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DYSSYNERGIES OF MERGERS AMONG LOCAL BANKS†

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Abstract

In this paper, we investigate how bank mergers affect bank revenues and present empirical evidence that mergers among banks have a substantial and persistent negative impact on merging banks' revenues. We refer to merger related negative effects on banks' revenues as dissynergies and suggest that they are a result of organizational diseconomies, the loss of customers and the temporary distraction of management from day-to-day operations by effecting the merger. For our analyses we draw on a proprietary data set with detailed financials of all 457 regional savings banks in Germany, which have been involved in 212 mergers between 1994 and 2006. We find that the negative impact of a merger on net operating revenues amounts to 3% of pro-forma consolidated banks' operating profits and persists not only for the year of the merger but for up to four years post-merger. Only thereafter mergers exhibit a significantly superior performance compared to their respective pre-merger performance or the performance of their non-merging peers. The magnitude and persistence of merger related revenue dissynergies highlight their economic relevance.

Previous research on post-merger performance mainly focuses on the effects from mergers on banks' (cost) efficiency and profitability but fails to provide clear and consistent results. We are the first, to our knowledge, to examine the post-merger performance of banks' net operating revenues and to empirically verify significant negative implications of mergers for banks' net operating revenues. We propose that our finding of negative merger related effects on banks' operating revenues is the reason why previous research fails to show merger related gains.

JEL Classification: G21, G34, L25, C23

Keywords: Mergers and acquisitions, post-merger performance, bank mergers

1. Introduction

Bank consolidation continues to be a key theme in the financial industry worldwide. Most developed economies have experienced a substantial decline in the number of banks over the last two decades. In Europe's largest economy, Germany, for example, the number of banks has fallen by over 50% from 4,719 in 1990 to 2,300 by the end of 2006.[3] This development has attracted numerous researchers to investigate the banks' motives for engaging in mergers and acquisitions and banks' actual post-merger performance. Research on post-merger performance mainly focuses on the effects from mergers on banks' (cost) efficiency and profitability but fails to provide consistent evidence for merger benefits. For the purpose of this study we choose net operating revenues as measure of operating performance and thereby define net operating revenues as the sum of net interest and net non-interest income before deduction of any operating expenses. This measure of post-merger operating performance is particularly appropriate because it immediately captures changes in top-line performance while masking any changes to the combined bank's cost structure. In previous research the impact of mergers on net operating revenues has not yet attracted much attention. In our paper, we contribute to closing this gap and investigate to what extend net operating revenues are affected by banks' mergers and acquisitions activities.[4]

Conventional wisdom suggests two counteractive merger related effects on net operating revenues: On the one hand, merging banks may benefit from revenue synergies derived from cross-selling, raised lending limits, the transfer of best practices or economies of scope in funding and distribution. On the other hand, increasing organizational complexity and restructuring measures such as branch network consolidation may endanger the competitive advantage in relationship banking which small banks have compared to larger banks because of their customer proximity and their decentralized organizational setup (e.g. see Berger *et al*. (1998), Stein (2002)). Furthermore, increasing organizational complexity may, at least temporarily, complicate senior management's ability to effectively manage day-to-day operations. Mergers frequently also result in the loss of customers that can only be overcome by (costly) retention measures. Customers are more likely to switch banks following a merger because often mergers are accompanied by potential inconveniences for customers such as the

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3 Source: Deutsche Bundesbank.

4 Going forward, we do not distinguish between mergers and acquisitions because economically all transactions among German savings banks are mergers. Hence, the expressions "merger" and "M&A" are used interchangeably.

uncertainty of future service levels, the reduction of the number of (local) branches[5] and the requirement for customers to change their account details (i.e. account number and bank code) which, hence, leads to the reduction of customers' switching costs. Finally, the merger process as well as the post-merger integration may temporarily distract managers from effectively managing the operating business causing business disruptions and reducing overall productivity. Collectively, we refer to these potential negative merger related effects on net operating revenues as dissynergies.[6]

For our empirical analyses we draw on a unique proprietary data set made available by the German Savings Banks Association with detailed financials of all 457 German savings banks that remained active at the end of 2006 following 212 mergers among savings banks during the period from 1994 to 2006. Using this panel data set we find that mergers have a significant negative impact on banks' net operating revenues implying that merger related dissynergies outweigh any revenue synergies following the merger. Interestingly, negative merger related effects also affect bank profitability because mergers among German savings banks do not seem to produce sufficient cost synergies to offset any negative effects on net operating revenues. The negative effects on net operating revenues persist not only for the merger and post-merger year but for up to four years following the merger. However, negative effects decline in magnitude over time indicating that at least some of the negative effects are temporary in nature. After four years following the merger we observe a positive impact from mergers on banks' net operating revenues, suggesting that in the medium to long-run mergers are advantageous to participating banks. In terms of the economic relevance we find that merger related dissynergies, on average, amount to approximately EUR 3 million of revenues per year compared to average net operating revenues of EUR 109 million or an operating income of EUR 39 million before loan loss provisions and write-downs for merging banks in their pre-merger years. The magnitude and persistence of these merger related negative effects highlight their economic relevance. We further find evidence that banks with experience in mergers are able to partially offset these negative merger related effects. However, dissynergies from M&A cannot be completely offset. The robustness of our findings is confirmed by the introduction of alternative measures of operating revenues, the

5 We acknowledge that assuming economically rationale decisions by bank management branch closures pose projects with positive net present values. However, although cost reductions may exceed generated revenues a negative effect on net operating revenues remains.

6 Analogously we refer to dissynergies also as negative merger related effects throughout the paper.

analysis of different sub-samples as well as the application of different econometric methodologies.

With this paper, we contribute to the strand of post-merger performance literature. While the majority of existing research on banks' post-merger performance focuses on (cost) efficiency and profitability we are the first, to our knowledge, to investigate the implications of mergers for banks' net operating revenues.[7] Based on our finding of negative merger related effects on net operating revenues we propose that previous research fails to find evidence for significant merger related efficiency and profitability gains for banks because any positive effects are offset by the negative merger related effects we find (see e.g. Berger *et al.* (1999)). Furthermore, we are among the first to consider learning effects from repeated involvement in M&A in post-merger performance studies for banks.

The remaining paper is structured as follows: Section 2 provides a brief overview of the most relevant literature on bank M&A and post-merger performance in particular. Section 3 discusses the different factors influencing banks' post-merger top-line performance, categorized into the sources for revenue synergies as well as revenue dissynergies. Section 4 discusses our unique panel data set as well as empirical specifications of the model. Section 5 summarizes the empirical results and highlights the robustness of our findings. Finally, section 6 concludes.

2. Review of empirical literature on post-merger operating performance

Most operating performance studies focus on the post-merger (cost) efficiency and profitability of merging banks compared either to their respective pre-merger performance or the performance of a control group of comparable non-merging firms. These studies vary significantly in terms of observation period, geographic focus, merger size and econometric methodology, but most of them fail to find evidence for significant merger related efficiency gains.

In his extensive review of performance studies Rhoades (1994) concludes that previous findings point to a lack of improvement in efficiency or profitability upon bank mergers and that those findings are robust within studies, across studies and over time. He suggests that

[7] In previous research only Knapp *et al.* (2005) observe merger related effects on revenues and find that merging banks generate less non-interest revenues than their non-merging peers.

banks involved in horizontal mergers – like those we investigate in our study – should most likely benefit from efficiency gains due to savings from closing overlapping branches and, as most other mergers, from combining back-office systems, IT infrastructure and administrative functions. However, no study proves that these in-market mergers are different from other mergers and, hence, that they yield efficiency gains. According to Berger *et al.* (1999) results for post-merger performance of banks are mixed: While early studies that concentrate on scale, scope and product mix efficiencies find that there are no significant efficiencies to be gained and potentially even some scale efficiency losses to be suffered from mergers among large banks, more recent research from the 1990s finds evidence for substantial efficiency gains. Dynamic X-efficiency studies for the 1980s yield results similar to other early studies with on average very little or no X-efficiency enhancements following mergers. Based on their own review of previous literature Amel *et al.* (2004) also find that there is generally only limited evidence of benefits from economies of scope or managerial efficiency gains through M&A, and if so, benefits appear limited in magnitude. They argue that banks face difficulties in improving cost efficiency particularly in Europe due to rigid labor markets, not allowing for layoffs which are the main source for cost synergies in bank mergers. Moreover, they conclude that the benefits from M&A accrue only after a few years as restructuring and integration measures take time to show first results. In the first years restructuring and integration associated costs might offset early gains.

The few existing post-merger performance studies for mergers among German banks arrive mostly at similar results. For example, Lang and Welzel (1999) investigate the size and X-efficiency effects of mergers on costs using a sample of German cooperative banks and find no evidence that ex ante X-efficiency advantages translate into superior performance following the merger, not even if banks merged five or eight years ago. Lang and Welzel (1999) also suggest that pre-merger X-efficiency advantages of acquiring firms do not seem to be the key motive for mergers among German cooperative banks. Similarly, Elsas (2004) proposes that a large number of mergers among savings or cooperative banks in Germany are also a way of preemptive distress resolution. Using the German Central Bank's distress database Koetter *et al.* (2005) find that approximately 10% of bank mergers in the period 1995-2001 were bailouts. In this context the authors also find that merging banks, whether distressed or non-distressed, perform worse than a control group, suggesting that non-distressed mergers may also be motivated by the desire to avoid financial distress and regulatory intervention in the future. Another study by Koetter (2005) evaluates merger

success on the basis of cost efficiency and despite earlier results finds that about every second merger is a success. However, he highlights that this success is limited to a cost efficiency differential of one percentage point between merging and non-merging banks. In the most recent study Georgiev and Burghof (2007) apply a dataset of German savings banks similar to the one used in our study and propose that bank mergers are time-dependent. They show that mergers in the period 1993-1998 underperformed their non-merging peers in terms of both cost and profit efficiency, while mergers in the period 1999-2004 show sustainable efficiency improvements. However, they do not provide any insights on why the post-merger performance differs in the two periods observed.

