Why do specialized banks succeed? An empirical investigation of the credit business of cooperative and savings banks*

Abstract

There is empirical evidence that specialization in lending leads on average to lower loan loss provisions and a higher profitability. In this paper we examine whether a better monitoring quality and/or lending to industries with lower loss rates are able to explain these results. The main results are as follows: Specialized banks show a lower ratio of actual to expected losses, i.e. they possess a higher monitoring quality than diversified banks. Specialized cooperative banks particularly lend to low-risk industries. The level of specialization has a stronger explanatory content with respect to the monitoring quality than monitoring expenses.

Key Words:
bank lending, loan portfolio, diversification, expected loss, savings banks, cooperative banks.

JEL Classification: G11, G21.

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Contents

1 Introduction

Should banks specialize or diversify in lending? Diversification means reducing the correlations between the loss processes of the borrowers. The seminal works by Markowitz (1952) and Diamond (1996) establish the relationship between a higher diversification rate and lower unexpected losses. The papers by Heitfield et al. (2005), Düllmann and Masschelein (2007), and Norden and Szerencses (2005) examine the impact of concentration in lending on the portfolio risk. They assume that credit risk is exogenous, i.e. they do not consider that banks have different screening and monitoring skills and thereby influence on the credit loss distribution. It seems reasonable to presume that banks which specialize in certain industries can draw on better industry expertise and monitoring abilities respectively. Winton (1999) includes monitoring incentives and recommends diversification strategies solely for banks with medium high portfolio risk. In the work by Hellwig (1998) whose model is a further development of that by Diamond (1996) it is shown that it could be useful under certain circumstances to concentrate on a few big projects in order to save monitoring costs.

Recent empirical works have pointed out the relevance of considering specialization benefits. One of the main empirical findings is that a higher specialization level in lending is connected with a better profit situation of the bank.[1] Kamp (2006) and Hayden et al. (2007) observed a positive relationship between the specialization level and the return on assets and return on equity respectively for the German banking market. The same result is stated by Acharya et al. (2006) for the Italian and Elyasiani and Deng (2004) for the American banking market. Furthermore, it is noteworthy that specialized banks show lower loan provision rates, which refers to the empirical results by Kamp (2006) and Acharya et al. (2006).

An empirical well-founded causal research which aspires to clarify why specialized banks have on average higher return rates and lower loan loss provision rates is - to the best of our knowledge - still outstanding. It is not clear

- whether the lower loan loss provisions and higher return rates of specialized banks could be explained by better monitoring,
- whether specialized banks primarily lend to industries with lower loss rates or
- whether specialized banks have larger market shares in their customer industries and therefore higher market power which could be useful to retain good borrowers or to stipulate more collaterals.

There might also be a strong connection between specialization and successful relationship banking. [2] Furthermore, specialized banks may exhibit advantages in efficiency.

[1] Here and hereafter specialization in lending refers to specialization in certain industries.
[2] For an overview about relationship banking see Boot (2000).

In this paper we will address the first three questions. We conduct an empirical analysis based on the credit register of the German National Bank which contains lending data by industries of all German banks and on balance sheet data as well as insolvency data. The investigation period is from 1995 to 2005. We restrict to the primary institutions of the cooperative and savings banking group because these banks are predominantly engaged in traditional lending business and show the highest level of homogeneity among themselves.[3] Even though the results of this paper do not endorse a decision either for or against specialization it aims to contribute to a deeper understanding about specialization effects and their mechanisms. To shed light on the black box specialization benefits seems to be sensible given the widespread theoretical and empirical literature about diversification benefits.

Particularly, we want to analyze whether specialized banks are superior in screening and monitoring. Superior screening leads to a selection of borrowers with lower default risk in the respective industry[4] or to a charge of a higher collateral rate in case of borrowers with higher default risk. Superior monitoring implies the effective usage of control opportunities which possibly prevent the default of a borrower or reduce the loss in case of a default[5] or charging further collaterals in case of a probable default. [6] As we cannot clearly differ between screening and monitoring abilities in our empirical analysis and also assume a strong positive correlation between these two activities, we subsume both aspects under the term monitoring.

Furthermore, higher market shares may possibly be of use for the competition for good borrowers or for the claim of more collaterals. In order to verify these relationships we will set the actual loan losses in proportion to the expected loan losses based on the industry disposition in corporate lending. We will examine whether this ratio is influenced by the specialization level and/or the market share. If specialized banks mainly concentrated on industries with on average lower loss rates this would also reason lower loan loss provisions rates. To clarify this circumstance we analyze whether the expected (unconditional) loss rate[7] based on the industry disposition depends on the specialization level.

In the work by Coleman et al. (2006) a proxy for the monitoring efforts of a bank is developed which basically represents the personnel expense rate for monitoring activities. The specialization level of a bank is not considered in this context. We will integrate a slightly modified proxy in our examinations. We aim to verify whether the monitoring efforts are sufficient to explain the monitoring quality or whether the consideration of the specializa-

[3]Further motivation for the restriction can be found in section 2.

[4]Doubtless, loans can also be lent to more risky borrowers for a reasonable risk-adjusted price. However, better screening activities effect by reducing adverse selection that - for an identical attitude towards risk - less risky borrowers are selected and a better risk-return-rate is achieved. See Jankowitsch et al. (2007).

[5]Better monitoring may prevent a borrower from risk shifting.

[6]Potentially, a superior workout may also cause a lower LGD.

[7]Unlike the term LGD the term loss rate used in this paper is not conditioned by default, i.e. beside the LGD the default rate (PD) is considered.

tion level is a relevant information.

The main results of the paper are: Specialized banks on average show a lower ratio of actual to expected losses, i.e. they possess a higher monitoring quality than diversified banks. Specialized cooperative banks particularly lend to low-risk industries. Furthermore, the level of specialization has a stronger explanatory content with respect to the monitoring quality than monitoring expenses.

The remainder of the paper is organized as follows. In section 2 we introduce our data sources and the relevant variables. Section 3 deals with the presentation of the analysis concept. In section 4 we present and interpret the empirical results. The paper ends with some conclusions (section 5).

2 Data

2.1 Data sources

We restrain our analysis on the primary institutions of the savings and the cooperative banking group. These banks are predominantly engaged in traditional lending business and show the highest level of homogeneity among themselves.[8] Furthermore, savings and cooperative banks constitute 84% (89%) of all German banks in 2005 (1995). Our analysis is based on annual data from 1995 until 2005, i.e. the investigation period is 11 years. In 1995 the analysis includes 1655 cooperative banks and 533 savings banks. In 2005 the number of considered cooperative and savings banks has diminished - mainly due to mergers - to 1282 and 457 respectively.

In the quarter-annual German credit register the German National Bank records the loan exposures of each German bank in corporate banking differentiated by 23 industries. The classification orientates on the industry classification of the Federal Statistical Office and the NACE-Code respectively. Additionally, retail loans differentiated in real estate and non real estate loans have to be reported by the banks. Foreign loans are not considered as well as off-the-balance-sheet credit transactions. However, these restrictions are not extremely harmful because of restraining on cooperative and savings banks which are not active players in these business segments in the most cases. This data is fundamental for the calculation of the specialization measures and the expected loss. Based on this data, the market shares of the banks in each industry can also be evaluated.

The second relevant data source is the Bankaufsichtliche Informationssystem (BAKIS). The data which is collected by the German National Bank and the German Federal Fi-

[8] See Hackethal (2004).

nancial Supervisory Authority includes annual balance sheet, profit and loss data of all German banks and annual quantitative reports by auditors. Apart from control variables, for example total assets or equity ratio, we can approximate the actual loan losses.

