The real effects of distressed bank mergers ☆

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ABSTRACT

We show that distressed bank mergers that are a widely used instrument for bank resolution have the potential to generate adverse real economic effects. We analyze distressed mergers of German savings banks and show that they represent exogenous shocks to the (initially non-distressed) acquiring bank. In the years after a distressed merger: (i) the performance of the acquiring savings bank deteriorates; (ii) the shock is transmitted to firms in the acquirer's region which cut back their investments and reduce employment and (iii) the overall macroeconomic dynamics in the region of the acquirer deteriorates, leading to reductions in investment and employment growth. To support a causal interpretation of our results we perform several tests that confirm that local economic dynamics is affected by the shock to the acquiring bank and not by real economic contagion.

1. Introduction

Mergers between distressed and sound banks are a widely used instrument to resolve financial distress in the banking sector. Despite some insightful research (Granja et al., 2017; Vij, 2021), their benefits and costs are still not fully understood. In this paper we present evidence that distressed bank mergers can generate so far undocumented adverse real economic effects which should be taken into account when designing a bank resolution strategy. More specifically, we focus on the following setup in the framework of the German banking system. Savings banks in Germany are only active in a defined geographic region. When a savings bank is in substantial financial distress, institutional mechanisms which will be discussed in detail in Section 2 imply that it is merged with a neighboring savings bank. We interpret the resulting distressed merger as an exogenous negative shock to the acquiring savings bank and analyze its effect on real economic activities at both the firm and the aggregate level in the region of the acquiring bank. We expect these effects to emerge because savings banks – even though they are often small institutions in terms of absolute size – are large in terms of market share in their regional markets. Consequently, shocks to these banks cannot be easily absorbed by other banks.

We proceed as follows. First, we show that the choice of the acquiring bank (out of usually several potential acquirers) is almost exclusively driven by the size of the bank and the geographic distance to the target bank, and can thus be considered as exogenous. This finding has two important implications. First, it implies that the selection of the acquirer is not driven by regional real economic conditions. Second, the choice of the acquirer is also unrelated to managerial ability, overconfidence, or empire-building aspirations.

Having established the exogeneity of acquirer selection, we next provide evidence that distressed mergers indeed constitute a negative shock to the acquiring bank. Specifically, we show that, following the merger, acquiring banks have worse performance in terms of capitalization relative to banks that have not been involved in a merger, but also relative to banks that act as acquirers in mergers that are not driven by distressed conditions of the target. In addition, we document an immediate drop in the propensity to lend for acquiring banks in distressed mergers relative to both control groups. Further, we empirically track how firms domiciled in the region of a distressed merger are affected by the merger and find that investment growth drops by 3%–4%, an economically significant magnitude. The decrease is driven by lower investments in current assets. We further find that these firms experience lower growth in long-term debt and employment. Last but not least we document the effects on real economic activity at the regional level. We focus on changes in investments since this is the real economic variable most closely related to the lending behavior of banks, but we also consider GDP and employment. We find that aggregate investment and employment growth are significantly lower in regions experiencing a distressed merger.

A drop in economic activity in the region of the distressed target could spread to the region of the acquirer even without the distressed merger. Thus, in order to establish that the distressed merger is indeed causal for the change in regional economic activity we have to rule out that regional economic contagion is driving our results. To this end, we first show that the deterioration of performance is observed only for the distressed acquirer but not for banks which are subject to similar real economic dynamics. For this purpose, we examine the performance of two sets of banks facing similar economic conditions: first, cooperative banks in the same geographical region as the acquirer[1] and second, the savings banks in placebo regions, defined as regions that (1) are also neighbors to the region of the distressed target bank, (2) had similar economic dynamics as the acquiring bank's region prior to the merger and (3) did not experience a savings bank merger.

Further, we show that for these placebo regions there are no adverse real effects (neither at the firm nor at the regional level). This result again supports our argument that the deterioration of real economic conditions in the region of the distressed acquirer is not driven by real economic contagion. The fact that firms in the placebo regions (which face similar economic conditions as those in the region affected by the distressed merger) do not reduce their investment spending implies that the reduction in investments is not caused by a demand effect but rather can be traced back to the reduction in lending supply and thus to the shock to the acquiring bank.

In summary, our empirical evidence allows the conclusion that there is indeed a causal effect from the distressed bank mergers to real economic activity in the region of the acquiring bank. Our results thus speak to the literature on bank resolution via distressed mergers by showing that these mergers may constitute a channel that transmits economic shocks. The academic discussion on bank distressed mergers was, to our knowledge, initiated by Elsas (2007). He uses a large sample of mergers within the groups of German savings and cooperative banks and finds that pre-emptive distress resolution through mergers generates adverse effects for the acquirer in terms of profitability at least in the short and mid-term, while acquirer bank risk taking and efficiency are not significantly affected by the merger. The paper does not consider other dimensions of post-merger acquirer performance, nor does it consider the real effects in the affected regions. We complement the setup of Elsas (2007) and focus on the dynamics of acquirer bank capitalization and lending as well as on the real economic effects of the distressed merger. By showing that acquirer bank capitalization and lending deteriorate, and that this deterioration is associated with adverse real economic dynamics, we identify negative side effects of distressed mergers as a bank resolution tool that have not been identified so far.

Research on the relevance of distressed bank mergers has also accelerated in the US after the FDIC broadly applied the tool of selling failed banks for the purposes of bank resolution. Granja et al. (2017) employ FDIC data to explore the consequences of using auctions for selling failed banks. They show that the allocation of failed banks can be distorted due to the fact the banks that can derive most value from an acquisition of the failed bank may be capital-constrained and thus unable to place a bid sufficiently high to win the auction and acquire the failed bank. Contrary to Granja et al. (2017) who focus on the distribution of the benefits from the acquisition of a failed bank, our paper focuses on potential drawbacks of such an acquisition. Despite this difference and the very different institutional process through which the acquirer of the distressed bank is determined in both jurisdictions, some outcomes are similar. In particular, in both cases the acquiring banks are geographically close to the distressed target (in Germany by the design of the resolution process, in the US as the typical outcome of the auction). Therefore, our findings based on distressed mergers of German public banks may be relevant in a broader geographic and institutional context.

Vij (2021) also analyzes FDIC failed banks auctions. He zooms into the details of the post-merger dynamics of the acquiring bank and examines the post-merger changes in the acquirers' deposits and lending. His paper is, to the best of our knowledge, the only paper besides ours that analyzes the real effects of distressed mergers using regional-level data. In terms of deposits, Vij (2021) finds that the acquiring bank enjoys increased market power and a boost of deposit volumes. In contrast, he documents (just as we do) a substantial reduction of lending growth by the acquiring bank. Similarly to us, he shows that the reduction of lending by the merged institutions is not compensated by other banks, at least in terms of small business lending which drops in consolidated regions (defined as regions where, before the merger, both the target and the acquirer were active) by 2.3% relative to control regions. The drop in lending is associated with negative real effects as both regional-level employment and the number of new establishments decrease by about 0.3–0.4% in consolidated regions relative to the control regions. Vij (2021) does not examine effects on firm investments or aggregate economic activity in the region where *only* the acquirers were active before the merger.

Our setting and results differ substantially from those of Vij (2021). As described in more detail in Section 2, German savings banks have defined areas of activity that usually do not overlap, meaning that there are no consolidated regions in our setting. We

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[1] Just as savings banks, cooperative banks operate in closely defined regions. These regions are, however, often smaller than those of the savings banks. More institutional details will be provided in Section 2.

rather focus on the region in which only the acquirer was active before the merger. We find that, following a distressed merger, the growth rate of investments is 3%–4% and the growth rate of employment 2%–3% lower relative to firms in unaffected regions. Investments and employment growth in the acquirer regions are also negatively affected at the aggregate regional level. In summary, our findings complement those of Vij (2021) and highlight the existence of a dark side of distressed mergers. These negative effects of distressed mergers should be taken into account when designing bank resolution strategies.

We further contribute to the literature on the relation between finance and real economic activities by proposing an innovative strategy to identify the impact of finance on the real economy. We provide explicit empirical evidence that distressed mergers are exogenous shocks to the acquiring banks and then carefully trace how these shocks are transmitted to relevant dimensions of real economic performance, both at the firm and at the aggregate regional level. One particular advantage of our setup is the fact that we focus on banks which, because of their regional scope and importance for the region, have a close link to local firms and thus to local economic dynamics. In particular, these banks do not have a choice *where* to lend. With our novel identification strategy we enrich the extensive literature studying the real effects of bank performance. The list of papers exploring various identification strategies based on exogenous shocks to the performance of financial institutions and tracing the lending and real effects of these exogenous shocks is long (e.g. Jayaratne and Strahan, 1996; Demyanyk et al., 2007; Rice and Strahan, 2010; Hoffmann and Shcherbakova-Stewen, 2011; Bai et al., 2018; Gropp et al., 2018; Goetz and Gozzi, 2010; Acharya et al., 2018, to name but a few). For the sake of brevity we focus on those papers that (as we do) follow identification strategies which are derived from the structure of the German banking system, and which arguably result in exogenous variation in bank loan supply. Similarly to us, Puri et al. (2011) trace the effects of an exogenous shock to German savings banks. In their setup the exogenous shock stems from the subprime exposure of the regional public banks (Landesbanken) which are co-owned by the savings banks located in the corresponding states. While some Landesbanken were heavily invested in subprime instruments, others were not. Consequently, the authors argue that savings banks located in the states of troubled Landesbanken have an exogenously higher exposure to the subprime crisis relative to savings banks located in other states. Puri et al. (2011) find that savings banks affected by the subprime crisis shock reduce their credit supply in the sense that they accept about 7% less credit applications relative to unaffected banks. While they perform a detailed analysis of bank lending behavior, they do not analyze the impact on regional economic activity. Further, their identification strategy ignores the potential endogeneity of subprime exposure that arises from the fact that savings banks in regions with less promising projects were likely to channel more idle funds to the Landesbanken, which in turn invested these funds in subprime instruments. Huber (2018) proposes another identification strategy based on exogenous shocks to German banks. He explores the lending cuts by a large German bank hit by a negative shock during the financial crisis that was unrelated to domestic factors. He documents worse economic outcomes for domestic firms and counties that depended more on the respective bank. His identification approach is derived from the fact that, as a consequence of post-World War 2 regulation, the bank's activities are geographically concentrated around few regional headquarters. The dependence of a county on the bank is instrumented by the geographic distance to these regional headquarters. As the headquarters happen to be located in the most important German urban and industrial centers, the instrument is likely to violate exclusion restrictions since it affects real economic dynamics through multiple channels. Last but not least, Bersch et al. (2020) focus on episodes of exogenous regional bank distress. They focus on the change in lending by distressed banks subject to publicly or privately funded bailouts, and the effects of these changes on firms in the region of the distressed bank. The authors show that, due to the covenants of the bailout, distressed banks tighten their credit supply, resulting in a significant (by about 10%) increase in local firms' probability of default as well as in a reduction in firms' sales of a similar magnitude. Our approach complements their findings by showing that distressed mergers, which are an alternative resolution mechanism, also generate adverse real effects that go beyond the region of the distressed bank because they also affect the region of the acquirer.

The remainder of the paper is organized as follows. Section 2 describes the institutional background, while Section 3 describes our data set. We further present an in-depth discussion of our identification strategy in that section. Section 4 presents our main analysis with regard to post-merger dynamics. It also presents the tests conducted in order to rule out the possibility of regional economic contagion. Section 5 concludes.

2. Institutional background

Administrative regions in Germany

The Federal Republic of Germany consists of 16 states. 14 of these states are further subdivided into administrative regions, which are either cities ("kreisfreie Stadt") or rural areas ("Landkreis").[2] Each region has a legislative body, the members of which are elected in regional-level elections. These elections take place on the same date for all regions within a state. There are approximately 400 of these regions. In the sequel, we refer to the "Landkreise" and "kreisfreie Städte" as "regions" or "administrative regions". The administrative regions are the smallest geographical units for which the German Federal Statistics reports macroeconomic data.