Generally, results from post-merger performance seem to conflict with the motives publicly stated by banks, motives such as scale and scope economies as well as the improvement of management quality. This could indicate that organizational diseconomies (partially) offset any gains from scale or scope efficiencies. Accordingly, Berger *et al*. (1999) argue that gains can hardly be observed because they may be offset by counteractive effects arising from managerial difficulties due to increased organizational complexity, culture clashes and other integration problems – a case we make for merger related effects on net operating revenues.[8] Because most, if not all, studies reviewed by Rhoades (1994), Berger *et al*. (1999) or Amel *et al*. (2004) focus their research on banks' post-merger profitability using measures such as return on equity or return on assets they provide no indication whether mergers actually fail to produce efficiency gains or whether improvements are achieved but at the same time offset by counteractive effects. Although a number of studies also investigate banks' operating expenses or cost efficiency they still provide only limited insights on why overall profitability does not benefit from mergers (even in the case of actual enhancements to banks' cost structures). For example, in a recent study Beccalli and Frantz (2007) find that mergers are associated with a pronounced enhancement in banks' cost efficiency but simultaneously with a deterioration in profit efficiency, return on equity and cash flow. The authors conclude, but do not provide proof, that merger gains are passed on to customers rather than to banks' shareholders. With this paper, we intend to shed more light on the merger related effects on

8 Amel *et al.* (2004) offer further valid reasons why previous literature fails to prove the benefits of M&A among banks: Firstly, past deals suffered from stricter regulation. Secondly, improvement of efficiency is difficult to measure due to the lack of clear-cut results of the effects of M&A. Thirdly, there is a significant time lack between the transaction and the actual realization of respective benefits which are not covered by studies that analyze the effects only in the years immediately following a merger. Finally, M&A may not be driven by efficiency motives but also by non-value maximizing motives such as managerial hubris.

banks' revenues and whether potentially negative merger related effects on banks' revenues are responsible why previous studies fail to show efficiency and profitability gains from bank mergers. We are among the first to investigate the impact of bank mergers on merging banks' net operating revenues. So far, only Knapp *et al.* (2005) consider merger related effects on revenues and find that merging banks generate less non-interest income than their non-merging peers.[9] They show that non-interest income measured as percentage of total assets declines further relative to the industry in all five post-merger years observed. We substantially extend the scope of investigating merger related effects on banks' revenues by including both net interest and net non-interest revenues, the former accounting for approximately 80% of total net operating revenues in the case of German savings banks.

3. Influencing factors on post-merger net operating revenues of banks

Motivated by the failure of previous research to find evidence for gains from mergers among banks, we investigate the impact of mergers on banks' net operating revenues. Thereby we suggest two counteractive merger related effects on banks' net operating revenues, namely revenue synergies and revenue dissynergies. While revenue synergies describe merger related gains made available through the transaction, revenue dissynergies pose potential losses caused solely by the merger or the combination of two or more banks.

Revenue synergies can be realized from a number of different sources: First, banks aim to increase sales volumes by cross-selling the products of one bank to the other bank's customers, and vice versa (Linder and Crane (1992)). Second, merging banks are able to enhance the diversification of their loan portfolios as well as to overcome regulatory lending limits, hence, allowing them to expand their lending activities in terms of both volumes and average loan amounts. Among practitioners overcoming limits to banks' lending activities is often cited as a key motive for mergers especially among smaller regional banks. Third, banks may benefit from a strengthened competitive position in certain product categories and regions. Fourth, the transfer of best practices especially in the area of sales and marketing helps banks to improve their customer targeting and product pricing strategies (Linder and

9 There is a strand of literature that focuses on the effects of bank mergers on deposit and loan prices which they explain with merger induced changes to the respective market's competitive structure. Prager and Hannan (1998) and Focarelli and Panetta (2003) find that interest paid on deposits decrease in the aftermath of mergers due to increased market concentration. Results for loans are mixed. For a literature overview and detailed analyses for the German case see Fischer (2005).

Crane (1992)). Fifth, access to new customer groups and new geographical markets allows banks to expand beyond existing markets. Furthermore, merging banks might also be able to reduce their funding costs by improved access to money markets as well as less external funding requirements through use of potential cash and deposit surpluses from the other bank (Linder and Crane (1992)). Changes in funding costs are reflected in interest expenses as part of net interest revenues and, hence, affect net operating revenues.

Although the sources for revenue synergies hold true for mergers among regional banks in general they are not fully applicable in the case of German savings banks. For example, the potential for cross-selling is very limited because German savings banks all operate on the basis of the same business model and very similar product portfolios. Furthermore, the so-called regional principle ("Regionalprinzip") stipulates by law that each savings bank must not conduct business outside its defined business area.[10] Hence, mergers among savings banks should have almost no effect on the local market concentration and the merging bank's market position. Also, the transfer of best practices is already being facilitated in light of the cooperation among savings banks formally established by their mutual membership in the German Savings Banks Association and respective regional savings banks associations. Finally, the regional principle also limits the further regional expansion beyond the borders of the combined business district of merging banks. Continued regional expansion is only feasible by ways of further mergers. Koetter (2005) suggests that the regional principle imposed for by German regulation also limits the potential for diversification benefits due to continued regional concentration and exposure to local economic conditions.

In terms of revenue dissynergies we regard the following as circumstances that may negatively affect banks' net operating revenues in the post-merger period: First, merger activity comprising mainly of the transaction execution and subsequent integration may (temporarily) distract managers from effectively managing bank's day-to-day operations, which would adversely affect banks' productivity and, hence, sales performance. Berger *et al.* (1999) also suggest downsizing and culture clashes as potential triggers for business disruptions and, thus, reasons for inferior operating performance. According to Pilloff (1996) the effort required for merging two institutions may be costly and difficult to the extent that

[10] The objective of the regional principle is to ensure that also rural and economically weak areas in Germany are supplied with financial services (see Koetter (2005)). The regional principle applies to savings and cooperative banks in Germany but not to private sector institutions.

any benefits to consolidation may even be lost. Second, with increasing size and organizational complexity management's abilities to monitor the bank's business may also become less effective. Caves (1989) uses the term "managerial transaction costs" for this phenomenon and highlights that this possible source of inefficiencies from mergers has not been documented in the research literature. Third, as banks grow they are less able to reap the benefits of relationship banking, which is typically regarded as a strength of small banks. Especially in the course of mergers and acquisitions, banks' growth is often accompanied by streamlining of branch networks eliminating regional proximity to customers and therefore the basis for relationship banking. Berger *et al.* (2005) and Bloch and Vins (2008) explain how bank size (and respective changes to bank size through M&A) determines the bank's ability to conduct relationship banking and, hence, the bank's lending and funding activities, respectively. Fourth, as Linder and Crane (1992) propose, merging banks tend to lose assets and deposits to competing banks. Customers are more likely to switch banks following a merger because often mergers are accompanied by potential inconveniences for customers such as the uncertainty of future service levels, the reduction of the number of (local) branches and the requirement for customers to change their account details. The loss of customers would primarily affect revenues while costs would remain fairly constant, at least in the short-term. There is a wide literature, mainly in the areas of marketing and industrial economics that explores the impact of switching cost on bank-customer relationships.[11] Generally, a customer only switches providers if the expected benefit (e.g. lower service charges, higher deposit interest) from switching banks is higher than the switching cost. In the case of mergers associated inconveniences can pose substantial costs for the customer that may at least partially offset the benefits from the existing bank-customer relationship.

The extent to which synergies are realized (or dissynergies are avoided) also depends on the experience the merging banks have in executing transactions and integrating new businesses. DeLong and DeYoung (2007) suggest that banks learn to better plan and execute mergers by repeatedly participating in transactions as well as by observing the successes and shortcomings of other mergers. DeYoung (1997) confirms that acquiring banks with recent experience in M&A are more likely to produce post-merger cost efficiency gains. Contrarily, DeLong and DeYoung (2007) do not find empirical evidence for effects from learning-by-

[11] For a general overview see Klemperer (1995).

doing but, interestingly, find that merging banks rather learn by observing other recent mergers.

4. Empirical specifications

Description of data set

Our analyses are based on a proprietary data sample provided by the German Savings Banks Association comprising detailed financials of German public savings banks for the period from 1994 until 2006. At the end of 2006 there were 457 savings banks in Germany for all of which annual records for each year of the observation period are included in the sample. For each bank and year we have added data on the regional economic environment as well as the local market concentration. The data set is unique because it includes all savings banks active in Germany. In comparison, BvD's BankScope only covers approximately 80% of the savings banks in terms of total assets and number. Also, contrary to general accounting practice balance sheet data in our data set is based on arithmetic averages of monthly balance sheets. This poses a more realistic picture of the actual balances of the different asset and liability accounts throughout the respective year. Furthermore, our sample contains operating statistics such as the number of employees and branches per bank as well as a complete list of mergers and acquisitions among savings banks all of which are not publicly available.

