to each borrower, and employ three different kinds of internal ratings used by the banks simultaneously. The first rating is the general Risk-Rating that indicates borrowers' probability of default. The second rating – Creditworthiness-Rating – reflects borrowers' ability to pay back the borrowed money in full and on time. The third type of rating – Property-Rating – is assigned based on the value of borrowers' premises. Third, we test for joint rating effects.

3 The data set and descriptive statistics

3.1 Sampling

Based on a unique credit file data of two German banks we draw a sample of 4,767 fresh loans. The data contain information on duration of bank-client relationship, borrowers' type, loan values, loan maturity, collateral as well as three types of internal ratings assigned by the banks to each borrower. A loan is defined as fresh if the loan account enters the data set within the observation period. This definition comprises new loans

but also loans that are rearranged in the course of a restructuring of a client's debt. We exclude the initial month from our sample since we are unable to discriminate between existing and new loan accounts in the start-off month December 2002. Thus, our actual sample consists of loans entering the data set between January 2003 and July 2005.

In order to control for the firm-specific characteristics we divide the sample into two sub-samples dependent on borrowers' types. According to the German Commercial Registry we define two types of borrowers: corporations and sole proprietors. Sole proprietors have drawn 2,433 loans (Sample A), and 2,334 loans belong to corporate borrowers (Sample B). We differentiate between these two types because their legal status and, commonly, the firms' size is different, and therefore their contractual terms may be different too. Stohs and Mauer (1996) and Scherr and Hulburt (2001) are among those studies providing evidence that smaller firms issue more short-term debt. Our data do not provide information on firms' turnover. However, the distinguishing between sole proprietors and corporate borrowers helps to control for the firms' size. Sole proprietors generally run smaller businesses than corporations, so the annual turnover for them may be smaller.

3.2 Ratings' measures

There is a common agreement that internal bank ratings result from the aggregation of all client-related information obtained in the bank-client relationship. However, the empirical literature on the banking risk management usually distinguishes between borrowers' ratings and credit risk ratings. For example, Brunner et al. (2000) differentiate the borrowers' and the actual loan rating. The former rating indicates the probability of a borrower's default, while the latter takes into account the individually agreed loan collateral. Feldman (1997) defines loan rating as an estimate of a borrower's future loan performance. However, to the best of our knowledge none of the studies employs more than one internal rating in one model.

In our study we use three types of internal ratings that the banks providing our data use in their practice. The ratings are the Risk-Rating, the Creditworthiness-Rating

and the Property-Rating. Risk-Rating is a measure of the anticipated risk of a borrower's default in the sense of the borrowers' rating of Brunner et al. (2000). The Creditworthiness-Rating measures a borrower's creditworthiness, i.e. the anticipated ability of a borrower to repay the loan according to Feldman (1997). Property-Rating measures the credit standing of borrowers with respect to the value of premises, which can be used to cover the debt payment in case of default. The banks changed the scales of their rating measures over time. Therefore, a standardized rating scale from 1 to 3 has been created for each rating type to make the old and the new measures comparable. The matching matrices are presented in Table 1. In order to make the estimation process more convenient we generate a set of dummies for each kind of rating.

As three quality measures are available banks may allow for mutual compensation effects, e.g. a bad rating in the Risk-Rating may be partly offset by a better figure in the Creditworthiness-Rating. If such a mechanism exists, joint effects of the ratings are also relevant for the loan maturity. A high correlation between the Property-Rating and the Creditworthiness-Rating prevents us to check the joint effects of all three ratings. However, we combine the Risk-Rating and the Creditworthiness-Rating and create a set of dummies to indicate the combinations. Table 2 and Table 3 present a matrix of relative frequencies of loans with regard to each pair of combinations. It is notable that in our sample only few loans have a high Risk-Rating and at the same time a low Creditworthiness-Rating and vice versa. In the model specification we include only those combinations, which have relative high frequencies. The dummy indicating loans with the best Risk-Rating and the best Creditworthiness is the base category.

