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Transmitting Fiscal Covid-19 Counterstrikes Effectively: Mind the Banks!

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Transmitting Fiscal Covid-19 Counterstrikes Effectively: Mind the Banks!

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Transmitting Fiscal Covid-19 Counterstrikes Effectively: Mind the Banks!

Abstract

The German government launched an unprecedented range of support programmes to mitigate the economic fallout from the Covid-19 pandemic for employees, self-employed, and firms. Fiscal transfers and guarantees amount to approximately €1.2 billion by now and are supplemented by similarly impressive measures taken at the European level.

We argue in this note that the pandemic poses, however, also important challenges to financial stability in general and bank resilience in particular. A stable banking system is, in turn, crucial to ensure that support measures are transmitted to the real economy and that credit markets function seamlessly.

Our analysis shows that banks are exposed rather differently to deteriorated business outlooks due to marked differences in their lending specialisation to different economic sectors. Moreover, a number of the banks that were hit hardest by bleak growth prospects of their borrowers were already relatively thinly capitalised at the outset of the pandemic. This coincidence can impair the ability and willingness of selected banks to continue lending to their mostly small and medium sized entrepreneurial customers. Therefore, ensuring financial stability is an important pre-requisite to also ensure the effectiveness of fiscal support measures.

We estimate that contracting business prospects during the first quarter of 2020 could lead to an additional volume of non-performing loans (NPL) among the 40 most stressed banks – mostly small, regional relationship lenders – on the order of around €200 million. Given an initial stock of NPL of €650 million, this estimate thus suggests a potential level of NPL at year-end of €1.45 billion for this fairly small group of banks already. We further show that 17 regional banking markets are particularly exposed to an undesirable coincidence of starkly deteriorating borrower prospects and weakly capitalised local banks. Since these regions are home to around 6.8% of total employment in Germany, we argue that ensuring financial stability in the form of healthy bank balance sheets should be an important element of the policy strategy to contain the adverse real economic effects of the pandemic.

Main insights

First, conditional on their past lending choices, **banks are exposed differently to those sectors in the economy that were hit hardest by the Covid-19 shock**. We approximate changes in global growth opportunities per sector by the change of price-to-earnings (PE) ratios of US firms (Baekert et al., 2007). **On average, growth opportunities contracted by 39% across all sectors according to this indicator**, ranging from a reduction of 110% in brick-and-mortar retailing activities up to an increase of around 42% for educational services (see Figure 1). To assess the impact for the German banking system, we match financial data for more than 400,000 German (including small and medium) enterprises to almost all commercial, savings, and cooperative banks in Germany. Based on this bank-firm link, we calculate for each bank the average change of growth opportunities as

reflected by changing PE-ratios of their corporate borrower portfolio weighted by these firms' debt. According to this measure**, the average German bank was exposed to a borrower portfolio exhibiting 28% lower growth opportunities between January 2, 2020 and March 31, 2020** (see Figure 2).

Second, German banks started with rather different equity capital buffers into the Covid-19 crisis, thereby giving rise to **markedly different abilities to absorb credit portfolio stress of different intensity**. We identify those banks that are simultaneously hit hard by credit portfolio shocks and are least capitalised (see Figures 3 and 4). Assuming that the relative reduction of growth opportunities leads to a proportional increase in the share of non-performing loans (NPL), we estimate for the 39 most exposed banks with the lowest equity-to-asset ratios **an increase of NPL by €206 million** leading to **a total NPL volume at risk on the order of €652 million** that might have to be covered by equity capital. **For the most fragile banks, this scenario implies a decline of mean equity-to-total asset ratios from 9.4 to 7.6 percentage points.** This estimate bodes well since it indicates no material threat of widespread bank failures because of Covid-19 shocks. At the same time, we observe that already these mild increases in NPL ratios stress selected banks significantly. Should future NPL ratios exhibit more drastic hikes as the pandemic continues to hold back economic activity, more local banks may face more urgent capitalisation pressure. **To avoid moral hazard, any possible bank support measures should not take the form of capital guarantees.** One alternative is that the National Resolution Authority or the Federal Agency for Financial Market Stabilisation (FMSA) **extends a small fraction of the Pandemic Support package of €1 billion to purchase additional NPL from these banks in exchange for long-term convertible debt.** Another alternative is **to temporarily reduce capital requirements** for these banks analogous to releasing the counter-cyclical capital buffers for systemically relevant banks done already. This latter option likely has adverse moral hazard implications for banks as well and should be used as a subordinate line of defense in our view.