For several reasons savings banks in Germany pose a very interesting subject for economic research. First, besides the cooperative banks savings banks have been responsible for the majority of mergers and acquisitions among banks in Germany, accounting for 212 mergers between 1994 and 2006 while reducing the number of savings banks from more than 700 at the beginning of 1994 to less than 460 at the end of 2006 (see Panel A in Table 3). Second, together with cooperative banks savings banks are still the dominant provider of credit and banking services to individuals and small and medium sized enterprises in Germany, accounting for approximately 40% of assets in the banking system. Third, savings banks follow what is known as the "regional principle", i.e. each institution exclusively serves a well defined and separated regional business area that often corresponds to one of the 440 administrative districts in Germany. This allows us to account for the local rather than national market concentration and economic environment. Moreover, due to the regional principle consolidation among savings banks does not induce changes in market power and subsequently operating performance of non-merging banks. This is argued to be one of the

problems of studies using sample groups of merging and non-merging banks operating in the same region (see Amel *et al.* (2004)). Fourth, all banks operate based on the same business model and an almost identical product offering. Fifth, all banks use the same accounting and reporting principles and almost all operate on the basis of the same legal foundation. Finally, all savings banks are independent institutions with their own business strategy and operational setup. As a result, these banks form a large group of highly comparable but independent entities – an ideal setup to analyze the implications of mergers as well as different bank and market characteristics with econometric models.

The data set contains all German savings banks that were active at the end of 2006. Financials are available on a pro forma adjusted basis that accounts for mergers and acquisitions. Thereby financials of acquiring and acquired banks have been consolidated over the whole observation period as if the merging banks have always operated as one entity. Hence, contrary to general accounting practice financials have not only been consolidated in the period following a merger but also in the years prior to the actual transaction.[12] Berger and Humphrey (1992), Linder and Crane (1992), Rhoades (1993) and Elsas (2004) use a similar approach in their respective post-merger operating performance studies.

The list of mergers and acquisitions among savings banks comprises details on timing and parties involved for each transaction. The data set contains 212 mergers in the period from 1994 to 2006 for which financials for an average post-merger time of 6.7 years are available.

Economic data was provided by the German Statistical State Offices. Information on market concentration is based on regional bank branch statistics provided by the German Central Bank. The economic data and the concentration measures are reported on the level of the respective administrative districts ("Landkreise" and "kreisfreie Städte") the bank is headquartered in. Germany comprises of 440 such administrative districts. Thomson Financial's Datastream is used to obtain interest rate data.

Descriptive statistics of the data applied in our empirical analysis are provided below following the introduction of the empirical model and variables.

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[12] Elsas (2004) points out that the approach of consolidation of balance sheet data by backwards aggregation dilutes merger related effects in case of subsequent mergers because financials of banks absorbed by subsequent mergers are included in consolidated financials already at the time of the first merger. In line with Elsas (2004) we argue that this problem is only relevant for a small sub-sample of our data; in our sample only 34 banks are repeatedly involved in mergers. Our robustness tests show that results remain unaffected even when excluding banks repeatedly involved in M&A.

Empirical model and variables

In this paper, we investigate whether banks' involvement in mergers and acquisitions has an impact on their net operating revenues.

The general form of the models we propose is as follows:

$$NOR_{i,t} = c + \alpha_i + \upsilon_t + \sum \beta_\tau M\&A activity_{i,\tau} + \sum \beta_\tau (M\&A activity_{i,\tau} \cdot M\&A expertise_{i,\tau}) + \sum \beta_k BS_{k,i,t} + \sum \beta_l LMC_{l,i,t} + \sum \beta_m LE_{m,i,t} + \varepsilon_{i,t}$$

The dependent variable is net operating revenues (NOR, i.e. net interest and net non-interest revenues before deduction of any operating expenses) for which we use three different measures.[13] First, we measure net operating revenues as the (logarithm of) absolute operating revenues (*Ln(Net Operating Revenues)*) in order to evaluate whether the level of revenues is affected by merges. Second, we include *Net Operating Revenues per Employee* as dependent variable to investigate whether potential merger related changes are a result of layoffs or changes to employees' productivity.[14] Third, we measure *Net Operating Revenues as % of Total Assets* to observe revenues in relation to overall bank size and, hence, to account for potential restructuring measures such as downsizing or disposals. Furthermore, the use of different measures for net operating revenues as our dependent variable verifies the robustness of our findings.

The key right hand side variables include dummy variables indicating when the respective bank was involved in a merger (M&A activity) as well as interaction terms that account for whether banks possess expertise in M&A from involvement in earlier transactions at the time of the respective current transaction (M&A activity · M&A expertise). In our empirical model we include several additional variables to control for bank specific characteristics (BS), local market concentration (LMC) and the local economic environment (LE) of each bank. Furthermore, using fixed effects regression models we implicitly control for time-invariant fixed effects for each bank in the sample (α). As suggested by Wooldridge (2002a) we also

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13 In further tests we also apply the same model setup to different measures of operating income as dependent variable. Furthermore, in robustness checks we re-design this model as dynamic model by including lags of the dependent variable on the right hand side of the equation. Because we arrive at consistent results we do not further report details on the model setup for conciseness reasons.

14 We use absolute net operating revenues per employee instead of its natural logarithm because this variable is already scaled by the number of employees to reflect different sizes across banks. However, in a robustness check we also include the natural logarithm of net operating revenues per employee and arrive at consistent results.

include dummy variables for each year in the observation period to account for secular changes that are not being modeled (υ). The constant term is represented by c. Table 1 provides an overview of variables included as well as their respective calculation. Below we discuss the rationale for the inclusion of selected variables in more detail.

In order to investigate the impact on net operating revenues from M&A activity we introduce a dummy variable that takes the value 1 if the respective bank is involved in a merger or an acquisition in the respective year (M&A activity; $\tau = t$).[15] The longer term impact of M&A is accounted for by the inclusion of lagged M&A activity dummy variables, one for each of the last four years ($\tau = t - 1$; $\tau = t - 2$; $\tau = t - 3$; $\tau = t - 4$) and one for M&A involvement in any year before that ($\tau < t - 4$) (for example, see Berger *et al.* (1998), Focarelli *et al.* (2002) and Elsas (2004)). For our analyses we choose a comparatively long explicit observation period as previous literature finds that merger benefits only emerge fully after some time (see Amel *et al.* (2004) for an overview). The reference group of observations for our M&A dummy variable comprises implicitly all observations of banks that have not been involved in M&A throughout the observation period and observations of pre-merger years of merging banks. The control group does not include any observations of banks that have been involved in M&A in any previous year of the observation period. This is in line with Calomiris (1999) who suggests that the inclusion of observations of post-merger years into the control group limits the time horizon of gains and can lead to substantial underestimation of the gains from mergers.[16] We also introduce a M&A expertise dummy variable that takes the value 1 in all years following the first M&A transaction of the respective bank (M&A expertise).[17] In our model we capture the effects from banks' experience in executing mergers through the inclusion of an interaction term (M&A expertise · M&A activity). Coefficient estimates for this interaction term are interpreted as the average effect on net operating revenues for those merging banks that exhibit M&A experience from previous involvement in M&A.

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15 Multiple transactions in any one year or single transactions with multiple parties involved are treated as one transaction since annual data is used for post-merger performance evaluation (see Linder and Crane (1992)).

16 Also see Calomiris (1999) for a detailed discussion of the construction of counterfactuals in post-merger performance analyses.

17 Our M&A expertise measure does not account for more frequent M&A activity because in our sample only 8 banks have been involved in more than two transactions during the observation period. Furthermore, due to the limited number of banks frequently involved in M&A we also do not account for the time passed between the first and subsequent transactions. Furthermore, one weakness remains that we cannot account for expertise gained in mergers before 1994 due to data constraints. Technically, in our analysis banks are only able to gain transaction experience from 1994 onwards.

In order to account for further determinants of net operating revenues we control for bank specific characteristics. We include bank size (*Ln(Total Assets)*) to control for size specific effects such as economies of scale. Focarelli *et al.* (2002) also include bank size to control for size effects and to account for size specific cost and revenue structures. However, they do not include any other bank specific control variables. We account for the bank's cost structure (*Operating Expenses / Total Assets*) as suggested by Rhoades (1994) to control for changes in product mix that would convert interest expenses into non-interest expenses without changing the overall bank's efficiency. For example, in the context of post-merger cost efficiency gains he argues that banks lose out on relatively cheap deposits upon branch closures designed to cut non-interest expenses but at the same time they are required to replace lost deposits with more expensive money market funding, the latter of which is reflected in interest expenses and may offset savings in non-interest expenses.[18] The revenue share from non-interest bearing products (*Non-Interest Revenues / Operating Revenues*), the loan portfolio share of corporate loans (*Corporate Loans / Total Loans to Non-banks*) and the extent to which the bank pursues lending business (*Loans / Total Assets*) are included to control for the bank's business focus and product mix as well as the credit risk inherent in the bank's business. The equity ratio (*Equity / Total Assets*) is used to account for the capitalization of the respective bank which we use as proxy of the risk aversion of the bank's management. We propose that the equity ratio increases with management's risk aversion. In terms of its impact on net operating revenues we assume that risk averse management teams do not take on as many risky projects (e.g. loans) as risk-seeking management teams would do, hence, they generate comparatively less (non-risk adjusted) revenues.