Savings banks and cooperative banks

The German banking system consists of three pillars, private banks, cooperative banks and public savings banks. Private banks are for-profit firms and do not face restrictions as to the areas in which they can be active. Also, no data on the regional distribution of the operations of these banks is available. For these reasons, we do not consider them in this paper. The cooperative banking

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[2] The two remaining states (Berlin and Hamburg) are cities.

group consists of a large number of mostly small banks,[3] organized as cooperatives and active only within a specified area. The area restriction is intended to assure that cooperative banks do not compete with each other. For most cooperative banks the area of activity is smaller than an administrative region. We use cooperative banks as a control group in some of the tests we perform.

Our analysis focuses on public savings banks.[4] The savings banks as a group are the largest of the three German banking groups. At year-end 2014 (the end of our sample period) they accounted for 37.7% of retail customer deposits and for 27.3% of the loans to the corporate sector.[5] They are particularly important for small firms and start-ups.

Savings banks activities are governed by state-level laws. Each savings bank is active only in a specified area[6] and is typically owned by the municipality(ies) in this area. This area often, but not always, coincides with an administrative region.[7] Given their regional scope of operations, individual savings banks are typically small institutions. The average savings bank in our sample had total assets of 2.6 billion Euro in 2014 (the largest savings bank had total assets of 27.4 billion Euro in that year). However, their regional market shares are substantial, and in many cases the savings bank is the largest bank in its area of activity. This, in turn, suggests that financial distress of a savings bank may at least temporarily affect the access to credit for small firms and, consequently, result in negative real economic effects. This line of reasoning is consistent with Hakenes et al. (2014) who argue that small regional banks are more effective than large banks in promoting local economic growth.

Savings bank mergers

There are three motives for savings bank mergers. The first is the consolidation of administrative regions. During our sample period there were three major consolidations of administrative regions ("Gebietsreform") in the states of Sachsen-Anhalt (2007), Sachsen (2008) and Mecklenburg-Vorpommern (2011). The second motive is to increase bank efficiency through the realization of economies of scale. This is a plausible motive for mergers among savings banks given the small size of some of these institutions. Efficiency-motivated mergers involve savings banks which are not in distress, and which try to extract synergies from reduced overheads and/or from exploiting advantages due to complementary business models, e.g. a bank in a region with a lot of lending opportunities merging with a neighboring bank with a solid volume of deposits.

The third merger motive is distress resolution. We refer to the corresponding mergers as distressed mergers, and they are in the focus of our paper. Their occurrence among savings banks is, in part, due to a structural characteristic of the German savings bank sector. Savings banks operate a safety net system which is coordinated at the state level by a state-level savings bank association ("Sparkassenverband"). The system requires that, whenever one savings bank is in distress, the other member banks step in and provide support (see Behn et al., 2016 for details). Specifically, once a distress situation in a savings bank is detected, the savings bank association may assist in the arrangement of a merger with a suitable acquirer bank. The acquirer is usually a savings bank from a neighboring region within the same state.[8]

There are two types of distressed mergers. Type one occurs when the target bank has been officially identified as a distressed institution by the German Banking Supervision (BaFin). This typically happens when a bank violates minimum equity requirements or other regulatory restrictions. In this case the savings bank association, together with the owner of the distressed bank (i.e. the municipality owning the target bank), has to develop a restructuring plan. The plan may stipulate financial support by the association[9] and may involve a merger. A merger, in turn, requires approval by the owner and by the management of the acquiring savings bank. The second type of distressed merger occurs when the owners of the savings banks, usually coordinated by the savings bank association, pro-actively organize a merger before the target is officially identified as a distressed institution by the BaFin. In this paper we use a broad definition of distressed mergers that includes both types. We categorize a merger as distressed whenever the target bank performs poorly in terms of capitalization, non-performing loans or profitability. Details will be presented in the next section.

As noted, savings banks are public institutions and they are regulated by specific state-level laws ("Landes-Sparkassengesetze"). As a consequence, a savings bank can only be merged with another savings bank located in the same state.[10] While not formally required, mergers almost exclusively occur between neighboring savings banks. These restrictions imply that the number of merger candidates is small. We show in Section 4.1.1 that two variables (the size of the savings bank and the distance between the headquarters of the target and the candidate acquirers) reliably predict which of the candidates becomes the actual acquirer in a distressed merger.

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[3] The number of cooperative banks has decreased from more than 7000 in 1970 to 1047 at year-end 2014 (the end of our sample period). Few larger central institutions which coordinate and pool the activities of the smaller cooperative banks are also part of the cooperative banking group, but because of their inter-regional and even international activities will not be part of the analysis presented here.

[4] The "Landesbanken", which are co-owned by the savings banks and are thus also part of the public savings bank sector in Germany are excluded from the analysis because they (just as the central institutions of the cooperative banking sector) have an interregional scope of operations.

[5] See the Financial Report 2014, pp. 26–27, of the DSGV, available at https://www.dsgv.de/sparkassen-finanzgruppe/publikationen/finanzbericht.html.

[6] While there are exceptions, it generally holds that the areas of activity of different savings banks do not overlap.

[7] Deviations can occur in both ways. First, individual municipalities within an administrative region can operate a savings bank. Consequently, there can be more than one savings bank in a region. Second, mergers among savings banks may result in savings banks which are active in two or more administrative regions. Our empirical analysis focuses on these mergers. In fact, the number of savings banks decreased from 567 at the beginning of 2000 (the start of our sample period) to 423 [416] at the end of 2012 [2014] (Source: Deutsche Bundesbank).

[8] There is no exception from this rule in our data set.

[9] Ultimately the funds would come from the other member banks of the savings bank association.

[10] The first merger between two savings banks located in different states (Sparkasse Bremerhaven and Kreissparkasse Wesermünde-Hadeln which merged to become Weser-Elbe Sparkasse) occurred after the end of our sample period. Completion of the merger required changes to the savings bank laws of both states.

Table 1
Bank descriptives (2000–2014).

	(A) Acquirer savings bank				(B) Other savings banks				(C) Cooperative banks			
	N	Mean	p50	Std. Dev.	N	Mean	p50	Std. Dev.	N	Mean	p50	Std. Dev.
Total assets (EURm)	1442	3183	2270	2923	4575	1995	1318	2534	3294	869	595	860
Asset growth	1343	0.0396	0.0164	0.1275	4270	0.0147	0.0140	0.0411	3032	0.0489	0.0261	0.1201
Equity/Total assets	1430	0.0581	0.0550	0.0167	4559	0.0606	0.0556	0.0198	3294	0.0644	0.0602	0.0187
Total customer deposits/Total assets	1442	0.6963	0.7047	0.0934	4575	0.6860	0.6950	0.0946	3294	0.7493	0.7537	0.0709
Gross loans/Total assets	1442	0.5884	0.6092	0.1319	4571	0.5992	0.6105	0.1211	3292	0.5708	0.5946	0.1296
Total debt/Equity	1430	17.6509	17.1841	5.5005	4559	17.1145	16.9759	5.5691	3294	15.7496	15.6000	4.4794
Current assets/Total assets	1430	0.1194	0.1051	0.0705	4559	0.1183	0.1010	0.0738	3294	0.1441	0.1307	0.0783
Loan loss provisions/Gross loans	1442	0.0067	0.0073	0.0111	4570	0.0057	0.0067	0.0108	3282	0.0068	0.0068	0.0106
Gross loans/Total customer deposits	1442	0.8738	0.8774	0.2685	4571	0.9011	0.8889	0.2590	3292	0.7762	0.7977	0.2161
Return on average assets	1442	0.0017	0.0015	0.0019	4574	0.0018	0.0016	0.0014	3293	0.0026	0.0023	0.0025
Return on average equity	1441	0.0301	0.0266	0.0302	4574	0.0322	0.0283	0.0251	3293	0.0415	0.0363	0.0412

Table 1 presents the distribution of various bank characteristics over our whole sample period, from 2000 to 2014, among the three different groups of banks we use in our analysis. Panel A consists of all savings banks that engaged in a merger as acquirer bank, independent of the type of merger. Panel B contains all other savings banks that never engaged in a merger (neither as acquirer nor as target). Panel C consists of the largest cooperative banks operating in the same region as a corresponding savings bank. Target savings banks are included in neither of the group and omitted from the Table as we do not use them in our analysis at any point.

We note that, as a consequence of the specific institutional setting we analyze, the distressed merger is a large acquisition for the acquiring bank. In our distressed merger sample the ratio of total assets of acquirer and target in the pre-merger year is 2.3, implying that the acquisition increases the assets of the acquiring bank by 43.5% on average. This, together with the fact that savings banks have high market shares in their local markets, has several implications which are important in the context of our study. First, adverse effects on the financial strength of the acquirer bank of a distressed merger will be exacerbated by the fact that the targets are large relative to the size of the acquirer. Second, because the savings banks are large institutions in their local markets, a large fraction of local firms are potentially affected by a decline in the bank's propensity to lend. Third, for the same reason, adverse effects on local economic activity are potentially large. Thus, because of the peculiarities of the institutional setting, the potential adverse effects of distressed mergers are "magnified". In our view, the importance of our results does not predominantly derive from the applicability of the institutional setting we analyze to other countries. Rather, the peculiarities of the German institutional setting make visible potential negative effects of distressed mergers that are likely to be present (but less visible) in other countries.

3. Data, descriptive statistics and identification

We combine information on local banks, data on local firms and macroeconomic variables describing the state and dynamics of the local economy. Our sample period covers the years 2000 to 2014. Data on regional economic activity is unavailable prior to 2000, thereafter the time series are published with a delay of two to three years.

Bank-level data

We collect data on local banks from two different sources. First, we obtained a list containing all savings banks and the administrative regions they are operating in from "Deutscher Sparkassen- und Giroverband" (DSGV). This list also includes information on all mergers, i.e. the names and identification codes of the merging banks and the year of the merger. We identify the acquiring bank in a merger as the bank which retains its savings bank identification number. There were 125 unique transactions, undertaken by 93 unique acquiring savings banks, between 2000 and 2012. We do not consider mergers occurring after 2012 because we require at least two years of data subsequent to the year of the merger.

We obtain detailed accounting data from Bureau van Dijk's Bankscope database (now known as Bank Focus) and match it to the data provided by the DSGV. Out of the 567 savings banks in existence at the beginning of the year 2000 Bankscope provides information on 507. These banks operate in 439 distinct administrative regions. The number of savings banks decreases during our sample period because of the mergers. At the end of the sample period (i.e. at the end of 2014) Bankscope provides data on 394 savings banks.[11]

We also source information on cooperative banks from Bankscope. We use these banks as a control sample in a robustness check. Bankscope provides information on 1411 unique cooperative banks operating in 401 different administrative regions during our sample period. Whenever using cooperative banks as controls we focus on the largest cooperative bank in the respective administrative region.

Table 1 shows descriptive statistics for the acquiring banks, for all other savings banks, and for our sample of cooperative banks.

Savings banks mainly refinance themselves with customer deposits (on average 68.6% of total assets) which they utilize for their lending activities that account for 59.9% of total assets. The average equity ratio of the savings banks in our sample is 6.1%. The

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[11] This number is larger than the number of savings banks covered by Bankscope at the beginning of our sample period (507) minus the number of mergers (125) because Bankscope has increased its coverage of savings banks during our sample period.
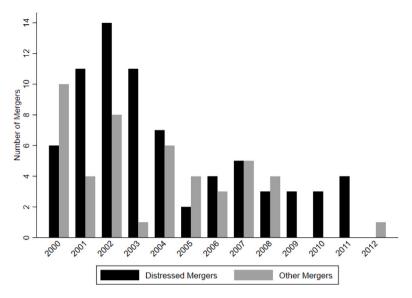
Fig. 1. Distribution of distressed and other mergers between 2000 and 2012. Fig. 1 depicts the distribution of savings bank mergers between 2000 and 2012. Mergers are classified as distressed if in either of the two years prior to the merger, the target savings bank figures for equity ratio, return on equity or LLP to total loans ratio was in the worst quintile relative to the universe of German savings bank.

equity ratio strongly increases during this period, starting at 4.4% in 2000 and increasing to 8.7% by 2014 (figures not shown in the table). The only noticeable difference between acquirers and other savings banks is that the former are, on average, much larger (total assets 3.2 bn Euros as compared to 2.0 bn). The cooperative banks are much smaller than the savings banks, have higher deposit ratios and slightly higher equity ratios than the savings banks (6.4% as compared to 6.1%).

