Discussion Paper

21|01

The Effects of Regional Banks on Economic Resilience during the COVID-19 Pandemic and the Global Financial Crisis

A Cross-Country Comparison of the European Countries*

Franz Flögel and Tereza Hejnová

Author Flögel, Franz; Hejnová, Tereza (2021): The Effects of Regional Banks on Economic Resilience during the COVID-19 Pandemic and the Global Financial Crisis: A Cross-Country Comparison of the European Nations. *IAT Discussion Paper,* 21/12, December 2021.

The Effects of Regional Banks on Economic Resilience during the COVID-19 Pandemic and the Global Financial Crisis

A Cross-Country Comparison of the European Countries

Franz Flögel* and Tereza Hejnová+

December 2021

Abstract

An economy's ability to resist adverse shocks, such as an economic recession or natural disaster, is associated with its financial system structure due to different countercyclical funding capabilities. This paper uses a novel database of bank headquarter locations in a cross-country comparison to investigate whether a decentralised geographical structure cushioned economic shocks during the COVID-19 pandemic and the global financial crisis (GFC). Findings suggest that the impacts of decentralisation differ between the two crises: while a greater spread of regional banks was associated with economic resilience during the GFC, countries with more centralised banking systems performed better in the first year of the pandemic. Future studies of pandemic recovery paths will show if regional banks have lost their ability for countercyclical funding, or if this non-financial crisis has rendered financial structure less important.

Keywords: *COVID-19 pandemic, regional banks, soft information, economic resilience*

JEL classification: G21, D82, O47, R58, H12

* *Institute for Work and Technology; Munscheidstr. 14, D-45886 Gelsenkirchen; +49 (0)209.1707-203; floegel@iat.eu*
+*Institute for Work and Technology; Munscheidstr. 14, D-45886 Gelsenkirchen; +49 (0)209.1707-148; hejnova@iat.eu*

1. Introduction

Financial system structure is associated with the ability of an economy to resist adverse shocks, such as the COVID-19 pandemic (Beck et al., 2020, Flögel and Gärtner 2020, Levine 2020). A financial system's ability to fund viable firms (i.e. firms that generate positive net present value) when revenues and profitability are temporarily lower following external shocks contributes to the resilience of the economy overall. Countercyclical funding enables firms to continue operating and thus hasten economic recovery. Maintaining access to finance limits company defaults, employment losses and the abandonment of production capacities that would otherwise multiply the initial shock and impede recovery paths (Levine, 2020). But which financial system structures most benefit economic resilience?

As the global financial crisis (GFC) of 2008/09 has shown, financial system diversity is advantageous since it increases the likelihood that enough financial institutions are able to resist the adverse shock and continue funding the economy (Ayadi et al., 2009; Liikanen et al., 2012). Furthermore, evidence suggests that a financial system with a decentralised structure consisting of many small and regional banks is associated with economic resilience during adverse shocks (Abberger et al., 2009; Gärtner, 2009; Hakenes et al., 2014; Lee and Brown, 2017; Gärtner and Flögel, 2017; Blažek and Hejnová, 2020 Flögel and Gärtner, 2020; Levine, 2020). There are however contradictory claims and still lacking evidence concerning the importance of regional banks in economic recovery following a shock.

Small and regional banks are said to have an advantage compared to large banks in acquiring soft information about firms through long-term lending relationships and by operating in short distance to clients. Such soft information is indispensable to identifying viable business operations in times of crisis (Flögel, 2018; Berger et al, 2020; Levine et al. 2020). On the other hand, the large exposure of regional banks to small and local businesses and the high risk of loan default by these clients may prevent regional banks from lending during the current COVID-19 pandemic and may also cause bank defaults (Gropp et al., 2020, Berger et al, 2020; for negative economic effects in general: La Porta et al., 2002; Bonin et al., 2005). Banks may also exploit relationship borrowers that need funds during adverse shocks by offering poor terms (Berger et al., 2020). Considering these contradictory claims about regional banks, it remains an open empirical question whether decentralised financial systems cushion or amplify external shocks.

To address this question, we use data from 30 European countries to test the relationship between the geographical location of banks' headquarters and the country's economic performance during the COVID-19 pandemic and the GFC. We compute two unique indicators: the geographical concentration of banks' headquarters and the geographical spread of banks' headquarters to population, as proxies for the degree of national banking system centralisation and the existence of regional banks, respectively. We control for factors like public spending and the severity of the pandemic in terms of COVID-19 cases per 100,000 inhabitants. Our results for the pandemic show that banking system centralisation positively influenced GDP growth, with centralised countries experiencing a lower reduction in GDP per capita between 2019 and 2020. However, this result is only significant in some model specifications and does not hold for employment growth.

We compare these findings with economic resilience during the GFC using the same geographical banking system structure indicators for 2007 to 2012. In these models, with up to 153 country-year observations, countries with more geographically centralised banking systems showed a significantly stronger decline in GDP per capita and a stronger increase in the unemployment rate. The models further indicate that outstanding business loans decreased less in decentralised banking systems, suggesting that countercyclical lending of decentralised systems enhanced crisis resilience. Although several studies reference the effects of decentralised banking systems during crises, especially with respect to the German recovery after the GFC (Gärtner, 2009; Hardie and Howarth, 2013; Audretsch and Lehmann, 2016; Klagge et al., 2017; Gärtner and Flögel, 2017; Burghof et. al., 2021), this analysis is to the best of our knowledge the first to substantiate this claim with cross-country evidence. Our models withstand reverse causality concerns, because the reaction speed of the banking system structure to external shocks is delayed, since bank closures and mergers take some time to materialise (with the exception of a few spectacular defaults). This is particularly true for the "quasi-natural experiment" of the pandemic (Berger et al. 2021) as an unforeseeable shock that could not alter the structure of banking systems beforehand.

The remainder of the paper is organised as follows: Section 2 presents the theoretical background and answers the question of why the location of bank headquarters may influence economic resilience. Section 3 introduces the unique data source of headquarter locations, explains the calculation of the two banking structure indicators, describes the geographical concentration of banking systems in Europe and outlines the empirical strategy. We then describe the details of the pandemic models and discuss the results (Section 4). Section 5 depicts model specifications and results of the GFC models. Section 6 critically examines our contradictory findings from the two crises and poses further research questions.

2. Economic resilience, diversity, decentralisation, and the influence of the locations of bank headquarters

Economic resilience refers to the ability of a regional economy to resist, recover from, adapt in response to, and return to its pre-shock state following a recessionary shock to its long-term growth path (Martin, 2012). Following Holling (1973), economic resilience has been variously considered as the ability of an economic system to 'bounce back' to its pre-existing state or growth path ('engineering resilience'), absorb shocks ('ecological resilience'), or positively adapt in anticipation of or response to shocks (Simmie and Martin, 2010; Martin, 2012; Martin and Sunley, 2015). In this regard, Martin and Sunley (2015) state that "[…] studying resilience requires the specification of a meaningful 'reference' state, regime or path against which the impact of a shock can be measured and the extent and nature of recovery from that shock can be judged." (p. 12). Whereas a broad range of indicators have been used to measure resilience in general, output (GDP) and employment are commonly used to assess economic resilience (Cutter et al., 2008; Martin, 2012; Fingleton et al. 2012; Modica and Reggiani, 2015).

Finance impacts economic resilience as the ability of a financial system to provide countercyclical funding to companies in time of crises can cushion adverse shocks. Without access to finance, more firms may reduce production and employment, magnifying the initial impact of the shock (Berger et al., 2020; Levine et al., 2020). Furthermore, a lack of finance hinders companies' abilities to adapt to shocks, for example by altering production and impeding recovery paths. Once production capacities are reduced and firms shut down, the restoration of these capacities is slow when demand does increase again. The structure of financial systems relates to economic resilience for two reasons:

1. Certain financial system structures are more prone to financial crises than others (Ayadi et al., 2009; Haldane and May, 2011; Liikanen et al., 2012; Giese and Haldane, 2020; Gropp et al., 2020).
2. The ability and/or willingness of banks and other financial agents to fund firms in financial turmoil differ and depend on the structure of financial systems, so that certain systems contribute more to countercyclical funding than others (DeYoung et al., 2015; Sette and Gobbi, 2015; Flögel and Gärtner, 2020; Berger et al., 2020; Levine et al. 2020).

