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The changing geography of banking in CESEE. Branch closures outpace openings

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Abstract

We study the evolution of bank branch networks in ten CESEE countries between 2013 and 2021. Using a manually compiled dataset of all branches and their geocoordinates, we document a decline exceeding 30%, with substantial heterogeneity across and within countries. We show that banking market consolidation is a key driver of closures, while profitability and local economic growth mitigate them. Branches in highly urban or very rural areas close more often. Competitive effects are nonlinear: moderate clustering lowers closure risk, but intense competition increases it. These patterns differ markedly across CESEE banking systems during the entire period we analyze.

Keywords: debranching, banks, consolidation, spatial distribution

JEL classification: D53, G21, R12

Non-technical summary

Across many advanced economies, physical bank branches have been steadily disappearing for more than a decade. In Western Europe and the United States, the rapid spread of online banking, declining cash use, and cost-cutting in increasingly consolidated banking sectors have contributed to substantial reductions in branch networks. While this "debranching" trend is well documented in high-income countries, it has been less clear whether similar forces are reshaping the geography of banking in Central, Eastern, and Southeastern Europe (CESEE). Banking markets in many CESEE economies emerged only in the early 1990s during the transition from planned to market economies. Cash remains widely used for everyday payments and for storing savings, and limited capital market activity means that companies also predominantly depend on banks. Under these conditions, local branches are particularly important for households and small firms, and closures could slow economic development in some areas and create disadvantages for certain groups.

To understand how bank networks in CESEE have evolved, this paper compiles a uniquely detailed dataset that records the precise locations of bank branches in 2013 and 2021 across ten countries—two euro area member states, four EU member states, and four EU candidate countries. The geocoded nature of the data allows us to move beyond national aggregates and directly study where closures occur, how local market structure changes, and how these patterns differ within and across countries.

The empirical strategy proceeds along three complementary levels of analysis. First, we look at regions (NUTS-3) and examine how demographic trends, local economic activity, and digital infrastructure are related to changes in branch density. Second, we focus on banks within regions and assess whether branch-network changes are linked to bank characteristics such as profitability and involvement in mergers and acquisitions. Third, we analyze individual branches to understand how local competition and proximity to other branches are associated with closure decisions, while accounting for persistent differences across banks and regions.

Our results show that CESEE has experienced a substantial contraction in branch networks. Between 2013 and 2021, the total number of branches across the ten countries declined by more than 30 percent, indicating that the global "debranching" trend extends beyond the euro area and EU. At the same time, the pace of decline differs markedly across countries: North

Macedonia saw only a modest reduction, whereas Hungary lost more than half of its branches. Differences within countries are also pronounced. Branch numbers remained comparatively stable in some regions, whereas others saw a larger decline. A recurring pattern across countries is that the largest reductions occurred both in the most urban areas and in peripheral rural regions. Market structure also plays a key role. Branch closures are strongly associated with mergers and acquisitions, suggesting that consolidation is an important driver of network downsizing. While digitization is often highlighted as the main explanation for debranching in advanced economies, the evidence for CESEE points more strongly to competitive restructuring. The results also indicate that branch adjustments differ systematically across banks. In particular, smaller and more profitable banks tend to reduce their networks more strongly. Finally, the paper highlights the importance of the immediate competitive environment of each branch. Branches located in more competitive local markets are less likely to close, although this stabilizing effect is weaker for banks with a larger local market share. Taken together, the evidence highlights that debranching in CESEE is widespread but highly heterogeneous, shaped jointly by consolidation dynamics, bank heterogeneity, and local market conditions.

1 Introduction

Across advanced economies, the progressive decline in physical bank branch networks marks a significant transformation in the financial sector that has unfolded since the Global Financial Crisis. The widespread adoption of internet and mobile banking in these economies has reshaped the economic rationale for maintaining branch networks. In some countries, the decline in cash usage and the rise of digital payment systems have further diminished the relevance of physical bank branches. Within the euro area, branch numbers have contracted by over 40% since 2008, and bank branch density per 100,000 adults has dropped even more sharply by nearly 60%.[1] The reduction in branch networks in the euro area outpaced that of the U.S. (Keil and Ongena, 2024; Narayanan et al., 2025).

This pervasive decline in branches unfolds against the backdrop of the well-established economic understanding that banks play a crucial role in fostering growth, supporting financial inclusion, and facilitating access to credit. The spatial distribution of bank branches has long been a concern for policymakers in developing countries and emerging markets, where physical access to financial services remains uneven.[2] In recent years, several central banks in advanced economies have begun to analyze the contraction of branch networks, consistent with their responsibility to monitor structural developments and identify vulnerabilities in the banking sector.[3] Research on the dynamics of debranching is still emerging and has so far focused primarily on advanced economies with mature banking markets (Galardo et al., 2021; Amberg and Becker, 2024; Keil and Ongena, 2024). The debranching trend in advanced economies is largely attributed to improvements in ICT infrastructure. However, Keil and Ongena (2024) demonstrate for the U.S. that debranching is not only associated with technological factors, but that bank fragility and consolidation are equally significant drivers. Galardo et al. (2021) analyze the spatial dimension of bank branch closures in Italy and find that closures are more frequent in areas where the proprietary branch network is denser and competition from other banks is more intense.

[1] ECB Banking Strutural Statistical Indicators: `https://data.ecb.europa.eu/data/datasets` and blog post: `https://data.ecb.europa.eu/blog/blog-posts/changing-landscape-bank-offices-euro-area`

[2] See, for example, Burgess and Pande (2005) for India, Fonseca and Matray (2024) for Brazil and Ji et al. (2023) for Thailand who study the effects of a policy-led expansion of the bank branch network on economic growth and inequality.