As mentioned above our identification strategy explores the effects of distressed mergers which we define in a broad sense. Specifically, we consider a merger as distressed if at least one of the following three criteria applies to the target bank (relative to the universe of German savings banks):

(i) the target bank's equity to total assets ratio is in the lowest quintile of the respective yearly equity-to-total assets distribution in at least one of the two years prior to the merger

(ii) the return on equity is in the lowest quintile of the respective yearly ROE distribution in at least one of the two years prior to the merger or

(iii) the loan loss provisions (LLP) to total loans ratio is in the highest quintile of the respective yearly LLP-to-total-loans distribution in at least one of the two years prior to the merger.

By requiring that only one of the three criteria applies in only one of the two previous years we are more likely to classify a non-distressed merger as distressed than vice versa. Note, though, that 84.6% of the mergers categorized as distressed meet two or all three of the criteria, so that in the broad majority of cases we pick up banks that will also be identified as distressed under stricter definitions. When we classify only these mergers as distressed and drop those satisfying only one criterion from the sample we obtain results that are very similar to those reported in the paper. We use a broad definition of distressed mergers (rather than a stricter one e.g. based on regulatory lists of distressed events like e.g. Behn et al. (2016) or Bian et al. (2020)) because it allows us to also trace the impact of pre-emptive mergers where the formal filing of a distress event with the regulator can be avoided when the merger is accomplished before any formal regulatory measures are needed. Note also that any bias resulting from a misclassification of a non-distressed merger into the distressed category would be on the conservative side because we wish to show that distressed mergers constitute a negative shock to the acquiring bank. We are less likely to find evidence of such a negative shock if we erroneously include non-distressed mergers in the distressed merger sample.

Based on our definition, we classify 88 mergers as distressed mergers while the remaining 37 mergers are caused by other reasons, such as economies of scale or the consolidation of administrative regions.[12] The distribution of distressed and other mergers during our sample period is displayed in Fig. 1. The 125 mergers affected 177 unique administrative regions, either as acquiring or as target region, or both. Because we want to identify the impact of a distressed merger on the acquiring bank's region and distinguish this impact from regional economic contagion we remove from the sample

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[12] As noted above, there were three major consolidations of administrative regions ("Gebietsreform") during our sample period in the states of Sachsen-Anhalt (2007), Sachsen (2008) and Mecklenburg-Vorpommern (2011). We treat all mergers in these states that occur in the two years surrounding the year of the consolidation as non-distressed mergers because they are most likely caused by the reorganization of the administrative regions. When we eliminate these mergers from the sample (rather than retaining them and classifying them as non-distressed) we obtain results that are virtually identical to those reported below.

  (i) All mergers where the acquiring bank operates only in a region that hosted a target of a distressed merger at any point during the sample period (reducing the number of distressed [non-distressed] mergers from 88 [37] to 43 [24]). Correspondingly, in the firm-level [regional-level] analysis we exclude all firms in regions [all regions] that hosted a target of a distressed merger.

 (ii) All observations where the merged unit subsequently became the target of a merger (reducing the number of distressed [non-distressed] mergers from 43 [24] to 29 [21]).

The final data set thus contains 50 mergers of which 29 [21] are categorized as distressed [non-distressed].

In order to show that the effects we find are caused by the distressed merger and not by regional economic contagion we create a control sample of banks that are similar to the acquiring bank but were not involved in a merger. To do so we first select, for each acquirer bank region, a placebo region according to the following selection process:

   (i) the region needs to share a common border with the target bank region and

  (ii) the region never experienced a merger, neither as acquirer nor as target and

 (iii) the region belongs to the same state as the target bank region;

 (iv) macro data for the region is non-missing;

  (v) for the regions that meet these conditions we compute the Euclidean distance (ED) relative to the region of the actual acquirer based on observable macroeconomic variables. The ED is computed as the square root of the sum of the squared differences of the matching variables GDP growth, GDP per capita and population. The differences are standardized by the respective variable's sample standard deviation. The region with the lowest ED is selected as placebo region, except if the so selected region has an ED larger than one, in which case we exclude it from the placebo sample.[13]

This protocol leaves us with 31 mergers (19 of which are categorized as distressed mergers and 12 as non-distressed) for which we can identify a suitable placebo region.[14]

We use the placebo regions for robustness checks throughout the paper, i.e. in the bank level, firm level as well as macro level analyses. In the bank level analysis we compare the actual acquiring bank to the savings bank in the placebo region. In the firm-level analysis we compare firms in the actual acquirer region to firms in the placebo regions. In the macro level analysis, we compare real economic dynamics in the actual acquirer regions and the placebo regions.

Firm-level data

We obtain firm-level data from Bureau van Dijk's ORBIS global database which provides detailed information, including industry affiliation and accounting data, for public and private firms. In order to obtain a representative dataset we use ORBIS Flat File data and clean it in accordance with the instructions provided in Kalemli-Ozcan et al. (2015).[15] ORBIS provides information on more than two million unique German firms, of which more than one million firms have non-missing information on total assets over the period 2000 to 2014. We match each firm to an administrative region based on its headquarter's zip code. We include in our sample firms from the manufacturing and service sectors which are identified by the two-digit industry codes 5–82 in NACE Rev.2 (excluding 64–66).[16] We further exclude firms with total assets in excess of EUR 100 000 000 as well as listed firms because we assume that these firms predominantly rely on financing sources other than borrowing from local savings banks. This size restriction eliminates less than 3% of all observations from our sample.

In our main analysis we compare firms operating in the region of the acquiring savings bank in a distressed merger to a sample of control firms located in regions not affected by mergers. In order to show that the distress of the target bank is causal for any effect we find we also compare firms in the region of the acquirer in a non-distressed merger to a matched sample of control firms. Further, to rule out that regional economic contagion explains the effects we also compare firms located in the placebo regions (as defined above) to a matched sample of control firms. Consequently, we need to match control firms to all firms operating in (1) the region of an acquirer in a distressed merger, (2) the region of an acquirer in a non-distressed merger and (3) a placebo region, a total of 25 000 unique firms. For each of these firms we identify up to five control firms from other regions according to the following protocol:

   (i) the firm operates in the same 2-digit NACE industry;

  (ii) the region the firm is located in did not experience a merger at any time, neither as acquirer nor as target;

 (iii) we require that data is available for years $m-2$ to $m+2$ where m is the year of the merger;

 (iv) for all firms that fulfill these two criteria we calculate the Euclidean distance relative to the firm in the acquirer or placebo region based on total assets, long-term leverage and firm age, where all variables are measured in the year prior to the merger. The Euclidean distance is computed as the square root of the sum of the squared differences of the matching variables, where each difference is standardized by the sample standard deviation of the respective variable within the 2-digit NACE industry. We keep the five firms with the lowest distance.

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[13] An Euclidean distance larger than one exemplifies a "bad" match, i.e. it implies that all regions eligible as placebo region are substantially different from the acquirer region. This is most often the case when a rural area ("Landkreis") is matched to a metropolitan area ("Stadtkreis/kreisfreie Stadt"), or vice versa. In these cases the matching variables differ by a factor of five to seven.

[14] We lose eight regions because of missing macro data and 12 regions because the Euclidean distance is above 1, suggesting that these regions are bad matches.

[15] We thank Peter Severin for sharing the dataset with us.

[16] The excluded sectors are agriculture (01–04), finance (64–66), public administration (84), education (85), human health (86–88), arts (90–93) and other activities (94–99). See NACE Rev.2 for details on the European Classification of Economic Activities.

Table 2

Firm descriptives.

Panel A: Firms in acquirer regions and matched firms								
	(1) Firms in acquirer regions				(2) Firms matched to firms in acquirer regions			
	N	Mean	p50	Std. Dev.	N	Mean	p50	Std. Dev.
Total assets (EURm)	83,832	3.8689	0.6097	10.1110	386,506	3.4508	0.5934	9.0333
Firm age (Years)	83,832	18.4909	12.0000	20.6393	386,506	17.7814	12.0000	19.2617
Number of employees	20,155	52	12	106	113,614	44	10	94
Cash/Total assets	83,130	0.2081	0.1033	0.2482	383,441	0.2023	0.1029	0.2389
Current assets/Total assets	83,832	0.7083	0.8336	0.3077	386,506	0.7031	0.8191	0.3027
Fixed assets/Total assets	83,829	0.2917	0.1664	0.3077	386,486	0.2969	0.1809	0.3027
Inventories/Current assets	83,130	0.5002	0.5240	0.3154	383,441	0.5008	0.5184	0.3079
Current liabilities/Total assets	83,832	0.2143	0.0682	0.2789	386,506	0.2212	0.0829	0.2793
Long-term debt/Total assets	83,832	0.3820	0.3021	0.3176	386,506	0.3822	0.3096	0.3096
Equity/Total assets	83,832	0.4010	0.3587	0.3175	386,506	0.3942	0.3547	0.3084
Total debt/Equity	80,275	10.6810	1.6369	39.8033	371,346	10.3111	1.6800	38.0751

Panel B: Firms in placebo regions and matched firms								
	(1) Firms in placebo regions				(2) Firms matched to firms in placebo regions			
	N	Mean	p50	Std. Dev.	N	Mean	p50	Std. Dev.
Total assets (EURm)	28,572	3.3502	0.7343	8.3917	138,009	3.1315	0.7158	7.9146
Firm age (Years)	28,572	21.0867	15.0000	21.9020	138,009	19.7915	14.0000	19.8430
Number of employees	11,428	45	15	88	60,295	48	14	211
Cash/Total assets	28,418	0.1789	0.0971	0.2101	137,154	0.1913	0.1039	0.2212
Current assets/Total assets	28,572	0.7171	0.8103	0.2749	138,009	0.7241	0.8236	0.2758
Fixed assets/Total assets	28,564	0.2830	0.1898	0.2749	137,999	0.2759	0.1764	0.2758
Inventories/Current assets	28,418	0.5384	0.5679	0.2871	137,154	0.5327	0.5535	0.2897
Current liabilities/Total assets	28,572	0.2232	0.0859	0.2790	138,009	0.2238	0.0838	0.2810
Long-term debt/Total assets	28,572	0.4174	0.3604	0.3089	138,009	0.3990	0.3346	0.3033
Equity/Total assets	28,572	0.3578	0.3171	0.2843	138,009	0.3753	0.3356	0.2904
Total debt/Equity	27,583	11.0661	2.0092	37.9606	133,143	10.0257	1.8452	36.4350

Table 2 displays the distribution of various firm characteristics. Panel A shows data for (1) firms located in the region of all acquiring savings banks and (2) the firms matched to each acquirer region firm. Panel B shows data (1) for firms located in placebo regions and (2) for firms matched to firms in the placebo region. The matched firms (up to five per treatment firm) are selected such that they operate in the same 2-digit NACE industry and are closest to the acquirer region firm in terms of total assets, long-term leverage and firm age in the year prior to the merger. Placebo firms are located in placebo regions, i.e. regions that (i) share a common border with the target region; (ii) were never affected by a merger and (iii) are similar to the actual acquirer region in terms of investments per employee, GDP per capita, gross value added of manufacturing and construction as well as insolvencies (if available).

Table 2 shows descriptive statistics for the years surrounding the merger year ($m-2$ to $m+2$) for four groups of firms, namely (1) firms located in a region hosting the acquiring savings bank in a distressed merger, (2) control firms matched to the firms in the first group, (3) firms located in a placebo region and (4) control firms matched to firms in the placebo region. All four groups show similar characteristics. The median firm size (as measured by total assets) ranges from roughly EUR 600 000 to EUR 735 000 and the median firm age ranges between 12 and 15 years. Employment levels across all three groups are also similar.[17] The firms in our sample have low ratios of fixed assets to total assets (on average less than one third) and, correspondingly, high current asset ratios. The mean equity ratio ranges between 35.8% and slightly more than 40%.

Macro-level data

We source data on local economic activity from the "Genesis" regional data platform maintained by the German Federal Statistical Institute (Statistisches Bundesamt). This database contains a comprehensive set of variables at the level of the administrative regions such as regional GDP, the level of investments and employment. We further obtain data on the shares of construction and manufacturing in regional GDP. We collect this data, which usually only becomes available with a delay of several years, for the period 2000 (the first year in which the data was made available in a uniform format) to 2014.