Starting with the first point, financial system resilience has been shown to impact economic resilience, which is why financial sector regulations were tightened following the GFC (Giese and Haldane 2020). As Ayadie et al. (2009) argue, homogeneous and highly connected financial systems are vulnerable to financial crises due to the self-reinforcing tendencies of initially small shocks (Haldane and May, 2011). Financial crises in turn hinder the financial system's ability to fund companies in other sectors and thus cause crisis in the overall economy. This was apparent in the GFC which started within the US financial sector itself (caused by excessive subprime lending), before spreading to other countries and sectors through the credit crunch and withdrawal of funds (Aalbers, 2011; Martin, 2011; Beck et al., 2020). Diversity enhances resilient financial systems (Haldane and May, 2011; Liikanen et al., 2012; Kotz and Schäfer, 2018; Schmidt, 2018) and tends to reduce the contagiousness of financial crises, thus increasing the stability of the overall financial system. Geographical decentralisation of banks and other financial agents contributes to diversity (Liikanen et al., 2012; Gärtner, 2013; Machine and Oughton, 2013).

As Ayadi et al. (2009) argue, different types of financial intermediaries have advantages and disadvantages, meaning there is a systemic advantage in having a diverse financial system structure (i.e. a system comprised of different types of intermediaries). If some intermediaries, like large banks, stock markets or regional banks, fail or falter following an adverse shock, other intermediaries may still function and support the economy. The stability of Germany's decentralised financial system during the GFC is viewed in this regard. The over 1,500 regional savings and cooperative banks had few losses in sub-prime lending and were able to increase lending to business in the peak of the financial turmoil (Abberger et al., 2009; Gärtner, 2009; Hardie and Howarth, 2013). Conversely, this decentralised system may have been a hazard during the current pandemic crisis. As Gropp et al. (2020) argue, the large exposure of regional banks to local businesses that were particularly affected by social lockdowns may have caused defaults among regional banks or an excessive withdrawal of lending to mitigate the risk exposure. This would have multiplied the initial pandemic shock if no other intermediaries took over the lending of regional banks.

Regarding the second reason that financial and economic resilience are related, the distance between bank headquarters and firms may affect a bank's ability and/or willingness to continue financing firms following economic shocks. Theories about asymmetric information in small-firm finance depict the distance dependency of information gathering when information is soft (Stein, 2002; Pollard, 2003; Alessandrini et al., 2009; Gärtner, 2009). According to Stein's (2002, 1982) definition, soft information "cannot be directly verified by anyone other than the agent who produces it". In banking, soft information such as judgments on the integrity of a client, gut feelings and information about the private affairs of a manager (Flögel, 2018) usually develop in longlasting business relationships, which is why soft information is associated with relationship lending (Boot, 2000; Uzzi and Lancaster, 2003; Udell, 2008; Handke, 2011). In contrast, hard information such as financial statements, payment histories and account information is gained in an impersonal manner and is thus associated with transaction-oriented banking. Furthermore, as the verification of hard information is not restricted to its producer, Stein's (2002) model predicts that hierarchy obstructs the use of soft but not hard information. Agents therefore need decision-making autonomy to consider soft information in lending and other investment decisions.

Distance is important in Stein's (2002) model when short distances allow for the seamless transmission of soft information between levels of hierarchy (Flögel 2018). For example, when agents share soft information that is socially embedded (Uzzi and Lancaster, 2003) and within proximity (Boschma, 2005). Small and regional banks' proclaimed superiority in soft information-based relationship lending (Handke, 2011; Klagge et al., 2017; Fritsch and Wyrwich, 2021; Mayer et al., 2021) refers not only to flatter internal hierarchies but also to shorter distances between the hierarchical levels. Alessandrini et al. (2009) clarify that two distances matter in lending. First, the distance within a bank, for example between customer advisors located within branches and supervisors within headquarters (functional distance). Second, the distance between clients and banks, for example the distance between small and medium enterprises (SMEs) and their branch customer advisors (operational distance). Operational distance is frequently measured by the location of bank branches, whereas functional distance depends on the location of bank headquarters. Numerous empirical studies reaffirm that short functional distances reduce the financial constraints of SMEs by facilitating the consideration of soft information in lending decisions (Alessandrini et al., 2009; Behr et al., 2013; Lee and Brown, 2017; Zhao and Jones-Evans, 2017; Zhao et al., 2021). The influence of a bank headquarters' location on soft information-based SME lending is thus well established in theory and empirical studies.

The influence of functional distances (i.e. the location of a bank's headquarters) on economic resilience has also received some scholarly attention. Burghof et al.'s (2021) working paper shows that the Italian NUTS2 regions (Nomenclature of Territorial Units for Statistics; the basic regions for the application of EU regional policies) with more bank headquarters per 100,000 inhabitants were better buffered against the shock from the sovereign debt crisis in terms of GDP per capita, disposable household income and the unemployment rate. Several studies have observed the "flight to headquarters" effect whereby banks disproportionately withdraw loans from distant places in times of crisis (Giannetti and Eleven, 2012; Degryse et al., 2018). For example, Degryse et al. (2018) show that functional distance negatively affected the financing patterns of UK companies during but not before the GFC.

Several studies examine this flight to headquarters or home bias effect during times of crisis, particularly for foreign banks (Giannetti and Laeven, 2012; Presbitero et al., 2014), although contradictory findings also exist (Epstein 2014). Central and eastern European countries (CEE) experienced significant drops in lending during the GFC, as foreign banks had high market shares and cut lending in foreign subsidiaries (Allen et al., 2013; Cull and Martínez Pería, 2013). This tendency of banks to disproportionally withdraw lending from distant locations in times of crisis could be explained by the above-outlined problem of verifying soft information over long distances. As Flögel's (2019) ethnographic study shows, soft information matters most when enterprises experience financial turmoil and hard information becomes critical, since in this situation soft information can qualify critical hard information. For example, is the management able to lead the company's turn around? Are the poor financial figures expected to be temporary? Banks operating in short distance to clients may continue lending in times of crisis when valid soft information advises so, whereas distant banks may withdraw lending, as they can only decide on the basis of critical hard information. One can therefore argue that countries with decentralised banking systems (where the headquarters of banks are spread across many regions) tend to maintain soft information-based lending and thus be more resilient in times of crisis than countries where headquarters are centralised.

Similar to studies on functional distance, several scholars discuss the impact of relationship lending and/or small and regional banks on resilience (see for an overview Berger et al. 2020). Concerning banks' lending activities during the GFC, studies find a positive impact of relationship lending and small banks on access to finance for firms (e.g., DeYoung et al., 2015; Sette and Gobbi, 2015; Bolton et al., 2016; Beck et al. 2019). The results are mixed for the COVID-19 pandemic. The working paper of Zhao et al. (2021) finds that strong pre-crisis ties between SMEs and banks did not ease access to finance in the UK, suggesting that close bank relationships did not shield SMEs from liquidity risks during the COVID-19 pandemic. Similar results are reported for the USA, for loans of large banks to large firms (Berger et al., 2021). In contrast, Levine et al.'s (2020) working paper on employment growth in US counties suggests that a higher market share of small banks was associated with lower employment declines in the first months of the pandemic, especially for low-paid jobs. To our knowledge, no paper systematically relates the locations of bank headquarters to economic resilience during the current COVID-19 shock. Overall systematic analyses of the influence of financial systems structure on economic resilience are still rare, especially using cross-country comparisons.

3. Data sources, the banking system structure in Europe and empirical strategy

One aim of this paper is to test simple indicators for the geographical diversity of national banking systems with respect to the geographical concentration of banks and its influence on economic resilience. To this end, we utilise the list of monetary financial institutions (MFIs) that is publicly available and updated daily from the European Central Bank (ECB) for the 27 EU Member States and extend it with data from other central banks for non-EU countries. On request, the ECB and some other central banks also provided historical data starting in 2007, allowing us to track changes over time. The key advantage of the central bank data is that all legal MFIs are included in the lists. In commercial databases, such as The Banker Database provided by The Financial Times, the coverage tends to be limited and numerous small regional banks are missing, so that these databases are insufficient for studies on regional banks. However, the ECB database only includes basic information about the MFIs like the type of bank (credit institution, central bank, money market fund or other institution), reporting status (yes/no) and the postal address. We therefore do not have information about the size or business activities of the MFIs.