[3] See, for example, Narayanan et al. (2025) for the U.S., Stix (2020) for Austria and Broekhoff and van der Cruijsen (2025) for the Netherlands.

Our analysis focuses on ten Central, Eastern and Southeastern European (CESEE) countries—two euro area member states, four EU member states and four candidate countries. Banking markets in CESEE economies began to develop in the early 1990s during the transition from planned to market economies. The financial sector in CESEE is dominated by banks, which continue to exhibit comparatively high profitability, while capital markets remain relatively underdeveloped. A significant share of banks are foreign-owned (De Haas et al., 2015), with most institutions now primarily self-funded through domestic deposits. Credit demand—particularly for mortgages and consumer loans—remains relatively strong (Hildebrandt, 2025). At the same time, cash persists as an important medium for transactions and for holding savings. Although the countries in our sample share a broad history of economic transition and financial-sector restructuring, they differ substantially in economic development, urbanization, and digital adoption. For instance, digitization indicators point to considerable variation across CESEE economies, with some countries exceeding the European average while others still lag behind (Gereben and Wruuck, 2021).

We build on Qi et al. (2024), who analyze the evolution of bank branch networks in Eastern Europe between 1995 and 2012. This period was initially marked by rapid expansion. Qi et al. (2024) show that the introduction of credit registries and improvements in information-sharing mechanisms led to a shift in branch clustering. Our study picks up from this point, examining how banking geography in CESEE has evolved after 2012.

The cross-country setting allows us to examine whether branch network adjustments reflect common banking-sector trends, such as consolidation, or whether they depend on country-specific economic conditions. At the same time, the pronounced divide between urban centers and peripheral regions in many CESEE countries makes it possible to analyze whether branch reductions are spatially uneven and whether rural or declining regions are disproportionately affected.

We manually compile a dataset containing all bank branches in 2013 and 2021 along with their addresses and geocoordinates for ten CESEE countries. Using this dataset, we identify openings and closures at the branch level. We document that CESEE economies follow the pattern of a demise in bank branching observed in advanced economies: On average across the ten CESEE countries, the number of bank branches declined by more than 30% from 2013 to 2021—a decrease that, while smaller than in the euro area, is still substantial. Notably, it is also larger than the decline observed in the U.S. between 2009 and 2020 (Keil and Ongena, 2024). Yet, this average

masks substantial heterogeneity across countries: debranching ranged from just above 5% in North Macedonia to more than 50% in Hungary.

We describe the spatial distribution of bank branches and show that there is substantial variation not only between countries but also within them. The number of adults per bank branch ranges from 3,872 in Bulgaria, a level comparable to Germany, to 8,342 in Hungary, which exceeds Greece but remains well below the levels observed in the Netherlands, Estonia and Lithuania. Within countries, the largest variation in adults per bank branch at the regional level is observed in Albania with a difference of 6,474. These differences within countries correlate with indicators for regional economic development.

We analyze the factors behind the decline in bank branches using regression analyses at three levels: regional, regional-bank, and individual branch. We find that banking market consolidation through mergers and acquisitions strongly influences branch closures. On average, bank profitability negatively correlates with branch closures. However, this effect varies across countries and depends on bank size: smaller more profitable banks are less likely to debranch. Our analysis further reveals a strong non-linear link to the degree of urbanization: Closures occur more frequently in the most urban areas with an increase in population density and also in the most rural areas. We do not find a strong association with digital access; however, branch decline is less pronounced in areas experiencing local economic growth. The probability of closure initially declines as the number of competing branches increases, suggesting benefits from moderate competitive clustering. However, this relationship reverses once the number of competitors reaches nine or more, at which point closure likelihood rises. This non-linear competitive effect is mitigated by a higher share of the bank's own branches within the local market. Given the diverse set of countries we cover, we further document substantial divergence from these average results for individuals countries.

Our analysis is exploratory and does not claim to identify causal effects. First, the nearly decade-long period we examine does not include any policy interventions regarding banks' branching strategies. Second, for some of the factors that influence branching reverse causality might be an issue. Third, we observe the branch network at only two points in time, which requires us to assume that all changes occurred simultaneously and not gradually. Fourth, for some countries, the number of observations is relatively low, so we can conduct country-level analyses only at the most granular, branch-specific level.

Still, we complement existing research on bank branch networks, which relies on natural experiments[4] in the form of regulatory changes but typically focuses on one specific country, by exploring whether the drivers of branch dynamics vary across countries. In addition, few studies track branch openings and closures at the level of the individual branch address using latitude/longitude geocoding. Where such granular analyses exist, they are usually limited to countries with long-standing reporting systems that provide unique branch identifiers. For the countries included in our study, such systems are not available. Nevertheless, this granular perspective is particularly relevant, as some significant gaps in financial inclusion persist, consumers continue to rely heavily on cash, and small and medium-sized enterprises are almost exclusively financed by banks.

The remainder of the paper is structured as follows: The next section presents the data, explains how we identify branch openings and closures over time, and describes the additional data sources used to complement the bank branch data. We then outline how bank branching patterns have evolved both between and within countries. Section 4 details our empirical strategy. Section 5 presents the results and robustness checks. Finally, section 6 offers conclusions and discusses avenues for future research.

2 Data

To enable a systematic assessment of branch network dynamics across the CESEE region, we first construct a harmonized cross-country database of bank branch locations for twelve economies in 2021, ensuring comprehensive and comparable spatial coverage of the retail banking branch network.[5] The data for 2021 are complemented by a previously collected dataset covering ten CESEE countries in 2013. These datasets are integrated with information on bank ownership and other bank-level characteristics, granular data on local economic activity, and indicators at the regional level defined by the European Union's Nomenclature of Units for Territorial Statistics, level 3 (NUTS3).