3.3 Variables and Descriptive Statistics

An overview of the descriptive statistics is given in Table 4. The means and standard errors of the variables used in the analysis are computed for each sub-sample separately. Our dependent variable *Maturity* is a binary variable taking on the value of 0 for loans that mature within 5 years, and taking on the value of 1 when a loan matures more than in 5 years. The descriptive statistics show that 21 per cent of all loans given to

sole proprietors and 25 per cent of loans given to corporate borrowers mature in more than in 5 years.

The structure of the loan portfolio of sole proprietors and corporations with respect to ratings is different. With respect to the Risk-Rating the loans with the highest grade are the largest group in both samples. However, the fraction of the best rated loans given to sole proprietors is higher when compared to the best rated loans given to corporate borrowers. The loans with moderate risk present about one quarter and one third of the two samples, respectively. About one third of the loans in the sample of sole proprietors and about 29 percent in the sample of corporate borrowers are assigned to the highest risk group. With respect to Creditworthiness-Rating the fraction of the best-rated loans is smaller than in case of Risk-Rating. It consists of about one quarter of the loans in each sample. The biggest group in both samples present the loans with moderate creditworthiness, while the fraction of the worst-rated loans takes about one third of all loans.

Property-Rating is assigned only to about one third of all loans. The small fraction can be attributed to the fact that only in few cases borrower's property can be used to cover its debt. About one quarter of the loans in both samples has the best property standing, while the loans with moderate rating present the largest group. In general, our sample has a significantly smaller fraction of bad-rated loans compared to other empirical studies, such as Berger et al. (2005) and English and Nelson (1998).

We control for three contract terms: collateral, commitment and loan value. The dummy variable *Collateral* equals 1 if a loan is secured and 0 otherwise. Empirical literature provides evidence that collateral is used to signal the quality of a borrower and, therefore, can reduce credit rationing under asymmetric information and moral hazard problems (Chan and Thakor, 1987). In our sample, a larger share of the loans is collateralized by sole proprietors (95 per cent) as compared to corporate borrowers (78 per cent). The variable *Loanvalue* indicates the amount of the loan measured in thousand Euro. Sole proprietors have on average smaller loans than corporate borrowers. We also control for the duration of bank-client relationship, because as relationship lasts longer

bank may get additional information about a borrower, which reduces the informational asymmetry. This may reduce the risk of credit rationing associated with moral hazard problems (see Peterson and Rajan (1994) and Boot and Thakor (1994)). The variable *Relationship* is a measure of the duration of bank-client relationship in months. In our sample relationship between the banks and sole proprietors before the observed loans were issued had been lasting about 160 months on average, while relationship with corporate borrowers - about 121 months. Empirical literature provides controversial evidence on the bank-client relationship. Peterson and Rajan (1994) argue that closer ties with credit institutions increase the availability of financing, while Ortiz-Molina and Penas (2004) find no relation between loan maturities and firm-bank relationships.

We are not able to control for the effects of commitment because of a very low variability of that factor in our sample. In fact, 99 per cent of sole proprietors and 98 per cent of corporate borrowers in our sample draw loans under commitment. The rate is significantly higher than those observed in the US bank lending practice, where 80 per cent of loans are made under commitment (Shockley and Thakor, 1997). In order to control for time-specific effects our econometric model also includes the time dummy variables that indicate the year in which a loan was given. The dummy for the year 2003 is the base category.