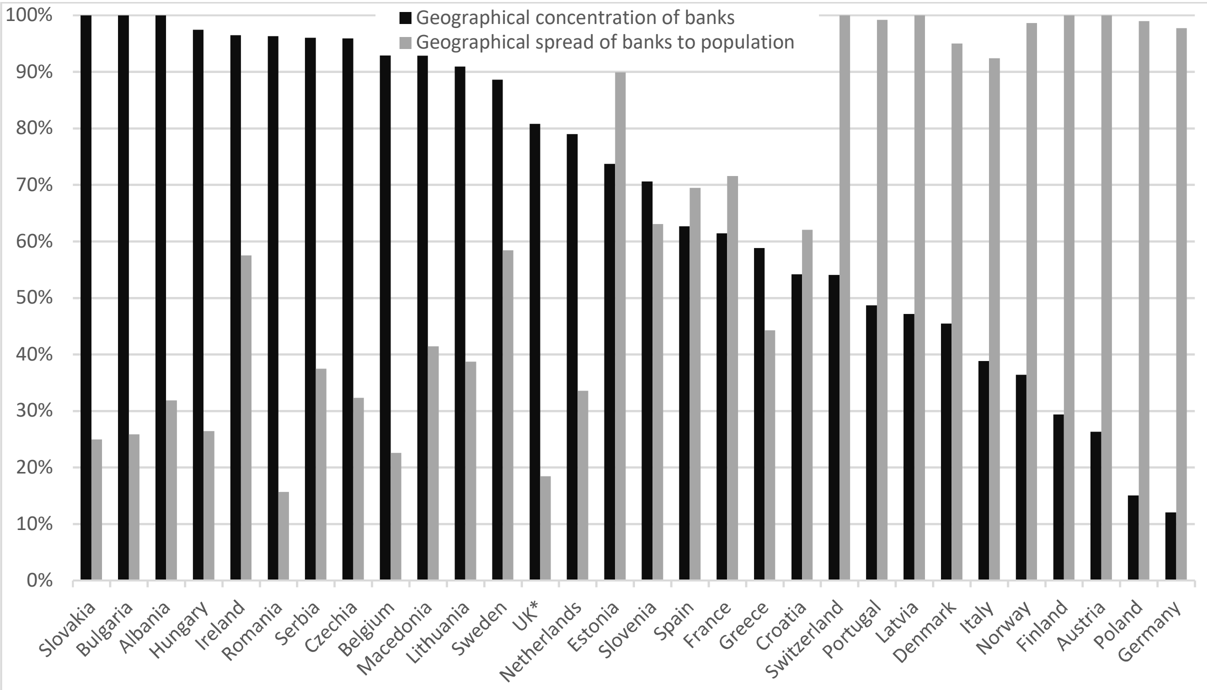
Using the credit institutions' postal addresses, we have computed the geographical centrality of bank headquarters for 30 European countries. The distribution of bank headquarters has been used to assess the degree of centralisation (i.e. the functional distance) of national and regional banking systems (e.g. Alessandrini et al., 2009; Zhao and Jones-Evans, 2017; Degryse et al., 2018; Flögel and Gärtner, 2018). However, the distribution of banks' headquarters has not been systematically used for a quantitative cross-country comparison before.

To make use of the geographical location of banks' headquarters, we compute two indicators:

1. The geographical concentration of banks: The share of a country's banks that are located in the largest banking centres (in terms of the number of headquarters) relative to all banks in the country. This indicator represents the geographical concentration of the banking sector and is measured at NUTS3 region level (the European Commission's smallest regional level of statistical classification). In order to account for differences in country size, we have considered one NUTS3 region when the country has less than five million inhabitants, two NUTS3 regions when the country has between 5 and 20 million inhabitants, and three NUTS3 regions for all countries with 20 million or more inhabitants.
2. The geographical spread of banks to population: The share of inhabitants that live in NUTS3 regions with at least one bank's headquarters. The indicator intends to measure access to bank headquarters for the local population.

Figure 1 reports the results for both indicators for February 2020, one month before the pandemic began to affect European economies. We have excluded all countries with less than five NUTS3 regions from the analysis because in these small countries, such as Luxembourg and Malta, our indicators no longer generate meaningful differences. Of the remaining 30 countries, Germany, Poland, Austria, Finland, Norway, Italy, Denmark, Latvia and Portugal show lower levels of concentration (geographical concentration < 50%) and high levels of spread; Switzerland and Estonia show higher levels of geographical concentration (concentration > 50%) but also higher percentages of geographical spread. Conversely, in Albania, Bulgaria and Slovakia, all banks are located in the largest financial centres. In countries such as the UK, Sweden, Lithuania, Macedonia, Belgium, Czechia, Serbia, Romania and Ireland, more than 80% of the banks are located in the main financial centre(s). Note that in this analysis we have only considered credit institutions that are actively reporting MFIs. This excludes several very small credit unions and banks that are exempt from the reporting requirements of the ECB. Geographical concentration and geographical spread correlate negatively at a high significance level, with a Pearson correlation coefficient of -0.872.

Figure 1: Geographical banking market structure in Europe (Feb. 2020)



*Data is of December 2019

Source: own figure and calculation based on the list of MFI by ECB and other central banks

To identify the moderation effect of the financial structure on the impact of the pandemic shock, we interact the two structural variables (and all control variables) with COVID-19 cases per 100,000 inhabitants in 2020, following the approach of Levine et al. (2020). The dependent variables of concern are economic growth (GDP per capita) and employment growth between 2019 and 2020. We control for government intervention in terms of government spending and dependency of the economies on the accommodation and food sectors, as tourism suffered considerably from the impacts of the virus. As Berger et al. (2021) highlight, the pandemic shock acts as a quasi-natural experiment as it was neither caused by the finance sector nor anticipated by economic actors. Hence, the pandemic shock allows us to analyse the influence of banking decentralisation on the ability and/or willingness of finance providers to support firms during an economic crisis. Reverse causality concerns of our structural variables are irrelevant, as we use the geographical structure of the bank headquarters in February 2020, the month before the virus has penetrated the European economies.

To analyse the impact of the GFC, we relate the two structural variables to economic performance for the years 2007 to 2012 with time fixed-effects. The economic performance in 2006, the year before the burst of the subprime lending bubble, is included in the regression models as a reference point. Reverse causality of the financial system structure is of some concern because the GFC clearly altered the financial sector. However, the geographical structure of bank headquarters changed slowly, with the number of banks decreasing by 10.2% to 7,446 headquarters from 2006 to 2012. The short-term influence of the GFC shock therefore remains limited. However, in contrast to the pandemic shock, the instability of the financial system itself is the cause and initial driver of the GFC shock. To account for this impact, we control for the contribution of the financial sector to GDP in each country. Furthermore, the influence of government intervention is controlled via general government spending. The detailed model specification and summary statistics are explained in the following sections.

4. The pandemic models

The pandemic models examine the change in GDP per capita (employment growth) between 2019 and 2020 with the logarithm of COVID-19 cases per 100,000 inhabitants in 2020 (henceforth lncases) for 30 European countries (listed in Figure 1). Furthermore the influence of the interaction terms between lncases and our structure variables (geographical concentration and geographical spread) on GDP per capita is analysed. Table 1 outlines the definition of variables, summary statistics and data sources. We control for the proportion of gross value added in the accommodation and food sectors as a proxy indicator for the dependency of the economies on tourism. As the pandemic has substantially hindered tourism, a negative impact on GDP is expected. General government spending was included to control for government intervention in the crisis, as several nations have issued substantial subsidies during the pandemic with average spending growth of over 10% between 2019 and 2020. All independent variables are interacted with lncases.