[4] See, for example, Cramer (2025) and Burgess and Pande (2005) for analyses exploiting the regulatory change in India, and Célerier and Matray (2019) for evidence from the United States

[5] The authors would like to express their particular gratitude to Roland Schmidt, who carried out the bulk of this work with exceptional accuracy and thorough documentation.

2.1 Bank branch data

Bank branch data 2021. The data were primarily gathered through manual web scraping from the websites of individual banks. In a few cases datasets of all bank branches operating in the country are provided by national central banks. However, even centrally provided data often required extensive validation and revision to ensure consistency and accuracy. A comprehensive explanation of the data validation procedures is provided in the Appendix, Table A1.[6].

Bank branch data 2013. We use the dataset compiled by Beckmann et al. (2018), who collected detailed information on the number and location (address, latitude, and longitude) of bank branches serving households across ten CESEE countries in 2013. Their dataset includes geographic coordinates for 28,540 branches operated by 214 banks.

We then merge the dataset collected by Beckmann et al. (2018) for 2013 with the newly collected data for 2021 and implement a procedure to identify branch openings and closures, as illustrated in Appendix Figure 4 and described below.

Mergers & Acquisitions. Since some banks failed between 2013 and 2021, others entered the market via greenfield investment, and still others underwent mergers or acquisitions (M&A), we first verify these developments at the bank level. This is done through research using Bureau van Dijk's database, information provided by national central banks and supervisory authorities, as well as the banks' own websites for each individual institution. For the purpose of identifying branch openings and closures, we assume that all mergers occurred simultaneously at the beginning of the period.[7]

Matching branches from 2013 and 2021. To identify branch openings and closures between 2013 and 2021, we match the geographic location of bank branches of the same bank (accounting for M&A activities) across the two years. For each branch recorded in 2021, we assess whether a corresponding branch existed in 2013 within a 250-meter radius. This relatively generous threshold is chosen to account for minor discrepancies in address formatting and geocoding

[6]For Hungary and Poland, we use data from 2025 instead of 2021. However, for simplicity, we refer to the dataset as representing the year 2021 throughout. When merging the data with other time series (e.g., population data), we use 2025 data for Hungary and Poland, and 2021 data for the remaining countries.

[7]Table 2 shows the number of banks that were involved in mergers and acquisitions, that failed or entered the market via greenfield.

precision, though it may also capture branches that are not located at the exact same site. We refine the matching process by subsequently calculating the exact distance between potential branch pairs and use this information to identify the most plausible matches.

The likelihood of successfully matching branches across the two years depends on the source of the geocoordinates. Branches geocoded using automated services in 2021 are less likely to be matched to a 2013 counterpart than branches for which coordinates were directly retrieved from maps embedded on banks' websites. This discrepancy is unlikely to reflect limitations of the geocoding service itself; rather, it is likely driven by differences in the quality and structure of the underlying branch address data. In some cases, addresses contain informal location descriptors, such as the name of a shopping center, rather than standardized address components, which reduces their suitability for automated geocoding.

This limitation does not apply uniformly across countries. Assuming that the quality of branch address data is relatively stable within each country over time, cross-country differences in match rates are therefore more likely to reflect variation in geocoding suitability than differences in actual branch openings and closures.

2.2 Complementary bank and regional data

We merge the geographically matched bank-branch dataset with additional bank-level information from Bureau van Dijk. For the main analysis, we rely on bank-level indicators with minimal missing observations in the Bureau van Dijk data. We use total assets to compute bank-level market shares and compare them to branch-based market shares, and we incorporate return on average assets (ROAA) as a measure of bank performance. Other potentially relevant indicators, such as non-performing loans, exhibit substantial data gaps, which would risk introducing selection bias if banks were excluded due to missing values.

In a second step, we merge regional data on population and GDP at the NUTS2 and NUTS3 levels from Eurostat. We further enrich the bank-branch dataset with regionally aggregated indicators of internet access, online banking use, preferences for holding savings in cash, and educational attainment, sourced from the OeNB Euro Survey.

Finally, we add granular measures describing the immediate surroundings of each bank branch, merging branch coordinates with a range of georeferenced datasets. First, we incorporate an

indicator of local economic activity derived from nightlight intensity (following Henderson et al. (2012)). In the absence of harmonized and current population data at granular spatial scales, we use urban fabric information from the Corine Land Cover dataset as a proxy for local urbanicity. We also link branches to Collins Bartholomew's global mobile coverage dataset, which contains annual information on mobile network availability provided by mobile operators and the GSMA, enabling us to capture the rollout of 3G networks and the expansion of internet access.

Variable definitions at the bank branch level. Based on the matched bank branch location data from 2013 to 2021, we define several variables that describe the local environment in terms of competitor and proprietary branches. These include the distance to the nearest proprietary branch, the distance to the nearest competitor branch, and the number of own and competitor branches within a 1 km and 5 km radius. We also compute each bank's market share within a country using two complementary measures. First, we define market share as a bank's number of branches relative to the total number of branches nationwide and use tercile cutoffs of this distribution to classify banks as small, medium, or large. Second, we measure bank size as a bank's share of total market assets in 2013 (if the 2013 data is missing, we use the corresponding data from 2021). Banks with an asset share below 10% are classified as small.

A full account of all data sources, matching procedures, and variable construction is provided in Appendix A, Table A2. Tables A3 and A4 provide descriptive statistics.

2.3 Data validation

To verify the data from 2021, we compare the number of branches with figures from official national-level statistics, such as the IMF's Financial Access Survey. We also use data from national central banks and the commercial banks themselves. Additionally, we examine whether the number of branches correlates with the market share of the banks. The positive correlation shown in Figure 1 is reassuring.