For the calculation of the expected loan losses we also resort to statistics on insolvencies and number of firms liable to tax on sales by the Federal Statistical Office. The classification by industries is at least as detailed as the one in the credit register. This allows for mapping among the 23 industries. The insolvency ratio in each industry is calculated as the number of insolvencies divided by the number of firms liable to tax on sales.[9]

2.2 Basic variables

Apart from the definition of the specialization level, which we discuss in the next section, it is necessary to introduce further relevant variables for the empirical investigation. However, at first we want to introduce the notation which is relevant for subsequent definitions. We write $X_{(b,i,t)}$ for the loan amount of the bank b in industry i and $x_{(b,i,t)}$ for the proportion of industry i as a share of the corporate loans of bank b at time t. $X_{(b,t)} := \sum_{i=1}^{23} X_{(b,i,t)}$ stands for the sum of the corporate loan amounts of bank b at time t. In addition to the nationally aggregated loan amounts we also determine loan amounts on a federal state or regional level. Each bank b is allocated to a federal state s_b and a region[10] o_b according to its headquarters. We define $X_{(i,t)}^{nation}$, $X_{(i,t)}^{state_b}$ and $X_{(i,t)}^{region_b}$ respectively as the sum of the loan amounts in the industry i at time t on the national level, the level of the state and the level of the region respectively where the headquarter of bank b is located.[11] $x_{(\cdot,\cdot)}^{\cdot}$ indicates the corresponding proportion.

Key variables are the expected and the actual loan losses. We note that the expected loss rate does not stand for the loss rate given default, but for the unconditional loss rate, which includes the probability of default (PD) beside the LGD. In order to determine the expected losses we use the credit register and the insolvency statistics. Strictly speaking, we calculate the losses (EL) and the loss rates (ELR) respectively which can be expected on average based on the industry allocation of each bank. We set

$$EL_{(b,t)} := \sum_{i=1}^{23} X_{(b,i,t)} \cdot IR_{(i,t)} \cdot f_t^{state_b} \tag{1}$$

[9] Though there are inaccuracies for certain industries, e.g. for agriculture and forestry, using the number of firms liable to tax on sales is a common way to approximate the number of companies in Germany due to the lack of an exhaustive German business register.

[10] The banks are assigned to 182 different regions in total. According to Koetter and Wedow (2006) local savings and cooperative banks grant on average 80 percent of their loan portfolio to customers within these regions.

[11] For the calculation of $X_{(i,t)}^{state_b}$ we exclude big commercial banks and private mortgage banks because these banks have a business district exceeding the corresponding federal state. For the calculation of $X_{(i,t)}^{region_b}$ we merely include cooperative, savings, and regional banks.

as the expected losses of bank b at time t where $IR_{(i,t)}$ denotes the average insolvency rate of the industry i in Germany at time t. $f_t^{state_b}$ is an adjustment factor for the state in which the bank b operates. It is calculated as the ratio of the average insolvency rate in the corresponding state at time t to the average insolvency rate in Germany at time t. This refinement seems to be reasonable as savings and cooperative banks have a regional business district. The LGD is implicitly assumed as 100%.[12] The expected loss rate of the corporate loans (ELR^C) is computed as the ratio of the expected loss to the total corporate loan amount.[13]

The term expected loss rate has to be used carefully. As the industry is considered as the key risk factor for the PD and the insolvency rates indicate the defaulted proportion of each industry, ELQ is a reasonable measure of the loss rate, which a bank with corresponding industry allocation should show on average. We interpret the ex post knowledge about the insolvency rate of an industry as the ex ante expected default rate of an industry - perfect prediction assumed.

To approximate the actual loss rates which will be related to the expected loss rates we use the following two proxies:[14]

- Rate of distressed loans (LR^{dis}):[15]

$$\frac{\text{Nominal amount of audited distressed loans}}{\text{Loan amount}}$$

- Failure rate (LR^{fai}):

$$\frac{(\text{Consumption of specific loan provisions} + \text{Direct write-offs on loans})}{\text{Loan amount}}$$

LR^{dis} does not consider the loss rate given default unlike LR^{fai}. This is advantageous w.r.t.

[12] The expected loss of each industry is therefore calculated as $EAD \cdot PD$, where EAD corresponds to the loan amount and the PD corresponds to the insolvency rate.

[13] For alternative examinations to which we will refer later in the margin we use three further variants of the expected loss rate:

- ELR^{B_1}: Apart from the corporate loans interbank loans are considered. Their expected loss rates are set to 0.
- ELR^{B_2}: Apart from the corporate loans interbank loans are considered. Their expected loss rates are set to the insolvency rates of financial institutions.
- ELR^{R}: As extension of ELR^{B_2} retail loans are also considered. Expected loss rates are set to 1.5% for non real estate loans and to 0.5% for real estate loans. The values follow the values in Basel Committee on Banking Supervision (2003) and Basel Committee on Banking Supervision (2006). For the real estate loans we additionally applied a deduction of 50% because of the low LGD.

[14] In order to simplify the notation we do not subscript for time and bank.

[15] The audited distressed loans comprise specific doubtful loans and loans with increased latent risk. An alternative would be to use the audited loans as denominator. However, the risk orientated audit implies that the portfolio of audited loans particularly contains the critical loan engagements.

our analysis because we assess the expected loss rate based on the assumption that the LGD is 100%. However, this rate is not temporally related to default events in a distinct way. Thus it seems to be reasonable to additionally revert to LR^{fai} as a rate which leaves less leeway to the bank.[16] We introduce the variable unsecured portion (unsec) in order to reflect different LGDs among the banks. This variable represents the unsecured portion in case of audited specific doubtful loans. As we calculate the expected loss rate solely based on the corporate loans[17] we control for the share of retail loans (retail) and the share of bank loans (bankloan), which are calculated as ratio of the corresponding loan volume to the total loan volume.[18]

In order to measure the monitoring quality we compare the actual loss rate with the expected loss rate, explicitly said we define

$$RATIO_{(b,t)}^{(dis \text{ or } fai)} = \frac{LR_{(b,t)}^{(dis \text{ or } fai)}}{ELR_{(b,t)}},$$

i.e. $\mathrm{RATIO}_{(b,t)}^{dis}$ denotes the ratio of LR^{dis} to the expected loss rate and $\mathrm{RATIO}_{(b,t)}^{fai}$ denotes the ratio of LR^{fai} to the expected loss rate for the bank b at time t. A comparatively low RATIO implies that a bank selects and monitors borrowers in their customer industries in a comparatively better way. Therefore the RATIO is used as a proxy for the monitoring quality of a bank. The lower the RATIO the higher the monitoring quality is.[19]

The average market share (ms) which can be attributed to a savings or cooperative bank in its business district is defined as

$$ms_{(b,t)} := \sum_{i=1}^{23} ms_{(b,i,t)} \cdot x_{(b,i,t)} \tag{2}$$

for the bank b at time t with

$$ms_{(b,i,t)} := \frac{X_{(b,i,t)}}{X_{(i,t)}^{region_b}} \tag{3}$$

as the portion of the bank's loan volume in industry i as a share of the total loan volume in the region in industry i at time t. The variable ms therefore considers the market shares

[16] Further reasonable and in additional examinations used variables are the appropriation rate (ratio of net loan loss provisions appropriation to net write-offs over loan amount) or the loan loss provisions ratio. However, for both variables the same critical point (huge leeway for the bank) as for the rate of distressed loans is valid.

[17] We incorporate expected loss rates for retail and interbank loans in alternative examinations we mention in the margin of this paper.

[18] It is to note that retail loans just comprise loans to employed persons in contrast to the definition by Basel II.

[19] We assume that there is no systematic difference between the risk preference of specialized and diversified banks. Investigations concerning the interest rates in lending confirm this assumption. Corresponding results will be provided by the authors on request.