Table 1: Summary statistics of the COVID-19 pandemic model

Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Source**
GDP per capita growth from 2019 to 2020 (in EUR)	30	-1164.92	1290.33	-3712.88	3106.66	Worldbank (GDP per capita in constant local currency); Euro exchange rate from 09th January 2020 for non-euro local currencies.
Employment growth from 2019 to 2020 (per 100,000 inhabitants)	29	-545	410	-1525	138	Eurostat (Employment and activity by sex and age - annual data); Albania is missing.
COVID-19 cases per 100,000 inhabitants (2020 average)	30	3541	1495	659	6724	WHO
lncases 2020	30	3.4986	0.2361	2.82	3.83	WHO
Geographical concentration of banks (in percent)	30	68.16	27.95	12.03	100	List of reporting MFI by the ECB, the Bank of Albania, the National Bank of the Republic of North Macedonia, Norges Bank, the National Bank of Serbia, the Swiss National Bank (NUTS3 regions from Eurostat)
Geographical spread of banks to population (in percent)	30	61.58	31.14	15.68	100	List of reporting MFI by the ECB, the Bank of Albania, the National Bank of the Republic of North Macedonia, Norges Bank, the National Bank of

						Serbia, the Swiss National Bank (NUTS3 regions and inhabitants from Eurostat)
Proportion of gross value added in accommodation and food (2019 in percent)	30	2.84	1.78	1.32	7.84	Eurostat
General government spending growth (2019 to 2020, in percent)	25	10.36	4.37	-0.5	19.07	Eurostat

Source: own table

With this data set, we executed the following linear regression model:

$$Y_i = \beta_0 + \beta_1 * lncases_i + \beta_2 * Structure\ of\ the\ banking\ system_i * lncases_i + \beta_3 * Gross\ value\ added\ in\ accomodation\ and\ food\ 2019_i * lncases_i + \beta_4 * General\ goverment\ spending\ growth\ _i * lncases_i + \beta_5 * Country\ dummies_i + \varepsilon_1$$

As outlined above, our dependent variable *Y* in a given country *i* is GDP per capita growth between 2019 and 2020 in euros, or employment growth between 2019 and 2020 per 100,000 inhabitants. Our key explanatory variable is lncases and the interaction terms between lncases and the structure of the banking system. The results of the linear regression models are summarised in Table 2. For all model specifications we control for a dummy variable that identifies the UK and a dummy variable that indicates CEE countries. Both dummy variables significantly explain GDP growth. A strong negative association of the UK with GDP growth is likely explained by the country's simultaneous exit from the EU and single market. The positive association of CEE countries with GDP growth may relate to the fact that CEE countries remained largely spared from the first wave of the pandemic in spring 2020. The high number of COVID cases were the result of the subsequent winter wave and likely affected GDP growth in 2020 to a limited degree. Lncases negatively affected GDP growth as expected, and the association is significant at the 1% level (column 1 of Table 2).

As column 2 reports, growth is positively associated with the interaction between lncases and the geographical concentration of banks, implying that countries with more centralised banking systems experienced a smaller decline in GDP between 2019 and 2020. This association is significant at the 5% level and the explanatory power of the model increases moderately (from adjusted R^2 of 0,403 to adjusted R^2 of 0.480). Remarkably, the proportion of gross value added in accommodation and food (interacted with lncases) misses 10% significant level and does not improve the overall adjusted R^2 of the model (column 3). The interaction between lncases and general government spending is significant and positive (column 4). In countries where government spending increased by more, the economic decline was lower. Over all four model specifications, the geographical concentration of banks has a positive impact on GDP growth during the pandemic, although the significance level decreases to 10 % when using the control variables.

Our second banking system structure indicator, the geographical spread of banks to population, slightly misses significance level in all three model specifications when interacted with lncases (column 5, 6 and 7). The very low number of only 30 observations, resulting from the limited number of European countries suitable for our analyses, may explain the insignificance of this variable as well as the accommodation and food control variable. In unreported regression models we identified a significant negative impact of the geographical spread and the proportion of gross value added in accommodation and food on GDP per capita growth. In these linear regressions we used an alternative modelling strategy and did not interact our independent variables with lncases, but included the cases as further independent variable into the models.

Table 2: Effects of the structure of the banking systems on GDP per capita during the COVID-19 pandemic

<Table 2 [page 25]>

Table 2 reports the results of the linear regression analysis. GDP per capita growth from 2019 to 2020 is the dependent variable. Independent variables are lncases and the interaction terms between lncases and the geographical concentration of banks, the geographical spread of banks to population, proportion of gross value added in accommodation and food sectors, the general government spending growth from 2019 to 2020. We control for a dummy variable for the UK and a dummy variable for CEE. The standard errors are in parentheses. *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level.

We test the influence of the banking system structure variables on employment growth as an alternative indicator for economic resilience. Appendix 1 reports the findings. The model specifications replicate our analysis for GDP per capita growth. Only the CEE dummy is excluded because it worsens the overall explanatory power of the models. The very low adjusted R^2 of all model specifications suggests that no explanation for employment changes between 2019 and 2020 can be identified. Neither the severity of the pandemic measured with lncases, nor banking system structure variables or the control variable explain the observed variation in employment change at a significant level. Only the proportion of gross value added in the accommodation and food sectors negatively impacts employment growth (at the 10% significance level, see column 3). Possible explanations for this poor model fits are speculative. Perhaps changes in employment are the outcome of government intervention. With the short-term work allowance scheme, several European countries prevented that a lack of work causing a redundancies. The fact that employment changes do not correlate with changes in GDP per capita growth support this speculation. Overall, our models with the alternative dependent indicator do not support the initial finding that the structure of the banking system influences economic resilience. The signs of the geographical concentration and geographical spread rather indicate that banking system decentralisation is associated with less job losses, though the effects are not significant. As lncases and most other control variables have no impact on employment growth either, we assume that employment fluctuation is a poor indicator for economic resilience in the 2020 pandemic.

5. The GFC models

The financial crisis models explain GDP per capita (unemployment rate and outstanding business loans per head) in the six years of the GFC from 2007 to 2012, with our geographical structure indicators for 26 European countries. Up to 153 country-year observations are included in the linear panel-data regression models. Deviating from Figure 1, Albania, Macedonia, Norway and Serbia are excluded due to missing data. For Croatia, we only have data for 2010, 2011 and 2012. Table 3 outlines the summary statistics of the included variables. The dependent variable GDP per capita is measured in USD and comes from the World Bank world development indicators. The unemployment rate comes from the International Labour Organization. For business loans, the OECD financing SMEs and entrepreneurs database was extended with data from Deutsche Bundesbank for Germany and the Bank of England for the UK. Compared to the other dependent variables, the reliability of the business loans tends to be lower owing to divergent national definitions on what counts as a business loan. To control for alternative factors on economic resilience, we include the proportion of gross value added in the financial sector in 2006 and general government spending.

Table 3: Summary statistic of the financial crisis model

Variable	Obs.	Mean	Std. Dev.	Mini.	Max.	Source
GDP per capita (constant 2005 USD)	153	32029.60	18074.16	6476.05	75793.60	World Bank World Development Indicators
Unemployment rate (in percent)	153	8.94	4.20	3.35	24,79	International Labour Organization
Outstanding business loans per inhabitant (EUR 1,000)	110	11.82	8.56	1.42	41.69	OECD - financing SMEs and entrepreneurs; Eurostat; Bundesbank for Germany; the Bank of England for the UK; Euro exchange rates from 8th January 2010 for non-Euro local currency
Geographical concentration of banks (in %)	153	58.47	27.83	9.72	100.00	List of reporting MFI by ECB and Swiss National Bank (NUTS3 regions from Eurostat)
Geographical spread of banks to population (in %)	153	77.65	25.42	20.4	100.00	List of reporting MFI by ECB and the Swiss National Bank (NUTS3 regions from Eurostat)
Proportion of gross value added in the financial sector (2006, in %)	153	5.17	2.12	2.06	11.89	Eurostat
General government spending per inhabitant (EUR 1,000)	147	11.23	6.75	1.62	26.44	Eurostat

Source: own table

With this dataset, we executed the following linear panel-data regression model:

$$Y_{i,t} = \beta_0 + \beta_1 * Structure\ of\ the\ banking\ system_{i,t} + \beta_2 * Y\ 2006_i + \beta_3 * Gross\ value\ added\ in\ finance\ 2006_i + \beta_4 * General\ goverment\ spending_{\ i,t} + \beta_5 * PIIGS - Dummy_i + a_t + u_{i,t}$$

Our dependent variable Y in a given country i and a given year t is GDP per capita, the unemployment rate or outstanding business loans per inhabitant. The explanatory variables are the geographical structure of the national banking system in each year, measured by the geographical concentration of banks and the geographical spread of banks to population. We control for the baseline of the dependent variables as a pre-crisis reference: GDP per capita in 2006, the unemployment rate in 2006 and outstanding business loans per inhabitant in 2007 (the earliest year provided by the OECD database). Furthermore, we control for time fixed-effects in the model specifications as the impact of the crisis did vary over the observed period. The control variable gross value added in finance represents the situation in 2006, the year before the financial turmoil started. General government spending is included for each year of the crisis. To control for the impact of the sovereign debt crisis that followed the financial crisis, we use a dummy variable in most models that identifies the so-called PIIGS states (Portugal, Italy, Ireland, Greece, and Spain) where the bursting of the real estate bubble and subsequent bank bailouts led to government funding problems.