The regional fragmentation of German banking markets bears an **important implication** of this unholy alliance between Covid-19 credit shocks and low equity buffers. In contrast to the great financial crisis of 2008, small regional banks are particularly affected by the Covid-19 induced stress imposed on their local borrowers, be it due to lockdown effects or overall contractions in aggregate demand. Thus, **selected local lending markets and the resident SME may face particularly tight credit conditions**. We identify the counties ("Kreise") that host banks that are exposed to both large Covid-19 credit shocks and that exhibit low capitalisation (see Figure 4). **Out of 400 regional lending markets, we identify 17 that are exposed to such double-hits. These counties are home to 6.2% of all employees in Germany** (see Table 2). Thus, the potential need for regionally differentiated policies to incent local bank lending in particularly stressed counties should be closely monitored by regulators, supervisors, and not the least local politicians. **Possible actions could involve state development credit coupled to KfW programmes or a (temporary) lifting of regional demarcation principles anchored in law (for savings banks) and habit (for cooperative banks) of local banks.**

Banks' exposures to economic Covid-19 shocks

We document the extent to which German banks' corporate loan portfolios are exposed to adverse economic conditions sparked by the Covid-19 pandemic and how these shocks materialise in local banking markets in Germany. We proceed in three steps. First, we approximate the deteriorating economic outlooks for 72 sectors of the economy from PE ratio fluctuations. Second, we gauge credit portfolio exposures of German banks to these sectors by observing the bank relationships of German firms. Third, we simulate increases of non-performing loans given banks' portfolio exposures to declining growth opportunities of their borrowers and extrapolate resulting equity capital needs of banks to buffer these losses. Simulated NPL volumes and resulting capitalisation ratios are then aggregated to the county level to gauge the regional dispersion of potentially tight local banking markets that hamper the transmission of fiscal Covid-19 counterstrikes.

Credit portfolio exposures and equity buffers

The actual corporate loan portfolios of banks are not publicly available. Therefore, we approximate banks' portfolios by examining firms with which banks have a recent lending history. We compile a cross-section of bank-firm relationships with financial data for banks from Bankfocus and firm financials from Amadeus. The sample consists of up to 1,284 German banks from the commercial, the savings bank, and the cooperative bank sector for which total assets are available at least as of year-end 2017, 93% of the population (Deutsche Bundesbank, 2020). The extent to which a bank's corporate loan portfolio poses a risk to the bank's solvency depends primarily on the bank's ability to absorb losses with equity capital. Data on core capital (Tier 1) are not available for 168 banks, 70% of which are small savings or cooperative banks with a mean asset value of just under €24 million. Table 1 shows mean Tier 1 capital and gross equity to gross total assets, respectively. Risk-weighted assets, a preferable measure of shock-absorbing capacity, are missing for too many banks to be informative.

The first six columns show that we cover the major share of banks in Germany and that the system as a whole appears decently capitalised going into the crisis, exhibiting capitalisation ratios around 9 percentage points. An exception are head institutions of the savings banking (Landesbanken) and cooperative banking (Genossenschaftliche Zentralbanken) sectors, which exhibit ratios of only 5 percentage points.[1] Local savings and cooperative banks, which finance the major share of SMEs and operate in regionally confined markets, however, exhibit robust capital buffers on average.

To gauge the sectoral credit exposure of banks, we match banks to 417,746 German firms following, for example, Gopinath et al. (2017), Popov and Rocholl (2018), Acharya et al. (2019), or Koetter et al. (2020). We collect data for each entity as per the most recent available date, where 2017 is the earliest date included. Banks are allocated to counties ("Kreise") based on the location of the head-quarter.

[1] Data are available for Bayerische Landesbank, Landesbank Hessen-Thüringen, Landesbank Saar, Norddeutsche Landesbank, Landesbank Berlin, DZ Bank, Landesbank Baden-Württemberg.

Changes in growth opportunities

Banks' are exposed to Covid-19 through lending to industries whose cash flows are particularly sensitive to the decline in aggregate demand. Beyond contemporaneous effects on economic activity, for example due to lockdowns, curfews, and the closure of borders, different industries face different growth prospects. Backward looking accounting data will not reflect changed economic conditions. Forward-looking metrics are notoriously elusive. In the spirit of Baekert et al. (2007), we gauge industry-specific changes to growth expectations due to Covid-19 from revealed investor preferences in stock markets based on price-to-earnings (PE) ratios.

We aggregate daily averages of PE ratio changes of publicly-listed U.S. firms from Compustat Security Daily between January 2nd 2019 to March 31st 2020 to industry-specific PE ratio changes to approximate the changes in investors' expectations about sectoral growth opportunities. Figure 1 illustrates that global growth prospects contracted for 67 out of the 72 sampled sectors during the 1st quarter of 2020. The data reveal considerable heterogeneity across sectors, which suggests that banks' historical lending choices result in different intensities of stress on credit portfolios as the pandemic gained momentum.