	Savings banks		Cooperative banks		Both banking groups	
	Mean	Median	Mean	Median	p5	p95
Total assets in mill. €	617	227	296	154	31	2350
Return on assets	0.26%	0.25%	0.28%	0.27%	0.08%	0.47%
Equity ratio	5.02%	4.87%	5.25%	5.08%	3.49%	6.93%
Bank loan share	25.64%	24.54%	26.59%	24.94%	11.60%	44.58%
Retail loan share	53.06%	52.55%	53.43%	53.02%	35.73%	71.08%
Unsecured loan share	43.69%	43.21%	43.65%	42.90%	27.21%	60.55%
Market Share	5.35%	1.74%	3.04%	1.10%	0.16%	21.13%
LR^{dis}	7.08%	6.42%	7.49%	6.79%	1.87%	14.33%
LR^{fai}	0.31%	0.26%	0.30%	0.23%	0.04%	0.70%
ELR^{C}	0.98%	0.84%	0.93%	0.80%	0.60%	1.96%
$RATIO^{dis}$	-		-		3.08	24.03
$RATIO^{fai}$	-		-		0.26	1.05

Table 1: Summary statistics of variables based on bank-means (1995-2005). p5 (p95) stands for the 5th (95th) percentile. The statistics for the RATIOs of cooperative and savings banks are omitted because of confidentiality reasons.

of a bank in all the industries, but weights with respect to the portion which each industry contributes to the corporate loan volume of the bank.[20]

Further variables which shall control for individual characteristics of a bank, e.g. the total assets (size), the return on assets (return), equity ratio (eqr) and the proportion of loans as a share of total assets (loan) are rather self-explanatory. They are introduced within the presentation of the analysis concept.

Table 1 shows some summary statistics of the introduced variables. It is noticeable that savings banks are on average about twice as big (measured by total assets) as cooperative banks.

2.3 Specialization measures

An essential part of the investigation is to determine the specialization level by means of key figures. We apply to the concentration of banks on certain industries in corporate lending. We essentially revert to the specialization measures used by Kamp (2006). Measuring naive diversification the Hirschman Herfindahl Index (HHI) is a very popular key figure.[21] In our case it is calculated for the bank b at time t as

[20]Therefore, a high ms could stem from just one industry. However, by introducing the specialization measures we will control for this circumstance.

[21]Beside the HHI (absolute concentration measure) there are further concentration measures, e.g. the Gini-coefficient (relative concentration measure), used by Kamp (2006).

$$HHI_{(b,t)} := \sum_{i=1}^{23} x_{(b,i,t)}^2. \tag{4}$$

The values range from $\frac{1}{23}$ to 1. The higher the value the more specialized a bank is. A value of 1 means that a bank has loans in just one industry whereas a value of $\frac{1}{23}$ indicates the maximal diversification: the total loan amount splits equally into the 23 industries.

In addition to the calculation of the HHI based on loan volumes we evaluate a so called weighted HHI (HHI^w) which is based on the expected loss of each industry, i.e.

$$HHI_{(b,t)}^w := \sum_{i=1}^{23} \left(\frac{IR_{(i,t)} \cdot X_{(b,i,t)}}{\sum_{j=1}^{23} IR_{(j,t)} \cdot X_{(b,j,t)}} \right)^2. \tag{5}$$

This definition can be justified if one considers that the level of knowledge and effort should reflect the level of potential loss. It could be assumed that the higher the expected loss the more endeavours there are to monitor. If an industry constitutes a major part of the expected losses and of the capital requirements, this should be taken into account when determining the specialization level.[22]

A substantial objection to our use of the HHI (HHI^w) is aimed at weighting the industries evenly. This seems to be critical because the industries differ extremely in loan volume and importance for the lending business. In particular, the explanatory power of the HHI depends on the chosen industry classification. Hence, Pfingsten and Rudolph (2004) recommend distance measures to benchmark portfolios as reasonable alternative key figures. These measures have already been used in works by Kamp (2006) and Norden and Szerencses (2005). Our benchmarks are the national lending amount (nation) and the national gross value added (gva) as well as the lending amounts referring to the federal states (state) and regions (region).[23] Since the investigation focuses on savings and cooperative banks the regional benchmarks represent an indicator for lending in the corresponding business district. The benchmark portfolios for a bank b are in each case determined by the shares $x_{(i,t)}^{nation}$, $x_{(i,t)}^{state_b}$, $x_{(i,t)}^{region_b}$ and $x_{(i,t)}^{gva}$ where $x_{(i,t)}^{gva}$ denotes the proportion of the industry i as a share of the gross value added at time t. We adopt the standardized sum of the absolute differences between the bank portfolio and the benchmark portfolio as the distance measure:[24]

$$D_{(b,t)}^{type} := \frac{1}{2} \sum_{i=1}^{23} |x_{(i,b,t)} - x_{(i,t)}^{type_b}|, \tag{6}$$

[22] As for the calculation of the expected losses we revert to the insolvency rates of the industries because of missing single borrower data.

[23] For the motivation of the benchmarks see Kamp (2006). For the calculation of the regional benchmarks we use the same banks as mentioned in the footnote 11.

[24] The benchmarks based on the regional lending differ depending on the region a bank belongs to. Because of this the benchmark possesses the index b.

where *type* = nation, state, region or gva. The values range from 0 to 1 and can be interpreted as the part of the loan portfolio which has to be rearranged to replicate the structure of the benchmark portfolio.

In case of all specialization measures high values imply a high specialization level and low values indicate a high diversification level. We stress that a high specialization level is not necessarily a result of the bank's strategy. In fact, this doesn't impair our investigations. Table 2 gives an overview about the specialization levels for savings and cooperative banks.

	Savings banks				Cooperative banks			
	Mean	Median	p5	p95	Mean	Median	p5	p95
HHI	0.107	0.105	0.085	0.137	0.154	0.124	0.091	0.304
HHI^w	0.128	0.123	0.095	0.174	0.174	0.152	0.107	0.283
D^{nation}	0.295	0.288	0.205	0.409	0.439	0.423	0.289	0.651
D^{state}	0.245	0.233	0.155	0.364	0.386	0.371	0.232	0.614
D^{region}	0.204	0.190	0.107	0.352	0.331	0.322	0.168	0.586
D^{gva}	0.312	0.310	0.226	0.417	0.435	0.423	0.288	0.644

Table 2: Summary statistics of specialization measures based on bank-means (1995-2005). p5 (p95) stands for the 5th (95th) percentile.

Obviously, savings banks are more diversified than cooperative banks. For each specialization measure the mean values of the cooperative banks are about 1.5 times higher than the mean values of the savings banks. It is also noteworthy that the 95th percentiles of the savings banks are - except for D^{region} - lower than the mean values of the cooperative banks.