Table 3 displays various macroeconomic variables, separately for acquiring regions, placebo regions, and all other regions (excluding target regions) over the sample period. On average, acquirer regions and placebo regions have higher population than other regions. The main reason is that acquiring savings bank are usually larger than the target banks, and the size of savings banks is positively related to the population in their region of activity.

Because we deliberately select placebo regions that are similar to the acquirer region, placebo regions are of similar size as acquirer regions. Further, average unemployment, investments per employee, GDP per unit employee, GDP per capita, the share of gross value added (GVA) of manufacturing to GDP and the share of GVA of construction are also similar across acquirer, placebo,

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[17] Employment data in ORBIS is only available for a rather small subset of firms. Therefore, the number of observations is much lower for the employment variable than for the other variables.

Table 3

Macro descriptives (2000–2014).

	(1) Acquirer region				(2) Other regions				(3) Placebo regions			
	N	Mean	p50	Std. Dev.	N	Mean	p50	Std. Dev.	N	Mean	p50	Std. Dev.
Population	765	213,390	151,588	171,387	3642	177,543	139,326	146,959	321	179,679	140,463	91,995
Labor force	785	112,341	69,960	116,937	3752	86,747	63,508	83,289	331	84,011	59,713	56,801
Unemployed people	719	9691	5315	10,945	3480	7450	5819	6460	309	6848	4739	5358
Investments (TEUR)	772	133,600	64,408	203,509	3589	106,721	66,586	136,852	324	122,606	75,844	124,056
Investments per unit labor (TEUR)	741	1.2189	0.9199	0.9964	3494	1.2672	1.0484	1.0979	322	1.3005	1.2508	0.7775
GDP (TEUR)	785	7,059,057	3,766,085	9,055,973	3752	5,129,717	3,428,226	6,056,771	331	4,943,379	3,370,588	3,909,901
GDP per unit labor (TEUR)	785	57.2250	55.2030	13.4834	3752	54.9436	53.4130	11.5679	331	56.0309	55.5400	8.5601
GDP per capita (TEUR)	765	29.7793	25.9920	14.6864	3642	28.2308	24.6035	13.5879	321	25.9442	24.6090	8.8464
GVA manufacturing/GDP	765	0.2005	0.1789	0.0996	3630	0.2148	0.2016	0.1021	321	0.2331	0.2351	0.0871
GVA construction/GDP	765	0.0458	0.0436	0.0193	3642	0.0491	0.0469	0.0217	321	0.0477	0.0456	0.0154

Table 3 presents macroeconomic characteristics for three different groups of regions that we use in our analysis in the period from 2000 to 2014. The first group consists of all regions that hosted an acquiring savings bank of both distressed and non-distressed mergers. The second group contains all regions that never experienced a merger (neither of an acquiring nor a target savings bank) and that are not identified as a placebo region of a merger. The third group displays the same characteristics for regions that we identified as placebo regions, i.e. regions that (i) share a common border with the target region; (ii) were never affected by a merger and (iii) are similar to the actual acquirer region in terms of their macroeconomic characteristics (investments per employee, GDP per capita, gross value added of manufacturing and construction as well as insolvencies (if available)). Information on insolvencies is only available from 2007 onwards. GVA stands for gross value added.

and other regions. Nevertheless, in our regressions we will control for differences across regions in these variables by including them as controls and by adding region fixed effects.

Identification

In our setting, identification of causal effects of the deterioration of the financial strength of local banks on the real economy requires that (1) the distressed merger is a negative shock to the acquiring bank and that (2) this negative shock is exogenous with regard to both the real economic dynamics faced by the acquirer and unobservable characteristics of the bank or its managers that might correlate with bank performance, bank lending or real economic dynamics. In this section we describe how our identification strategy addresses these issues.

First, in many cases, there are several potential acquirers for a distressed target, and the selection of the actual acquirer - a process that involves the state-level savings banks association, local political leaders and the management of the target and the potential acquirers — may give rise to endogeneity problems. For example, the potential acquirer with the least risk averse or the most overconfident management may lobby to be selected,[18] and it may be those managerial characteristics rather than the distressed merger that affect the post-merger performance of the acquiring bank. Similarly, the acquirer selection might be driven by performance-related bank characteristics or by economic conditions in the acquirer's region of activity and would thus be endogenous to the economic effects we want to identify. To rule out these possibilities we need to establish that the acquirer selection depends on variables that are unrelated to real economic conditions, bank performance and managerial characteristics. To this end we estimate a probit model with only three explanatory variables, the size of the potential acquirers,[19] the geographic distance between the target's and the potential acquirers' headquarters and a dummy variable which captures cases in which the areas of operation of the target and the potential acquirer overlap. We then consider, separately for each target, the scores delivered by the probit model for each of the potential acquirers. In 90% of the cases the potential acquirer with the highest score is the bank that was selected to be the actual acquirer, implying that the acquirer selection is exogenous.

Second, our identification is based on the argument that the distressed merger is a negative shock to the acquiring bank, and that any deterioration in the acquirer's performance is indeed caused by the distressed merger and not by real economic contagion. To support this argument we first show, in Section 4.1.2, that the acquirer's capitalization deteriorates after a distressed merger, as does the bank's propensity to lend. To ensure that this shock is exogenous with regard to real economic dynamics we need to rule out the possibility of real economic contagion across the regional borders, that is, the possibility that real economic issues originating in the target's region spread to the acquirer's region for reasons not related to the merging banks (e.g. inter-regional demand for output). For this purpose we perform a battery of placebo tests showing that the deterioration of bank performance and real economic dynamics occurs in the region of the acquirer but not in neighboring regions which are ex ante similar to the one of the acquirer and serve as placebos in our tests. We further show that cooperative banks operating in the region of the acquiring banks are not showing a deterioration of performance, suggesting that the shock to the savings bank is related to the merger rather than to some unobservable regional factors.

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[18] The management of potential acquirers faces a tradeoff here. On the one hand, a distressed merger would increase the assets under control of the management and, as a consequence, may lead to higher remuneration. On the other hand the distressed merger will negatively affect the financial strength of the bank. Faced with this tradeoff, less risk-averse or more overconfident managers may be more supportive of a merger.

[19] It is conceivable that the size of a bank is related to managerial characteristics such as risk aversion or overconfidence. However, the main driver of bank size is the size of a bank's region of activity. We related bank size (measured by total assets) to the population in the region of activity and found no significant differences between acquiring and non-acquiring banks.

Third, a non-distressed merger may also adversely affect the acquiring bank because the integration of the target puts strain on the management and on the whole organization. To disentangle the effect on the acquiring bank in a distressed merger from the general effect of a merger we create a control sample consisting of acquiring banks in non-distressed mergers and show that significant differences exist between distressed and non-distressed mergers.

Our identification strategy as described here has several important advantages. To start with, we can convincingly demonstrate the exogeneity of the shock to the acquiring bank. Next, given the savings banks' regional scope and their importance for the region, we focus on a set up with a much closer link (e.g. relative to Huber, 2018) between affected banks and local firms and thus local economic dynamics. Hence, in contrast to Huber (2018), we do not face the challenge of finding suitable instruments. Finally, our setup allows us to implement a series of placebo tests designed to rule out that confounding effects drive our results.

4. Results

4.1. Bank-level analysis

4.1.1. The choice of the acquirer is exogenous

The acquiring savings bank in a distressed merger is a bank that is (1) located in the same state and is (2) a direct neighbor of the distressed target. However, there is often more than one savings bank that meets these requirements and qualifies as a potential acquirer. As outlined in the previous section, the choice of the acquirer may give rise to endogeneity concerns. In particular, managerial characteristics or the performance of the bank may affect the probability that a bank is selected as an acquirer. To rule out this possibility we wish to establish that the choice of the actual acquirer is exogenous. To do so we estimate the following probit model of acquirer selection.

$$True\ acquirer_{i,j,t} = \beta_1 Bank\ size_{j,t} + \beta_2 Distance_{i,j} + \beta_3 Overlap_{i,j}$$
$$+ \gamma controls_{j,t-1} + \delta_t + \eta_i + \epsilon_{i,j,t} \tag{1}$$

The sample is based on 29 distressed mergers (indexed by i). For each merger we include all savings banks that qualify as potential acquirers according to the criteria listed above (indexed by j). The dependent variable is a binary variable that takes on the value 1 if the bank under consideration is the actual acquirer and takes on the value 0 else. As independent variables we include bank size (measured by the log of total assets), the geographic distance between the headquarters of the bank under consideration and the distressed target and a dummy variable denoted *overlap* which takes on the value 1 if the areas of operation of the target and the potential acquirer overlap.[20] We include bank size because larger banks may be better able to integrate a distressed target and may therefore be more likely to be selected as acquirers. The geographic distance and the overlap dummy are included for two reasons. First, German savings banks in their external communication highlight the role of regional proximity, making it more likely that a nearby bank is chosen as an acquirer. Second, there is evidence suggesting that geographic proximity and overlap generally are significant determinants of merger probabilities (Levine et al., 2020; Goetz et al., 2016). Besides the three independent variables we include target and year fixed effects. In a second model specification we include additional control variables which capture the performance of the potential acquirers. Specifically, we control for the level of capitalization, the return on equity, the share of loan loss provisions, and the cost-to-income ratio.

Estimation of the probit model delivers an estimate of the predicted probability of each potential acquirer to be selected as the actual acquirer. We use this information to infer whether the potential acquirer with the highest predicted probability is indeed the true acquirer. The results are presented in Table 4.

The results of the probit model imply that acquirer selection is indeed exogenous. The probability to be selected as an acquirer is increasing in bank size and decreasing in the geographic distance between the headquarters, and it is significantly larger if the areas of operations overlap. These three variables are sufficient to correctly predict the true acquirer in 27 of the 29 mergers. While some of the additional control variables included in model 2 are significant, their inclusion does not further improve the predictive quality of the model and causes only a modest increase in the pseudo-R^2 (from 0.71 to 0.76). Taken together, these results imply that the choice of the acquiring bank is mainly driven by geography: the largest and closest neighboring savings bank is the acquirer in almost all cases. The choice of the acquirer can therefore be treated as exogenous with regard to bank and regional characteristics potentially correlating with post-merger bank performance or real economic dynamics.

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[20] There are eight cases in which the area of operation of a target is smaller than an administrative region and a potential acquirer is already active in other parts of that administrative region. Such a constellation makes it more likely that this potential acquirer is selected to be the actual acquirer. The overlap dummy captures these cases. We note that even in these cases, the pre-merger areas of activity of target and acquirer will usually be distinct. The target serves one or several municipalities within the administrative region, but is not allowed to establish branches in other municipalities of the region. At the same time, the acquirer is not allowed to establish branches in the muncicpalities served by the target.

Table 4
Acquirer selection.

	True acquirer	True acquirer
Log(total assets)$_{t-1}$	1.456***	1.627***
	(0.273)	(0.353)
Distance	−0.092***	−0.133***
	(0.030)	(0.036)
Overlap	13.832***	13.357***
	(0.493)	(0.845)
CAR$_{t-1}$		−24.042
		(46.322)
ROE$_{t-1}$		75.434***
		(17.682)
LLP$_{t-1}$		208.074
		(162.324)
Cost-to-income$_{t-1}$		13.009***
		(4.589)
Target bank FE	Yes	Yes
Time FE	Yes	Yes
Total number of mergers	29	29
Corectly predicted acquirers	27	27
Number of observations	191	191
Pseudo − R^2	0.71	0.76

Table 4 displays the results of the probit regression modeling the choice of the true acquirer among the potentially eligible acquiring banks described in equation (1). The dependent variable is a dummy equal to one for the actual acquirers in a distressed mergers and equal to 0 for potential acquirers (i.e. banks that are also neighbors of the distressed target and are located in the same state but were not selected as acquirers). The main explanatory variables are the size of the bank (measured by the log of total assets) in the pre-merger year, the geographic distance between the headquarter of the bank and the headquarter of the target, and a dummy that indicates whether the region of activity of the bank and the target overlap. Model (2) includes as additional explanatory variables the lagged values of the log changes in a bank's equity ratio (CAR), the return on average equity (ROE), the loan loss provisions to gross loans (LLP) and the ratio of total costs-to-total bank revenue (cost-to-incmome). Year and target bank fixed effects are included in all specifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

4.1.2. A distressed merger is a persistent negative shock to the acquirer

Having established the exogeneity of the choice of the acquiring bank we next provide evidence that a distressed merger generates adverse effects for this bank. For this purpose we explore the changes in key accounting variables following distressed bank mergers. Given that a distressed merger is a merger with a target that has weak capitalization, risky loans and/or low profitability, we analyze whether the capitalization of the acquiring bank (measured by the ratio of total equity to total assets), the quality of the loan portfolio (measured by the ratio of loan loss provisions to total loans), and the profitability (measured by the return on equity and return on assets) of the acquiring bank deteriorate after the merger. We start by noting that, not surprisingly, in the year of the merger the first-time consolidation of the acquirer and the target bank balance sheets results in lower profitability (returns on assets are approximately 28 percent and return on equity 26 percent lower) and about 35 percent higher loan loss provisions relative to the pre-merger values for the acquirer.[21] Due to the equity injections that accompany some of the distressed mergers (Behn et al., 2016) capital ratios of the acquiring bank are not declining in the year of the merger (but as we show next they significantly decline in the years following the merger).