We use U.S. PE-ratios as a source of global growth opportunities for two main reasons. First, changes of investor sentiment across industries over this period reflect expectations about global aggregate demand and supply-chain weakness that we assume to apply across developed countries in the spirit of Rajan and Zingales' (1998). Second, the alternative to use the few publicly listed German firms would suffer from reverse causality concerns and gauge mostly contemporary responses to policies instead of changes in growth prospects.

We then bring our gauge of changes in industry growth expectations to the bank level by generating mean industry changes in PE ratios of firms with which the bank has a relationship. Banks' exposures to a given industry vary not just with the number of relationships it has in that industry, but also with the volume of lending to each firm in the industry. As data on the loan volume per firm are not publicly available, we proxy for this fact by weighing changes in PE ratios of bank portfolios by firms' debt.

Caveats

Our approach is subject to a number of caveats. First, our bank-firm link is based on (dated) payment system relationships. These links are a good approximation of bank-firm relationships due to the stickiness of lending relationships (see e.g. Popov and Rocholl, 2018), but the superior strategy is to observe lending exposures from regulatory credit registers. Second, more timely prudential supervisory data on banks' equity positions would identify banks that started with precarious capital buffers at the outset of the pandemic better. Third, the use of listed US firms and resulting expectations for U.S. industries may not translate perfectly to small private companies in Germany. Evidence using survey-based information about growth expectations of different industries could help to (in)validate our approach.

Results

Table 1 shows that the average bank in Germany was exposed to a contraction of global growth opportunities of 28 percentage points as measured by debt-weighted PE ratio changes of its borrowers in q1:2020. Especially head institutions of the savings and cooperative banking sector were hit the hardest by contracting loan portfolio PE changes.

To assess whether less well-capitalised banks are systematically more exposed to contracting growth opportunities in their loan portfolios, Figure 2 plots changes in portfolio PE ratios versus Tier 1 ratios. For the German banking system as a whole, the mass of banks clusters around Tier 1 ratios of around 9 percentage points (see also Table 1). Banks from all four groups are distributed in this space without any obvious pattern. Thus, no glaringly obvious indications of widespread undercapitalisation in general or of any particular banking group emerges.

Figure 3 focuses on the south-western quadrant of the previous figure, i.e. it shows banks that are least capitalised and simultaneously face the largest loan portfolio PE changes. Specifically, we show banks with Tier 1 capital ratios below 15 percentage points and a decline in portfolio PE ratios of 25 percentage points. A first important insight from this focus is that three of the larger head institutions as well as three commercial banks, which are larger and nationally active, are exposed to relatively large declines in loan portfolio PE changes while being at the same time among the least capitalised banks.

Figure 3 also shows that especially smaller, locally active savings and cooperative banks suffer from PE ratio contractions that are the largest while being simultaneously weakly capitalised. This feature differs starkly from the pattern of the Great Financial Crisis of 2007/2008, which affected primarily large, internationally active banks. To obtain a bearing on the magnitude of potential banking system instability among these local lenders, we focus on banks exhibiting a contraction of growth opportunities by more than 40 percentage points, roughly equal to two standard deviations below the sample mean, while holding 10% or less of Tier 1 capital relative to total assets. The resulting group of 39 banks comprises only local savings and cooperatives.

For these most stressed institutions, we simulate possible capital needs arising from increasing non-performing loans. We assume that the percentage change transposes proportionately to an increase of historic NPL ratios, which is 2.15%. On average, these banks were exposed to a 48% decline in PE ratios of their borrowers, implying an increase of NPL by €205.5 million during the first quarter of 2020 to a simulated aggregate volume of NPL held by these banks on the order of €652.2 million. Ignoring any additional NPL arising in the remainder of 2020 and assuming that the entire NPL portfolio has to be written-off, the simulated Tier 1 ratio of these banks would drop from 9.4% to 7.6%.

These capital simulations do therefore not warrant fears of wide-spread bank failures due to collapsing growth opportunities of these banks' customers. However, the willingness of these banks to provide additional emergency lending to their mostly small customers with incomplete guarantees as part of the fiscal pandemic programme is likely small. Whereas we cannot assess the regulatory capitalisation of these banks due to lacking risk-weighted asset data, it is noteworthy that six banks would exhibit a simulated Tier 1 to total asset ratio below 6%. Given that these banks jointly hold €10.7 billion in customer loans as of their most recently available balance sheets, our thought

experiment illustrates quite clearly that even under these relatively undramatic circumstances, bank failures would undermine the effective transmission of fiscal support measures considerably.