2.4 Monitoring expenses

Superior monitoring is one of the possible advantages attributed to specialization strategies. The empirical verification of this relationship is the main objective of this paper. Instead of verifying whether focussing leads to superior monitoring one could also calculate expenses for monitoring and examine their relationship to monitoring quality. Coleman et al. (2006) developed a proxy for the monitoring quality which is based on the personnel expenses for monitoring activities. By running a panel regression they adjust the ratio of personnel expenses over non interest rate expenses for special bank features. According to Coleman et al. (2006) we define the Salary Exposure Rate (SER) as

$$\text{SER}_{(b,t)} := \frac{\text{personnel expenses}_{(b,t)}}{\text{non interest rate expenses }_{(b,t)}}$$

and perform the following fixed effects estimation in order to assess the monitoring proxy $\overline{mon}_b$:

$$\text{Salary Exposure Rate}_{(b,t)} = \overline{mon}_b + \sum_{j=1}^{n} \beta_j \cdot Y_{(j,b,t)} + \epsilon_{(b,t)}. \tag{7}$$

The SER is adjusted for different influencing factors, so that the time-constant bank-proprietary term ($\overline{mon}_b$) shows the (additionally for size and efficiency effects adjusted) expenses for the corporate loan business of a bank. We use the share of retail loans (retail) and the share of bank loans (bankloan) as control variables. We assume that the first ratio has a positive influence on the SER because a higher ratio is probably equivalent to more branches and a higher ratio of personnel expenses to the loan exposure. The second ratio might rather be negatively correlated with the SER because of the more standardized business and higher transaction volumes. The share of loans in total assets (loan) and the share of fees in total earnings (fee) represent important characteristics of a bank. Both variables are indicators for the labor-intensity of the bank's business and should influence the SER positively.[25] We also consider the share of liabilities against banks in total assets (bankliab) and the share of secured liabilities in total assets (sec). Due to the expected labor-intensity we assume a negative relationship with the SER for the first and a positive relationship for the second variable. In order to measure the efficiency of a bank we resort to the return on total assets (return). For a more profitable bank we assume a lower SER. The control variable size (size) - calculated as log of total assets - reflects that bigger banks might benefit from economies of scale.[26]

The results of the estimation are stated in Table 7 of the appendices (section 6.1). Furthermore, Table 8 displays a survey of the results for the monitoring proxy on the basis of certain descriptive statistics.

2.5 Dependencies between the variables

In this section we want to reveal some selected dependencies between the presented variables. Table 3 contains Spearman rank correlation values for certain variable pairs.[27]

It is observable that specialized banks tend to be smaller than diversified banks, show a smaller loan share and a smaller market share in credit business. Thus, bigger banks tend to diversify their loan portfolio w.r.t. industries and at the same time possess a higher market share in these industries because of higher loan volumes. Specialized banks are particularly active in retail loan business and their loans exhibit a slightly lower unsecured portion. Additionally considering the positive correlation between market share and unsecured portion this seems to disprove that specialization is connected with higher market

[25] Here and in the remainder of the paper we have performed robustness tests to check for the relevance of endogeneity. Leaving out certain variables in the regressions we so far have seen no major changes in the results.

[26] In Coleman et al. (2006) similar control variables are used.

[27] We point out that this pairwise analysis cannot replace a multivariate examination. This basic approach intends to give a first impression of the relationship between the different variables.

	Cooperative banks	Savings banks	Both groups
	SM		
Size	-0.55	-0.48	-0.65
Loan share	-0.35	-0.18	-0.22
Market share	-0.33	-0.34	-0.48
Retail share	0.18	0.14	0.17
Unsecured portion	-0.08	-0.15	-0.10
LR	-0.31	-0.03^{-}	-0.22
Monitoring	-0.25	0.11	-0.22
Number of industries	-0.57	-0.15	-0.50
	Monitoring		
Number of industries	0.16	0.17	0.16
Equity ratio	-0.17	0.26	-0.10
	LR		
Unsecured portion	0.26	0.26	0.25
Retail share	-0.34	-0.14	-0.30
	Number of industries		
Retail share	0.10	0.04^{-}	0.09
Size	0.20	-0.05^{-}	0.20
Market share	-0.00	-0.12	0.05^{-}
	Market share		
Unsecured portion	0.09	0.29	0.13

Table 3: Rank correlations between selected variables (bank-means over the period 1995 to 2005) for cooperative, savings banks and both banking groups combined. The rank correlation values in case of the SM and the LR are averaged values. Values which are marked with a $^{-}$ exhibit non-significant relationships. The variable number of industries stands for the number of industries to which a bank has lent at least 5% of its corporate credit volume.

power and higher collateral rates. As stated in the works by Kamp (2006) and Acharya et al. (2006) a negative relationship between the specialization level and the actual loss rate is detectable which is especially pronounced for the cooperative banks. The monitoring efforts are lower for specialized banks in case of the cooperative banks. In contrast, savings banks with a higher specialization level show higher monitoring efforts. This could be explained by the fact that the number of industries which belong to the loan portfolio is more heavily declining for an increasing specialization level in case of the cooperative banks than in case of the savings banks. Specialized cooperative banks invest in considerably fewer industries than diversified banks and may therefore save fixed costs needed for the development and preservation of industry expertise. This is also indicated by the positive rank correlation between the number of industries and the monitoring efforts. A higher equity ratio and hence a larger cushion against losses may lead to lower monitoring efforts. This relationship can be detected for the cooperative banks. As expected, the higher the unsecured portion of the loans the higher the actual loss rate is. Particularly for the cooperative banks, a higher retail portion comes along with a lower actual loss

rate. This could be due to the large part of real estate loans with high collateral rates and rather low PDs. The number of industries which is - at least for the cooperative banks - highly (negatively) correlated with the specialization level shows quite different dependency features than the specialization level, e.g. a weak relationship to the bank size (actually negative for the savings banks).

3 Empirical design

3.1 Specialization and monitoring

We want to shed light on the empirically verified negative relationship between specialization level and loan loss rates. The investigation is based on the following linear regression model

$$\begin{aligned} \log(\overline{RATIO})_b &= \alpha + \beta_1 \cdot \overline{SM}_b + \beta_2 \cdot \overline{retail}_b + \beta_3 \cdot \overline{bankloan}_b + \beta_4 \cdot \overline{loan}_b \\ &\quad + \beta_5 \cdot \overline{size}_b + + \beta_6 \cdot \overline{mon}_b + \beta_7 \cdot \overline{ms}_b + \beta_8 \cdot \overline{unsec}_b \\ &\quad + \beta_9 \cdot \overline{eqr}_b + \beta_{10} \cdot \overline{return}_b + \epsilon_b, \end{aligned} \tag{8}$$

where the variables represent average values over the observed time period (basically 1995 to 2005) for each bank. SM stands for the six specialization measures introduced in section 2.3 and RATIO is used representatively for RATIO^{dis} and RATIO^{fai}. The main idea of this investigation is to evaluate the impact of the specialization level on the quotient (RATIO) of actual and expected loss rate. This quotient reflects the relation between the actual loan losses and the losses, which are expected based on the industry allocation in corporate lending. The higher the RATIO the worse the monitoring ability of a bank in lending has basically to be judged.

The main reason for reducing the panel structure to a pure cross-sectional data structure by averaging for each bank is the evaluation of a reasonable and reliable actual loan loss rate. The creation of provisions for specific doubtful loans does not coincidence with the insolvency of a borrower in the most cases, but is already conducted in case of incidents which make the accurate redemption of the interest and amortization payment doubtful. Direct write-offs and the consumption of provisions are normally conducted at a later date, when the default is certain. Since the practices differ enormously between banks and banks have intertemporal leeway it seems to be useful to refer to a longer time period than just one year for the calculation of a reasonable loss variable. These aspects cannot be considered by a panel analysis, e.g. a fixed effects estimation with time lags. At the same time, the between group estimation gives us the opportunity of integrating the monitoring variable

into the equation. The average RATIO is calculated as[28]

$$\overline{RATIO}_b = \frac{\sum_{t=1995}^{2005} L_{(b,t)}}{\sum_{t=1995}^{2005} EL_{(b,t)}} \cdot \frac{\sum_{t=1995}^{2005} Loan - amount_{(b,t)}}{\sum_{t=1995}^{2005} X_{(b,t)}}.$$

We have chosen this procedure in order to prevent that the results are biased by outlier RATIOs, which might occur in some years due to banking policy.[29]

In particular because of the error term correction we use the number of observed years for each bank as a weighting factor in the regression. Additionally, we conduct a White adjustment for the standard errors. We tested different time lags for the variables. The differences in the results are negligible. The results presented in the next section stem from a model which uses a time lag of one year for the actual loss rates based on distressed loans and no time lag for LR^{fai}. In case of mergers we identify the merged bank with the bigger or overtaking bank. The smaller or overtaken bank is considered as an independent observation entity until the year of the merger.