So far we described the pure accounting effect caused by the consolidation of the acquirer with a distressed target. We next broaden the perspective and analyze whether the performance of the merged bank continues to deteriorate in the two years following the merger (but excluding the merger year). Put differently, we test whether the negative shock to the acquiring bank *persists* after the distressed merger. One reason why the shock may persist is that the full extent of the target's distress is not reflected on its balance sheet (e.g. because of understated loan loss provisions) and is only revealed in the post-merger years. Another potential reason for persistent weak post-merger performance is the cost of integrating the target. Besides analyzing changes in key accounting ratios we also explore whether the acquiring bank responds to the negative shock caused by the merger by reducing its loan supply. Loan contraction has been identified as a channel through which bank distress may affect real economic outcomes (Amiti and Weinstein, 2018; Alfaro et al., 2021).

To analyze the effect of the merger on the bank performance measures and the ratio of loans (excluding interbank loans) to assets we estimate the following panel regression model where i denotes the bank, t the year and m is the year of the merger.

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[21] We manually checked the consistency of the merger year as provided by the DSGV and the year of consolidation in Bankscope to avoid the inclusion of any effect resulting from the consolidation that might bias our results.

Table 5

Bank performance - distressed vs. all mergers.

	(1) CAR	(2) ROE	(3) ROA	(4) LLP	(5) Loans
Acquirer bank distressed (m+1;m+2)	−0.0254**	−0.0075	−0.0650	0.1152	−0.0232**
	(0.0111)	(0.1226)	(0.1216)	(0.1079)	(0.0113)
Acquirer bank (m+1;m+2)	0.0077	−0.1817*	−0.1359	0.1183**	0.0087
	(0.0082)	(0.0982)	(0.0980)	(0.0546)	(0.0085)
CAR_{t-1}	−3.2630***	−8.8792***	−9.1191***	−17.8833***	−0.4534***
	(0.2810)	(1.7001)	(1.6504)	(3.4208)	(0.1330)
ROE_{t-1}	−1.3721***	−12.2282***	−9.8191***	−2.5766	−0.0985
	(0.4049)	(2.5151)	(2.4416)	(1.8659)	(0.0785)
ROA_{t-1}	23.2649***	−18.1057	−51.6647	132.8477**	2.5607
	(7.1384)	(46.3124)	(44.9865)	(56.9349)	(1.9024)
LLP_{t-1}	−0.3540***	−0.0786	−1.9484*	−15.8470***	−0.2848***
	(0.1279)	(1.0176)	(1.0093)	(3.9522)	(0.0878)
$Loans_{t-1}$	−0.0823***	0.1653	0.1802	0.6723*	−0.2478***
	(0.0280)	(0.2016)	(0.1955)	(0.3974)	(0.0211)
$Log(Total\ Assets)_{t-1}$	0.0169	−0.1966	−0.1545	−0.2213	0.0266**
	(0.0108)	(0.1458)	(0.1255)	(0.1381)	(0.0106)
Local election	−0.0014	−0.0491	−0.0450	−0.1660***	−0.0017
	(0.0027)	(0.0329)	(0.0292)	(0.0328)	(0.0017)
Bank FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	4363	4304	4292	3363	4363
Adjusted R^2	0.4083	0.2415	0.2385	0.1072	0.1526

Table 5 displays the results for the fixed effect panel regression described in Eq. (2) over the period 2000 to 2014. The dependent variables are the log changes in banks' equity ratio (CAR). return on average equity (ROE), return on average assets (ROA), loan loss provisions to gross loans (LLP) and gross loans to total assets (Loans). Acquirer bank (m+1;m+2) is a dummy indicating whether the bank has been an acquirer in any type of merger (distressed or non-distressed) in the two years subsequent to the merger year. Acquirer bank distressed (m+1;m+2) is equal to one only for acquirer banks of distressed mergers in the two years after the merger. The control variables are the lagged values of the dependent variables as well as lagged values of the log of total assets, the ratio of total customer deposits to total assets and a dummy indicating whether there was regional elections in the banks' region in the respective year. Year and bank fixed effects are included in all specifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%.

$$\Delta perf_{i,t} = \beta_1 \cdot Acquirer\ bank\ distressed(m+1;m+2) \tag{2}$$
$$+ \beta_2 \cdot Acquirer\ bank(m+1;m+2) + \gamma \cdot controls_{r,t-1} + \delta_t + \vartheta_i + \varepsilon_{i,t}.$$

The dependent variable, denoted $\Delta perf_{i,t}$ in Eq. (2), is the log growth rate of capitalization, non-performing loans ratio, return on equity, return on assets, and loan-to-assets ratio, respectively. The independent variable of main interest is $Acquirer\ bank\ distressed(m+1;m+2)$, a dummy variable that identifies acquiring banks in the two years after distressed mergers.[22] We apply the definition of distressed mergers introduced earlier. In order to differentiate between distressed mergers and non-distressed mergers we also include a dummy variable $Acquirer\ bank(m+1;m+2)$ indicating whether a bank has been an acquirer in *any* type of merger (distressed or non-distressed). As $Acquirer\ bank\ distressed(m+1;m+2)$, $Acquirer\ bank(m+1;m+2)$ is set equal to one in the two years after the merger, excluding the merger year.

We include as additional independent variables bank-level control variables (the lagged levels of the three performance measures and the relative lending volume, total assets, the ratio of retail deposits to total assets, the ratio of loans to total assets) and a dummy variable that indicates whether regional elections took place in the respective region in the year under consideration.[23] Bank fixed effects, ϑ_r, control for unobservable heterogeneity across banks. Also, time fixed effects, δ_t, are included to account for macroeconomic dynamics as well as for changes in bank regulation. Since we are interested in detecting the effect of the merger on the acquiring bank we exclude all target banks from all regression specifications. Target bank performance is likely to be lower than the performance of the average savings banks. Their inclusion might thus bias our estimates.

As a validation for our empirical approach we present in the appendix event-study plots for those specifications for which we find a significant distressed merger effect. The plots provide a visualization of the dynamics of the performance variables of the distressed acquirer in the pre-merger period, the merger year, and the post-merger period. (see figures D1 to D2). A major observation from

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[22] We define a dummy variable covering both post-merger years rather than individual year dummies because individual year dummies are likely to deliver noisy results. A merger may occur early in the year (e.g. in January) or late in the year (e.g. in December). In the first case one would expect to see a strong post-merger effect in year (m+1) and possibly only a weak effect in year (m+2) while in the second case the reverse may hold. Also, variations in the speed of integrating the target bank across mergers can generate noise when using yearly dummies.

[23] Englmaier and Stowasser (2017) have shown that savings banks in Germany adjust their lending policies in response to regional-level elections.

these event plots that is consistent with our argument that the choice of the distressed acquirer is exogenous is that there is no significant difference in the performance of the distressed acquirer prior to the merger.

The results are shown in Table 5. Given the fact that the regressions include both *Acquirer bank*$(m + 1; m + 2)$, a dummy for the acquirer of all (distressed and non-distressed) mergers, and *Acquirer bank distressed*$(m + 1; m + 2)$, a dummy only for the acquirer in distressed mergers, the coefficients of *Acquirer bank*$(m + 1; m + 2)$ measure the effect in the two years after a merger for the acquirer in non-distressed mergers (when *Acquirer bank distressed*$(m + 1; m + 2) = 0$) relative to the control group of non-merging banks. The coefficients on this dummy variable are insignificant, except for an increase in loan loss provisions and the drop in return on equity, which are significant at the 5% and 10% level, respectively, and most likely indicate a shift in post-merger accounting policy characterized by higher loan loss provisions and thus lower profitability. The reduction in profitability may also reflect frictions in the process of target integration, e.g. costly branch closures (as in Avramidis et al. (2021)). More important in our context are the coefficients of the dummy *Acquirer bank distressed*$(m + 1; m + 2)$, as well as the sums of the coefficients of *Acquirer bank distressed*$(m + 1; m + 2)$ and *Acquirer bank*$(m + 1; m + 2)$. The former represents an estimate of the differences between acquirers in distressed and non-distressed mergers, while the latter indicate the effect of the distressed acquisition relative to the control group of banks not involved in mergers. The results clearly indicate that the equity ratios of acquirers in distressed mergers decrease significantly following the merger. This effect is not only statistically, but also economically significant, with acquirers in distressed mergers experiencing about 2.5%[24] lower growth in capitalization relative to the group of acquirers in non-distressed mergers. The coefficients on the two profitability measures ROE and ROA and on the loan loss provisions are insignificant but their signs point to lower profitability and higher loan loss provisions of acquiring banks in distressed mergers relative to those in non-distressed mergers.

Unsurprisingly, the deterioration of the acquirers' capitalization is also reflected in an immediate drop in their propensity to lend. As shown in column (5) of Table 5, the growth of the loan-to-assets ratio in the balance sheets of acquiring banks in distressed mergers decreases by approximately 2.3% in the years following the merger, while there is no significant change in the loan-to-assets ratios of acquirers in non-distressed mergers.[25] This result indicates that the distressed acquirers' post-merger drop in capitalization is associated with a restriction of their lending capacity. The causality of this relation can work in both directions. On the one hand, banks with low capital ratios might reduce their lending ratios in order to comply with capital regulation. On the other hand, banks with reduced lending ratios face lower capital requirements (because non-loan assets are typically charged with lower risk weights than loans) and may thus reduce their capital ratios, e.g. by paying higher dividends. The drop in both capital ratios and loan-to-asset ratios also suggests that (consistent with Behn et al., 2016) no capital injections from the municipalities take place after the merger. This is not surprising given that such injections would de facto involve a redistribution of local fiscal resources across municipalities.

Further, because after the merger we only observe the consolidated balance sheet that includes the lending of both the acquirer and the target, we cannot rule out that the reduction of lending ratios is driven by stricter lending standards imposed by the acquirer that limit the lending growth of the target. In other words, we may observe a lending growth reduction of the merged bank even if the lending dynamics of the acquirer itself does not change following the merger. However, this is an unlikely scenario in our case as we show in our firm- and regional-level analysis that firms in the region of the acquirer (and the region as a whole) exhibit lower levels of investment, suggesting that the reduction in lending is not contained only in the region of the target but also affects the region of the acquirer. As already mentioned, the reduction of lending may be generated by the post-merger contraction of capital ratios, but it might also be driven by consolidation involving the closure of branches not only in the target's but also in the acquirer's region. Branch closures might negatively affect lending given the informational sensitivity of the lending by savings banks (Berger and Udell, 1995; Petersen and Rajan, 1994).

In sum, the results so far are consistent with our hypothesis that a distressed merger adversely affects the capitalization and lending ratios of the acquiring bank. In Sections 4.2 and 4.3 below we will analyze how the reduced capitalization and lending supply of the acquiring bank affect the firms and the economy in the region of the distressed acquirer. These firm- and regional-level analyses are not only relevant in terms of quantifying the real effects of the distressed mergers. They also present additional evidence that the distressed merger indeed affects the lending behavior of the acquirer in its original region.