The results of the panel estimation models for GDP per capita are summarised in Table 4. The negative sign of the initial model in column 1 indicates that the concentration of the banking system negatively influenced economic resilience. In other words, we observe a smaller decline in GDP per capita between 2007 and 2012 in countries with less centralised banking systems. This finding is significant at the 5% level and remains significant for all other specifications (columns 1 to 3) at the 5% or 1% level. Unsurprisingly, GDP before the crisis is the strongest predictor of crisis GDP growth, which is why adjusted R^2 is above 0.9 in all three models. Surprisingly, the proportion of gross value added in the financial sector in 2006 positively influences GDP per capita (column 2), hence a larger financial sector cushions the decline in GDP in the observed six crisis years. This observation may be seen as an indication for the finance-growth nexus (Levine, 2005; Zademach, 2014), that more finance is associated with economic growth. However, the effect is only significant at the 10% level and disappears when controlling for general government spending (column 3). General government spending also negatively influences GDP, meaning that countries which spent more experienced a stronger decline in GDP. This finding at the 5% significance level appears counterintuitive and may be explained by stronger absolute declines in GDP in countries with higher income and hence higher government expenditures. Furthermore, countries that were hit strongest by the financial turmoil were in particular need of government interventions for example to bail out banks, which potentially explains the higher government spending. Note that we control for the PIIGS states that experienced a significant decrease in GDP and where government spending was limited by fiscal challenges. Either way, in strong contrast to our pandemic models, the geographical concentration of banks shows a significant, moderately negative impact on GDP per capita in the financial crisis for all model specifications.

As the models in columns 4 to 6 of Table 4 show, the geographical spread of banks to population (our second structural variable) only significantly influences GDP per capita in one out of the three specifications. Its impact only becomes significant at the 5% level when controlling for the proportion of gross value added in the finance sector and the PIIGS countries (column 5). In the last specification reported in column 6, geographical spread of banks just misses the 10% significant level, perhaps explained by the lower number of 147 observations (the UK is omitted due to missing data). Overall, the models that consider the geographical spread of banks to population as a key independent variable report similar explanatory power and similar effects of the independent variables. However, the confidence level tends to be lower in some model specifications compared to the models in columns 1 to 3.

Table 4: Effects of the structure of the banking systems on GDP per capita during the GFC

GDP per capita (constant 2005 USD)	(1)	(2)	(3)	(4)	(5)	(6)
Geographical concentration of banks (in %)	-9.357**	-10.123**	-10.519***			
	(4.736)	(4.070)	(4.006)			
Geographical spread of banks to population (in %)				7.538	9.805**	6.797
				(5.474)	(4.699)	(4.805)
GDP per capita (2006)	0.981***	0.978***	1.031***	0.981***	0.977***	1.026***
	(0.007)	(0.008)	(0.027)	(0.008)	(0.008)	(0.026)
Proportion of gross value added in the financial sector (2006, in %)		109.419*	42.943		103.863	35.477
		(65.781)	(85.173)		(66.155)	(86.989)
General government spending per inhabitant (EUR 1,000)			-135.967**			-120.306*
			(65.920)			(66.986)
Dummy PIIGS		-2209.791***	-2261.468**		-2229.559***	-2260.532***
		(281.524)	(283.697)		(283.938)	(288.864)
Dummy Years	yes***	yes***	yes***	yes***	yes***	yes***
Constant	2204.109***	2236.438***	2356.332***	1108.800	970.745*	1260.103**
	(503.116)	(444.220)	(457.683)	(511.817)	(496.663)	(512.149)
Number of Obs.	153	153	147	153	153	147
Adjusted R^2 (overall)	0.992	0.995	0.995	0.992	0.995	0.995

Table 4 reports the results of the linear regression analysis with GDP per capita as the dependent variable. Independent variables are the geographical concentration of banks, the geographical spread of banks to population, 2006 GDP per capita, general government spending, proportion of gross value added in finance, dummy variables for the PIIGS states and years of observation. The standard errors are in parentheses. *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level.

Considering the unemployment rate as an alternative dependent variable confirms the general finding that banking system concentration harmed economic resilience during the financial crisis. Table 5 reports the model specifications and shows that the geographical concentration of banks is associated with an increase in the unemployment rate in all model specifications at the 1 or 5% significance level (columns 1 to 3). The initial unemployment rate in 2006, the years of the crisis and the PIIGS dummy variable indicators influence the unemployment rate significantly and in a similar direction as for the GDP models. Interestingly, the direction of the influence of general government spending reverses in comparison to the GDP models: more government spending cushions unemployment. The models of the geographical spread of banks to population almost replicate the findings of the GDP analyses. Spread is negatively associated with the unemployment rate only in one of the three model specifications (columns 4 to 6). The influence of the other independent variable is in line with columns 1 to 3: more government spending reduces the unemployment rate and the initial size of the financial sector loses its significant negative impact on the unemployment rate when controlling for government spending. Overall, the two geographical structure variables show similar impacts on the unemployment rate, as concentration lowers and spread increases economic resilience. With adjusted R^2 of below 0.5 , the explanatory power of the unemployment models are lower compared to the GDP models.

Table 5: Effects of the structure of the banking systems on the unemployment rate during the GFC

Unemployment rate (in percent)	(2)	(3)	(4)	(6)	(7)	(8)
Geographical concentration of banks (in %)	0.032***	0.033***	0.022**			
	(0.010)	(0.009)	(0.009)			
Geographical spread of banks to population (in %)				-0.018	-0.021**	-0.007
				(0.012)	(0.010)	(0.011)
Unemployment rate (2006, in %)	0.489***	0.409***	0.274**	0.448***	0.362***	0.229***
	(0.116)	(0.008)	(0.120)	(0.121)	(0.117)	(0.121)
Proportion of gross value added in the financial sector (2006, in %)		-0.285**	-0.185		-0.285**	-0.160
		(0.137)	(0.142)		(0.141)	(0.145)
General government spending per inhabitant (EUR 1,000)			-0.143***			-0.170***
			(0.046)			(0.047)
Dummy PIIGS		-4.594***	-4.561***		-4.651***	-4.551***
		(0.653)	(0.655)		(0.673)	(0.667)
Dummy Years	yes***	yes***	yes***	yes***	yes***	yes***
Constant	1.012	2.136	4.644	4.522	5.962***	6.926***
	(1.260)	(1.511)	(1.702)	(1.563)	(1.741)	(0.1741)
Number of Obs.	153	153	147	153	153	147
Adjusted R^2 (overall)	0.292	0.467	0.494	0.256	0.434	0.475

Table 5 reports the results of the linear regression analysis where the dependent variable is the unemployment rate. Independent variables are the geographical concentration of banks and the geographical spread of banks to population, unemployment rate in 2006, general government spending, proportion of gross value added in finance and dummy variables for the PIIGS states and years of observation. The standard errors are in parentheses. *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level.

Outstanding business loans are one causal link for the banking structure´s influence on economic resilience, to conduct countercyclical funding and prevents a credit crunch. Therefore, it is especially relevant to see that the structural indicators significantly influence business loans in the expected direction (Table 6). Greater geographical concentration of banks is associated with less business loans, while extensive spread of banks is associated with more outstanding business loans in all models with significance levels of 5% or 10% (column 1 to 6). The models in column 3 and 6 have a significance level of 10%, which is probably explained by the small sample size of 95 observations. All other independent variables remain insignificant except the initial 2007 business loans and the PIIGS dummy, suggesting that business lending is indeed influenced by the geographical structure of the national banking systems rather than other variables.