The main hypothesis is $\beta_1 < 0$. A negative β_1 means that specialized banks have on average lower actual losses proportional to the expected losses than diversified banks. This would mean that specialized banks show monitoring advantages, i.e. superior screening abilities to identify better borrowers in an industry or superior monitoring abilities to influence an ongoing contract positively, which leads to comparatively low losses from lending. This conclusion would be valid because we do not solely rely on loan loss rates, but adjust for each bank's industry allocation. In case of the RATIO^{dis} and in contrast to the RATIO^{fai} the influence of different LGD values is suppressed so that the examination just cares about different PD values.

Additionally, further variables which might influence the loan losses are considered. We presume that the share of retail loans has a negative impact on the RATIO. The expected loss rate is calculated merely on the basis of the corporate loans. As three quarters of the retail loans stem from real estate lending which implies relatively high collateral rates and low PDs compared to corporate lending,[30] it can be assumed that the actual loss rates are lower c.p. for banks with relatively more retail loans. The same argument can be applied for the share of bank loans. Concerning the share of loans there are arguments for and against a negative relationship with the RATIO. E.g. a higher share might indicate an expanding and aggressive lending policy which suggests a positive relationship,

[28] In order to simplify the notation we do not distinguish between different time periods and just refer to the period from 1995 to 2005 although this is a rough indication because of incomplete data for some banks and used time lags.

[29] However, the results just differ marginally, in particular the regression results, if using the average of the year-RATIOs.

[30] See Basel Committee on Banking Supervision (2003) and Basel Committee on Banking Supervision (2006).

but a higher share might also induce the bank to monitor more diligently which suggests a negative relationship. We guess that bigger banks have a lower RATIO. Bigger banks can build up deeper industry knowledge more easily than other banks (assuming an identical specialization level) because they can allocate the fixed costs related to monitoring activities over a larger volume. We expect that the RATIO depends negatively on the monitoring efforts. Banks with higher monitoring expenses should on average show a lower ratio of actual to expected losses. We presume a negative relationship between the market share as a proxy for the market power of a bank in lending and the RATIO. Banks with a larger market share might have more selection possibilities and negotiating power. However, a larger market share could also be the result of an undifferentiated lending policy and market power could also be used to charge higher interest rates instead of reducing the risk. Potential systematic differences between specialized and diversified banks w.r.t. the unsecured portion of the loans, which can be assumed as a suitable proxy for the LGD,[31] are considered by introducing the variable unsec.[32] We assume that the RATIO increases if the unsecured portion increases because a higher LGD is expected. The equity ratio serves as an indication for the cushion against unexpected losses. A higher equity ratio might therefore on average lead to a more careless lending policy which would suggest a positive β_9. We presume a negative dependency between return and RATIO. A higher return on assets c.p. stands for higher efficiency and thus for superior processes in monitoring.

We run these regressions for savings and cooperative banks separately and jointly[33] and also perform the regression

$$\begin{aligned} \log(\frac{\overline{LR}_b}{ELR_b^C}) &= \alpha + \alpha^\star \cdot DUMMY_b + \beta_1 \cdot \overline{SM}_b + \beta_1^\star \cdot \overline{SM}_b \cdot DUMMY_b + \sum_{j=2}^{10} \beta_j \cdot \overline{z}_{(j,b)} \\ &\quad + \epsilon_b \end{aligned} \tag{9}$$

in order to clarify whether there are significant differences between savings and cooperative banks concerning the RATIO and the influence of the specialization level on the RATIO. The dummy variable $DUMMY_b$ takes the value 1 if the bank is a savings bank and the value 0 if the bank is a cooperative bank. $z_{(i,b)}$ for $j = 2, \ldots, 10$ stands for the explanatory variables used in equation 8.

Furthermore, we want to analyze whether the impact of the specialization level on the RATIO varies for different size classes. For this purpose we divide the banks into three size classes (small/medium sized/big banks) with equal number of banks where we do

[31] See Grunert and Weber (2007).

[32] We remark that the incorporation of the unsecured-variable counteracts the probably prevalent effect by specialization on the LGD. However, we consider the variable to avoid that the results are biased by industry specific LGDs.

[33] In the regression combining both banking groups we incorporate a dummy variable for the banking group. The results are not presented because of confidentiality reasons.

the segmentation for savings and cooperative banks separately as well as combined over both banking groups. We complement the regression equation 8 by the two terms Δ $HHI-small := Dummy_{small} \cdot SM$ and Δ $HHI-big := Dummy_{big} \cdot SM$. $Dummy_{small}$ and $Dummy_{big}$ are dummy variables for small and big banks respectively. Regressions based on this equation reveal whether the benefits of specialization for the monitoring quality are larger for small or big banks.

3.2 Specialization and industry selection

A further possible reason for the - on average - lower actual loss rates of specialized banks is focusing on industries with less or lower defaults. To verify this presumption we choose following linear regression model:

$$\begin{aligned} \overline{ELR}_b &= \alpha + \beta_1 \cdot \overline{SM}_b + \beta_2 \cdot \overline{retail}_b + \beta_3 \cdot \overline{bankloan}_b + \beta_4 \cdot \overline{loan}_b \\ &\quad + \beta_5 \cdot \overline{size}_b + \beta_6 \cdot \overline{mon}_b + \beta_7 \cdot \overline{ms}_b + \beta_8 \cdot \overline{unsec}_b \\ &\quad + \beta_9 \cdot \overline{eqr}_b + \beta_{10} \cdot \overline{return}_b + \epsilon_b. \end{aligned} \tag{10}$$

Again, we consider aggregate values - one value for each bank - in order to perform a regression comparable with equation 8 and to integrate the monitoring expenses.[34]

In this case we do not adjust the expected loss rates for different state adjustment factors because we do not want to incorporate regional differences between the banks but focus on industry selection. A negative β_1 would mean, that specialized banks tend to concentrate on low-risk industries.

The control variables are motivated as follows. A larger share of retail loans, in particular a larger share of real estate loans, and also a larger share of interbank loans might induce the banks to take more risks in corporate lending. Therefore, we expect a positive β_2 and β_3. A larger loan share and therefore a stronger dependence on the credit business should prompt banks to restrain their risk and therefore to restrain their lending to high-risk industries. Larger banks possibly show a different selection policy compared to small banks but in this case and also for the market share we do not allow ourselves to predict a sign for the coefficient. Higher monitoring expenses could lead to a lower expected loss rate because a more sophisticated credit risk management might install risk adjusted limits on industry level. We expect a negative β_8 because we assume that loans with higher risks are rather secured by collateral, i.e. show a lower unsecured portion. The reasons for assuming a negative β_9 and a positive β_{10} are the same as in section 3.1.

[34] In alternative examinations we also used the expected (unconditional) loss rates presented in footnote 13 for the ELR in order to analyze separately whether specialized banks select industries with lower default rates or reduce their expected loss rate by increased engagement in retail and interbank loans.

4 Empirical results

4.1 Specialization and monitoring

In this section we present the results of the regressions which shall clarify whether specialized banks have a lower ratio of actual to expected loss rates than diversified banks. Table 4 contains the results for the savings and cooperative banks separately and both banking groups together where the variables have been standardized to possess mean zero and unit variance. We restrict the table to the results for the HHI. The results for the other variables (without the values for the control variables because they are fairly stable over different specialization measures) can be found in Table 9 of the appendices (section 6.2).