In line with Berger *et al.* (1999) we consider market concentration on a local bank market level (*Local HHI*) given that markets for most retail products are local.[19] We control for market power but do not assume major shifts in local market concentration from mergers in our sample as German savings banks by law operate in proprietary, non-overlapping local markets. As data for total assets, loan and deposit volumes is not available on a regional level for all (especially private) banking groups, we determine the local market concentration as the

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[18] However, at the same time Rhoades (1994) acknowledges that changes in product mix do not necessarily occur upon mergers and that most banks plan branch closures to minimize deposit losses. Hence, we expect product mix effects to be limited.

[19] US studies focus on local bank markets analogous to US policy guidelines for merger approval processes and also because research finds that both households and small businesses almost always choose banks that are present nearby (see Kwast *et al.* (1997) and Kwast (1999)).

Hirschman-Herfindahl-Index on the basis of individual banks' market shares calculated as the number of own branches in each administrative district over the total number of bank branches in the respective district (see Fischer and Hempell (2006)). We assume that revenues increase with market concentration because savings banks in Germany hold a dominant market position in higher concentrated, typically rural, local bank markets. In rural areas savings banks and cooperative banks are often the only banks present while private banks maintain branch networks merely in urban or more densely populated areas.

In terms of macroeconomic factors we control for the average interest rate level (*Interest Rate*) and the bank's ability to benefit from term transformation (i.e. funding long-term loans with short-term deposits while maximizing the average interest spread) approximated by the slope of the yield curve (*Yield Curve Slope*). Factors that describe the regional economic environment are only used for robustness checks due to their high correlation with either bank size or local market concentration.

Descriptive statistics

Descriptive statistics are structured as follows: Table 2 presents the development of the overall savings banks sector in Germany as well as individual bank and local market characteristics overall and on a per year basis. Table 3 provides an overview of the merger activity among German savings banks during the period from 1994 to 2006.

Panel A of Table 2 outlines the development of the overall savings banks sector as well as of the average savings bank. During the observation period from 1994 to 2006 the total number of savings banks, the number of employees as well as the number of bank branches has declined substantially while the size of the German savings banks sector measured in total assets has increased by almost 25% to EUR 925 billion in 2006.[20] On average, banks have grown by almost 2% per annum while net operating revenues have stagnated over the same period. Revenues did not grow in line with overall bank assets because of the ongoing margin erosion in German banking driven by intensifying competition. Moreover, the flat yield curve in recent years has limited banks' ability to benefit from term transformation. The strong growth in operating revenues per employee was driven by the reduction of employees rather than by growth in revenues. The reduction in personnel accelerated only after the stock

[20] Absolute values in EUR are presented at 2000 prices in order to account for inflationary effects.

market downturn in 2002 representing the drive for efficiency enhancements among German banks. Generally, savings banks' cost base measured as *Operating Expenses / Total Assets* decreased over the years from 2.2% in 1994 to 1.9% in 2006. Another important development is the increasing share of non-interest revenues as part of total operating revenues from 15% in 1994 to 22% in 2006. Both, a relatively flat interest rate yield curve reducing net interest revenues as well as the increased importance of non-interest bearing products are responsible for this development. Panel B of Table 2 presents means as well as 25% and 75% percentiles for observations of all banks for the years 1999 to 2006.[21]

Table 3 depicts the M&A activity among German savings banks. Panel A describes the decline in the number of savings banks in Germany which can be fully attributed to M&A activity. The number of savings banks dissolved through M&A is not equal to the M&A activity among savings banks because some M&A transactions involve more than two savings banks, also some savings banks were involved in more than one transaction in any one year which we do not account for in our analysis. Almost one third of mergers took place in 1994 and 1995 and was conducted mainly among East German savings banks because of adjustments to the border lines of administrative districts in East German states following the German unification (see Georgiev and Burghof (2007)). A larger number of savings banks dissolved also in the years 2001 to 2003. Panel B presents a break down of how many savings banks have been involved in M&A once or repeatedly. Out of a total of 457 savings banks 300 banks have not been involved in M&A during the observation period, 123 banks have been involved once while 34 banks have been involved two or more times. The savings bank in Dresden and her predecessors have been most active in M&A and have been involved in M&A in six years of the observation period.

5. Empirical results and discussion

In this section we investigate how bank mergers affect merging banks' net operating revenues. In a first step, we compare the differences in means of net operating revenues between merging and non-merging banks in the years following the merger. In a second step, we estimate merger related effects on net operating revenues using the fixed effects regression

[21] Please note that descriptive statistics in Panel B of Table 2 are based on observations for the years 1999 to 2006. This is in analogy to our main regression analysis which only accounts for observations in these years because up to five years of observations are dropped because of the inclusion of the dummy variables that account for banks' merger involvement in at least the last five years.

model laid out above. Moreover, we extend our regression analysis and analyze the effects of M&A expertise from merging banks' repeated involvement in transactions on net operating revenues. We discuss our results based on analyses using different measures of net operating revenues as dependent variables, different sub-samples of our dataset and also estimate merger related effects on net operating revenues in a dynamic model to confirm the robustness of our findings.

Impact of mergers on banks' net operating revenues

As part of our analysis of differences in means we compare the average development of net operating revenues of merging banks in the merger year and up to four years thereafter to the simultaneous average performance of the 300 savings banks not involved in M&A during the observation period. For our analysis of average post-merger performance we use an index with the pre-merger year as base year in order to ensure equal weighting of effects at banks of different sizes. Moreover, we use a *t*-test to show whether both merging and non-merging banks perform significantly different from each other. Table 4 depicts the performance of net operating revenues. The development of net operating revenues measured in absolute terms suggests that revenues at merging banks grow slightly slower compared to non-merging banks. Nevertheless, performance differences are only statistically significant in the merger year and the first two post-merger years. In the years thereafter merging banks still exhibit an inferior performance, however, results are not statistically significant, i.e. performance differences are not significantly different from zero. Based on net operating revenues per employee and net operating revenues as percentage of total assets merging banks perform slightly worse than non-merging banks, however, only in the year of the merger differences are statistically significant. In the immediate post-merger years merging banks' revenues grow in line with non-merging banks. However, in the third and fourth post-merger years merging banks outperform banks not involved in mergers in terms of revenue growth. Results suggest that, although merging banks experience an inferior performance immediately after the merger, they outperform non-merging banks in the long-run. Overall, our differences in means analysis suggests that negative merger related effects on merging banks' revenues are only temporary in nature and that over time revenue synergies outweigh potential revenue dissynergies.

For our regression analyses we make full use of our panel data set and apply fixed effects regression models in order to allow for unobserved time independent effects. We argue that it

is reasonable to assume that unobserved characteristics that are individual for each bank in the sample influence the bank's business and, thus, its individual ability to generate operating revenues. Specifically, we use the so-called fixed effects transformation (or within transformation) that uses time-demeaned dependent and independent variables in order to eliminate the unobserved fixed effect in a first step. In a second step the model is then estimated using pooled OLS regression.[22]

Table 5 presents the effects of banks' M&A activity on their net operating revenues. In Panel A *Ln(Net Operating Revenues)* is regressed on our M&A activity dummy variables and control variables for bank specific characteristics, market concentration and the local economic environment.[23] [24] In Panel B and C the same model setup is used in regressions with *Net Operating Revenues per Employee* and *Net Operating Revenues as % of Total Assets* as dependent variables, respectively.

Across our three different measures of net operating revenues the immediate effects from mergers are negative and both economically and statistically significant. In the first years following a merger, banks experience a negative impact on net operating revenues of EUR 3,000 to EUR 3,500 per employee. For the average merging savings bank with approximately 820 employees this translates into a decrease in net operating revenues of EUR 2.5 to EUR 2.9 million per year post-merger. This compares to an average operating income of EUR 39 million before loan loss provisions and write-downs or EUR 16 million after loan loss provisions and write-downs for merging banks in their pre-merger year, respectively. The significant negative merger related effects do not only persist in the year of the merger but also for the three years following the merger. In the fourth year following the merger net operating revenues remain negative, although only the results for *Ln(Net Operating Revenues)* and *Net Operating Revenues per Employee* remain statistically significant at the 10% and 5% levels, respectively. The magnitude of revenue dissynergies decreases over time.[25] For *Ln(Net*

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[22] The fact that the sample of banks used in our analysis is not a random draw but represents all existing savings banks in Germany does not suggest the application of random effects regression (see Wooldridge (2002b)).

[23] We use logarithmic transformation for the absolute value of net operating revenues to achieve a normal distribution of the dependent variable as well as for interpretability purposes (see Wooldridge (2002a)).

[24] Please note that regression output for all regressions shown in Tables 5, 6 and 7 is based on observations only for the years 1999 to 2006 because five years of observations are dropped because of the inclusion of the dummy variables that account for banks' merger involvement in at least the last five years. The step-wise inclusion of the M&A activity dummy variables and, hence, the step-wise shortening of the observation period leads to consistent results.