4.1.3. Alternative explanations/robustness

Before we analyze the effect of the merger on regional firms and the regional economy we present additional tests to support our claim that the distressed merger is the driving force behind the deterioration of the acquiring bank's balance sheet. More specifically, we aim to rule out the possibility that the deterioration of the acquiring banks' performance is caused by regional economic contagion rather than by the distressed merger. If real economic distress in the region of the target bank, which is potentially the source of the target's distress, spreads to neighboring regions, including the region of the acquiring bank, the acquiring bank's performance might deteriorate even without a merger. In this case the negative shock to the acquiring bank is not exogenous with respect to real economic outcomes. We therefore estimate two additional sets of regressions to rule out this scenario.

In the first set of regressions we explore whether other banks in the region of the acquiring bank in a distressed merger also suffer a deterioration of their performance. If it is indeed the distressed merger which causes the poor performance of the acquiring banks, other banks in the same region should not display deteriorating performance. If, on the other hand, causality ran from local

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[24] Since the dependent variable is defined as the logarithmic growth rate, the effect of the explanatory variables is obtained by $100 \cdot (\exp(-0.0254) - 1) = 2.5\%$.

[25] As mentioned above, Vij (2021) finds a similar reduction of lending by US acquirers of distressed banks sold via FDIC auctions.

Table 6
Bank performance - coop vs. savings banks.

	(1) CAR	(2) ROE	(3) ROA	(4) LLP	(5) Loans
Acquirer bank distressed (m+1;m+2)	−0.0243**	−0.2496***	−0.2739***	0.2891**	−0.0168*
	(0.0105)	(0.0920)	(0.0903)	(0.1149)	(0.0100)
Coop & savings bank	0.0131	0.0732	0.0923*	−0.1301*	0.0058
distressed (m+1;m+2)	(0.0082)	(0.0502)	(0.0509)	(0.0675)	(0.0063)
Bank Controls	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	7570	7425	7413	5701	7570
Adjusted R^2	0.3088	0.2321	0.2248	0.0941	0.1748

Table 6 displays the results for the re-estimated fixed effect panel regression described in Eq. (2), comparing acquirer savings bank of distressed mergers with the largest cooperative bank operating in the same region. The dependent variables and control variables are defined as described in Table 5. Coop & savings bank distressed (m+1;m+2) is a dummy identifying the actual acquiring bank of a distressed merger as well as the largest cooperative bank operating in the same region in the two years subsequent to the merger. Acquirer bank distressed (m+1;m+2) is equal to one only for the actual acquirer banks of distressed mergers in the two years after the merger. Year and bank fixed effects are included in all specifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%.

real economic conditions to bank performance, we would expect to find that all banks active in the region of the acquiring savings bank in a distressed merger were negatively affected. To differentiate between these two cases we take advantage of the fact that, parallel to the regional savings banks, there is also a network of cooperative banks which have a similar geographical scope of activity (see Section 2 for details). To examine the performance of cooperative banks operating in the region of the acquiring saving banks we compile a sample of all cooperative banks for which information is provided by Bankscope (1 411 cooperative banks operating throughout the sample period). The overlap between the regions of the savings banks and those of the cooperative banks is not perfect, in the sense that cooperative banks are, on average, smaller than savings banks and often operate in a local area that is smaller than the regions we use in our analysis (see Table 1 for details). Oftentimes (in 283 of the regions) more than one cooperative bank operates in a region served by a savings bank. In these cases we choose the largest cooperative bank that is active in the respective region.[26] Moreover, we drop all cooperative banks that operate in a target bank region so that we end up with 280 unique cooperative banks.

To analyze the relative difference between the changes in the performance of cooperative banks and savings banks in the same region, we modify model (2) by including two dummy variables. The first dummy variable, *coop & savings bank distressed*$(m+1; m+2)$, identifies both the savings and the cooperative bank in the distressed acquirer region in the two years following the merger year. The second dummy, *savings bank distressed*$(m + 1; m + 2)$, only identifies the acquiring savings bank, and thus captures the performance differences between the acquiring savings bank and the cooperative bank which is active in the same region. The results, shown in Table 6, indicate that the performance of the cooperative banks in the acquirer regions does not deteriorate relative to the control group of banks in non-merger regions. This is evidence against regional contagion. The savings banks which are acquirers in a distressed merger, on the other hand, do markedly worse. Their capitalization, profitability and loan-to-assets ratios decrease significantly relative to the cooperative banks in the same region while their loan loss provisions increase. The finding that the loan-to-assets ratio of the acquiring savings bank drops while the loan-to-assets ratio of the cooperative bank operating in the same region does not is evidence that the reduction in lending by the savings bank is not due to reduced demand for loans.

In the second set of regressions we modify the model described in Eq. (1) to include a comparison between the performance of acquiring banks and the performance of the savings banks in the placebo regions defined in Section 3. The placebo regions are also neighbors to the target region, are in the same state, have not experienced a savings bank merger, and are deliberately selected to be similar to the region of the acquiring bank in terms of macroeconomic characteristics. Consequently, should real economic contagion be the channel behind the deterioration of the acquiring bank performance, the savings bank in the placebo region should also be affected.

Similar to the test including the cooperative banks, we implement our approach by adding two dummy variables to model (2). The first dummy variable, *Acquirer & placebo bank distressed*$(m+1; m+2)$, is set to 1 for both the actual acquiring bank and the bank in the placebo region in the two years following a distressed merger (and is set to 0 for all other banks and in all other periods). The second dummy, *acquirer bank distressed*$(m + 1; m + 2)$, is set to 1 only for the actual acquiring bank and thus captures any performance differences between the true and placebo acquiring banks. Consequently, the first dummy will capture the effect on bank performance of regional economic contagion while the second dummy will pick up the additional effect of the merger on the acquiring bank.

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[26] We use only the largest cooperative bank as this is the cooperative bank that typically serves the municipal center which is also where the headquarter of the saving bank and most of the savings bank's business is located. An important consequence of the fact that savings banks' headquarter is mostly located in the same town as the largest coop bank's headquarter is that the pool of potential customers of the savings bank overlaps with the one of the largest coop bank. Further, the largest cooperative bank is also the one that (while usually smaller) is closest in size to the savings bank. Smaller cooperative banks' total assets are often smaller than those of the savings bank by orders of magnitude. The focus on only the largest cooperative bank also addresses the issue that Bankscope does not cover all cooperative banks but has a reasonably high coverage in terms of the largest ones. Still, we lose 39 regions for which data on cooperative bank balance sheets is unavailable.

Table 7
Bank performance - actual vs. placebo acquirer.

	(1) CAR	(2) ROE	(3) ROA	(4) LLP	(5) Loans
Acquirer bank distressed (m+1;m+2)	−0.0186*	−0.2366*	−0.2536**	0.2657**	−0.0141*
	(0.0105)	(0.1272)	(0.1262)	(0.1209)	(0.0083)
Acquirer & placebo bank distressed (m+1;m+2)	0.0006	0.0552	0.0582	−0.0381	−0.0008
	(0.0070)	(0.0983)	(0.0985)	(0.0675)	(0.0041)
Bank Controls	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	4363	4304	4292	3363	4363
Adjusted R^2	0.4082	0.2409	0.2382	0.1070	0.1523

Table 7 displays the results for the re-estimated fixed effect panel regression described in Eq. (2), comparing true and placebo acquirer of distressed mergers, where the later is the savings bank that operates in the placebo region as identified in Section 3. The dependent variables and control variables are defined as described in Table 5. Acquirer & placebo bank distressed (m+1;m+2) is a dummy identifying the true and the placebo acquiring bank of a distressed merger in the two years subsequent to the merger. Acquirer bank distressed (m+1;m+2) is equal to one only for the true acquirer banks of distressed mergers in the two years after the merger. Year and bank fixed effects are included in all specifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%.

The results, presented in Table 7, indicate that the performance of savings banks operating in the placebo regions is not significantly different from that of the banks in the reference group. In contrast, the performance of the true acquirers significantly deteriorates relative to the placebo acquirers in all dimensions we explore here. Namely, the growth rates of capital ratios, profitability, and loan volumes relative to total assets drop, while those of loan loss provisions increase. These results, therefore, suggest that the negative shock to the performance of the acquiring bank is not due to regional economic contagion, but is rather directly related to the distressed merger.

In the appendix (Table A1) we also provide an additional set of tests where we compare the performance of savings banks in placebo regions for distressed and non-distressed mergers. If the deterioration of the performance of the actual acquirer in a distressed merger was caused by regional economic contagion, we would expect the placebo acquirers for distressed mergers (which are subject to the same economic environment as the actual acquirers) to be also affected. We estimate a model similar to Eq. (2) where we include a dummy variable identifying placebo acquirers in distressed mergers and a second dummy identifying placebo acquirers in all (distressed and non-distressed) mergers. The results indicate that there are no statistically significant differences between the two groups of savings banks and thus speak against the argument of regional economic contagion.

We further provide a robustness check with respect to the post merger period considered in the analysis. While in the main analysis we focus on two years after the merger we consider three years post-merger in the robustness check. The results, shown in Table A2, are quantitatively and qualitatively similar to those of our main specification.

In sum, the results in this section provide evidence that the distressed merger is indeed a negative shock for the acquiring savings bank. The observation that acquirers in distressed mergers show worse performance than the cooperative banks active in the same region and the savings banks in the placebo regions support our claim that the distressed merger, and not real economic contagion, are the cause of the deterioration of the acquiring banks' performance.

4.2. Firm-level analysis

4.2.1. The acquirer transmits the shock to the firms

In the previous sections we have shown that a distressed merger indeed represents a negative shock to the acquiring bank. The next logical step is to ask whether the shock to the acquiring savings bank is transmitted to the firms in its region. We presume that firms in the region of the acquiring bank might be affected by the negative shock because the acquiring savings bank is often a major credit provider in the region so that reduced lending by this bank cannot be fully compensated by other banks. We obtain data on regional firms from the ORBIS database which contains detailed information on firm fundamentals and covers a wide range of firms, including (very) small private firms. These firms are more likely to suffer from a negative shock to a regional bank than large firms with several bank relationships and capital market access.

We use this data in several ways. We start by performing an analysis analogous to that in Section 4.1.1 by comparing firms in the acquirer region to matched firms in other administrative regions as a control group.[27] The sample of control group firms consists of up to five matched firms which we select using the procedure described in Section 3. Accordingly, the control group firms are operating in the same 2-digit NACE industry, are situated in a region that did not experience a savings bank merger, and are closest to the acquirer region firm in terms of observable firm characteristics in the year prior to the merger.[28] We estimate the following fixed effect panel regression for the period $t − 2$ to $t + 2$:

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[27] We include all firms in the region and not only those whose main banking relation is to the savings bank since our purpose is to track the impact of the shock to acquiring banks on the population of firms as a whole.

[28] We include firms from the placebo regions in the control group. Our findings are robust to excluding these firms from the analysis.

$$\Delta perf_{j,t} = \beta_1 \cdot Acquirer\ firm\ distressed(m+1;m+2) \tag{3}$$
$$+ \beta_2 \cdot Acquirer\ firm(m+1;m+2) + \gamma \cdot controls_{j,t-1} + \delta_t + \vartheta_j + \varepsilon_{j,t}.$$

The dependent variable $\Delta perf_{j,t}$ is the log change in a measure of firm performance (to be described below). Firms are indexed by j. $Acquirer\ firm\ distressed(m+1;m+2)$ is a dummy variable which takes the value one if a firm operates in a distressed acquirer region in the post-merger period $m+1$ to $m+2$, $Acquirer\ firm(m+1;m+2)$ is a dummy variable which takes on the value one if a firm operates in any acquirer region (i.e. in a region experiencing a distressed or a non-distressed merger) in the post-merger period $m+1$ to $m+2$, $controls_{j,t-1}$ are firm-level controls (lagged leverage, lagged log(total assets), log(firm age) as well as log(GDP) to control for local economic activity). To control for unobservable heterogeneity across firms we also include firm fixed effects, ϑ_j. Also, time fixed effects, δ_t, are included to account for macroeconomic dynamics. The coefficient of main interest is β_1.