	Cooperative banks		Savings banks		Both groups	
	dis	fai	dis	fai	dis	fai
HHI	-0.21***	-0.16***	-0.06	-0.09***	-0.2***	-0.16***
	(-5.76)	(-5.54)	(-1.4)	(-2.03)	(-5.95)	(-5.61)
retail	-0.18***	-0.14***	-0.16***	-0.07*	-0.18***	-0.13***
	(-7.17)	(-5.27)	(-3.77)	(-1.64)	(-7.63)	(-5.16)
bankloan	-0.37***	-0.23***	-0.047***	-0.32***	-0.38***	-0.25***
	(-13.49)	(-8.4)	(-10.08)	(-6.68)	(-17.15)	(-11.63)
loan	0.17***	0.13***	0.34***	0.24***	0.22***	0.15***
	(6.24)	(4.81)	(6.26)	(4.82)	(9.61)	(7.11)
size	-0.15***	0.16***	-0.21***	0.08*	-0.21***	0.19***
	(-5.73)	(6.6)	(-4.64)	(1.81)	(-7.39)	(6.65)
monitor	0.01	-0.03	0.1***	0.06	0.01	-0.03
	(0.37)	(-0.85)	(2.24)	(1.44)	(0.42)	(-1.1)
ms	-0.01	-0.03	0.03	0.03	0	-0.02
	(-0.25)	(-1.2)	(0.66)	(0.67)	(0.2)	(-1.39)
unsec	0.04	0.22***	0.03	0.29***	0.04*	0.22***
	(1.48)	(5.36)	(0.72)	(6.16)	(1.79)	(6.13)
eqr	-0.02	-0.03	-0.16***	-0.08	-0.04	0.02
	(-0.33)	(-0.7)	(-2.88)	(-1.49)	(-0.91)	(0.42)
return	-0.18***	-0.21*	-0.15***	-0.3***	-0.18***	-0.23**
	(-2.21)	(-1.7)	(-3.09)	(-6.73)	(-2.42)	(-1.92)
R^2	0.39	0.35	0.36	0.36	0.41	0.35
Observations	1,663		537		2,200	

Table 4: Estimation of the ratio of actual over expected loss rate for cooperative, savings banks, and both banking groups combined after 0-1 standardization of the variables. ***, **, * indicate statistical significance on a 1%, 5%, 10% significance level. The values in brackets are the corresponding t-values. The results for the banking group dummy are not presented because of confidentiality reasons.

Both for cooperative and savings banks negative coefficients β_1 are prevalent for both loss rates. Furthermore, the coefficient is negative for the joint estimation. In the case of the

cooperative banks statistically and economically significant negative relations between the specialization level and the ratio of actual loss rate over expected loss rate can be observed. This means that specialized cooperative banks on average show a higher monitoring quality than other cooperative banks. $RATIO^{dis}$ does not consider - as previously mentioned - the impact of different LGDs. Thus it is noticeable that the specialization level influences the monitoring expertise w.r.t. the PD for the cooperative banks. To what extent there is influence on the LGD cannot be determined in this case. For the other specialization measures - the results can be found in Table 9 of the appendices (section 6.2) - there are similar high values for the cooperative banks, allowing us to allude to a stable relationship. For the savings banks the relationship is somewhat weaker. Nevertheless, there is a statistically and economically significant negative relationship between the specialization level and RATIO for all specialization measures when the failure rate is used as actual loss rate. An explanation for the negative[35], but just in the case of HHI^{w} and RATIO statistically significant dependency might be that for the savings banks the specialization level has possibly more influence on the LGD than on the PD. The results for the joint estimations are similar to the ones of the cooperative banks which can be explained by the higher number of used observations for the cooperative banks. In order to detect whether there are significant differences between the coefficients of cooperative and savings banks we have run the regressions according to equation 9. Although the coefficients seem to differ enormously in case of separated regressions there are significant differences just in case of using D^{state} and D^{region}. Here, savings banks show a significantly weaker relationship between the specialization level and RATIO than cooperative banks.[36] The on average strongest dependencies are revealed for the specialization measure HHI^{w}. Overall, we can conclude that monitoring benefits are prevalent for both specialized cooperative and specialized savings banks.

In order to consider the influence of other important parameters we used control variables in the regressions. As assumed, the RATIO declines in case of rising retail rates.[37] As we calculated the expected loss rate based on the corporate credit business and thus implicitly assumed that the expected loss rate in retail and corporate lending equals each other, this indicates, that there is a lower actual loss rate in the retail than in the corporate credit business. In our opinion, this is mainly due to the fact that a huge share of the retail loans are real estate loans with sound collaterals. However, this strongly negative relation can also be observed for $RATIO^{dis}$ which means that not just the LGD but also the PD is lower for the retail loans. The positive relationship between retail rate and specialization level - which is remarked in section 2.5 - leads to the speculation that specialized banks further reduce their actual loss rate by a high retail rate or that banks which are mainly

[35] An exception has to be noted for the specialization measure D^{state}.

[36] The results will be provided by the authors on request.

[37] As the results for the other specialization measures just differ marginally from the results for the HHI, we do not present these values in this paper. The results will be provided by the authors on request.

active in retail lending concentrate on a few very save corporate borrowers.[38]

It was likewise important to eliminate the impact of the interbank loan share. The - in comparison to corporate lending - lower loss rates are indicated by the negative coefficients.[39] The loan share shows a significantly positive relationship with the RATIO. Banks with a huge credit volume in relation to total assets seem to care about quantity rather than about quality in lending. The results for the bank size are not as uniform. Both for cooperative and savings banks the RATIO^{dis} decreases and the RATIO^{fai} increases in case of an increasing bank size.[40] The results for the monitoring expenses are also rather heterogenous. All in all, higher monitoring expenses show just an marginal and not uniform impact on the RATIO. For savings banks positive relationships can be observed. Higher personnel expenses for the credit business[41] tend - contrary to our expectations - to worsen the monitoring quality in case of savings banks. Regressions which omit the specialization measure as explanatory variable show a slightly negative relationship for the monitoring variable.[42] It is obvious that the specialization level has higher explanatory power for the monitoring quality than the personnel expenses for the credit business. The market share which specifies the loan share a bank possesses in their customer industries in relation to the whole regional lending amount has no significant influence on the RATIO. Considerations which equate higher market share with higher market power and conclude benefits for the selection of the borrowers and the collateralization cannot be verified empirically here. In addition, there is no indication that a higher market share is the result of an unrestrained and imprudent lending policy. Examinations concerning the possibility that both effects are coexisting and cancel each other out are not undertaken in this paper. As expected, the RATIO^{fai} increases in case of an increasing unsecured portion (related to audited specific doubtful loans). An increasing equity rate tends to come along with a lower RATIO for savings banks. Furthermore, there is a negative relationship between the return on total assets and the RATIO for both cooperative and savings banks. More efficient banks seem to be more efficient also in monitoring.

As aforementioned, we intend to analyze the impact of the bank size in more detail. In particular, the interaction with the specialization level w.r.t the monitoring quality needs to be clarified. The results of the regressions (equation 8 extended by two interaction terms

[38] Results not presented in the paper show an increased negative relationship between specialization level and RATIO in comparison to the above mentioned results for the case that the retail loan rate is left out as explaining variable. This confirms the presumption. The regression results will be provided by the authors on request.

[39] Another possibility to consider the influence of the interbank and retail loan rate is to integrate these parameters into the calculation of the expected losses. We have run regressions based on this modified quotient (see footnote 13) and without using the interbank and retail loan rate as explanatory variables. Also in this case (significantly) negative relationships between the specialization level and RATIO can be observed. More detailed information will be provided by the authors on request.

[40] Incorporation of quadratic size terms did not have a meaningful impact on the results.

[41] As described in section 2.4, efficiency and size benefits are considered.