Given the high degree of fragmentation in German banking, which implies a crucial role for local lenders that make up the majority of the German banking system, we visualise in Figure 4 the differences in local banks' loan portfolio PE change exposures (left panel) and mean capitalisation (right panel), respectively. We aggregate the bank information on loan portfolio exposures to PE contractions as well as Tier 1 capitalisation ratios per county ("Kreis"). We sort resulting county aggregates into quartiles and colour code the 25% most stressed counties in dark blue. The most stressed portfolio exposures span the interval from 55 to 31 percentage point reductions in global growth opportunities. The quartile of most stressed capitalisation rates runs from 4 to 8 percentage points. Two aspects are noteworthy. First, neither the distribution of portfolio exposures nor of capitalisation rates coincides with the spatial clustering of Covid-19 cases in Baden-Württemberg and Nordrhein-Westfalen, see data provided by the Robert Koch Institute. Second, relatively few counties are exposed to joint stress in terms of these two metrics. Table 2 lists the 17 counties, which are sorted simultaneously in both stress quartiles. The two last columns provide information from the regional national accounts on employment shares to assess whether these regional markets matter in terms of economic relevance. As it turns out, 6.2% of Germany's workforce are employed in these counties. We consider this employment share sufficiently large to warrant heightened attention by policymakers to ease a smooth transmission of fiscal Covid-19 counterstrike measures through banks to the real economy.

Conclusion

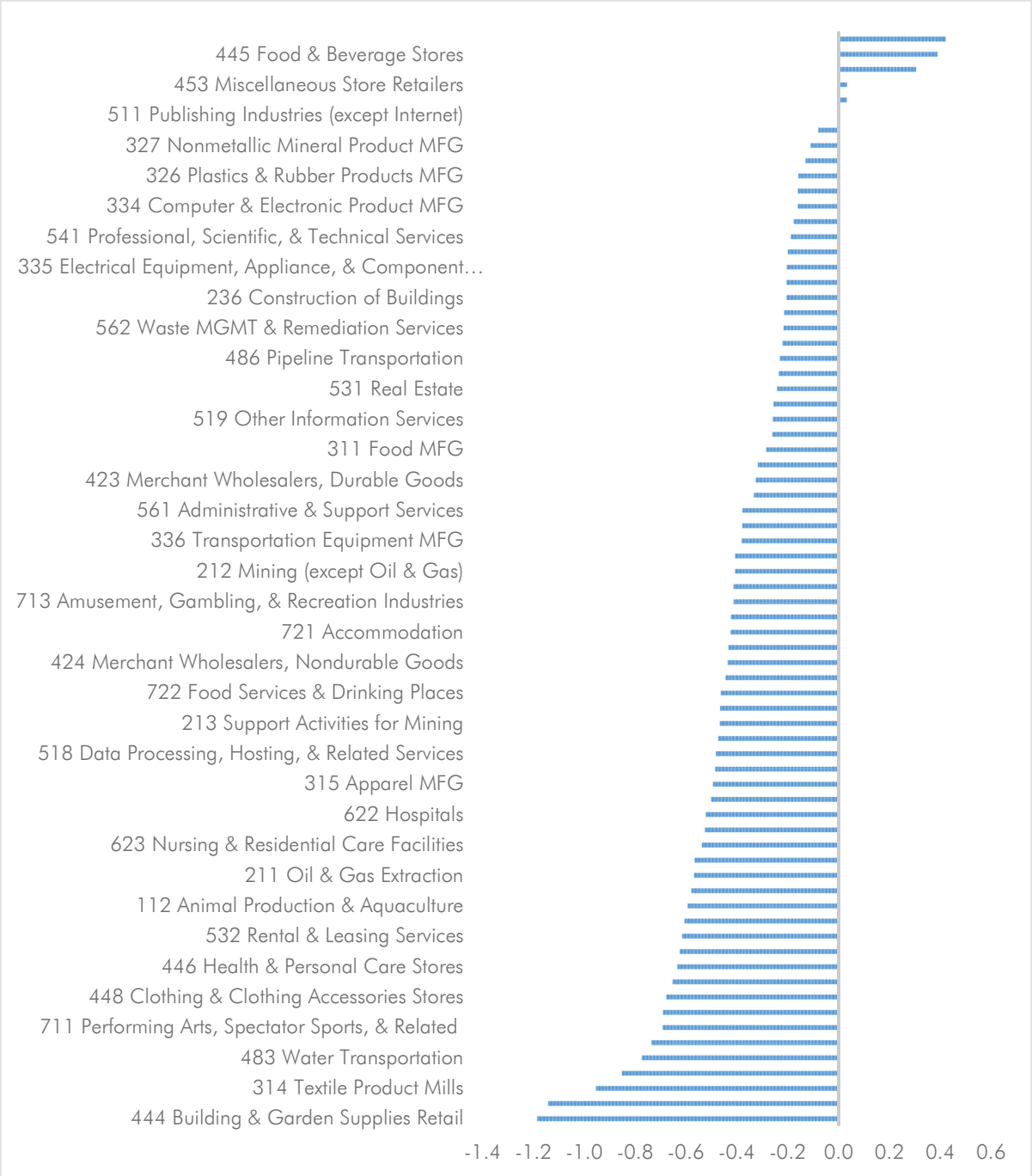
This note shows that German banks are affected rather differently by the Covid-19 shock. We identify the banks that are likely to be the most stressed ones, we simulate possible credit losses, and subsequently simulate resulting equity needs. For the relatively mild additional credit losses revealed by the data up and until now, we already identify a number of banks with substantial reductions in their capitalisation. Aggregating our stress indicators to the county ("Kreis") level shows which local markets might face particularly strong credit frictions.