[25] The magnitude of the negative effects in the merger year is lower than in the year thereafter because mergers are effected throughout the year and not necessarily on January 1. Hence, negative effects included in the merger year on average do

Operating Revenues) and *Net Operating Revenues as % of Total Assets* the magnitude of the negative effects from M&A starts to decrease in the second year following the merger, compared to the fourth year for *Net Operating Revenues per Employee*. Based on these results we propose that some of the negative merger related effects are temporary in nature. For example, after the completion of the merger and the subsequent integration management is not any longer distracted and is able to refocus on the bank's day-to-day business. Moreover, once management gains experience in managing the enlarged organization the negative effects from increased organizational complexity can be (partially) overcome. In the fifth year after the merger and the years thereafter, mergers even have a positive impact on net operating revenues, although only statistically significant at the 10% level for net operating revenues per employee. Hence, banks seem to benefit from mergers in the long-run suggesting that merger related gains, e.g. revenue synergies, require time to become visible as Amel *et al.* (2004) propose. The late emergence of merger gains is also the consequence of the negative effects offsetting the positive effects in the immediate post-merger period.

For savings banks which generally do not offer much potential for synergies the merger related effects on net operating revenues persist and are not offset by efficiency gains or other cost improvements and, hence, also have a negative "bottom-line" impact. Table 6 outlines the regression results for different measures of operating income before loan loss provisions, depreciation and amortization. Other profit measures lead to similar results but are not reported for reasons of brevity. For mergers among banks other than those observed in this study it remains to be shown whether negative effects on revenues can be offset by efficiency gains or cost cutting. Nevertheless, negative merger related effects on net operating revenues pose an alternative explanation for previous literature failing to provide consistent evidence for efficiency gains from M&A.

In all regressions we control for bank specific characteristics, local market concentration and economic factors. Results for bank size (*Ln(Total Assets)*) differ across measures for net operating revenues: Intuitively, *Ln(Net Operating Revenues)* increases with bank size (Table 5, Panel A). *Net Operating Revenues per Employee* and *Net Operating Revenues as % of Total Assets* decrease with bank size (Table 5, Panel B and C). We explain the negative impact on these measures of net operating revenues with higher staffing requirements for back

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not account for a full year but rather a shorter period. In contrast, the negative effects in the first post-merger year and the years thereafter account for full year periods.

office and administrative functions in larger banks. Moreover, increased organizational complexity leads to the need for additional layers of management and potentially also results in less effective management and, thus, to inferior employee productivity. Net operating revenues decrease with increasing *Non-Interest Revenues / Operating Revenues* for all measures of net operating revenues as dependent variable. We propose that non-interest business is generally a higher margin business than the lending and deposit taking business. In order to grow profits banks need to generate fewer revenues from non-interest business than they would need to from interest business. Furthermore, interest revenues from lending include a risk component that is usually not included in revenues from provision or fee revenues. Coefficients for *Operating Expenses / Total Assets* show positive signs for *Ln(Net Operating Revenues)* (Table 5, Panel A) and *Net Operating Revenues as % of Total Assets* (Table 5, Panel C) and are statistically significant. In line with Rhoades (1994) we explain this with different product mixes at individual banks. Some banks maintain extensive (costly) branch networks enabling them to access funding through deposits which is generally cheaper than money-market funding and, hence, increases net interest revenues. In contrast, banks with relatively smaller branch networks exhibit lower operating expenses but higher interest expenses due to relatively more expensive money market funding required in the absence of (sufficient) deposits. Alternatively, the more banks invest in personnel and marketing the more revenues they should be able to generate. In Panel B of Table 5 operating expenses show a negative sign because revenues per employee decrease with an increasing number of employees.[26] In line with expectations, *Loans / Total Assets* show a positive sign because the return (interest income) on loans is higher than on any of the other earning assets of savings bank. We also include *Loans / Total Assets* as a proxy for the credit risk inherent in the bank's business. Since banks adjust loan interest rates for credit risk, the higher the credit risk inherent in loans the higher the interest revenues. We explain the positive sign of *Corporate Loans / Total Loans to Non-banks* with considerably higher loan and non-interest business volumes from corporate customers compared to retail customers. The negative relation between operating revenues and the *Equity / Total Assets* suggests that a bank with more risk averse management takes on less or at least less risky business which is line with our expectations. In our robustness tests we also control for total asset growth in order to account for the pace of banks' growth, and the availability of deposits measured as percentage of total

[26] Operating expenses are correlated with the number of employees because personnel expenses account for approximately 60% of operating expenses.

assets to control for changes in funding mix due to loss of deposits in the aftermath of branch network consolidation (see Rhoades (1994)). Both variables do not show significant results and, thus, are not reported.

Our regression results show that *Local HHI* has a positive influence on net operating revenues. In Germany, savings banks hold leading market positions in concentrated, typically rural, areas and often are one of just two banking groups present locally. Because savings banks seem to be able to extract extra returns from their strong position in concentrated markets, market concentration is positively related with net operating revenues.[27] In terms of the macroeconomic environment, the *Yield Curve Slope* has a positive influence on revenues indicating that the bank's ability to benefit from term transformation increases with an increasing spread between short-term and long-term interest rates. The negative sign for *Interest Rate* is contrary to our expectations, however, we propose that savings banks developed strongly in the phase of declining interest rates, hence, we observe a negative sign. In our robustness checks we replace our market concentration measure and include GDP per inhabitant and the population density, both of which are highly correlated with our market concentration measure. Furthermore, we control for stock market performance which is highly correlated with our interest rate variable. All variables lead to consistent results but are not included in the regressions reported because of their correlation with other control variables.

Generally, control variables are regularly statistically significant, their signs are as expected and the coefficients do not vary across different model specifications.

The role of banks' expertise from previous involvement in M&A

In line with DeYoung (1993) we suggest that experience effects exist if banks are repeatedly engaged in mergers. Accordingly, in Table 7 we extend our analyses to investigate learning effects in M&As through banks' previous involvement in M&A. For *Net Operating Revenues per Employee* we find a positive influence on revenues if the respective merging bank has previously been involved in at least one transaction during the observation period 1994 to 2006.[28] In terms of their statistical significance results become clearer if we exclude banks not

[27] We do not separately investigate the impact from mergers on market concentration and respective banks' market shares because German savings banks by law operate exclusively in non-overlapping business districts and therefore we expect mergers not to have significant effects on the competitive environment.

[28] For conciseness reasons we only report regression output for operating revenues per employee as dependent variable. However, alternative measures for net operating revenues lead to consistent results.

involved in M&A during the observation period (Table 7, Panel B) and those that engaged in a merger only once (Table 7, Panel C) from the full sample (Table 7, Panel A). While in Panel A experience effects are significantly different from zero at the 10% level only in the merger year, Panel B and Panel C report significant experience effects for up to one and four post-merger years, respectively. We argue that this is the case because of the only small number of banks (34) that are repeatedly involved in mergers compared to 423 banks that are involved in a maximum of one transaction. Results become more visible once the full sample is narrowed down, i.e. banks repeatedly involved in M&A are compared to a smaller control group.

A comparison of the magnitude of negative merger related effects and the impact of experience suggests that banks repeatedly involved in M&A are able to avoid merger dissynergies to a large extent. However, experienced banks are not able to fully offset negative merger related effects. Furthermore, we observe that coefficient estimates for the M&A activity dummy variable increase in magnitude once we include the *M&A expertise * M&A activity* interaction term. This suggests that negative merger related effects at banks involved in M&A only once are economically even more pronounced than initially suggested.

Generally, coefficients of control variables show results that are consistent in terms of direction, magnitude and significance with those from our initial model setup accounting for M&A activity only.

Further robustness tests

In order to highlight the robustness of our findings we apply our main regression analysis to a number of sub-samples of our data set. In a first test, we exclude all banks from our sample that are not involved in any M&A activity during the observation period. Thereby we show that negative effects on net operating revenues are not driven by the possibility that merging banks generally show an inferior performance compared to non-merging banks. In a second test, we exclude all banks with multiple M&A involvement during the observation period in order to avoid an overestimation of the revenue dissynergies through overlapping effects from different mergers. This is in line with Rhoades (1994) who argues that one of the shortcomings of earlier post-merger operating performance studies is that during the post-merger period operating performance might not only be affected by the merger itself but also by other factors such as repeated mergers. Another reason why we exclude banks that are repeatedly engaged in M&A lays in the way we aggregate financials of merging banks in our

data sample. The consolidation of financials of merging parties over the whole observation period, i.e. even in the years prior to the merger, results in merger related effects being diluted if a bank is involved in a subsequent merger, because at the time of the first merger the financials of banks actually integrated at a later stage have already been consolidated (see also Elsas (2004)). The robustness tests using sub-samples based on banks' involvement in M&A are presented in Table 7 for *Net Operating Revenues per Employee* as dependent variable.[29] In another test, we review the definition of our M&A activity dummy variable that reflects whether a savings bank was involved in M&A in a respective year but does not account for the number of transactions in any one year. We examine the post-merger effects on net operating revenues for banks that merged with more than one other bank in any one year and find that those banks do not perform worse than those involved in one single merger in any one year. This is contrary to Srinivasan and Wall (1992) who show that mergers with more than two banks are more complex and costly mainly because the control of expenses becomes more difficult with an increasing number of involved parties or multiple simultaneous transactions. In further tests we re-run our main regression using samples of different time horizons, bank size classes as well as East and West German savings banks separately and arrive at consistent results.