3 Descriptive statistics

The bank branch networks in the ten CESEE countries display pronounced regional heterogeneity. Consistent with expectations, both maps of Figure 2 demonstrate a strong concentration of

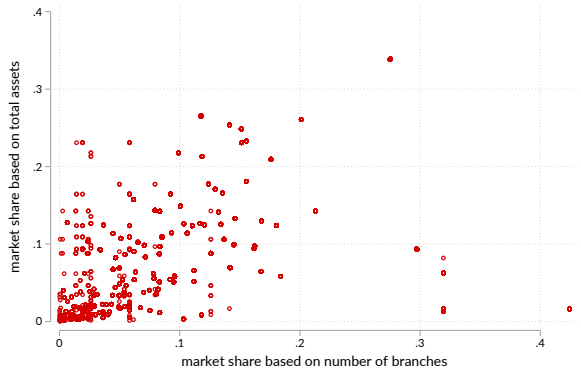

Figure 1: Banks' market shares measured by bank branches and total assets

Notes: Dots represent individual banks. Data refer to 2021. For Poland and Hungary, bank branch data refer to 2025 and total assets refer to 2024.

branches in urban and densely populated areas, such as the Prague region in the Czech Republic or the metropolitan area of Warsaw in Poland. Romania further illustrates notable disparities in branch density between rural regions and more urbanized areas.

Comparing branch densities in 2013 and 2021 based on Figure 2 might, at first sight, suggest that the overall changes have been relatively modest. A more detailed examination at the country level, however, reveals substantial contractions in certain cases—for instance, Hungary experienced a pronounced decline in the number of bank branches. In aggregate terms, the number of branches across the countries examined (excluding Montenegro and Kosovo) declined by 9,167, falling from 28,666 in 2013 to 19,499 in 2021[8].

While Figure 2 provides an impression of the spatial distribution of branches, a more systematic perspective is given by Table 1, which reports the number of banks and bank branches in 2013 and 2021. The development of the branch network exhibits a uniform downward trend across all countries. North Macedonia shows the smallest reduction in branch numbers, at 5.2%, Hungary exhibits the largest decline in the number of branches at 58.7%.

Looking at the number of banks, we also observe a decline in most countries, although a few cases suggest a more diversified banking sector in 2021 relative to 2013.

Table 2 provides an overview of greenfield entries, bank failures, and M&A. In contrast to the immediate post-transition years (see Claeys and Hainz (2014)), greenfield entries are rare, with

[8]These figures on the decline conceal a dynamic of openings and closures that ultimately result in a net reduction. See Table A6.

only Bulgaria, Albania, and Hungary recording such cases. Compared to the turbulent post-transition period in the 1990s marked by severe banking problems (Männasoo and Mayes, 2009), and the rise in bank exits following the Global Financial Crisis (Kočenda and Iwasaki, 2020), the number of bank failures appears relatively limited—mostly isolated cases in Bosnia and Herzegovina, North Macedonia, Bulgaria, and Serbia, with a more notable concentration in Croatia. By contrast, M&A activity was more widespread, affecting most countries in the sample, with Poland, Romania, and Serbia recording the highest numbers. The table thus highlights that structural change in the banking landscape of the region was driven predominantly by consolidation through M&A rather than by new entries or failures.

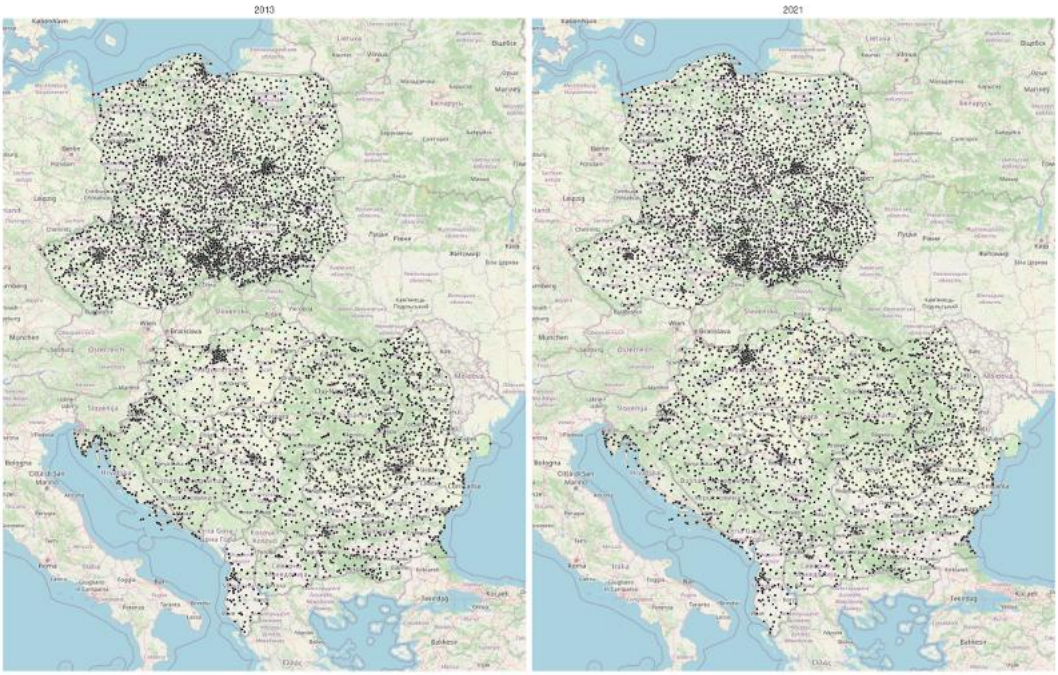

Figure 2: Bank branches in CESEE 2013 vs. 2021

Notes: Montenegro and Kosovo are only covered in 2021, as there are no data for 2013. For Poland and Hungary, bank branch data refer to 2025.