Contrary to the Great Crisis of 2008/2009, especially small, local lenders suffer from deteriorating credit quality, which potentially undermines financial resilience of this important part of the German financial system. Already the small increases in non-performing loans assumed here reveal an important need for additional equity. These bank equity capital needs may be substantially larger if credit defaults hiked more drastically in a prolonged situation of pandemic-induced economic contractions.

Figures

Figure 1

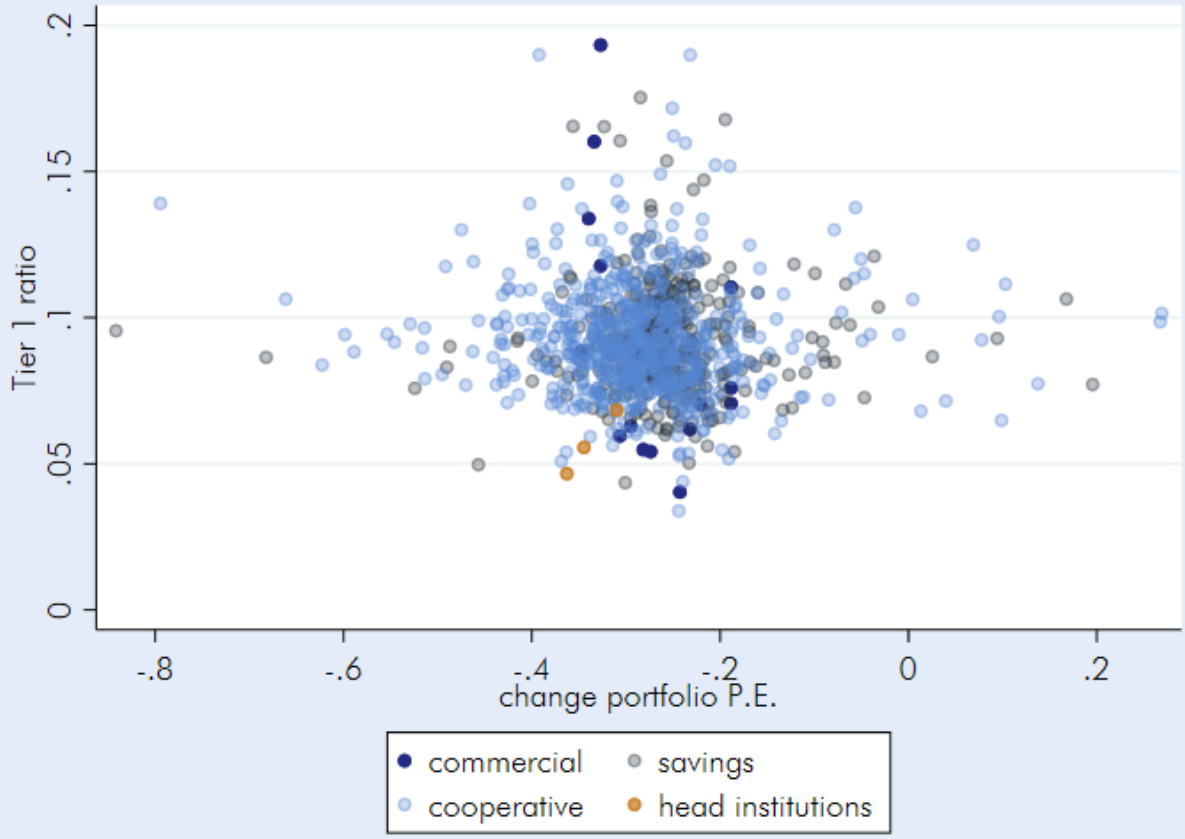
Industry exposure inferred from changes in price-earnings ratios (NAICS 3 digit subsectors)