[42] The results will be provided by the authors on request.

according to section 3.1) are given in Table 5.[43]

Cooperative banks	HHI	Δ HHI-small	Δ HHI-big
dis	-0.03	0.12	-0.34***
	(-0.28)	(0.98)	(-2.87)
fai	-0.10	-0.02	-0.09
	(-0.93)	(-0.18)	(-0.83)
Savings banks	HHI	Δ HHI-small	Δ HHI-big
dis	-0.05	0.02	-0.05
	(-0.89)	(0.20)	(-0.49)
fai	-0.12***	0.05	0.04
	(-2.22)	(0.57)	(0.49)
Both groups	HHI	Δ HHI-small	Δ HHI-big
dis	-0.32***	0.41***	-0.02
	(-4.63)	(5.04)	(-0.25)
fai	-0.21***	0.11	0.02
	(-4.37)	(1.32)	(0.39)

Table 5: Estimation of the ratio of actual over expected loss rate for cooperative, savings banks, and both banking groups combined after 0-1 standardization of the variables. ***, **, * indicate statistical significance on a 1%, 5%, 10% significance level. The values in brackets are the corresponding t-values. In the HHI-column the impact of the HHI on the RATIO for medium-sized banks is depicted. Δ HHI-small and Δ HHI-big respectively stand for the interaction terms constructed by a dummy for small and big banks respectively and the HHI. The results for the banking group dummy are not presented because of confidentiality reasons. The regressions are based on 1663/537/2200 observations for the cooperative banks/savings banks/both banking groups.

In total, there are considerably lower negative relationships. The reason might be that huge RATIO-differences between small specialized and big diversified banks are not taken into account in this case. For cooperative banks a significantly negative relationship between specialization level and RATIO can only be observed for the class of the biggest banks. For savings banks and in the case of the joint estimations, specialization benefits are noticeable also for the medium sized banks. Thus, for small banks specialization does not seem to be worthwhile. However, this conclusion should be restricted. According to section 2.5 small banks show a high specialization level on average. Considering this, the conclusion should rather be that for small banks with a high specialization level a further increase of the specialization level does not lead to additional benefits. In contrast, for big banks a specialization strategy seems to have a positive impact on the monitoring quality.

4.2 Specialization and industry selection

We have stated in the previous section that specialized banks apparently possess monitoring benefits. Another reason for lower losses from credit business could be that specialized

[43]The detailed regression results for all specialization measures will be provided by the authors on request.

banks concentrate on industries with on average lower loss rates. In Table 6 the results of regressions according to equation 10, where the variables have been standardized to possess mean zero and unit variance, are presented for the HHI and the D^{nation}. The results for the other specialization measures can be found in Table 10 of the appendices (section 6.2).

	Cooperative banks		Savings banks		Both groups	
	HHI	D^{nation}	HHI	D^{nation}	HHI	D^{nation}
SM	-0.51***	-0.40***	-0.32***	0.38***	-0.49***	-0.38***
	(-13.75)	(-8.46)	(-8.64)	(6.58)	(-13.01)	(-7.68)
ret	0.13***	0.09***	0.14***	0.15***	0.13***	0.08***
	(4.38)	(2.92)	(3.19)	(3.39)	(4.54)	(2.76)
bank	0.08***	0.07***	0.05	-0.02	0.03	0
	(3.12)	(2.33)	(0.91)	(-0.33)	(1.23)	(0.05)
kredit	0.13***	0.13***	-0.11***	-0.09***	0.03*	0.04**
	(5.03)	(4.40)	(-2.75)	(-2.35)	(1.66)	(1.98)
size	0.14***	-0.05	-0.24***	0.12*	0.15***	-0.06
	(4.23)	(-1.10)	(-5.08)	(1.79)	(4.05)	(-1.13)
monitor	-0.15***	-0.10***	-0.22***	-0.20***	-0.18***	-0.13***
	(-5.65)	(-3.56)	(-4.33)	(-4.16)	(-8.43)	(-5.42)
ms	0.02	0.01	-0.09***	-0.10***	-0.04***	-0.05***
	(0.66)	(0.69)	(-2.28)	(-2.52)	(-2.15)	(-2.35)
blanko	-0.06	-0.08	0	0.02	-0.06	-0.08
	(-2.82)	(-3.24)	(-0.01)	(0.54)	(-3.04)	(-3.40)
ekq	0.12	0.07	-0.01	-0.04	0.13	0.08
	(1.19)	(0.75)	(-0.17)	(-0.84)	(1.29)	(0.84)
gkr	-0.12***	-0.10***	-0.09*	-0.06	-0.13***	-0.12***
	(-2.33)	(-2.22)	(-1.66)	(-1.19)	(-2.53)	(-2.52)
R^2	0.28	0.17	0.21	0.20	0.24	0.12
Observations	1,663		537		2,200	

Table 6: Estimation of the expected loss rate for cooperative, savings banks, and both banking groups combined after 0-1 standardization of the variables. ***, **, * indicate statistical significance on a 1%, 5%, 10% significance level. The values in brackets are the corresponding t-values. The results for the banking group dummy are not presented because of confidentiality reasons.

In the case of the cooperative banks a significantly negative relationship between the specialization level and the expected loss rate can be observed both for the HHI and for the D^{nation}. This relationship also shows high economical significance. Thus, cooperative banks which are specialized according to their industry selection predominantly lend to industries with lower loss rates. This can also be observed for the other specialization measures. Just in case of the HHI^{w} an insignificant relationship has to be noticed. The reason for this is that high HHI^{w}-values are often assigned to banks which engage in industries with high loss rates. For the savings banks no clear result can be presented. In contrast to a significantly negative relationship in the case of the HHI, there is a significantly positive relationship in the case of the D^{nation}. Thus, for savings banks it is important in which way the specialization level is measured. As savings banks are on average more diversified

than cooperative banks (see Table 2), in particular if using distance measures, the regression results of the savings banks should depend more heavily on the expected loss rates of the corresponding benchmarks. All benchmarks show - the values are between 1.11% and 1.24% - considerably higher expected loss rates than both the cooperative and the savings banks (see Table 1). Therefore, it is quite astonishing that there is not a stable negative relationship between the specialization level and the expected loss rate for the savings banks. The regressions combining both banking groups lead to results similar to the ones of the cooperative banks. Significant differences between cooperative and savings banks are existing for all specialization measures except for the HHI. In every case cooperative banks show a stronger negative relationship between specialization level and expected loss rate.

For the other variables we restrict our comments to a few noticeable results. A higher credit share comes along with a lower expected loss rate for the savings banks. Savings banks which are mainly dependent on the credit business possibly restrain their engagement to more risky industries. However, for cooperative banks a positive relationship can be observed. The relationship between monitoring expenses and expected loss rate is significantly negative. Relatively higher personnel expenses for the credit business might induce a better risk management which strives for lending to industries with lower risk. Market share and expected loss rate show a significantly negative dependence (though with rather low economical significance) for the savings banks and no relationship in case of the cooperative banks which on average have a considerably lower market share than the savings banks.[44] This (weakly) indicates that lending to more risky industries is divided to more banks than lending to more secure industries, i.e. risk sharing exists among the banks.

5 Conclusions

In previous contributions, a negative (positive) relationship between specialization level and loan loss provisions (profitability) has been detected. Let us summarize the present paper. Cooperative and savings banks which specialize in certain industries in their corporate credit business tend to have a lower ratio of actual loss rate to expected loss rate than diversified banks when the expected loss rate is calculated as the weighted average of the industries' default rates with the bank's industry exposures' weights. This indicates that specialized banks on average have a better monitoring quality where both screening and monitoring of ongoing credit contracts are classified as monitoring. Therefore, the above average performance of specialized banks can be explained, at least to some extent, by a better monitoring quality.