4 Empirical Implementation and Results

4.1 Model specification

At first, we test the predictions of Flannery and Diamond separately for each rating. Then, we examine joint effects of the ratings in order to check what kind of information about borrowers may have the highest influence on the maturity choice. We model separately the effects of the Risk-, Creditworthiness- and Property-Rating using a similar econometric specification for each of the three models, which can be summarized as follows:

$$P_i = \lambda(\alpha_i + \sum_{j=1}^{2} R_{ji}\beta_j + \sum_{z=1}^{Z} V_{zi}\gamma_z + u_i),$$

where P_i stays for the probability that loan i matures later than in 5 years. λ is a cumulative density function of the logistic distribution. R_{ji} are the rating-dummies. Since each of the ratings has three levels, the model includes two dummies indicating the intermediately and the worst rated loans. The best rated loans are taken as the base category. Thus, $j = 1, 2$ and R_{ij} take on the values 1 or zero dependent on the rating of a ith loan. V_{zi}, $z \in [1, Z]$ are the control variables such as loan value, duration of the relationship between firm and bank, collateral and time dummies. β_j and γ_z are the respective coefficients. In order to estimate joint effect of the Risk- and Creditworthiness-Rating we employ a set of dummies indicating particular combinations of the two ratings. The specification is as follows:

$$P_i = \lambda(\alpha_i + \sum_{j=1}^{k} C_{ji}\beta_j + \sum_{z=1}^{Z} V_{zi}\gamma_z + u_i),$$

where C_{ji} represents a combination of two ratings with $j \in [1, k]$, and k equals the number of all possible combinations of the two ratings minus the combination of the highest Risk- and Creditworthiness-Rating, which is the base category. For each one of Panel A and B we run separately 4 regressions testing the hypothesis that the probability of long-term maturity will react to a change of the ratings. The regressions use logs of independent variables, but we report only their marginal effects.

4.2 Effects on maturities of loans given to sole proprietors

Table 5 shows the marginal effects of the independent variables on the loan maturity for sole proprietors. To illustrate the quantitative importance of each effect in the regressions, we also report in the bottom line of the Table the predicted probability of observing long-term maturity for a reference loan, i.e. a loan with the best rating, while all variables are taken at their means. The predicted probabilities in Table 5 and 6 show that ceteris paribus sole proprietors are more likely to receive long term debt than corporations as they get the best ratings. Our data also suggest that moderately rated loans of sole proprietors have a 11 per cent lower probability to mature in a long-term

perspective than the best rated loans. Loans with the highest risk have an even 21 per cent lower probability to mature in more than 5 years than the best rated loans. Thus, the probability of observing a long-term maturity for a sole proprietor decreases as the anticipated risk of default increases.

Our second regression estimates the effects of the borrowers credit standing. The results predict a negative relationship between the Creditworthiness-Rating and loan maturity which is similar to the effect of the Risk-Rating. In particular the probability of observing long-term maturity is by about 2 per cent lower for loans with a medium rating as compared to the best rated loans. However, the effect is statistically not significant. Thus, we can not reject the zero hypothesis. In contrast, our result for the lowest rated loans provide a statistically significant evidence on a negative relationship. In fact, this group of loans has the highest probability to mature in short term - by 17 percent lower as compared to the best rated loans.

Our predictions on Property-Rating follow the pattern of the Creditworthiness-Rating. There is a negative effect on the probability of long-term maturity for medium-rated loans. However, the coefficient is statistically not significant. The probability of observing shorter maturity for low-rated premises is by about 30 per cent higher than for the best rated premises. Hence, a low trust in the value of the borrower's premises that can be taken over in case of default induces a shorter loan maturity. Thus, our results imply in general a negative relationship between ratings and maturity of loans given to sole proprietors.

Collateral has a positive effect in all three regressions suggesting that secured loans mature later than those not-secured. The result conflicts with Berger et al. (2005), who predict a negative effect of collateral on maturity arguing that banks may require collateral especially from low rated firms because of moral hazard or adverse selection problems. In contrast, our results support the hypothesis that collateral is used to signal the quality of borrower and, therefore, can reduce credit rationing under asymmetric information and moral hazard problems as predicted by (Chan and Thakor, 1987). This is also consistent with the theoretical implication of collateral as a signaling device

suggested by Bester (1985) and Besanko and Thakor (1987). Moreover the possibility to seize collateral reduces the loss given default for the bank. Thus it is to be expected that banks act less strict with respect to maturity if collateral can be pledged. The duration of bank-client relationship has a statistically significant positive effect on the dependent variables. However, the practical magnitude of the relationship is very small. We find also evidence that probability to get a long-term loan increases as the loan value grows.