Although the total number of banks declined in most countries between 2013 and 2021, foreign-owned banks remained a dominant feature of the CESEE banking sector. Table 3 reports the number of foreign- and domestic-owned banks by country and shows that, in several countries, the decline in the number of banks was accompanied by a relatively persistent presence of foreign-owned institutions.

To make the absolute numbers presented in Table 1 comparable across countries, we scale them by population and by land area respectively. Calculating adults per bank branch and branches

Table 1 Banks and Bank branches by Country (2013 vs. 2021)

Country	Banks 2013	Banks 2021	Δ Banks	Branches 2013	Branches 2021	Δ Branches
Bulgaria	26	18	-30.8	2648	1667	-37.0
Croatia	28	20	-28.6	1146	829	-27.7
Czechia	17	20	17.6	2707	1521	-43.8
Hungary	12	9	-25.0	2738	1131	-58.7
Poland	25	26	4.0	10432	7861	-24.6
Romania	26	20	-23.1	5203	3344	-35.7
Albania	15	12	-20.0	471	410	-13.0
Bosnia and Herzegovina	21	18	-14.3	797	737	-7.5
North Macedonia	14	12	-14.3	400	379	-5.2
Serbia	31	20	-35.5	1984	1440	-27.4

Notes: The table reports the number of banks and bank branches by country for 2013 and 2021, except for Hungary and Poland, for which the second observation refers to 2025. Changes are expressed as percentage changes relative to 2013. Banks operating only a single branch in a given country are excluded.

per 1,000 km^2 captures different aspects of banking infrastructure—population-based demand versus geographic distribution—-providing complementary perspectives on access and coverage within countries. When considering branch density relative to population size, Table 4 shows that the average number of adults per branch increased across all countries between 2013 and 2021. The smallest absolute change is observed in North Macedonia, where the ratio rose only slightly, from 5,055 persons per branch in 2013 to 5,360 in 2021. By contrast, Hungary experienced the most pronounced change, with the figure more than doubling from 3,614 to 8,342 over the same period. The difference between the highest and lowest values at the NUTS2 level provides an additional indicator of regional disparities between urban and rural areas. In both years, Albania stands out: it not only recorded the highest number of persons per branch in a single NUTS2 region but also the largest intra-country gap between the regions with the highest and lowest value of inhabitants per branch.

Turning to the geographic perspective, Table 5 reports the number of branches per 1,000 km^2 to capture spatial access to banking services. The absolute gap between the NUTS3 region with the lowest density and that with the highest density declined in all countries over time. The widest disparity is observed in Romania in both 2013 and 2021, where the difference amounted to 3,583 in 2013 and 2,315 in 2021. By contrast, the smallest changes between 2013 and 2021 are found in North Macedonia and Bosnia and Herzegovina.

Finally, Figure 3 illustrates the relative intensity of branch reduction across regions, showing where contraction has been most pronounced—regardless of initial branch levels—and highlight-

Table 2 Greenfield, Bankrupt, and M&A by Country

Country	Greenfield banks	Bank failures	M&A banks
Bulgaria	2	1	7
Croatia	0	5	8
Czechia	0	0	6
Hungary	1	0	5
Poland	0	0	10
Romania	0	0	10
Albania	1	1	4
Bosnia and Herzegovina	0	1	5
North Macedonia	0	1	2
Serbia	0	2	10

Notes: The table shows the number of banks that went bankrupt, the number of banks that entered a country as greenfield investments, and the number of banks affected by consolidation through M&A for the 10 CESEE countries that are part of this study. The number of M&A cases refers to the year 2013. Note that for Hungary and Poland the data are from 2025.

ing regional variation in branch dynamics between 2013 and 2021 at the NUTS3 level. The shading indicates the relative change in the number of bank branches, with darker red areas corresponding to stronger branch reductions and green areas denoting branch growth. Branch closures were widespread, with most regions experiencing reductions in branch density. Branch expansions are concentrated in only a few localized areas.[9]

In summary, in both 2013 and 2021, the number and spatial distribution of bank branches varied substantially across—and in some cases even more within—countries. All countries experienced a decline in branch numbers over this period, though the intensity of consolidation differed notably between and within countries, with particularly pronounced contrasts between rural and urban areas.

[9]Montenegro and Kosovo are shaded in grey as there are no data for 2013.

Table 3 Number of foreign- and domestic-owned banks by country

	2013			2021		
Country	Total	Foreign	Domestic	Total	Foreign	Domestic
Bulgaria	26	16	10	18	11	7
Croatia	28	14	14	20	10	10
Czechia	17	13	4	20	16	4
Hungary	12	6	6	9	6	3
Poland	25	16	9	26	18	8
Romania	26	20	6	20	16	4
Albania	15	11	4	12	8	4
Bosnia and Herzegovina	21	10	11	18	10	8
North Macedonia	14	11	3	12	9	3
Serbia	31	23	8	20	17	3

Notes: The table reports the number of banks and the ownership structure by country for 2013 and 2021, except for Hungary and Poland, for which the second observation refers to 2025. Banks operating only a single branch in a given country are excluded.