The negative relationship between the specialization level and the ratio of actual over expected loss rate is stronger for the cooperative banks than for the savings banks. For

[44] See Table 1.

nearly all specialization measures applied and both proxies of the actual loss rate there are economically and statistically significant results in case of the cooperative banks. In particular, an increase of the specialization level comes along with a reduction of the PD in the corresponding industries. For the savings banks a statistically and economically significant negative relationship can particularly be found if the actual loss rate is approximated by the failure rate. The results for the regressions combining both banking groups mainly follow the results for the more numerous cooperative banks. The highest impact of the specialization level on the monitoring quality was detected for big banks. However, this result may be due to the fact that small banks are on average already highly specialized and there is no additional effect by further specialization in those cases.

Furthermore, we have shown that specialized cooperative banks tend to concentrate on industries with lower loss rates. This is a further reason for lower loan loss provisions. For savings banks no clear result could be derived. Depending on the applied specialization measure, there are both significantly positive and significantly negative relationships between specialization level and expected loss rate.

Specialized banks are on average considerably smaller than diversified banks, have a smaller loan share, and are strongly active in retail banking. As we have shown, the actual loss rates in retail banking are lower than in corporate lending. This seems to be a further success factor of specialized banks. The market share a bank has in the industries it serves is of little importance for the analyzed relationships. Only in cases of savings banks, more risky industries are accompanied by significantly smaller market shares, possibly an indication for risk sharing among banks.

The monitoring efforts - measured as personnel expense ratio for the credit business - have no explanatory power for the monitoring quality. The monitoring efforts are correlated negatively with the specialization level in case of the cooperative banks and slightly positive in case of the savings banks. This seems to indicate that on average smaller cooperative banks can save monitoring costs by specialization whereas this is not the case for the savings banks. Additionally, a negative relationship between monitoring efforts and expected loss rates was detected. One tentative interpretation is that higher personnel expenses are rather used for a better management of the credit business in terms of a risk sensitive industry selection than for the additional monitoring of borrowers which stem from industries with higher loss rates.

Summing up, we can state that industry concentration in the credit business should not be dismissed in principle. If banks are able to generate monitoring benefits from specialization - as seems to be the case for the savings banks and the cooperative banks - this argues for the endogeneity of credit risk. This counteracts a standardized quantitative analysis and the typical evaluation of credit risks of portfolios and makes it necessary to deal with the

credit risk strategy of a bank individually, just as it is required by pillar 2 of Basel II.

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6 Appendix

6.1 Estimation of monitoring expenses

Table 7 contains the results of the estimation based on equation 7.

	bankliab	size	return	fee	loan	bankloan
Cooperative banks	-0.22***	-0.19***	-0.22***	0.29***	-0.29***	0.07***
	-(2.28)	(-12.83)	(-21.96)	(17.29)	(-8.58)	(14.78)
Savings banks	-0.22**	0.01	0.93***	0.48***	-0.01***	0.04***
	(-1.97)	(1.29)	(3.84)	(15.2)	(-2.9)	(7.41)
Both groups	-0.13*	-0.17***	-1.92***	0.3***	-0.18***	0.06***
	(-1.8)	(-12.87)	(-21.2)	(20.76)	(-7.82)	(15.82)

Table 7: Fixed-effects-estimation of the salary exposure in order to evaluate the monitoring efforts (equation 7). ***, **, * indicate statistical significance on a 1%, 5%, 10% significance level. To increase clarity we do not show the non significant results for the retail rate and the share of secured liabilities.

As expected, the SER increases for an increasing fee share and a decreasing share of liabilities against banks. A higher loan share implies a lower SER, probably induced by fixed costs degression effects. Banks with a higher share of interbank loans on average have - contrary to our assumption - a higher SER. Concerning the bank size and return on assets we observe the expected results for the cooperative banks. Large and profitable banks are assumed to exhibit fixed cost degression effects and efficiency advantages respectively, which are reflected in a lower SER. In contrast, savings banks with a high return on assets show a high SER. This could mean, that banks with relatively high personnel expenses and possibly highly qualified employees realize a higher profit. The dependency between bank size and SER is insignificantly positive for the savings banks. This could stem from the fact that savings banks are on average twice as tall (w.r.t. the asset size) as cooperative banks and fixed costs degression effects are counteracted by organizational extra costs in this size cluster. It is also imaginable that especially the big savings banks look for highly qualified employees working as specialists and are willing to pay more for these.

Table 8 displays a survey of the results for the monitoring proxy on the basis of certain descriptive statistics.

	Mean	Median	Std dev	Min	Max	p5	p95
Cooperative banks	0	0.004	0.044	-0.335	0.117	-0.0741	0.064
Savings banks	0	0.005	0.048	-0.147	0.129	-0.095	0.067
Both groups	0	0.004	0.045	-0.340	0.144	-0.080	0.065

Table 8: Summary statistics for the monitoring variable. p5 (p95) stands for the 5th (95th) percentile and std dev is an abbreviation for standard deviation.

6.2 Further empirical results

Cooperative banks	HHI	HHI^{w}	D^{nation}	D^{state}	D^{region}	D^{gva}
dis	-0.21***	-0.28***	-0.21***	-0.2***	-0.19***	-0.19***
	(-5.76)	(-7.55)	(-6.03)	(-6.02)	(-6.03)	(-5.51)
fai	-0.16***	-0.18***	-0.19***	-0.19***	-0.17***	-0.17***
	(-5.54)	(-5.65)	(-6.03)	(-6.42)	(-6.19)	(-5.72)
Savings banks	HHI	HHI^{w}	D^{nation}	D^{state}	D^{region}	D^{gva}
dis	-0.06	-0.17***	-0.01	0.04	-0.05	-0.1*
	(-1.4)	(-3.96)	(-0.18)	(0.75)	(-1.35)	(-1.85)
fai	-0.09***	-0.2***	-0.17***	-0.14***	-0.09***	-0.15***
	(-2.03)	(-4.33)	(-3.41)	(-3.15)	(-2.06)	(-2.94)
Both banking groups	HHI	HHI^{w}	D^{nation}	D^{state}	D^{region}	D^{gva}
dis	-0.2***	-0.27***	-0.23***	-0.2***	-0.18***	-0.21***
	(-5.95)	(-7.67)	(-6.18)	(-5.98)	(-6.33)	(-5.96)
fai	-0.16***	-0.18***	-0.23***	-0.22***	-0.18***	-0.2***
	(-5.61)	(-5.56)	(-6.66)	(-7.03)	(-6.75)	(-6.3)

Table 9: Estimation of the ratio of actual over expected loss rate for cooperative, savings banks and both banking groups combined after 0-1 standardization of the variables. The values in brackets are the corresponding t-values. The regressions are based on 1663/537/2200 observations for cooperative banks/savings banks/both banking groups.

	HHI	HHI^{w}	D^{nation}	D^{state}	D^{region}	D^{gva}
Cooperative banks	-0.51***	-0.07	-0.40***	-0.42***	-0.36***	-0.44***
	(-13.75)	(-1.23)	(8.46)	(-9.74)	(-8.75)	(-10.35)
Savings banks	-0.32***	0.30***	0.38***	0.10*	-0.22***	0.25***
	(-8.64)	(6.32)	(6.58)	(1.70)	(-4.57)	(4.27)
Both banking groups	-0.49***	-0.06	-0.38***	-0.43***	-0.39***	-0.44***
	(-13.01)	(-1.16)	(-7.68)	(-9.75)	(10.16)	(-9.84)

Table 10: Estimation of the expected loss rates for cooperative, savings banks and both banking groups combined after 0-1 standardization of the variables. The values in brackets are the corresponding t-values. The regressions are based on 1663/537/2200 observations for cooperative banks/savings banks/both banking groups.