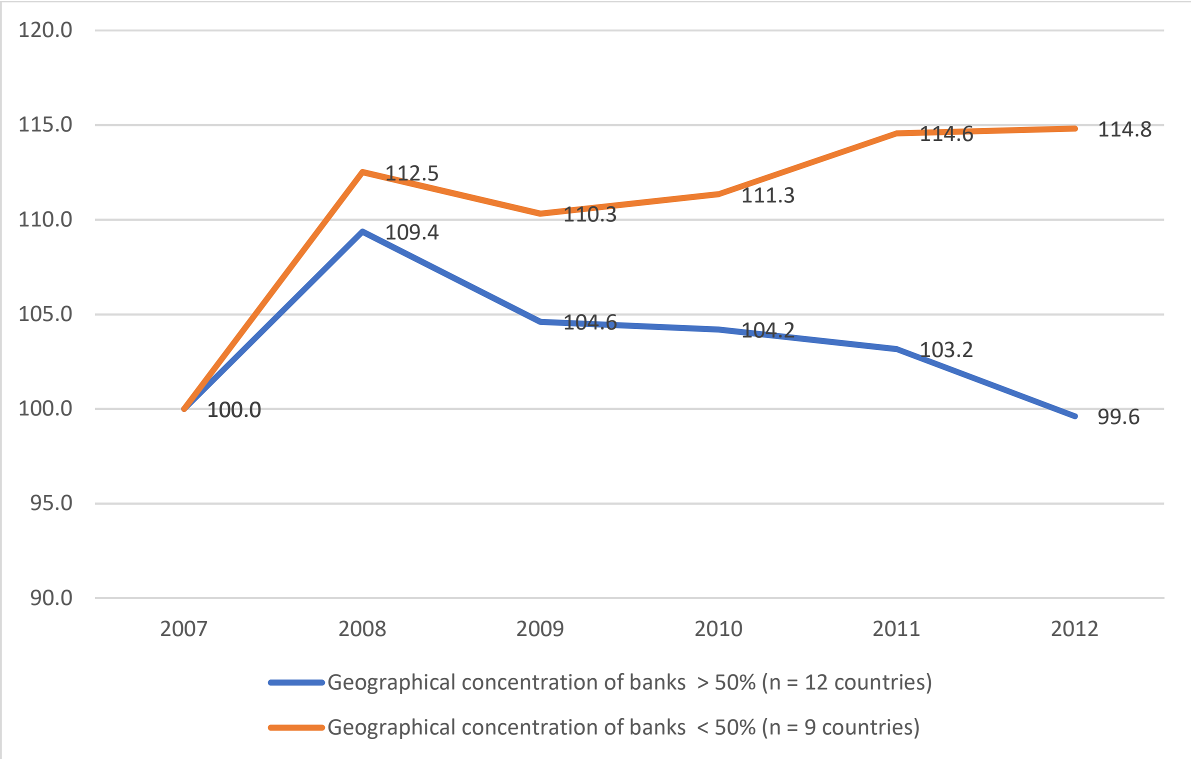
Table 6: Effects of the structure of the banking systems on outstanding business loans during the GFC

Outstanding business loans per inhabitant (EUR 1,000)	(1)	(2)	(3)	(4)	(5)	(6)
Geographical concentration of banks (in %)	-0.014**	-0.12**	-0.011*			
	(0.006)	(0.006)	(0.006)			
Geographical spread of banks to population (in %)				0.018**	0.016**	0.013*
				(0.007)	(0.007)	(0.007)
Outstanding business loans per inhabitant (2007)	1.073***	1.088***	1.057***	1.064***	1.076***	1.052***
	(0.020)	(0.026)	(0.032)	(0.021)	(0.020)	(0.026)
Proportion of gross value added in the financial sector (2006, in %)		-0.018	0.047		-0.030	0.037
		(0.091)	(0.097)		(0.153)	(0.157)
General government spending per inhabitant (EUR 1,000)			0.033			0.044
			(0.031)			(0.030)
Dummy PIIGS		-1.231***	-1.289***		-1.178**	-1.308**
		(0.326)	(0.334)		(0.480)	(0.497)
Dummy Years	yes	yes	yes	yes	yes	yes
Constant	1.106**	1.218**	0.805	-0.994	-0.635	-0.823
	(0.544)	(0.537)	(0.593	(0.620)	(0.604)	(0.663)
Number of Obs.	100	100	95	100	100	95
Adjusted R^2 (overall)	0.969	0.973	0.975	0.969	0.973	0.974

Table 6 reports the results of the linear regression analysis whereby the outstanding business loans per inhabitant in 1,000 Euro is the dependent variable. Independent variables are the geographical concentration of banks and the geographical spread of banks to population, outstanding business loans in 2007, general government spending, proportion of gross value added in finance and dummy variables for the PIIGS states and years of observation. The standard errors are in parentheses. *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level.

Interestingly, the time variable is also insignificant for all business loan model specifications (column 1 to 6 of Table 6), which may represent the average robustness of business lending when the crisis unfolded. As Figure 2 shows, outstanding business loans were on average above 2007 levels in countries with both higher geographical concentration of banks (concentration > 50%) and lower geographical concentrations (concentration < 50%). However, loans decreased steadily in higher concentrated countries after the 2008 peak whereas in rather decentralised countries loans continued to increase after a dent in 2009. Overall, Table 6 and Figure 2 strengthens the assumption that business lending is one factor by which decentralised banking systems support economic resilience in the GFC by providing countercyclical funding.

Figure 2: Outstanding business loans per inhabitant of countries with higher and lower geographical concentration of banks (index 2007 = 100)



Source: own calculation; data source: OECD - financing SMEs and entrepreneurs, Bank of England, Deutsche Bundesbank.

6. Discussion and conclusion

European countries with centralised banking systems were more resilient during the COVID-19 pandemic in terms of GDP per capita changes, but less resilient during the GFC in terms of GDP per capita, unemployment rates and outstanding business loans (a milder credit crunch). Hence the impact of centralised banking headquarters on national economic resilience differed between the two economic shocks. This finding leads us to question whether regional banks and decentralised banking systems lost their often proclaimed (and demonstrated for the case of the GFC in this paper) ability to cushion economic shocks. Four possible explanations for the contrasting effects in the two crises can be advanced:

- First, the lack of time-series data may explain the difference, as we cannot currently trace the recovery paths following the pandemic, for which countercyclical funding may show the strongest impact. The quicker economic recovery of countries with decentralised banking systems explains most of the observed positive effects during the financial crisis, but not the severity of the initial shock in 2009. The very low number of only 30 observations likely further explains the ambiguous results of the pandemic models. A recalculation of the models with longer-term panel data would support these explanations if the influence of the banking system structure variables vanishes. Furthermore, the pandemic models could be enhanced with the consideration of the national pandemic policies like social lockdowns and travel restrictions as additional independent variables.

- Second, in contrast to the GFC, the financial sector remains resilient in the current pandemic (Kozak, 2021; Marcu, 2021), which is one possible explanation why the banking system structure hardly affects economic resilience in our models. If the pandemic does eventually trigger a financial crisis, banking system structure may have a stronger impact on economic resilience, as was the case in the GFC.
- Third, perhaps banking has changed since the GFC so that regional banks and a decentralised banking system may no longer cushion or could now even harm economic resilience. Tightened banking regulations may have restricted the ability of regional *Hausbanks* to support clients in financial difficulties. For example, banks' non-performing loans must be backed with additional equity capital under current financial regulations, banks' average equity capital increased substantially, and the percentage of non-performing loans in banks' portfolios decreased (Flögel and Gärtner, 2020). Furthermore, as predicted by Gropp et al. (2020), the high exposure of regional banks to local businesses, which particularly suffer from social lockdowns, may restrict them from supporting their clients. It will be interesting to see how the banking systems will handle the possibly increasing number of enterprise defaults and rising inflation.
- Fourth, and related to the previous point, as countries with decentralised banking systems are more centralised in 2020 than they were in 2007, "real" decentralised systems may no longer exist. Most European banking systems have passed a certain degree of centralisation and the few genuine regional banks left no longer seem to make a difference. Only the future can tell if these explanations hold true and decentralisation maintains its negative influence on economic resilience.

In conclusion, this paper is the first to demonstrate the influence of two (simple) geographical structure variables, the geographical concentration of banks and the geographical spread of banks to population, on economic resilience during crises using a cross-country comparison. It will be interesting to observe whether the different effects of a banking systems' centralisation on economic resilience during the financial crisis and the COVID-19 pandemic persist when considering the post-pandemic recovery. This will have important consequences for judging the role of regional banks for economic resilience. Regional banks and decentralised banking systems are associated with other advantages, such as access to finance for SMEs and balanced regional development (Klagge and Martin, 2005; Gärtner, 2009; Zademach, 2014; Klagge et al., 2017; Berger et al., 2020). Still, the ability to cushion economic shocks and be a more patient lender represents a key characteristic of regional banking (Handke, 2011; Hardie and Howarth, 2013). It will be interesting to study the influence of structural variables for other time periods and non-European countries. Either way, the location of banks' headquarters has proven to be a remarkable data source for capturing the geographical dimension of a banking systems' structure for studies on economic resilience.