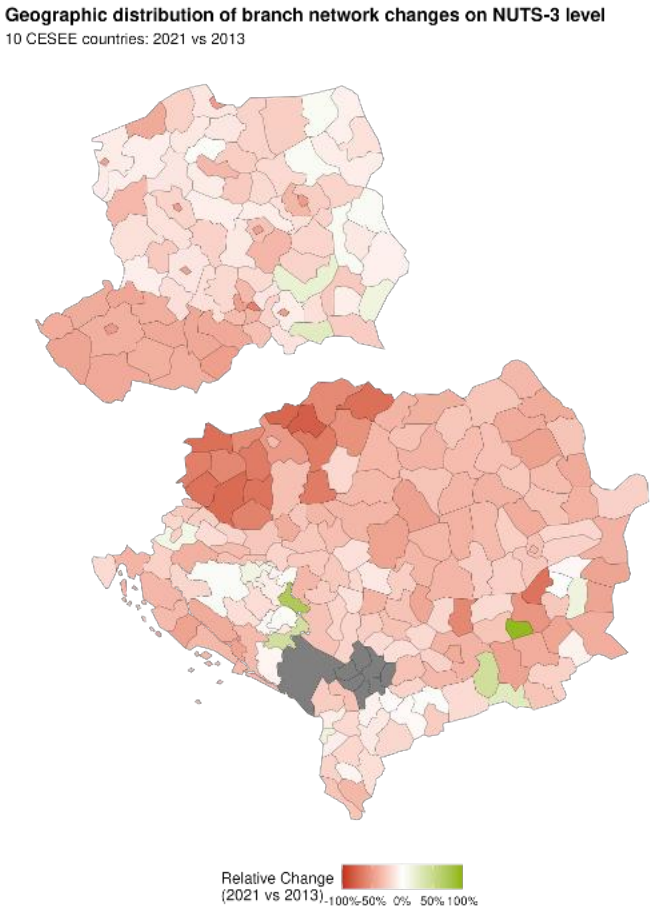

Figure 3: Change (%) in the geographic distribution of branch network changes on NUTS3 level

Table 4 Average number of adults per bank branch by country

Panel A: 2013

Country	Country Average	NUTS2 min.	NUTS2 max.	NUTS2 max–min
Bulgaria	2,700	2,359	3,121	762
Croatia	3,668	2,825	9,420	6,595
Czechia	3,849	2,539	4,875	2,336
Hungary	3,614	2,634	4,951	2,316
Poland	3,649	2,961	5,332	2,371
Romania	3,806	2,444	5,038	2,594
Albania	6,152	4,647	10,470	5,823
Bosnia and Herzegovina	-	-	-	-
North Macedonia	5,055	5,067	5,067	0
Serbia	3,527	2,680	4,718	2,038

Panel B: 2021

Country	Country Average	NUTS2 min.	NUTS2 max.	NUTS2 max.–min.
Bulgaria	3,872	3,559	4,702	1,143
Croatia	4,629	4,321	5,405	1,084
Czechia	6,775	5,140	8,525	3,385
Hungary	8,342	6,387	10,031	3,644
Poland	4,659	3,636	5,850	2,213
Romania	5,646	3,834	7,173	3,340
Albania	6,902	5,261	11,735	6,474
Bosnia and Herzegovina	-	-	-	-
North Macedonia	5,360	5,502	5,502	0
Serbia	4,668	3,688	5,903	2,215

Notes: The table reports the average number of adults (18+ years old) per bank branch at a country and NUTS2 level. Note that for Hungary and Poland the data in Panel B are from 2025. For Bosnia and Herzegovina we are missing population data for 2013 and 2021.

Table 5 Bank branches per 1,000 km^2 (NUTS 3) by country

Panel A: 2013

Country	Country Average	NUTS3 min.	NUTS3 max.	NUTS3 max.–min.
Bulgaria	23	5	499	495
Croatia	14	3	158	156
Czechia	33	1	984	983
Hungary	29	10	754	744
Poland	33	11	1,308	1,296
Romania	22	6	3,589	3,583
Albania	16	5	113	108
Bosnia and Herzegovina	16	2	100	99
North Macedonia	16	8	94	86
Serbia	26	8	195	187

Panel B: 2021

Country	Country Average	NUTS3 min.	NUTS3 max	NUTS3 max.–min.
Bulgaria	14	4	293	288
Croatia	12	2	23	22
Czechia	19	1	491	490
Hungary	12	5	503	498
Poland	25	10	669	659
Romania	14	4	2,320	2,315
Albania	14	4	104	100
Bosnia and Herzegovina	20	1	99	97
North Macedonia	15	8	92	85
Serbia	19	6	142	136

Notes: The table reports the bank branches per 1,000 km^2 (NUTS 3) by country. Note that for Hungary and Poland the data in Panel B are from 2025.

4 Empirical Analysis

Economic theory emphasizes that financial systems arise to mitigate information and transaction frictions in the allocation of capital (e.g. Levine (1997)). These frictions are partly spatial, as a banks' ability to screen and monitor borrowers may depend on geographic proximity. Local bank branches therefore are part of the infrastructure through which banks collect information, maintain lending relationships, and provide financial services to households and firms.

This is particularly relevant in relationship-based banking (e.g Berger and Udell (2002)). Petersen and Rajan (1995) show that credit-market competition affects the value of lending relationships. Degryse and Ongena (2005) extend this logic to the spatial organization of banking by emphasizing that proximity to borrowers and distance to competing banks shape loan conditions. They argue that nearby banks may benefit from lower monitoring and transaction costs, while borrower-lender distance increases communication and visiting costs.

Changes in branch networks thus reflect adjustments in the spatial organization of banking. These adjustments may reflect regional demand conditions, such as population change, urbanization, and local economic activity, as well as bank-level dynamics, including consolidation, profitability, ownership, and cost rationalization. To capture these mechanisms in our cross-country setting, the empirical analysis follows a hierarchical approach. We first study branch network changes at the NUTS3-regional level, then examine variation at the bank–NUTS3 level, and finally analyse closure decisions at the level of individual bank branches.