In terms of dependent variables, our main interest lies in the change of firms' investment behavior subsequent to the merger year because this is the real economic variable most closely related to the lending behavior of banks. Accordingly, we first analyze the effect of a distressed merger on firms' overall investment, measured as the log change in total assets minus cash.[29] Subsequently, we split total investments into investments in fixed assets[30] and investments in current assets as well as inventory growth (as a part of investments in current assets) in order to obtain additional insights into firms' specific reaction to the (financial) constraints imposed by the distressed merger. This separation is motivated by existing literature such as Fazzari and Petersen (1993) who find that firms engage in fixed investment smoothing using working capital if confronted with a negative (cash flow) shock, or Kashyap et al. (1994) who find that financial constraints have an impact on inventory movements. In order to analyze the effect on financial structure of distressed bank mergers we use the log changes in the current debt and the long-term debt ratios as additional dependent variables. Finally, to track the impact of distressed mergers on firm-level employment we also use the log change in employment as a dependent variable.

As with the bank-level analysis we again present in the appendix event-study plots providing a visualization of the dynamics of the investment behavior of firms in the region of the acquirer in the pre-merger period, the merger year, and the post-merger period (see figuresD3 to D7).

Columns (1) to (6) of Table 8 show the results for the log change in total assets minus cash (Investments), the log change in fixed assets (FA Growth), current assets (CA Growth) and inventories (Inventory Growth), and the log changes in current liabilities (CL Growth) and long-term debt (LTD Growth) as dependent variables.[31] The results in columns (1) to (4) indicate that firms located in an acquirer region of a distressed merger have lower total investments, lower current asset growth and lower inventory growth, all statistically significant at the 1% level. The effect on investments is also economically significant. The sum of the coefficients on the two dummy variables in column (1) is −0.0306, implying that investment growth of firms in distressed merger regions is 3% lower than that of firms in the reference group (i.e. the matched firms not affected by a merger).

Columns (2) to (4) reveal that this change is mainly driven by lower investments in current assets, and specifically in inventories, while investments in fixed asset do not change significantly. Given that our sample predominantly consists of SMEs (the mean (median) firm size, measured by total assets, amounts to approximately EUR 3 300 000 (510 000)) which hold most of their assets in the form of current assets, it is reasonable to find a stronger effect on current than on fixed assets.[32] This is particularly true when firms engage in fixed investment smoothing using working capital as Fazzari and Petersen (1993) suggest. This view is supported by the result in column (4) which shows that inventory growth of firms in the region of a distressed acquirer decreases by a statistically and economically significant 1.77%. This finding is also in line with Kashyap et al. (1994) who find that financial constraints have an impact on inventory movements.

Columns (5) and (6) of Table 8 analyze the growth in current liabilities and long-term debt. The coefficient in column (6) is negative and statistically significant, implying that firms located in distressed acquirer regions experience a lower growth in long-term debt, amounting to a net effect of −0.89%. The corresponding coefficient for current liability growth is displayed in column (5) and is not significantly different from zero. Thus, firms do not increase short-term lending in order to compensate for the reduced access to long-term debt. One implication of this result is that firms do not use trade credit as a substitute for bank loans. The results in the last column of Table 8 reveal that employment growth is significantly lower in firms located in the region of a distressed merger, a finding which suggests that the shock to a major bank in the region dampens employment dynamics.

Overall, the findings in Table 8 are consistent with the notion that acquiring banks in distressed mergers transmit the negative shock to the firms located in their region of operation. These firms react to the tightening credit conditions by cutting back their investments.

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[29] The change in total assets is a commonly used proxy for investments, e.g. Fama and French (2006), Aharoni et al. (2013) or Wahal (2019). We follow Hirshleifer et al. (2004) and deduct cash holdings from total assets to obtain an estimate of operating assets. Note that our measure of investments, the log change in total assets minus cash, provides an estimate of a firm's *gross* investment into fixed and current non-cash assets. Deducting depreciation would result in an estimate of *net* investments. We only analyze gross investments for two reasons. First, firms need to finance their gross investments, not only their net investments. Therefore, financial constraints should be more closely related to gross than to net investments (see Gebauer et al., 2017 for a similar argument). Second, data on depreciation is unavailable in Orbis for the vast majority of firms.

[30] An alternative definition (used e.g. by Kalemli-Ozcan et al., 2019) is to only consider investments in *tangible* fixed assets. However, total and tangible fixed assets are highly correlated (the correlation being 0.899 in our sample), suggesting that intangible assets are of minor relevance for the small firms in our sample. Orbis provides the breakdown of fixed assets into tangible and intangible fixed assets only for about a third of the firms in our sample, and in 41.7% of the cases where this information is available intangible fixed assets are 0. When we re-estimate our regression using the log change in tangible rather than total fixed assets as dependent variable we obtain results similar to those presented below.

[31] We approximate inventories by deducting cash and accounts receivable from current assets.

[32] The mean (median) ratio of current to total assets one year prior to the merger is 71%(83%).

Table 8
Firm performance - distressed vs. all mergers.

	(1) Investments	(2) FA Growth	(3) CA Growth	(4) Inventory Growth	(5) CL Growth	(6) LTD Growth	(7) Employment Growth
Acquirer firm distressed (m+1;m+2)	−0.0358***	0.0081	−0.0316***	−0.0363**	0.0131	−0.0514**	−0.0252**
	(0.0133)	(0.0126)	(0.0098)	(0.0168)	(0.0329)	(0.0244)	(0.0120)
Acquirer firm (m+1;m+2)	0.0052	−0.0196*	0.0229**	0.0193	−0.0137	0.0380*	0.0168
	(0.0120)	(0.0113)	(0.0090)	(0.0152)	(0.0306)	(0.0221)	(0.0115)
Leverage$_{t-1}$	−0.0003***	−0.0002***	−0.0001	−0.0002*	0.0003***	0.0003***	−0.0000
	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0000)
Log(Total Assets)$_{t-1}$	−0.7367***	0.1041***	0.0940***	0.1694***	0.1053***	0.1926***	0.0420***
	(0.0090)	(0.0058)	(0.0072)	(0.0102)	(0.0128)	(0.0108)	(0.0048)
Log(Firm Age)$_{t-1}$	−0.0196**	−0.0711***	0.0361***	0.1445***	0.0109	0.0376***	−0.0174**
	(0.0081)	(0.0073)	(0.0059)	(0.0111)	(0.0179)	(0.0132)	(0.0079)
Log(GDP)$_{t-1}$	0.1973***	0.1171***	0.0759***	0.1361***	0.0332	0.0911	0.0314
	(0.0391)	(0.0382)	(0.0278)	(0.0489)	(0.0935)	(0.0726)	(0.0281)
Local election	0.0008	−0.0004	−0.0022	−0.0011	0.0001	−0.0006	0.0013
	(0.0029)	(0.0027)	(0.0021)	(0.0036)	(0.0064)	(0.0053)	(0.0020)
Levels	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	399 399	373 249	404 286	391 002	212 329	251 401	83 379
Adjusted R^2	0.2259	0.3080	0.3528	0.4328	0.3914	0.3547	0.3253

Table 8 displays the results for the fixed effect panel regression described in Eq. (3). The dependent variables are the log changes in total assets minus cash (Investments), fixed assets (FA Growth), current assets (CA Growth), inventories (Inventory Growth), current liabilities (CL Growth), long-term debt (LTD Growth) and employment (Employment Growth). Acquirer firm (m+1;m+2) is a dummy identifying all firms that are located within the region of an acquiring savings bank of any type of merger (distressed or non-distressed) in the two years subsequent to the merger. Acquirer firm distressed (m+1;m+2) is equal to one only for firms that are located within the region of an acquiring savings bank of a distressed merger in the two years after the merger. The control variables include firm age, and lagged values of leverage (defined as total debt over equity), the log of total assets and the respective levels of the dependent variables (indicated as "Levels"). Year and firm fixed effects are included in all specifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%.

4.2.2. Alternative explanations/robustness

In order to provide further evidence that the effect we document in Table 8 is actually driven by the distressed merger and not by regional contagion, we perform placebo tests similar to those presented at the bank level.

More specifically, we compare firms from the actual region of the distressed acquirer directly to the firms located in the respective placebo regions in order to further strengthen our point that the acquiring savings bank in a distressed merger transmits the negative shock to the firms in its region. Because the placebo regions are selected such that they (i) share a common border with the target region; (ii) were never affected by a merger and (iii) are similar to the actual acquirer region in terms of their macroeconomic characteristics, we would expect that we do not find a difference in performance between these firms if the effect was driven by regional contagion. In contrast, finding an effect for firms in distressed acquirer regions would suggest that it is the transmission of the negative shock to the acquiring bank to the firms in its region that causes the effect shown in Table 8.

In analogy to the bank-level analysis, we re-estimate Eq. (3) and replace the two dummy variables in order to identify the difference between firms in the actual acquirer region and firms in the placebo regions. The first dummy variable, *Acquirer & placebo firm distressed*$(m+1; m+2)$, identifies firms from both the true and placebo distressed acquirer region in the two years following the year of the merger. The second dummy, *Acquirer firm distressed*$(m+1; m+2)$, only identifies the firms located in the true distressed acquirer region and thus captures the performance differences between firms in the true and the placebo distressed acquirer regions. The control group consists of all firms that were either matched to an acquirer or a placebo region firm. The results are presented in Table 9.

The results shown in columns (1) to (4) are similar to those in Table 8. Firms located in a distressed acquirer region have significantly lower investment growth, current asset growth and inventory growth. The effect on fixed asset growth is negative but just falls short of being statistically significant. These findings are in line with the previous results and strongly point towards the bank, and not regional contagion, as the transmitter of the negative shock. The coefficient on the long-term debt ratio is negative but, unlike its counterpart in Table 8, is not significant. The same is true for the specification using the log change of employment as the dependent variable.

Also similar to the bank level analysis we present an additional set of tests in Table B1 in the appendix where we analyze the firms in regions selected as placebo regions (as defined in Section 3) for distressed and non-distressed mergers. If the effects documented above on firms in the region of an acquirer bank in a distressed merger were caused by regional economic contagion we would expect a similar effect on firms in placebo regions for distressed mergers, as these firms are subject to similar economic conditions. The results indicate that firms located in the placebo region of a distressed merger do neither reduce their investments (in fact, they exhibit significantly higher growth in current assets than firms in the placebo regions of all mergers), nor do they reduce their growth in current liabilities or long term debt. However, they exhibit reduced employment growth. These findings (with the

Table 9

Firm performance - acquirer vs. placebo firms.

	(1) Investments	(2) FA Growth	(3) CA Growth	(4) Inventory Growth	(5) CL Growth	(6) LTD Growth	(7) Employment Growth
Acquirer firm distressed (m+1;m+2)	−0.0245*** (0.0094)	−0.0129 (0.0099)	−0.0123* (0.0071)	−0.0220* (0.0124)	0.0037 (0.0257)	−0.0108 (0.0192)	−0.0024 (0.0075)
Acquirer & placebo firm distressed (m+1;m+2)	−0.0079 (0.0072)	−0.0005 (0.0082)	0.0026 (0.0058)	0.0027 (0.0098)	−0.0113 (0.0225)	−0.0053 (0.0158)	−0.0068 (0.0062)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Levels	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	511 511	480 641	517 389	501 711	270 159	326 943	117 526
Adjusted R^2	0.2293	0.3057	0.3518	0.4297	0.3893	0.3502	0.3301

Table 9 displays the results for the re-estimated fixed effect panel regression described in Eq. (3), comparing firms in true and placebo regions (as identified in Section 3) of distressed mergers. The dependent variables and control variables are defined as described in Table 8. Acquirer & placebo firm distressed (m+1;m+2) is a dummy identifying all firms that are located within the region of the true or placebo region of a distressed merger. Acquirer firm distressed (m+1;m+2) is equal to one only for firms that are located within the true acquirer region of a distressed merger. Year and firm fixed effects are included in all specifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%.

exception of the result for employment growth) are again evidence against the argument of regional economic contagion. In an additional robustness check we extend the post-merger period from two to three years. The results, shown in Table B2, are similar to those of our main specification. This also holds for the specification that uses employment growth as the dependent variable.

The findings of this subsection provide strong support for the notion that it is the shock to the acquiring bank, and not regional contagion spreading to neighboring regions, that is causing the effect on investments and long-term debt documented in Section 4.2.1. We can therefore conclude that the results of the two robustness checks support our claim that the acquiring savings bank passes on the negative shock from the distressed merger to the firms in its region, which, in turn, react to the tightening loan supply by cutting back on their investments.