The results for joint effects of the Risk- and the Creditworthiness-Rating are generally consistent with those obtained in separate regressions (see Table 7). The combination of the best figures in both ratings is the base category. The sign across rating dummies is negative, suggesting that loans are more likely to mature in short-term as their rating in both categories gets worse. In general, the estimation results for sole proprietors predict a downward relationship between the loan maturity and borrowers' risk of default, credit standing and property value. Loans are more likely to mature in a shorter period as ratings become worse.

4.2.1 Effects on maturities of loans given to corporations

The results of the regressions for corporate borrowers support our assumption that ratings have different effects on maturity if borrowers are of different types (see Table 6). Firstly, the predicted probabilities of observing a long-term loan among corporative clients with the best ratings is significantly lower than for sole proprietors. Secondly, there is a non-monotonic relationship between each of the ratings and maturity. As Risk-, Creditworthiness- or Property-Rating become worse – from the best class to the moderate class – the probability of longer maturity increases by about 17, 20 and 31 per cent, respectively. In contrast, the worst rated loans are more likely to be short-termed. So borrowers with the highest risk of default are by about 18 per cent more likely to get short-term loans than borrowers with the lowest risk. Poor creditworthiness reduces the probability of long-term loans by about 8 per cent, while a low Property-Rating decreases the probability by 24 per cent.

Collateral and duration of bank-client relationship have a statistically significant

positive effect on maturity across all tree regressions, albeit the practically magnitude of the later factor is very small. These findings coincide with the results obtained for sample A. The increase in loan amount is associated with higher probability of long-term maturity when we control for the Risk- and the Creditworthiness-Rating. However, for the model that includes the Property-Rating as explanatory variable we get an unexpected negative sign for the *ln(Loanvalue)*.

The joint effects of ratings for corporate borrowers coincide with those obtained for separate ratings. Borrowers with medium figures in risk of default and credit standing are more likely to get long-term loans as compared to the rest, while the loans with the worst Risk- and Creditworthiness-Rating tend to mature in a shorter perspective than the best rated loans. Furthermore, the results reveal an interesting fact about the magnitude of information concerning a borrower's risk of default and his creditworthiness. Loans with the best Risk-Rating are more likely to have long-term maturity as the Creditworthiness-Rating becomes worse, suggesting that borrowers with excellent credit solvency have the best chances to get short-term loans. In general, the data analysis of loans given to corporate borrowers suggests a non-monotonic relationship between ratings and maturity.[1]

5 Conclusion

This paper explores the link between internal bank ratings and loan maturity. Using a large sample of fresh loans issued by two German banks we test the theoretical predictions of Flannery (1986) and Diamond (1991). In the test we employ data on three types of internal ratings, on contract terms, on firm-specific characteristics and on the bank-client relationship. Our results for corporate borrowers are consistent with predictions of Diamond. Ceteris paribus, high-rated borrowers and low-rated borrowers tend to have short-term loans, while loans given to medium-rated borrowers tend to mature

[1]We experimented with samples for both corporate borrowers and sole proprietors that exclude real estate firms. However, as the results for the reduced samples are in line with those obtained for the complete sample, we forgo the presentation of these results.

in longer term. The effect has the same pattern across all three types of ratings. In contrast, our results for sole proprietors support the predictions of Diamond only partially. Ceteris paribus, maturity tends to be shorter when the ratings get worse. Thus, our data evidence that ratings' effects on loan maturities differ with the type of borrowers.