4.1 Analysis at the NUTS3-regional level

At the NUTS3 regional level, we estimate a series of ordinary least squares (OLS) regressions using the change in the number of bank branches over this period, calculated as the growth rate from 2013 to 2021, i.e., $\frac{\text{N Branches}_{\text{NUTS3, 2021}} - \text{N Branches}_{\text{NUTS3, 2013}}}{\text{N Branches}_{\text{NUTS3, 2013}}}$ as the dependent variable.

As bank branches constitute a core element of the classical financial infrastructure, our set of explanatory variables at the NUTS-3 level includes indicators that are expected to influence the local demand for branch banking. We begin by focusing on demographic developments. Prior research demonstrates that changes in regional population levels are an important driver of branch dynamics, with population decline, being associated with branch closures. Moreover, the demand for branch-based services seems to differ across age groups: younger cohorts tend to

adopt online and mobile banking technologies more rapidly, whereas older individuals continue to rely more heavily on physical bank branches (e.g. Alonso et al. (2023), Barbieri et al. (2021)). To investigate these heterogeneous effects, we distinguish between young adults (18–35 years), middle-aged individuals (36–65 years), and the retired population (66+). Given the central role of technological change in shaping branch usage, we also include the average download speed as an explanatory variable. Following Narayanan et al. (2025), who show that the sophistication of local areas affects the demand for physical banking, we additionally incorporate the change in tertiary-educated population as a proxy for financial sophistication. We further interact the change in tertiary-educated population with the growth of the population aged 66 and above. This specification allows the association between local financial sophistication and branch network changes to differ across regions experiencing demographic ageing. This is particularly relevant in the CESEE context, where older cohorts were socialized under centrally planned economies and may exhibit different banking habits, levels of trust in financial institutions, or digital banking adoption. The interaction therefore captures whether the effect of educational upgrading on branch demand is moderated by the growing presence of older residents. Finally, night light serves as a widely used proxy for regional economic activity.

While pooling across countries increases the amount of variation in regional, demographic, and banking-sector characteristics, it also requires accounting for country-level heterogeneity through country fixed effects. Standard errors are clustered at the country level. Since not all countries publish the full set of control variables at the NUTS3 level, our sample is partially reduced[10].

4.2 Analysis at the NUTS3-region-bank level

At the NUTS3 regional-bank level, our dependent variable is the growth rate of bank branches of bank b at the NUTS3 level between 2013 and 2021. i.e., $\frac{\text{Branches}_{b,\,\text{NUTS3},\,2021} - \text{Branches}_{b,\,\text{NUTS3},\,2013}}{\text{Branches}_{b,\,\text{NUTS3},\,2013}}$. Since the growth rate can take on extreme values for a small number of banks in specific NUTS3 regions, we winsorize the variable at the 5th and 95th percentiles, corresponding to –100% and +100%, respectively.

We shift our attention to bank-level explanatory variables capturing institutional characteristics, most notably consolidation activity (M&A) and profitability (ROAA). This choice is motivated by a large empirical literature that examines how heterogeneity in bank fundamentals and strate-

[10]Bosnia and Herzegovina is excluded from the regressions due to the lack of recent regional population data.

gic responses is associated with branch network dynamics, including branch openings, closures, and overall network contraction (e.g. Keil and Ongena (2024)). We also distinguish between small, medium, and large banks based on country-specific market shares, using medium-sized banks as the reference category. This allows us to account for differences in competitive position within national banking markets. Moreover, we interact bank size with ROAA and download speed to assess whether profitability and local digital infrastructure are associated with different branch network strategies across bank-size groups. These interactions capture the possibility that large, medium-sized, and small banks respond differently to profitability pressures and digitalization, reflecting differences in resources, business models, and reliance on physical branch presence.

For the estimations at the NUTS3-bank level, we weight these bank-level indicators by the share of each bank's branches located in the respective region.

$$\text{BankChar}_{b,\text{NUTS3}} = \frac{\text{Branches}_{b,\text{NUTS3}}}{\sum_{b'} \text{Branches}_{b',\text{NUTS3}}} \cdot \text{BankChar}_{b}$$

In the baseline NUTS3-bank-level regressions, we estimate OLS regressions that include country fixed effects and cluster standard errors at the country level. We refrain from including NUTS3 fixed effects in the baseline specification, as several explanatory variables of particular interest, such as internet access, are only available at the NUTS3 level. Including both these controls and NUTS3 fixed effects would lead to multicollinearity concerns. In robustness analyses, we incorporate NUTS3 fixed effects and cluster standard errors at the NUTS3 level.

4.3 Analysis at the bank branch level

At the most granular level of our analysis we estimate the probability that an individual branch closed between 2013 and 2021.

$$\text{Closed}_{j,b} = \alpha + \beta_i \cdot \text{CompProx}_{j,b} + \beta_2 \cdot \text{OwnProx}_{j,b} + \mathbf{X}'_b\boldsymbol{\gamma} + \mu_b + \lambda_c + \varepsilon_{j,b}$$

where $\text{Closed}_{j,b}$ equals one if branch j of bank b that was active in 2013 has been closed between 2013 and 2021 and zero otherwise. $\text{CompProx}_{j,b}$ and $\text{OwnProx}_{j,b}$ are explanatory variables that capture the local branch environment in terms of spatial proximity to competitor and proprietary branches in 2013. $\mathbf{X}'_b\boldsymbol{\gamma}$ is a vector of bank-level control variables, μ_b are bank fixed effects and

λ_c are country fixed effects. Following Galardo et al. (2021) and Keil and Ongena (2024), we estimate linear probability models using OLS with standard errors clustered at the bank level. This approach facilitates interpretation, and is preferred because maximum likelihood models are known to be biased when a large number of fixed effects are included. As part of our robustness analyses, we estimate probit models.