Note/Source: Exposed defined as mean decline in price-earnings ratios of firms in a given industry at the 3-digit NAICS level. Price-earnings ratios defined as price at day's close scaled by earnings per share. Change calculated over January 2nd 2020 to March 31st 2020. Data based on publicly listed American firms in the Compustat Daily Securities database. We winsorize PE ratio changes at the 1st and 99th percentiles to alleviate the effect of outliers and discard industries with fewer than three observations.

Figure 2

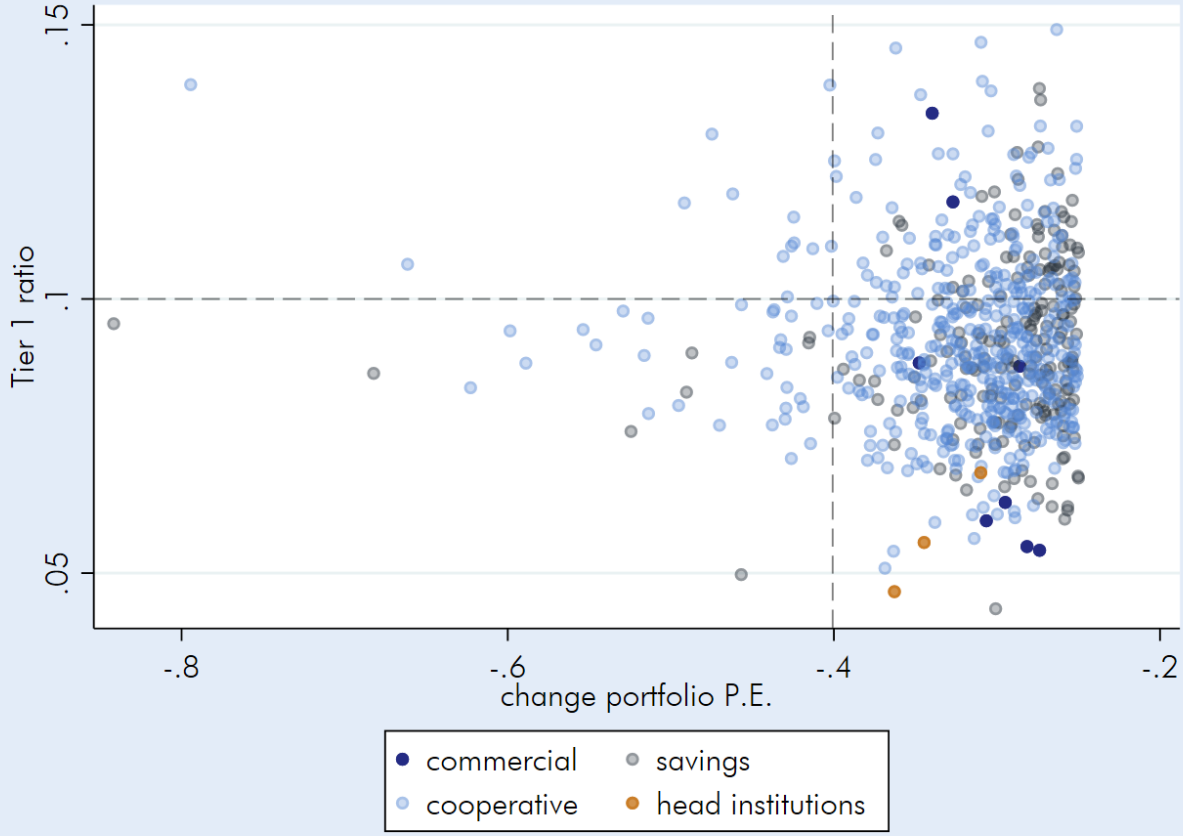
Tier 1 ratios against corporate loan portfolio P.E. changes



Note/Source: Change in industry P.E. ratios defined using Compustat Securities Daily data with a sample of U.S. firms for each industry. Corporate loan portfolios defined as the number of lending relationships a bank has in each industry, weighted by the debt of each firm. Sample of banks are from the 2019 vintage of Bankfocus and contains 1114 banks for which we are able to identify a lending relationship and with tier 1 capital coverage. Sample of firms from the 2019 vintage of Amadeus and contains 417,746 German firms for which we were able to identify a lending relationship. Other banks include Landesbanken, investment banks, micro-financing institutions, Islamic banks, asset management companies, securities firms, and real estate banks, among others.