In terms of the effects of bank size we also investigate whether merger related effects are dependent on the relative size differences between merging banks. Thereby we, first, define mergers in which the larger bank is not at least 25% larger than the smaller bank as mergers of equals. Furthermore, we include interaction terms between different acquirer and target size quartiles. In a final check we exclude all mergers in which one merger partner is smaller than 20% of the total assets of the largest participating bank. In all tests we arrive at results that are consistent with those presented above.

According to Elsas (2004) and Koetter *et al.* (2005), a non-negligible share of mergers among savings banks and cooperative banks are motivated to pre-emptively resolve financial distress. In order to account for the possibility that our findings are driven by an inferior post-merger performance of mostly distressed banks we control for the likelihood of a merger being motivated by imminent distress. Because we do not have information on the financial strength or the probability of distress of the banks participating in mergers on a pre-merger stand-alone

[29] We do not report other robustness tests (e.g. those for our other two measures of net operating revenues as dependent variable) for conciseness reasons. However, results are available on request from the authors.

basis we define a M&A activity and distress interaction term as the product of the M&A dummy variable and the relative frequency of distress cases among savings banks in the respective year. Once we include the interaction term in our regression analysis coefficient estimates for the M&A activity indicate that negative merger related effects are generally only temporary and do not persist over time: For our measures *Net Operating Revenues as % of Total Assets* and *Ln(Net Operating Revenues)* dissynergies now only emerge in the merger year and the first post-merger year. The former measure for net operating revenues exhibits positive and significant merger related effects in the fourth and any subsequent post-merger year. Coefficient estimates for the M&A activity dummy variable in all other years are not significantly different from zero. For our interaction term between M&A activity and the frequency of distress among savings banks coefficient estimates are negative and statistically significant also in the years two to four following the merger suggesting that indeed some of the negative merger related performance can be explained by the inclusion of distressed mergers in our data sample. Only for *Operating Revenues per Employee* as dependent variable the coefficient estimates for the interaction term are positive and statistically significant which we explain with an accelerated reduction of the number of employees at the potentially distressed bank following the merger. Overall, negative merger related effects occur irrespective of the merger motive, however, negative effects are more likely to persist in the case of distress mergers.

Finally, in order to account for the fact that merger related effects on banks' net operating revenues are not realized instantaneously but over time we also conduct a dynamic analysis and therefore include lags of the dependent variable (see Elsas (2004)). Because in this dynamic setting our initial fixed-effects regression model is biased we apply the dynamic panel data estimator using General Method of Moments (GMM) developed by Arellano and Bond (1991). Generally, results from the dynamic panel regression confirm negative merger related effects. Revenue dissynergies are statistically significant in the year of the merger and the first year thereafter, in the years two to four following the merger the coefficient estimates of the M&A activity dummy variable remain negative, however, are not statistically significant. In the subsequent post-merger period the coefficient estimate is positive, but again not statistically significant.

6. Conclusion

In this paper we present robust empirical evidence for revenue dissynergies as a consequence of mergers among savings banks in Germany. Negative merger related effects do not only emerge in the year of the merger or the first post-merger year but persist for up to four years following the merger. Furthermore, the effects are not offset by cost synergies or post-merger efficiency improvements and, hence, fully impact bank's net operating income. Only after four years following the merger positive merger related effects become visible, suggesting either that revenue synergies take time to materialize or that dissynergies offset most of the synergistic effects in the immediate post-merger period.

We suggest that the observed revenue dissynergies from bank mergers are a result of increasing organizational complexity which makes it more difficult for senior management to effectively manage and control day-to-day operations. Furthermore, the merger process as well as the post-merger integration may temporarily distract managers from day-to-day operations reducing overall productivity and potentially leading to the loss of customers. Our robustness tests also suggest that some of the negative effects in the second, third and fourth year after the merger may be driven by mergers that were entered into as a preemptive move to resolve distress of one of the participating banks which poses a key motive for mergers among savings banks in Germany. Anecdotal evidence confirms both our finding of negative merger related effects as well as what we propose as the reasons for this inferior performance.

Besides revenue dissynergies from mergers we also find positive learning effects from banks' repeated involvement in mergers. M&A experience from banks' previous involvement in mergers helps these banks to substantially reduce negative merger related effects on net operating revenues in future deals. However, revenue dissynergies cannot fully be offset by experience.

With yet another study proposing (at least temporary) negative implications from bank mergers one might argue that mergers among banks are not performance enhancing at all. However, it needs to be highlighted that most performance studies fail to show true operating performance enhancements because actual synergies are difficult to measure and often require a number of years to be realized, a period in which other factors may substantially impact the bank's operating performance. Our finding of negative merger related effects poses an alternative cause why previous literature fails to find post-merger efficiency or profitability

gains, namely potential revenue synergies and efficiency improvements might be (temporarily) offset by counteractive revenue dissynergies. Furthermore, Rhoades (1994) suggests that the performance of one or both merger partners might have even deteriorated further in the absence of the merger.[30] Negative effects from M&A may also signal the importance of non-value maximizing motives for mergers such as regulatory requirements, political pressure or managerial hubris. Moreover, Berger *et al.* (1999) highlight that most studies do not capture any positive external effects from mergers such as efficiency improvements that banks pass on to their customers by means of lower prices or higher service levels. Due to the difficulties around measuring banks' post-merger performance this subject remains an interesting topic for further research. For example, we suggest to extent our analysis of the post-merger performance of banks' net operating revenues to banks other than German savings banks as well as to other countries in order to ensure that revenue dissynergies are not driven by factors specific to German savings banks or the German banking market in particular.

[30] However, at the same time he admits that this argument might apply to a few mergers but that it provides a highly improbable explanation for the overall findings on post-merger operating performance studies.

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Table 1: Description of variables

Variable	Unit	Description
Dependent variables		
Ln(Net Operating Revenues)	EUR million	Natural logarithm of total operating revenues, i.e. net interest revenues plus non-interest revenues (i.e. fee, commission and other revenues) before deduction of any operating expenses.
Net Operating Revenues per Employee	EUR thousand	Total operating revenues divided by the average total number of employees. *Calculation:* *Operating revenues / employees*
Net Operating Revenues as % of Total Assets	%	Total operating revenues divided by the bank's average total assets. *Calculation:* *Operating revenues / total assets * 100*
Explanatory variables		
M&A related variables		
M&A activity	dummy variable	Dummy variable equal to 1 if the respective bank is involved in mergers and acquisitions in the respective year, otherwise 0.
M&A expertise	dummy variable	Dummy variable equal to 1 in all years following the respective bank's first involvement in mergers and acquisitions, otherwise 0.
Bank characteristics		
Ln(Total Assets)	EUR million	Natural logarithm of bank's average total assets.
Non-Interest Revenues / Operating Revenues	%	Percentage share of non-interest revenues of bank's total operating revenues comprising of net interest revenues and non-interest revenues (i.e. fee, commission and other revenues) before deduction of any operating expenses. *Calculation:* *Non-interest revenues/ (net interest revenues + non-interest revenues) * 100*
Operating Expenses / Total Assets	%	Percentage share of bank's operating expenses (including both admin and personnel expenses) to bank's average total assets. *Calculation:* *Operating expenses / total assets * 100*
Loans / Total Assets	%	Percentage share of bank's average total loans to non-banks of bank's average total assets. *Calculation:* *Loans / total assets * 100*
Corporate Loans / Total Loans to Non-banks	%	Percentage share of bank's average corporate loans to bank's average total loans to non-banks. Corporate and total loans to non-banks include mortgages. *Calculation:* *Corporate loans / total loans to non-banks * 100*
Equity / Total Assets	%	Percentage share of average total shareholders' equity of bank's average total assets *Calculation:* *Equity / total assets * 100*
Market concentration		
Local HHI	%	Hirschmann-Herfindahl-Index of market shares used to estimate market concentration and competition. Since total assets for all German banks are not available on a district level, we approximate the market share with the share of branches (compare Fischer and Hempell (2006)). *Calculation:* $\sum_{j=1}^{n}(ms_j)^2$ ** 100;* *n=number of banks in local market, ms_j=market share (in terms of branches) of j^{th} bank*
Capital market rates		
Interest Rate	%	One-month interbank interest rate (EURIBOR) based on monthly averages.
Yield Curve Slope	%	Difference in yields between short- (1-month) and long-term (10-year) maturities. *Calculation:* *10-year government bond rate – 1-month EURIBOR rate*

Note: Assets and liabilities represent average monthly balance sheet data for the respective year. Profit and loss items are as of the end of the respective year.

Table 2: Descriptive statistics – Bank and market characteristics

This table presents descriptive statistics for the sample of 457 public savings banks in Germany. Financials are pro forma adjusted for mergers by fully consolidating merging banks not only in the years following the merger but in all years of the observation period. Panel A presents totals for the savings banks sector as a whole and means of individual bank and market characteristics for each year for the period 1994 to 2006. Panel B presents the means and 25% and 75% percentiles for each variable and for the full sample applied in our regression analyses for the years 1999 to 2006 (observation period as per our regression analyses). Absolute values in EUR are presented at 2000 prices to adjust for inflationary effects. The Compounded Annual Growth Rate (CAGR) is presented for the period 1994 to 2006.