Funding

This work was supported by a research grant from the Westphalian University of Applied Sciences Gelsenkirchen [grant number H_2021_007].

Acknowledgements

We would like to acknowledge the financial support of the Westphalian University and thank the ECB and the national central banks for providing the necessary data, as well as Jessica Palka and Stefan Gärtner for their valuable comments on earlier versions of this article.

References

Abberger, K., Hainz, C., Kunkel, A. (2009), Kreditvergabepolitik der Banken: Warum leiden große Unternehmen besonders?, *ifo Schnelldienst,* 62: 32–34

Alessandrini, P., Presbitero, A.F., Zazzaro, A. (2009), Global banking and local markets: a national perspective, *Cambridge Journal of Regions, Economy and Society*, 2: 173–192

Allen, F., Jackowicz, K., Kowalewski, O. (2013) The Effects of Foreign and Government Ownership on Bank Lending Behavior During a Crisis in Central and Eastern Europe. Wharton Financial Institutions Center Working Paper No. 13-25, Available at SSRN: https://ssrn.com/abstract=2287081 or http://dx.doi.org/10.2139/ssrn.2287081.

Audretsch, D.B., Lehmann, E.E. (2016) *The Seven Secrets of Germany: Economic Resilience in an Era of Global Turbulence*. Oxford: Oxford University Press.

Ayadi, R., De Groen, W. (2014) Banking Business Models Monitor 2014: Europe. CEPS Paperbacks.

Ayadi, R., Schmidt, R.H., Valverde, S.C., Fernandez, F.R. (2009) *Investigating Diversity in the Banking Sector in Europe. The Performance and Role of Savings Banks*. Brussels: Centre for European Policy Studies.

Beck, T., H, Degryse, R, De Haas, Van Horen, N., (2018), When Arm's Length Is Too Far: Relationship Banking over the Business Cycle, *Journal of Financial Economics*, 127, 174–96.

Behr, P., Norden, L., Noth, F. (2013), Financial constraints of private firms and bank lending behaviour, *Journal of Banking & Finance*, 37: 3472–3485

Berger, A.N., Miller, N.H., Petersen, M.A., Rajan, R.G. and Stein, J.C., (2005), Does function follow organizational form? Evidence from the lending practices of large and small banks, *Journal of Financial Economics,* 76(2): 237-269.

Blažek, J., Hejnová, T. (2020), Geography, ownership and uneven trends in the economic performance of small banking centres in Europe during the financial crisis , *European Urban and Regional studies,* 27: 359-378

Bolton, P., Freixas, X., Gambacorta, L., Mistrulli, P., (2016), Relationship and Transaction Lending in a Crisis, *Review of Financial Studies,* 29(10): 2643-2676.

Bonin, J., Hasan, I., Wachtel, P. (2005), Privatization matters: Bank efficiency in transition countries, *Journal of Banking & Finance*, 29, 9: 2155–2178

Boot, A.W.A. (2000), Relationship Banking: What Do We know?, *Journal of Financial Intermediation,* 9: 7–25

Boschma, R. (2005), Proximity and Innovation: A Critical Assessment, *Regional Studies,* 39: 61–74

Burghof, H., Gehrung, M., Schmidt, D. (2021) Under Italy's Sun or in an Economic Shadow - The Effects of Regional Banking Systems on Economic Development in the Italian Mezzogiorno Regions. Working Paper online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3802547

Cull, R., Martínez Pería, M.S. (2013), Bank ownership and lending patterns during the 2008–2009 financial crisis: Evidence from Latin America and Eastern Europe, *Journal of Banking & Finance*, 37: 4861–4878

Cutter SL, Barnes L, Berry M, Burton C, Evans E, Tate E, Webb J (2008), A place-based model for understanding community resilience to natural disasters. Glob Environ Chang 18:598–606

Degryse, H., Matthews, K., Zhao, T. (2018), SMEs and access to bank credit: Evidence on the regional propagation of the financial crisis in the UK, *Journal of Financial Stability,* 38: 53–70

DeYoung, R., Gron, A., Torna, G., Winton, A., (2015), Risk Overhang and Loan Portfolio Decisions: Small Business Loan Supply before and during the Financial Crisis, *Journal of Finance* 70 (6):2451–2488.

Epstein, R.A. (2014), When do foreign banks 'cut and run'? Evidence from west European bailouts and east European markets, *Review of International Political Economy*, 21:4, 847–877

Fingleton, B.; Garretsen, H.; Martin, R. (2012), Recessionary shocks and regional employment: evidence on the resilience of UK regions, *Journal of Regional Science,* 52 (1): 109–133.

Flögel, F. (2018), Distance and modern banks' lending to SMEs: ethnographic insights from a comparison of regional and large banks in Germany, *Journal of economic geography,* 18, 35–57.

Flögel, F. (2019) *Distance, Rating Systems and Enterprise Finance. Ethnographic Insights from a Comparison of Regional and Large Banks in Germany.* London: Routledge.

Flögel, F., Gärtner, S. (2018) The Banking Systems of Germany, the UK and Spain from a Spatial Perspective: Lessons Learned and What Is to Be Done? Discussion Paper 18(1a), Institute for Work and Technology, Westphalian University of Applied Sciences.

Flögel, F., Gärtner, S. (2020), The COVID-19 pandemic and relationship banking in Germany: Will regional banks cushion an economic decline or is a banking crisis looming?, *Tijdschrift voor economische en sociale geografie*, 111: 416–433

Fritsch, M., Wyrwich, M. (2021), Does Successful Innovation Require Large Urban Areas? Germany as a Counterexample, *Economic Geography*, 97: 284–308

Gärtner, S. (2009) Lehren aus der Finanzkrise. Räumliche Nähe als stabilisierender Faktor. *IAT Forschung Aktuell* 08/2009, Institute for Work and Technology, Westphalian University of Applied Sciences.

Gärtner, S. (2013) Varianten institutioneller Arrangements am Beispiel regionaler Finanzregime. In Brand, O., Dörhöfer, S., Eser, P., Brand, O., Dörhöfer, S., Eser, P. (eds) *Die konflikthafte Konstitution der Region. Kultur, Politik, Ökonomie*, pp 233–263. Münster: Westfälisches Dampfboot.

Gärtner, S., Flögel, F. (2017), Zur Bedeutung und Zukunft dezentraler Banken für die KMU-Finanzierung in Deutschland, *ZfKE - Zeitschrift für KMU und Entrepreneurship*, 65: 41–60

Giannetti, M., Laeven, L. (2012), The flight home effect: Evidence from the syndicated loan market during financial crises, *Journal of Financial Economics*, 104: 23–43

Gropp, R., Koetter, M., McShane, W. (2020), The Corona Recession and Bank Stress in Germany. *IWH Online 4/*2020, Leibniz-Institut für Wirtschaftsforschung Halle

Hakenes, H., Hasan, I., Molyneux, P., Xie, R. (2014) Small banks and local economic development. Bank of Finland Research Discussion Papers 5, Bank of Finland.

Haldane, A.G., May, R.M. (2011), Systemic risk in banking ecosystems, *Nature*, 469: 351–355

Handke, M. (2011) *Die Hausbankbeziehung. Institutionalisierte Finanzlösungen für kleine und mittlere Unternehmen in räumlicher Perspektive*. Berlin: Lit.

Hardie, I., Howarth, D. (2013) A peculiar kind of devastation: German market-based banking. In Hardie, I., Howarth, D. (eds) *Market-Based Banking and the International Financial Crisis*, pp. 103–127. Oxford: Oxford University Press.

Holling, C. S. (1973), Resilience and stability of ecological systems, Annual Review of Ecology and Systematics, 4: 1–23.

Klagge, B., Martin, R. (2005), Decentralized versus centralized financial systems: is there a case for local capi-tal markets?, Journal of Economics Geography, 5: 387–421

Klagge, B., Martin, R., Sunley, P. (2017) The spatial structure of the financial system and the funding of regional business: a comparison of Britain and Germany. In Martin, R., Pollard, J. (eds) *Handbook on the Geographies of Money and Finance,* pp. 125–156. Cheltenham: Edward Elgar.