Figure 3

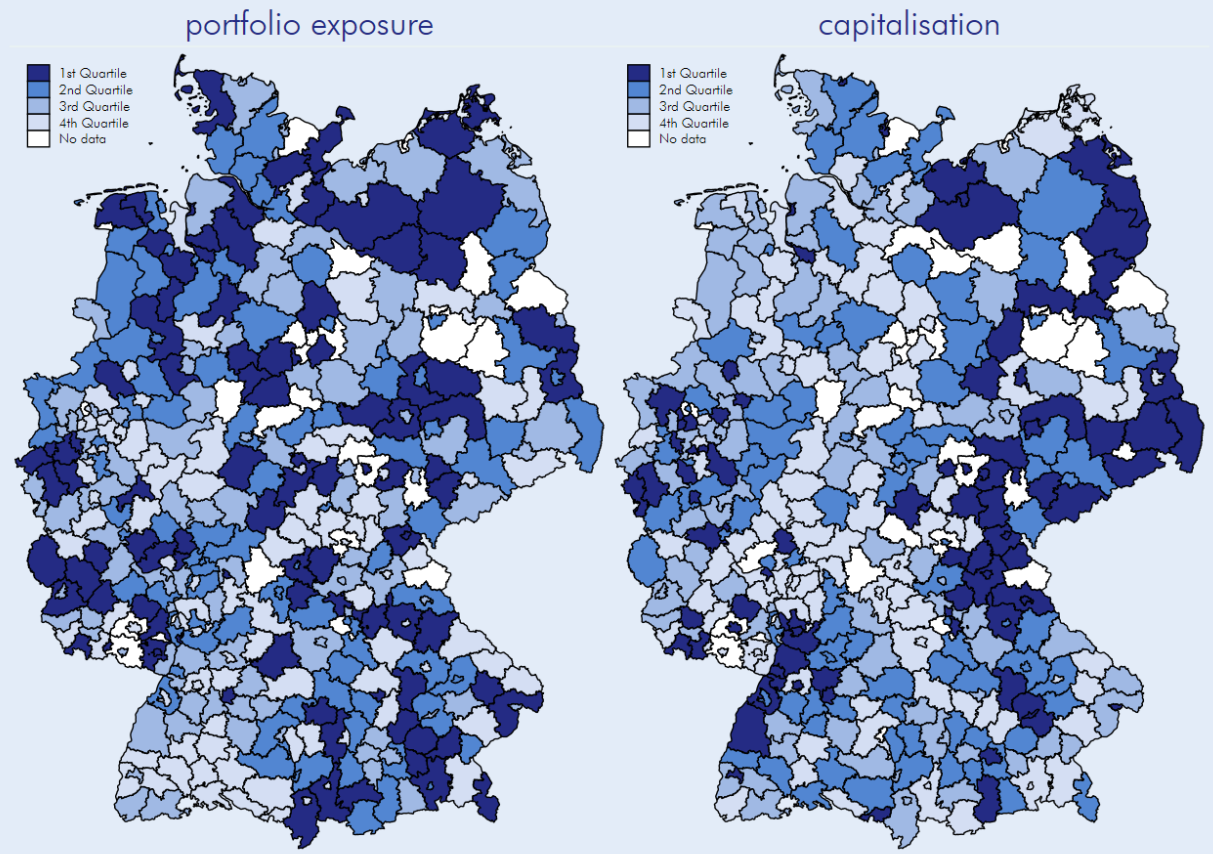
Tier 1 ratios against corporate loan portfolio P.E. changes of fragile and shocked banks



Note/Source: Figure shown limited to banks with Tier 1 capital ratios below 0.15 and a change in portfolio P.E. ratios of -25%. Change in industry P.E. ratios defined using Compustat Securities Daily data with a sample of U.S. firms for each industry. Corporate loan portfolios defined as the number of lending relationships a bank has in each industry, weighted by the debt of each firm. Sample of banks are from the 2019 vintage of Bankfocus and contains 1114 banks for which we are able to identify a lending relationship and with Tier 1 capital coverage. Sample of firms from the 2019 vintage of Amadeus and contains 417,746 German firms for which we were able to identify a lending relationship. Other banks include Landesbanken, investment banks, micro-financing institutions, Islamic banks, asset management companies, securities firms, and real estate banks, among others.