Panel A: Descriptive statistics by year (1994-2006)

Variables	Unit	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	CAGR
Savings banks sector characteristics (sum)															
Savings banks	#	654	624	607	598	594	578	562	537	519	489	477	463	457	-2.9%
Total assets	EUR billion	738	765	808	842	879	916	932	938	950	947	939	930	925	1.9%
Employees	#	204,231	204,929	204,980	205,094	205,206	203,841	204,350	202,478	199,728	195,996	190,866	186,509	183,063	-0.9%
Branches	#	18,851	18,599	18,323	18,036	17,753	17,438	16,867	16,135	15,386	14,448	14,270	13,958	13,766	-2.6%
Bank and market characteristics (mean)															
Bank characteristics															
Total Assets	EUR million	1,614	1,674	1,768	1,843	1,923	2,003	2,038	2,052	2,079	2,073	2,055	2,035	2,025	1.9%
Net Operating Revenues	EUR million	60	59	61	60	59	60	58	57	59	61	61	59	57	-0.3%
Net Operating Revenues per Employee	EUR thousand	129	129	132	130	127	131	127	125	131	137	140	140	138	0.5%
Net Operating Revenues as % of Total Assets	%	3.8%	3.6%	3.5%	3.3%	3.2%	3.1%	3.0%	2.9%	3.0%	3.1%	3.1%	3.0%	3.0%	N/A
Non-Interest Revenues / Operating Revenues	%	15.2%	15.0%	15.2%	16.0%	17.4%	18.9%	20.5%	19.4%	18.5%	19.3%	20.4%	20.8%	21.9%	N/A
Operating Expenses / Total Assets	%	2.2%	2.2%	2.2%	2.1%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	1.9%	1.9%	N/A
Loans / Total Assets	%	N/A	N/A	61%	62%	62%	61%	61%	62%	61%	61%	61%	60%	60%	N/A
Corporate Loans / Total Loans to Non-banks	%	N/A	N/A	46%	45%	46%	45%	45%	45%	44%	43%	43%	42%	42%	N/A
Equity / Total Assets	%	N/A	N/A	4%	4%	4%	4%	4%	4%	4%	5%	5%	5%	5%	N/A
Employees	#	447	448	449	449	449	446	447	443	437	429	418	408	401	-0.9%
Local market concentration															
Local HHI	#	N/A	N/A	1,802	1,694	1,686	1,657	1,642	1,669	1,711	1,658	1,658	1,658	1,658	N/A
Capital market rates															
Interest Rate	%	5.4%	4.8%	3.4%	3.5%	3.8%	3.2%	4.7%	4.1%	3.5%	2.4%	2.3%	2.3%	3.4%	N/A
Yield Curve Slope	%	N/A	N/A	2.9%	2.5%	1.1%	1.6%	1.1%	0.4%	1.5%	1.7%	2.0%	1.2%	0.8%	N/A

Panel B: Descriptive statistics for full sample (1999-2006)

		Full sample (457 banks)		
Variables	**Unit**	**25%**	**Mean**	**75%**
Bank characteristics				
Total Assets	EUR million	684	2,045	2,365
Net Operating Revenues	EUR million	22	59	71
Net Operating Revenues per Employee	EUR thousand	121	134	145
Net Operating Revenues as % of Total Assets	%	2.8%	3.0%	3.2%
Non-Interest Revenues / Operating Revenues	%	17.9%	20.0%	21.9%
Operating Expenses / Total Assets	%	1.8%	2.0%	2.2%
Loans / Total Assets	%	55.1%	60.9%	68.8%
Corporate Loans / Total Loans to Non-banks	%	39.0%	43.8%	48.8%
Equity / Total Assets	%	3.9%	4.6%	5.1%
Employees	#	165	429	527
Local market concentration				
Local HHI	#	1,264	1,664	2,016
Capital market rates				
Interest Rate	%	2.3%	3.2%	3.8%
Yield Curve Slope	%	1.0%	1.3%	1.6%

Table 3: Descriptive statistics – M&A activity among German savings banks

This table presents descriptive statistics of the merger activity of the 457 German public savings banks included in our sample for the years 1994 to 2006. Panel A presents the number of savings banks at the end of each year, the number of savings banks dissolved through M&A in each year and the number of savings banks involved in M&A in every year during the observation period. The latter is presented for the whole of Germany as well as for West and East Germany separately. The number of savings banks dissolved through M&A does not equal the M&A activity among savings banks because some M&A transactions involve more than two savings banks, also the number of M&A transactions of the individual bank in any one year is not taken into account. Panel B presents a breakdown of the number of saving banks involved in M&A by the frequency of their involvement. The sum of savings banks involved in M&A in each year during the observation period is 206 which is greater than the total number of savings banks involved in M&A during the observation period of 157 due to repeated M&A activity by 34 of the 157 merging savings banks. Repeated M&A involvement is used as proxy for M&A expertise in our regression analyses. Our M&A expertise dummy has the value 1 in all years following the first M&A involvement of the respective savings bank, and 0 otherwise.

Panel A: Development of number of savings banks and M&A activity among savings banks

	Total	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Savings banks	N/A	654	624	607	598	594	578	562	537	519	489	477	463	457
Savings banks dissolved through M&A	246	49	30	17	9	4	16	16	25	18	30	12	14	6
M&A activity per year	206	36	23	13	8	4	12	14	21	17	27	11	14	6
M&A activity per year - West Germany	136	12	1	6	6	4	10	14	21	17	23	6	10	6
M&A activity per year - East Germany	70	24	22	7	2	0	2	0	0	0	4	5	4	0

Panel B: Number of savings banks involved in M&A by activity

	Total
Savings banks involved in M&A in at least 1 year	157
Savings banks not involved in M&A during observation period	300
Savings banks involved in M&A in 1 year	123
Savings banks involved in M&A in more than 1 year	34
Savings banks involved in M&A in 2 years	26
Savings banks involved in M&A in 3 years	3
Savings banks involved in M&A in 4 years	4
Savings banks involved in M&A in 5 years	0
Savings banks involved in M&A in 6 years	1

Table 4: Differences in means – Post-merger performance of German savings banks

This table presents results for t-tests of differences in means for the simultaneous development of Net Operating Revenues, Net Operating Revenues as % of Total Assets and Net Operating Revenues per Employee of merging banks and 300 savings banks not involved in mergers during the observation period from 1994 and 2006. We do not include all 123 savings banks involved in M&A once during the observation period to ensure a balanced sample for each post-merger year observed. Savings banks repeatedly involved in M&A are not included in order to avoid interfering effects from repeated M&A in the post-merger period of the first merger. We also use an index with the year prior to the merger (t = -1) as base year to ensure that savings banks of different sizes are equally weighted. Performance is reported for the merger year (t = 0) and the respective years following the merger (t = +1, t = +2, t = +3, t = +4).

	Post-merger performance (index based on pre-merger year (t = -1); merger in t = 0)					
Variables	**t = -1**	**t = 0**	**t = +1**	**t = +2**	**t = +3**	**t = +4**
Net Operating Revenues						
Merging banks	100	100	102	104	107	108
Non-merging banks (control group)	100	102	104	106	107	109
Difference	0	-2***	-2***	-3***	-1	-1
Net Operating Revenues as % of Total Assets						
Merging banks	100	99	99	99	96	95
Non-merging banks (control group)	100	100	99	98	94	91
Difference	0	-1**	0	1	2	4**
Net Operating Revenues per Employee						
Merging banks	100	101	105	107	112	115
Non-merging banks (control group)	100	103	106	109	110	111
Difference	0	-2*	-1	-1	2*	4***

***significant at 0 to 1 percent level, **significant at 1 to 5 percent level, *significant at 5 to 10 percent level, others: significant at above 10 percent level

Table 5: The effects of bank M&A activity on banks' net operating revenues

This table presents coefficient estimates from regressions relating M&A activity to banks' net operating revenues (i.e. net interest revenues plus net non-interest revenues before deduction of any operating expenses). Dependent variables are *Ln(Net Operating Revenues)* (Panel A), *Net Operating Revenues per Employee* (Panel B) and *Net Operating Revenues as % of Total Assets* (Panel C). All regressions are applied to the full sample comprising all 457 savings banks in our dataset. Regression analyses include observations for the years 1999 to 2006, observations for the years 1994 to 1998 are excluded because five years of observations are dropped due to the inclusion of five lags of the M&A activity dummy variable. All regressions include year dummy variables (not reported). As estimation technique, we use fixed effects regression models with heteroskedasticity-robust standard errors. P-values are reported in brackets.