While being generally consistent with the results obtained for separate ratings, the analysis of the ratings' joint effects reveals the fact, that corporate borrowers' credit standing is more determinative for the loan maturity than their risk of default. In fact, loans with the best Creditworthiness-Rating tend to mature in shorter term then those with moderate credit standing regardless of the respective Risk-Rating. This constellation suggests that there is no mutual compensation of rating figures in different categories. The highest probability to get long-term loans have the borrowers with both, a moderate default risk and credit solvency, while those with the highest risk and the poorest creditworthiness have the highest likelihood to get short-term loans.

In general, the maturity policy of the German banks we investigate is more geared by the rating numbers than by the relationship duration. In the wake of Basel II it seems as if German house-banks reorient their business model towards the more arms-length lending policy of US-banks. We believe that a detailed comparative analysis of US bank data and German bank data would shed more light on the important question of whether there is convergence of both business models.

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Appendix

Table 1: Standardization of ratings

	Standardized Rating		Rating (old) [2]		Rating (new) [3]
1	High rating (Low risk)	G	Fully-secured	1 (A)	Normal Business
		A	Very low risk	1 (A+)	Normal Business
		B	Low Risk	1 (A-)	Normal Business
				1 (AA)	Normal Business
				1 (AA+)	Normal Business
				1 (AA-)	Normal Business
				1 (AAA)	Normal Business
				1 (AAAA)	Normal Business
				2	Normal Business
				3	Normal Business
				4	Normal Business
				5	Normal Business
				6	Normal Business
2	Medium rating (Medium Risk)	C	Medium Risk	7	Normal Business
				8	Normal Business
				9	Normal Business
				10	Normal Business
				11	Normal Business
				12	Normal Business
3	Low rating (High Risk)	D	High Risk	13	Conspicuous Engagements
		E	Very high Risk	14	Conspicuous Engagements
				15	Conspicuous Engagements
				16	Bad-debt reserve built up

[2]The scale with alphabetic notation was used by the banks till the August 2004.

[3]Currently used scale.

Table 2: Matrix of Ratings Interactions for sole proprietors

	Creditworthiness1	Creditworthiness2	Creditworthiness3	Total
Risk1	25.24	16.89	1.27	43.40
Risk2	0.86	20.22	3.62	24.70
Risk3	0.53	0.66	30.70	31.89
Total	26.63	37.77	35.59	100.00

Table 3: Matrix of Ratings Interactions for corporations

	Creditworthiness1	Creditworthiness2	Creditworthiness3	Total
Risk1	22.54	12.68	3.00	38.22
Risk2	1.59	27.85	3.81	33.25
Risk3	0.56	1.59	26.39	28.53
Total	24.68	42.12	33.20	100.00

Table 4: Variables and Descriptive statistics for the sample of sole proprietors and corporate borrowers

		Panel A N = 2433		Panel B N = 2334	
Variables	Description	Mean	Std.Dev	Mean	Std.Dev
Maturity	= 1 if loan matures in more than 5 years	0.21	0.40	0.25	0.43
Risk1	= 1 if Risk-Rating takes on the value 1 or 2	0.43	0.50	0.38	0.49
Risk2	= 1 if Risk-Rating takes on the value 3	0.25	0.43	0.33	0.47
Risk3	= 1 if Risk-Rating takes on the value 4 or 5	0.32	0.47	0.29	0.45
Creditworthiness1	= 1 if Creditworthiness-Rating takes on the value 1 or 2	0.27	0.44	0.25	0.43
Creditworthiness2	= 1 if Creditworthiness-Rating takes on the value 3	0.38	0.48	0.42	0.49
Creditworthiness3	= 1 if Creditworthiness-Rating takes on the value 4 or 5	0.36	0.48	0.33	0.47
Property1	= 1 if Property-Rating takes on the value 1 or 2	0.09	0.28	0.04	0.19
Property2	= 1 if Property-Rating takes on the value 3	0.14	0.35	0.19	0.39
Property3	= 1 if Property-Rating takes on the value 4 or 5	0.11	0.31	0.09	0.28
Collateral	= 1 if loan is collateralized	0.95	0.22	0.78	0.41
Commitment	= 1 if a loan is made under commitment	0.99	0.08	0.98	0.13
Loanvalue	the total amount of a loan, in + 1,000	3688.16	11124.73	13490.10	40019.41
Relationship	the duration of bank-client relationship, in months	159.42	74.54	120.90	57.28