Figure 4

Mean change in P.E. ratios of loan portfolios and Tier 1 capital to asset ratios per Kreis



Note/Source Left-hand figure plots the distribution of mean change in price-earnings ratios at the Kreis-level. 1st (4th) quartile indicates that the average bank in the Kreis is more (less) exposed to Covid-19 through its loan portfolio. The 4th quartile corresponds to changes in average loan portfolio price to earnings ratios of (-.24, .04], the 3rd quartile to (-0.28, -0.24], the 2nd quartile to (-0.31,-0.28], and the 1st quartile to [-0.55, -0.31]. Change in industry P.E. ratios defined using Compustat Securities Daily data with a sample of U.S. firms for each industry. Corporate loan portfolios defined as the number of lending relationships a bank has in each industry, weighted by the debt of each firm. Right-hand figure plots the distribution of mean tier 1 capital to assets ratios at the Kreis-level. 1st quartile (4th) indicates that the average bank in the Kreis is less (more) capitalized. The 4th quartile corresponds to (0.10, 14.92], the 3rd quartile to (0.09, 0.10], the 2nd quartile to (0.08, 0.09], and 1st quartile to [0.04, 0.08).Sample of banks are from the 2019 vintage of Bankfocus and contains 1114 banks for which we are able to identify a lending relationship and with tier 1 capital coverage. Sample of firms from the 2019 vintage of Amadeus and contains 417,746 German firms for which we were able to identify a lending relationship.

Tables

Table 1

Capital, leverage, and change in industry P.E. ratios of corporate loan portfolios

	Tier 1 capital to assets			equity capital to assets			Δ P.E. ratio of portfolio		
	mean	SD	n		mean	SD	mean	SD	n
commercial banks	0.09	0.04	20	0.11	0.08	31	-0.27	0.11	31
cooperative bank	0.09	0.02	689	0.10	0.03	774	-0.28	0.09	775
savings banks	0.09	0.02	337	0.10	0.03	357	-0.26	0.08	366
head Institutions	0.05	0.00	4	0.05	0.01	7	-0.33	0.07	7
total	0.09	0.02	1050	0.10	0.03	1169	-0.28	0.09	1179

Note/Source: Change in industry P.E. ratios defined using Compustat Securities Daily data with a sample of U.S. firms for each industry. Corporate loan portfolios defined as the number of lending relationships a bank has in each industry, weighted by the debt of each firm. Sample of banks are from the 2019 vintage of Bankfocus and contains 1114 banks for which we are able to identify a lending relationship and with Tier 1 capital coverage. Sample of firms from the 2019 vintage of Amadeus and contains 417,746 German firms for which we were able to identify a lending relationship.

Table 2

Most exposed and least capitalised Kreise

Kreis	Kreis type	employment (thousands)	share total
Bremen	kreisfreie Stadt	362.25	0.873%
Bremerhaven	kreisfreie Stadt	68.629	0.165%
Düsseldorf	kreisfreie Stadt	531.859	1.282%
Düren	Kreis	120.665	0.291%
Hochtaunuskreis	Landkreis	122.301	0.295%
Donnersbergkreis	Landkreis	31.009	0.075%
Stuttgart	Stadtkreis	524.127	1.263%
Kelheim	Landkreis	54.513	0.131%
Amberg-Sulzbach	Landkreis	40.116	0.097%
Hof	Landkreis	50.032	0.121%
Regionalverband Saarbrücken	Landkreis	211.104	0.509%
Spree-Neiße	Landkreis	45.633	0.110%
Ludwigslust-Parchim	Landkreis	86.689	0.209%
Zwickau	Landkreis	160.249	0.386%
Nordsachsen	Landkreis	93.623	0.226%
Weimar	kreisfreie Stadt	34.405	0.083%
Saale-Holzland-Kreis	Landkreis	34.703	0.084%
Total	–	2571.907	6.198%

Note/Source Below tables displays all Kreise which are in both the bottom quartile with respect to the mean of change in P.E. ratios of banks' loan portfolios and T1 capital to assets ratios. Employment data based on 2017 values from the 2019 edition of the 'Erwerbstätigenrechnung' compiled by the Hessisches Statistisches Landesamt. Change in industry P.E. ratios defined using Compustat Securities Daily data with a sample of U.S. firms for each industry. Corporate loan portfolios defined as the number of lending relationships a bank has in each industry, weighted by the debt of each firm. Simulated equity ratios calculated assuming a change in P.E. ratios of a bank's corporate loan portfolios yields an equal change in non-performing loan shares. Sample of banks are from the 2019 vintage of Bankfocus and contains 1114 banks for which we are able to identify a lending relationship and with Tier 1 capital coverage. Sample of firms from the 2019 vintage of Amadeus and contains 417,746 German firms for which we were able to identify a lending relationship.

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