Variables	Panel A: Ln(Net Operating Revenues)	Panel B: Net Operating Revenues per Employee	Panel C: Net Operating Revenues as % of Total Assets
M&A activity			
M&A activity ($\tau = t$)	-0.025***	-3.028***	-0.070***
	[0.000]	[0.000]	[0.000]
M&A activity ($\tau = t - 1$)	-0.027***	-3.451***	-0.074***
	[0.000]	[0.000]	[0.000]
M&A activity ($\tau = t - 2$)	-0.020***	-3.133***	-0.056***
	[0.000]	[0.000]	[0.000]
M&A activity ($\tau = t - 3$)	-0.019***	-3.431***	-0.053***
	[0.000]	[0.001]	[0.000]
M&A activity ($\tau = t - 4$)	-0.009*	-2.495**	-0.021
	[0.074]	[0.016]	[0.164]
M&A activity ($\tau < t - 4$)	0.003	2.152*	0.012
	[0.588]	[0.050]	[0.434]
Bank characteristics			
Ln(Total Assets)	0.572***	-5.773	-1.188***
	[0.000]	[0.273]	[0.000]
Non-Interest Revenues / Operating Revenues	-0.012***	-1.032***	-0.034***
	[0.000]	[0.000]	[0.000]
Operating Expenses / Total Assets	0.122***	-23.300***	0.381***
	[0.000]	[0.000]	[0.000]
Loans / Total Assets	0.002***	0.189**	0.006***
	[0.000]	[0.012]	[0.000]
Corporate Loans / Total Loans to Non-banks	0.001***	0.022	0.003***
	[0.005]	[0.714]	[0.005]
Equity / Total Assets	-0.007***	-1.514***	-0.023***
	[0.001]	[0.001]	[0.000]
Local market concentration			
Local HHI	0.000**	0.004**	0.000**
	[0.030]	[0.019]	[0.042]
Capital market rates			
Interest Rate	-0.011***	-6.015***	-0.030***
	[0.000]	[0.000]	[0.000]
Yield Curve Slope	0.052***	6.587***	0.157***
	[0.000]	[0.000]	[0.000]
Observations	3,651	3,651	3,651
Number of banks	457	457	457
R-squared within	0.666	0.650	0.491
R-squared between	0.989	0.110	0.193
R-squared overall	0.986	0.288	0.175

***significant at 0 to 1 percent level, **significant at 1 to 5 percent level, *significant at 5 to 10 percent level, others: significant at above 10 percent level

Table 6: The effects of bank M&A activity on banks' operating income

This table presents coefficient estimates from regressions relating M&A activity to banks' operating income before loan loss provisions, depreciation and amortization. Dependent variables are *Ln(Operating Income)* (Panel A), *Operating Income per Employee* (Panel B) and *Operating Income as % of Total Assets* (Panel C). All regressions are applied to the full sample comprising all 457 savings banks in our dataset. Regression analyses include observations for the years 1999 to 2006, observations for the years 1994 to 1998 are excluded because five years of observations are dropped due to the inclusion of five lags of the M&A activity dummy variable. All regressions include year dummy variables (not reported). As estimation technique, we use fixed effects regression models with heteroskedasticity-robust standard errors. P-values are reported in brackets.

Variables	Panel A: Ln(Operating Income)	Panel B: Operating Income per Employee	Panel C: Operating Income as % of Total Assets
M&A activity			
M&A activity (τ = t)	-0.089***	-3.438***	-0.071***
	[0.000]	[0.000]	[0.000]
M&A activity (τ = t - 1)	-0.094***	-3.593***	-0.075***
	[0.000]	[0.000]	[0.000]
M&A activity (τ = t - 2)	-0.056***	-2.724***	-0.053***
	[0.000]	[0.000]	[0.000]
M&A activity (τ = t - 3)	-0.056***	-2.920***	-0.055***
	[0.000]	[0.000]	[0.000]
M&A activity (τ = t - 4)	-0.024	-1.826**	-0.025
	[0.182]	[0.020]	[0.108]
M&A activity (τ < t - 4)	0.018	1.532*	0.015
	[0.335]	[0.064]	[0.352]
Bank characteristics			
Ln(Total Assets)	-0.348***	-30.552***	-1.198***
	[0.000]	[0.000]	[0.000]
Non-Interest Revenues / Operating Revenues	-0.040***	-1.386***	-0.034***
	[0.000]	[0.000]	[0.000]
Operating Expenses / Total Assets	-0.645***	-39.685***	-0.593***
	[0.000]	[0.000]	[0.000]
Loans / Total Assets	0.007***	0.246***	0.006***
	[0.000]	[0.000]	[0.000]
Corporate Loans / Total Loans to Non-banks	0.003**	0.101**	0.003***
	[0.018]	[0.038]	[0.002]
Equity / Total Assets	-0.035***	-0.730**	-0.023***
	[0.000]	[0.047]	[0.001]
Local market concentration			
Local HHI	0.000	0.004***	0.000*
	[0.107]	[0.003]	[0.051]
Capital market rates			
Interest Rate	-0.026***	-2.427***	-0.021***
	[0.000]	[0.000]	[0.000]
Yield Curve Slope	0.187***	7.811***	0.176***
	[0.000]	[0.000]	[0.000]
Observations	3,651	3,651	3,651
Number of banks	457	457	457
R-squared within	0.511	0.597	0.473
R-squared between	0.523	0.026	0.049
R-squared overall	0.385	0.055	0.047

***significant at 0 to 1 percent level, **significant at 1 to 5 percent level, *significant at 5 to 10 percent level, others: significant at above 10 percent level

Table 7: The effects of bank M&A activity on banks' net operating revenues – accounting for prior M&A expertise

This table presents coefficient estimates from regressions relating M&A activity to banks' net operating revenues (i.e. net interest revenues plus net non-interest revenues before deduction of any operating expenses). Dependent variable is *Net Operating Revenues per Employee*. Panel A presents regressions including all banks ("Full sample"). Panel B presents regressions including banks with at least one M&A involvement ("Banks with M&A involvement only"). Panel C presents regressions including only banks with more than one M&A involvement. Columns (1) present coefficient estimates from regressions relating M&A activity to banks' operating revenues that do not account for prior M&A expertise of banks, whereas Columns (2) present coefficient estimates from regression relating M&A activity to banks' operating revenues that account for prior M&A expertise of merging banks. All regressions include year dummy variables (not reported). As estimation technique, we use fixed effects regression models with heteroskedasticity-robust standard errors. P-values are reported in brackets.

	Panel A: Full sample		**Panel B: Banks with M&A involvement only**		**Panel C: Banks with multiple M&A involvement only**	
Variables	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
M&A activity						
M&A activity (τ = t)	-3.028***	-4.004***	-3.925***	-5.799***	-2.072	-8.982***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.114]	[0.004]
M&A activity (τ = t - 1)	-3.451***	-4.135***	-4.816***	-6.480***	-2.337*	-9.485***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.072]	[0.006]
M&A activity (τ = t - 2)	-3.133***	-3.338***	-4.861***	-6.230***	-3.966***	-9.960***
	[0.000]	[0.001]	[0.000]	[0.000]	[0.002]	[0.001]
M&A activity (τ = t - 3)	-3.431***	-3.530***	-5.382***	-6.920***	-5.097***	-11.935***
	[0.001]	[0.002]	[0.000]	[0.000]	[0.000]	[0.000]
M&A activity (τ = t - 4)	-2.495**	-2.295*	-4.469***	-6.203***	-4.934***	-13.545***
	[0.016]	[0.071]	[0.000]	[0.000]	[0.001]	[0.000]
M&A activity (τ < t - 4)	2.152*	2.051	-1.760	-3.912**	-4.206**	-12.811***
	[0.050]	[0.120]	[0.220]	[0.041]	[0.011]	[0.000]
M&A expertise * M&A activity						
M&A expertise * M&A activity (τ = t)		3.125*		4.655**		8.213**
		[0.085]		[0.011]		[0.016]
M&A expertise * M&A activity (τ = t - 1)		1.742		3.219*		8.230**
		[0.365]		[0.083]		[0.033]
M&A expertise * M&A activity (τ = t - 2)		0.090		2.028		6.507*
		[0.963]		[0.299]		[0.056]
M&A expertise * M&A activity (τ = t - 3)		-0.082		2.424		8.009**
		[0.969]		[0.259]		[0.020]
M&A expertise * M&A activity (τ = t - 4)		-1.529		2.623		10.558***
		[0.492]		[0.271]		[0.003]
Bank characteristics						
Ln(Total Assets)	-5.773	-5.465	-13.873	-13.624	26.607	27.079*
	[0.273]	[0.296]	[0.292]	[0.295]	[0.113]	[0.095]
Non-Interest Revenues / Operating Revenues	-1.032***	-1.033***	-0.783***	-0.816***	-1.083**	-0.957*
	[0.000]	[0.000]	[0.009]	[0.006]	[0.033]	[0.072]
Operating Expenses / Total Assets	-23.300***	-23.160***	-23.904***	-22.974***	-19.275**	-17.047**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.012]	[0.024]
Loans / Total Assets	0.189**	0.188**	0.045	0.046	-0.355	-0.381*
	[0.012]	[0.012]	[0.801]	[0.795]	[0.104]	[0.061]
Corporate Loans / Total Loans to Non-banks	0.022	0.019	-0.159	-0.167	-0.061	-0.091
	[0.714]	[0.756]	[0.199]	[0.176]	[0.756]	[0.640]
Equity / Total Assets	-1.514***	-1.496***	0.812	0.719	2.122	2.028
	[0.001]	[0.001]	[0.421]	[0.475]	[0.175]	[0.186]
Local market concentration						
Local HHI	0.004**	0.004**	0.009***	0.008***	0.000	-0.001
	[0.019]	[0.021]	[0.002]	[0.002]	[0.947]	[0.874]
Capital market rates						
Interest Rate	-6.015***	-5.991***	-6.661***	-6.846***	-5.356***	-5.825***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Yield Curve Slope	6.587***	6.591***	6.284***	6.329***	6.719***	6.602***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	3,651	3,651	1,255	1,255	272	272
Number of banks	457	457	157	157	34	34
R-squared within	0.650	0.651	0.641	0.643	0.724	0.737
R-squared between	0.110	0.119	0.060	0.054	0.559	0.539
R-squared overall	0.288	0.297	0.036	0.042	0.557	0.543

***significant at 0 to 1 percent level, **significant at 1 to 5 percent level, *significant at 5 to 10 percent level, others: significant at above 10 percent level

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