Kozak, S. (2021), The Impact of COVID-19 on Bank Equity and Performance: The Case of Central Eastern South European Countries, *Sustainability,* 13: 1–15

Kotz, H.H., Schäfer, D. (2018), Diversity across EU Banking Sectors: Poorly Researched and Underappreciated, *Vierteljahrshefte zur Wirtschaftsforschung*, 87: 153–179

La Porta, R., Lopez-De-Silanes, F., Shleifer, A. (2002), Government Ownership of Banks, *Journal of Finance*, 57: 265–301

Lee, N., Brown, R. (2017), Innovation, SMEs and the liability of distance: the demand and supply of bank funding in UK peripheral regions, *Journal of Economic Geography* , 17: 233–260

Levine, R. (2005) Finance and Growth: Theory and Evidence. In Aghion, P., Durlauf, S.N. (eds) *Handbook of economic growth,* pp. 865–934. Amsterdam: Elsevier.

Levine, R., Lin, C., Xie, W. (2020) Local Financial Structure and Economic Resilience. Working paper. Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3755560.

Liikanen, E., Bänziger, H., Campa, J. M., Gallois, L., Goyens, M., Krahnen, J.P., Mazzucchelli, M., Sergeant, C., Tuma, Z., Vanhevel, J., Wijffels, H. (2012) High-level Expert Group on reforming the structure of the EU banking sector. Final report. Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_12_1048

Marcu, M.R. (2021): The Impact of the COVID-19 Pandemic on the Banking Sector, *Management Dynamics in the Knowledge Economy*, 9 (2): 205-223.

Martin, R. (2011), The Local Geographies of the Financial Crisis: From the Housing Bubble to Economic Recession and Beyond, *Journal of Economic Geography*, 11: 587–618.

Martin, R. (2012), Regional economic resilience, hysteresis and recessionary shocks, Journal of Economic Geography, 12 (1): 1–32.

Martin, R., Sunley, P. (2015), On the notion of regional economic resilience: conceptualization and explanation, Journal of Economic Geography, 15 (1): 1–42.

Mayer, C., McCann, P., Schumacher, J. (2021), The structure and relations of banking systems: the UK experience and the challenges of 'levelling-up', *Oxford Review of Economic Policy*, 37: 152–171

Michie, J., Oughton, C. (2013) Measuring Diversity in Financial Services Markets: A Diversity Index. Discussion Paper 113, Centre for Financial and Management Studies, University of London.

Modica, M., Reggiani, A. (2015), Spatial Economic Resilience: Overview Perspectives, *Networks and Spatial Economics*, 15, 211–23.

Pollard, J.S. (2003), Small firm finance and economic geography, *Journal of Economic Geography*, 3: 429–452

Presbitero, A.F., Udell, G.F., Zazzaro, A. (2014), The Home Bias and the Credit Crunch: A Regional Perspective, *Journal of Money, Credit and Banking,* 46: 53–85

Schmidt, R.H. (2018), Diversity in Finance: An Overview, *Vierteljahrshefte zur Wirtschaftsforschung,* 87: 9–23

Sette, E., Gobbi, G. (2015), Relationship Lending during a Financial Crisis, *Journal of the European Economic Association,* 13(3): 453-481.

Simmie, J., Martin, R. (2010), The economic resilience of regions: towards an evolutionary approach, Cambridge Journal of Regions, Economy and Society, 3 (1): 27–43.

Smith, A., Swain, A. (2010), The global economic crisis, Eastern Europe, and the former Soviet Union: models of development and the contradictions of internationalization, *Euroasian Geography and Economics*, 51: 1–34

Stein, J.C. (2002), Information Production and Capital Allocation: Decentralized versus Hierarchical Firms, *The journal of finance*, 57: 1891–1921

Udell, G.F. (2008), What`s in a relationship? The case of commercial lending, *Business Horizons*, 51: 93–103

Uzzi, B., Lancaster, R. (2003), Relational embeddedness and learning: The case of bank loan managers and their clients, *Management Science,* 49: 373–399

Zademach, H-M. (2014) *Finanzgeographie*. Darmstadt: WBG.

Zhao, T., Jones-Evans, D. (2017), SMEs, banks and the spatial differentiation of access to finance, *Journal of Economic Geography*, 17: 791–824

Zhao, T., Luintel, K.B., Matthews, K. (2021), Soft information and the geography of SME bank lending, *Regional Studies,* 55: 679–692

Zhao, T., Matthews, K., Munday, M. (2021) Neither True-friend nor Fairweather friend: Relationship Banking and SME borrowing under Covid-19. Cardiff Economics Working Papers E2021/25, Cardiff Business School.

Table 2

GDP per capita growth from 2019 to 2020 (in EUR)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lncases (per 100.000 inhabitants in 2020)	-2057.680** (810.237)	-2777.159*** (823.669)	-2563.496*** (857.552)	-3345.381*** (887.563)	-6264.128** (808.964)	-1917.701** (818.589)	-2754.872*** (878.954)
Geographical concentration of banks * lncases		4.561** (2.070)	4.143* (2.124)	3.923* (2.127)			
geographical spread of banks to population * lncases					-2.239 (2.021)	-2.062 (2.006)	-1.164 (2.153)
Proportion of gross value added in accommodation and food (2019 in %) * lncases			-27.679 (29.859)			-37.748 (30.817)	
General government spending growth from 2019 to 2020 (in %) * lncases				31.007** (13.451)			33.000** (14.536)
Dummy UK	-1805.000* (1035.320)	-2139.648** (978.075)	-2147.920** (980.879)		-2229.486* (1099.705)	-2249.004** (1088.979)	
Dummy Central and Eastern Europe (CEE)	1373.772*** (382.063)	1030.804** (389.067)	971.291** (395.412)	878.513** (405.237)	1189.370*** (415.214)	1079.937** (420.715)	1055.552** (429.146)
Constant	5453.117* (2799.035)	7043.856** (2710.153)	6700.025** (2743.003)	8103.521*** (2839.592)	6264.128** (2881.376)	5929.845** (2865.988)	7064.171** (3059.059)
Number of Obs.	30	30	30	25	30	30	25
Adjusted R^2 (overall)	0.403	0.480	0.477	0.458	0.409	0.420	0.380

Appendix 1: Table 3 Effects of the structure of the banking systems on employment during the COVID-19 pandemic

Employment growth from 2019 to 2020 (per 100,000 inhabitant)	(1)	(2)	(3)	(4)	(5)	(5)	(6)
Lncases (per 100,000 inhabitants in 2020)	174.200 (321.309)	307.591 (372.593)	494.035 (371.958)	298.795 (388.071)	195.278 (334.442)	283.677 (331.396)	187.958 (358.829)
Geographical concentration of banks * lncases		-0.626 (0.862)	-1.111 (0.869)	-0.542 (0.902)			
geographical spread of banks to population * lncases					0.238 (789)	0.451 (0.782)	-0.159 (0.854)
Proportion of gross value added in accommodation and food (2019 in %) * lncases			-22.227* (12.400)			-18.574 (12.297)	
General government spending growth from 2019 to 2020 (in %) * lncases				-7.396 (5.838)			-8.274 (5.910)
Dummy UK	-679.072 (410.854)	-655.713 (415.876)	-629.995 (398.864)		-643.410 (434.585)	-605.166 (424.613)	
Constant	-1132.450 (1127.994)	-1451.994 (1220.305)	-1770.529 (1183.052)	-1217.244 (1239.499)	-1259.205 (1222.568)	-1432.038 (1197.867)	-887.907 (1260.147)
Number of Obs.	29	29	29	25	29	29	25
Adjusted R^2 (overall)	0.032	0.014	0,094	-0,028	-0,003	0.046	-0,044

Table 3 reports the results of the linear regression analysis. Employment growth from 2019 to 2020 is the dependent variable. Independent variables are lncases and the interaction terms between lncases and the geographical concentration of banks, the geographical spread of banks to population, proportion of gross value added in accommodation and food sectors, the general government spending growth from 2019 to 2020. We control for a dummy variable for the UK and a dummy variable for CEE. The standard errors are in parentheses. *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level.

IMPRESSUM

Institut Arbeit und Technik

Westphalian University
Institute for Work and Technology
Munscheidstr. 14
D-45886 Gelsenkirchen

Fon +49 (0) 209.17 07
Fax +49 (0) 209.17 07 110
Web www.iat.eu

ISSN print edition
ISSN electronic edition

Papers can be downloaded free of charge from the IAT website:
http://www.iat.eu/dicussionpapers

Zentrale wissenschaftliche Einrichtung der Westfälischen Hochschule in Kooperation mit der Ruhr-Universität Bochum

Westfälische Hochschule

RUHR UNIVERSITÄT BOCHUM RUB