Table 5: Marginal effects on maturity for sole proprietors (Sample A)

	(1)	(2)	(3)
Collateral (d)	0.1271*	0.1399**	0.2921*
	(0.0563)	(0.0466)	(0.1320)
Relationship	0.0007***	0.0007***	0.0013***
	(0.0002)	(0.0001)	(0.0003)
ln(Loanvalue)	0.0462***	0.0411***	0.0182
	(0.0076)	(0.0072)	(0.0148)
Risk2 (d)	-0.1073***		
	(0.0218)		
Risk3 (d)	-0.2111***		
	(0.0174)		
Creditworthiness2 (d)		-0.0187	
		(0.0231)	
Creditworthiness3 (d)		-0.1702***	
		(0.0202)	
Property2 (d)			-0.0361
			(0.0484)
Property3 (d)			-0.3020***
			(0.0448)
χ^2	202.709	169.367	71.379
p-value	0.000	0.000	0.000
Log-Likelihood	-1106	-1125	-481
R^2	0.102	0.087	0.092
N	2417	2417	802
P(Maturity)(for the highest Rating)	0.29	0.26	0.48

Note1: marginal effects for discrete change of dummy variables from 0 to 1;
Note2: *significant at 10%; **significant at 5%; ***significant at 1%.

Table 6: Marginal effects on maturity for corporations (Sample B)

	(1)	(2)	(3)
Collateral (d)	0.1764***	0.1288***	0.2811***
	(0.0201)	(0.0186)	(0.0666)
Relationship	0.0013***	0.0011***	0.0025***
	(0.0002)	(0.0002)	(0.0006)
ln(Loanvalue)	0.0301***	0.0323***	-0.0280*
	(0.0054)	(0.0053)	(0.0119)
Risk2 (d)	0.1728***		
	(0.0235)		
Risk3 (d)	-0.1771***		
	(0.0170)		
Creditworthiness2 (d)		0.1967***	
		(0.0242)	
Creditworthiness3 (d)		-0.0756***	
		(0.0202)	
Property2 (d)			0.3064***
			(0.0752)
Property3 (d)			-0.2414***
			(0.0724)
χ^2	300.202	310.658	152.402
p-value	0.000	0.000	0.000
Log-Likelihood	-1020	-1059	-346
R^2	0.209	0.179	0.310
N	2291	2291	728
P(Maturity)(for the highest Rating)	0.22	0.17	0.32

Note1: marginal effects for discrete change of dummy variables from 0 to 1;
Note2: *significant at 10%; **significant at 5%; ***significant at 1%.

Table 7: Joint effects of ratings on maturity

	Sample A	Sample B
Collateral (d)	0.0982	0.1329***
	(0.0617)	(0.0198)
Relationship	0.0007***	0.0011***
	(0.0002)	(0.0002)
ln(Loanvalue)	0.0464***	0.0156**
	(0.0078)	(0.0051)
Risk1*Creditworthiness2 (d)	0.0467	0.1363***
	(0.0304)	(0.0334)
Risk2*Creditworthiness2 (d)	-0.0900***	0.2495***
	(0.0264)	(0.0277)
Risk3*Creditworthiness3 (d)	-0.1969***	-0.1296***
	(0.0213)	(0.0204)
χ^2	198.513	263.240
p-value	0.000	0.000
Log-Likelihood	-1037	-915
R^2	0.107	0.210
N	2248	2049
P(Maturity) (for the highest rating)	0.28	0.17

Note1: marginal effects for discrete change of dummy variables from 0 to 1;
Note2: *significant at 10%; **significant at 5%; ***significant at 1%.