4.3. Macro-level analysis

Having established that distressed mergers negatively affect the performance of the acquiring banks and result in reduced investments of firms in the region of the acquiring bank, we now turn to exploring aggregate effects of the distressed merger on the real economic dynamics in the region of the acquirer. More specifically, we document how real economic variables change following a distressed merger. Since we have provided ample evidence that the shock to the acquiring bank is exogenous with respect to real economic conditions in the acquirer region, any aggregate real economic effect we detect can be traced to the distressed merger. Any such effect would thus be evidence of a causal effect of a distressed merger on macroeconomic outcomes.

4.3.1. Distressed mergers affect macroeconomic dynamics in the acquirer region

We examine the effect of the quality of financial institutions on real economic activity by estimating the dynamics of real economic variables at the regional level following mergers of regional savings banks. More specifically we estimate the following fixed effects panel regression[33]

$$\Delta real_{r,t} = \beta_1 \cdot acquirer\ distressed(m+1;m+2) \tag{4}$$
$$+ \beta_2 \cdot acquirer(m+1;m+2) + \gamma \cdot controls_{r,t-1} + \rho \cdot real_{(r,t-1)} + \delta_t + \vartheta_r + \varepsilon_{r,t}$$

where r denotes the region. Following the literature on the real effects of bank performance the set of dependent variables, denoted $\Delta real_{(r,t)}$, includes the log changes in region r and year t in (1) the regional per capita gross domestic product (GDP) in thousand Euros, (2) investments per business establishment (plant) in million Euro[34] and (3) employment, defined as employees over population.

As independent variables we include the lagged level of the aforementioned real variables, denoted $real_{(r,t-1)}$. They account for the fact that the growth rates of the macro variables might depend on the level in the preceding period. $Controls_{r,t}$ is a vector of lagged control variables. It includes the joint shares of manufacturing and construction in local GDP (*Industrial Production Share*) as proxies for the sensitivity of local economic activity to bank lending as well as a dummy variable indicating whether there have been regional elections in a year. To control for unobservable heterogeneity across regions, we also include regional fixed effects, ϑ_r. Also, time fixed effects, δ_t, are included to account for macroeconomic dynamics as well as for changes in bank regulation.

Analogous to the bank- and firm-level analysis, we isolate the effect of distressed mergers by including two separate dummy variables in the model: $acquirer(m+1;m+2)$ is set to one if the region is the host of an acquiring savings bank in either a

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[33] Bruno and Hauswald (2013) and Hoffmann and Shcherbakova-Stewen (2011) use a similar empirical strategy.

[34] The investment volume per business establishment stems from a representative survey by the German Statistical Office.

Table 10
Real economic activity - distressed vs. all mergers.

	(1) GDP per capita	(2) Investments	(3) Employment
Acquirer region distressed (m+1;m+2)	−0.0095	−0.1068**	−0.0171*
	(0.0058)	(0.0516)	(0.0099)
Acquirer region (m+1;m+2)	0.0130**	0.0468	0.0117
	(0.0051)	(0.0426)	(0.0083)
GDP per Capita$_{t-1}$	−0.2924***	0.2440*	0.0382
	(0.0230)	(0.1325)	(0.0276)
Investments$_{t-1}$	0.0027	−0.6519***	0.0054
	(0.0025)	(0.0226)	(0.0043)
Employment Rate$_{t-1}$	0.7990***	1.1293	−1.3687***
	(0.1439)	(0.8766)	(0.1986)
Industrial Production Share$_{t-1}$	−0.0427***	0.3498***	0.0117
	(0.0123)	(0.0938)	(0.0211)
Local election	−0.0008	−0.0217	−0.0058**
	(0.0015)	(0.0152)	(0.0023)
Region FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Observations	4001	4001	4001
Adjusted R^2	0.3842	0.3351	0.3198

Table 10 displays the results for the fixed effect panel regression described in Eq. (4). The dependent variables are the log changes in GDP per capita, investments and employment (defined as employees over population). Acquirer region (m+1;m+2) is a dummy identifying all region that hosted an acquiring savings bank of any type of merger (distressed or non-distressed) in the two years subsequent to the merger. Acquirer region distressed (m+1;m+2) is equal to one only for regions of acquiring savings banks, where the merger is classified as distressed. The control variables are (depending on the specification) lagged values of GDP, GDP per capita, investments and employment. In addition, we control for population and the shares of manufacturing and construction, relative to GDP. Year and region fixed effects are included in all specifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%.

distressed or a non-distressed merger which took place in one of the two preceding years, and is set to zero otherwise. Similarly, *acquirer distressed*$(m + 1; m + 2)$ is set to one in the two years after a region has been the host of an acquiring savings bank in a distressed merger, and is set to zero otherwise. Thus, the coefficient on the variable *acquirer distressed*$(m + 1; m + 2)$ captures the differences, if any, between non-distressed mergers and distressed mergers.

Since we are interested in detecting the effect of the merger on the region of the acquiring bank, we exclude the target bank regions from all regression specifications. Thus, we only use regions as controls which never hosted a target bank. We also exclude regions from the control group if they experienced (as host of an acquiring bank) a merger (distressed or non-distressed) in any prior year of the sample period. Again, as with the bank-level and the firm-level analysis we present in the appendix for the specifications with a significant distressed merger effect event-study plots. They provide a visualization of the aggregate economic dynamics in the region of the distressed acquirer in the pre-merger period, the merger year, and the post-merger period (see figures D8 to D9).

The results of the regressions are presented in Table 10. Similar to previous tables, the coefficient on the dummy *acquirer*$(m + 1; m + 2)$ measures real economic dynamics in regions with acquirers in non-distressed mergers relative to the control groups of regions without mergers. The coefficient on the dummy *acquirer distressed*$(m + 1; m + 2)$ compares regions of acquiring banks in distressed mergers to regions experiencing a non-distressed merger, while the sum of the coefficients of *acquirer*$(m + 1; m + 2)$ and *acquirer distressed*$(m + 1; m + 2)$ informs us about the effect of a distressed merger on the macroeconomic dynamics of the acquirer region relative to the regions without mergers. The results in the second line of Table 10 indicate that a non-distressed merger does not negatively affect the real economy. All coefficients are positive, and the coefficient on GDP growth is even statistically significant. Regions experiencing a distressed merger do much worse, as is evidenced by the results in the first line of the table. All coefficients, except the one in the GDP regression, are negative and significant, implying that distressed mergers have adverse real effects compared to non-distressed mergers. The magnitude of the coefficients suggests that the differences are not only statistically but also economically significant. The growth rate of investments is approximately 1% lower and the growth rate of the fraction of the population employed is about 1.7% lower relative to regions experiencing a non-distressed merger.

Taken together the results of our baseline regression model indicate that a distressed merger has adverse real economic implications for the region of the acquiring bank. This result confirms that the deterioration of the performance of the acquiring bank following a distressed merger not only limits the access to credit by firms in the region of the acquiring bank, but also generates negative effects at the aggregate regional level. These findings present strong support for a causal effect of the quality of financial institutions on real economic dynamics.

4.3.2. Alternative explanations/robustness

As in the bank- and firm-level analysis we compare the dynamics of real economic activity in regions affected by a distressed acquisition to that in the placebo regions defined in Section 3 in order to rule out the possibility that our results are driven

Table 11
Real economic activity - acquirer vs. placebo regions.

	(1) GDP per capita	(2) Investments	(3) Employment
Acquirer region distressed (m+1;m+2)	0.0075	−0.0650*	−0.0147*
	(0.0085)	(0.0374)	(0.0086)
Acquirer & placebo region distressed (m+1;m+2)	−0.0045	0.0032	0.0090
	(0.0078)	(0.0219)	(0.0071)
Region controls	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Observations	4001	4001	4001
Adjusted R^2	0.3833	0.3349	0.3196

Table 11 displays the results for the re-estimated fixed effect panel regression described in Eq. (4) comparing true and placebo distressed region (as identified in Section 3). The dependent variables and control variables are defined as described in Table 10. Acquirer & placebo region distressed (m+1;m+2) is a dummy equal to one for the true distressed acquirer region and its respective placebo in the two years subsequent to the merger year. Acquirer region distressed (m+1;m+2) is equal to one only for the true regions of an acquiring savings banks, where the merger is classified as distressed. Year and region fixed effects are included in all specifications. Standard errors (in parentheses) are clustered on the regional level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%.

by real economic contagion. To this end we re-estimate model (4) considering the actual distressed regions of the acquiring banks and the respective distressed placebo regions. Thus, we again have two dummy variables of interest. The first dummy *Acquirer & placebo region distressed*$(m + 1; m + 2)$, takes on the value one if a region is either the acquirer or the placebo region. The second dummy, *Acquirer region distressed*$(m + 1; m + 2)$, takes the value of one only in the region that experiences a distressed merger and zero otherwise. The second dummy thus measures whether the actual acquirer region fares less well than the placebo region. We expect this to be the case if it is indeed the distressed merger which is causing the real economic effects. If, instead, the effects were caused by regional economic contagion we would not expect to find differences between acquirer and placebo regions.

The results of these tests, presented in Table 11, clearly illustrate that investment and employment dynamics[35] in the region of the acquirer in a distressed merger deteriorate relative to the dynamics in the placebo regions. These results are again a clear indication against the concern that regional economic contagion rather than the adverse shock to the acquiring bank is at the core of the worsening macroeconomic outcomes.

In the appendix (Table C1) we provide results of an additional test where we compare the macroeconomic dynamics between the regions which serve as a placebo for the region of the acquirer in a distressed merger and all the regions selected as placebos for the regions of both distressed and non-distressed acquirers. These tests show no statistically significant difference between the two groups of regions and thus provide no support for the argument of regional economic contagion. Further, as in the previous subsections, we provide a robustness check with respect to the length of the post merger period. Specifically, we consider three years post-merger instead of two years. The results, shown in Table C2, are similar to those of our main specification.

Taken together, these findings are supportive of the view that the deterioration of real economic conditions in the region of an acquirer in a distressed merger can be attributed to the adverse shock to the performance of the acquiring bank and is not the result of regional contagion. Thus, our results provide strong support for a causal relation between the performance of financial institutions and real economic dynamics.

5. Conclusion

In this paper we explore distressed mergers as exogenous shocks to the acquiring banks and show that this shock (1) negatively affects the performance of the acquiring bank, (2) results in reduced investments and employment of firms in the region of the acquiring bank and (3) negatively affects regional economic dynamics in the region of the acquirer. Our results indicate a particularly robust and strong negative impact on regional investments, but employment and firm-level access to long-term debt are also substantially affected.

We perform a number of tests to rule out alternative explanations, most importantly regional contagion effects. We first provide evidence that the selection of the acquiring savings bank (out of several candidate acquirers) is exogenous. We then show that the performance of the acquiring savings bank deteriorates relative to the performance of (1) the largest cooperative bank in the region of the acquiring savings bank and (2) the savings banks in placebo regions defined as regions that are also adjacent to the region of the distressed target savings bank and had similar real economic dynamics prior to the merger, but in which no merger took place. We further show that, while firms in the region of the acquiring bank in a distressed merger reduce their investment and employment growth and the region of the acquiring bank as a whole suffers from lower investment and employment growth relative

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[35] As in the main test, GDP growth enters the regression with a statistically insignificant coefficient, suggesting that the short-term effect of the merger is limited to investments and employment.

to suitable control groups, there are no such adverse real economic effects in placebo regions, neither at the firm nor at the regional level.

In summary, our empirical evidence allows the conclusion that there is indeed a causal effect from shocks to savings banks to regional economic activity. This conclusion gives rise to at least two policy implications. First, by illustrating the negative real effects of bank distress our results highlight the importance of preventing individual bank distress especially during cyclical downturns. Stricter countercyclical capital requirements might be a step in that direction. Second, our results with regard to the adverse effects for the region of the acquiring bank imply that there are unintended side effects, or hidden costs, of distressed mergers.

CRediT authorship contribution statement

Valeriya Dinger: Writing – review & editing, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Christian Schmidt:** Methodology, Investigation, Formal analysis, Data curation. **Erik Theissen:** Writing – review & editing, Writing – original draft, Validation, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.jcorpfin.2024.102674.

Data availability

The authors do not have permission to share data.

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