We acknowledge that our empirical analysis does not permit strictly causal interpretation, as there is no natural experiment, such as a staggered policy shift or regulatory change that would drive changes in branching across all countries. Reverse causality may be a further concern in some regressions, particularly at the higher regional or bank-regional level. Moreover, the data comprise two points in time spanning nearly a decade. The analysis treats this period as if all changes occurred simultaneously at the beginning, rather than gradually over time. For instance, some banks were first acquired by another institution and later merged with a third. The granularity of the data enables us to partially mitigate concerns about causal interpretation—though not entirely—by implementing specifications with an extensive set of fixed effects, control variables and also specifications with lagged independent variables. Still, in light of these limitations, the results should be interpreted with appropriate caution.

5 Results

We present our results sequentially, starting from the regional and regional-bank level and moving to the individual branch level, before discussing the extent to which the insights are consistent across these different levels of analysis.

5.1 Results at the NUTS3-regional level

Table 6 reports the estimated effects of regional characteristics on changes in bank branch density between 2013 and 2021 at the NUTS-3 level. The results indicate that regions that experienced population growth tend, on average, to exhibit a decline in the number of bank branches. Contrary to our expectations, we do not find statistically significant associations between branch growth and changes in the two age-specific population groups, night light intensity, or tertiary education. However, when interacting growth in the population aged 66+ with changes in tertiary education, we observe a statistically significant negative effect. This suggests that the

association between the growth of the aging population and branch density is relevant only in regions where tertiary educational attainment increases. As expected, we find that the logarithm of average download speed is significantly negatively associated with branch growth, indicating that regions with faster internet connectivity in 2013 experienced a more pronounced decline in the number of bank branches.

Table 6 Bank branch density and dynamics: Correlates at the NUTS3 level

Dependent variable	Relative change in number of branches (2013–2021)						
growth in population density	−0.036***	−0.044*	−0.049***	−0.044*		−0.049**	−0.055**
	(0.008)	(0.023)	(0.008)	(0.022)		(0.018)	(0.019)
growth in night light	0.036	0.024	0.024	0.025	0.030	0.026	0.027
	(0.036)	(0.038)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)
growth in population (18-35)		−0.083		−0.083	−0.067		−0.096
		(0.051)		(0.051)	(0.038)		(0.058)
growth in population (66+)		−0.003		−0.003	0.000	0.006	0.004
		(0.013)		(0.013)	(0.007)	(0.009)	(0.010)
growth in tertiary-educated			−0.005	−0.007	0.007	0.003	0.000
			(0.006)	(0.008)	(0.008)	(0.009)	(0.014)
growth in population (66+) × growth in tertiary-educated					−0.011***	−0.008**	−0.014**
					(0.003)	(0.003)	(0.004)
log(average download speed in Mbps)						−0.157*	
						(0.080)	
							(0.153)
Constant	−0.203***	−0.151*	−0.148**	−0.150*	−0.164**	0.354	−0.043
	(0.044)	(0.068)	(0.049)	(0.070)	(0.065)	(0.236)	(0.130)
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓
R-squared	0.41	0.62	0.61	0.62	0.59	0.63	0.63
N	128	92	94	92	126	92	92

Notes: The table shows the results of OLS regressions. The dependent variable is the relative change in the number of bank branches between 2013 and 2021 at the NUTS 3 regional level. The interaction term combines growth in the population aged 66 and older with growth in the tertiary-educated population. Table A7 provides an extended version of this table. Detailed variable definitions are reported in Table A2. All regressions include country fixed effects. Standard errors are reported in parentheses and clustered at the country level. N denotes the number of regional observations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.2 Results at the NUTS3-region-bank level

To further examine the dynamics between 2013 and 2021 at the bank–NUTS3 level, Table 7 incorporates bank-specific characteristics as explanatory variables. The results show a positive correlation between economic activity—proxied by night light intensity—and branch development, with regions experiencing higher activity displaying fewer closures. In line with results for the U.S. (Keil and Ongena, 2024), consolidation (M&A) is negatively associated with changes in branch numbers: For example (column 1), a bank with a market share of 1% in a given NUTS3 region that was affected by M&A is linked to a 1.6 percentage point lower branch growth rate ($-1.616 \times 0.01 = -0.01616$). Put differently, greater local exposure of an M&A bank, measured by its branch share in the NUTS3 region, is associated with more pronounced branch reductions at the bank–region level.

ROAA is also negatively associated with changes in branch numbers at the bank region level. For example, Erste Bank has a market share of 6.8% in Budapest (HU110). ROAA in 2024 was 2.6%, the estimated coefficient implies a reduction in branch growth of about 26.0 percentage

points ($-1.471 \times 0.068 \times 2.6 = -0.26$) for Erste Bank in Budapest between 2013 and 2021. When interacting ROAA with bank size (small, medium, and large), however, a significant positive association emerges for small and large banks, suggesting that for these banks higher profitability is linked to an increase in branch numbers. Overall, the results indicate that at the bank–NUTS3 level, change in economic activity (proxied by night lights) and consolidation (M&A) consistently correlates with changes in branch networks, whereas population growth and indicators of digitization do not exhibit robust associations.

Table 7 Bank branch dynamics at the bank–NUTS3 level: Profitability, consolidation, and ICT access

Dependent variable	change in branch # (NUTS3 x bank)						
change in night light	0.089**	0.083***		0.073***	0.073***	0.074***	
	(0.028)	(0.019)		(0.014)	(0.017)	(0.013)	
growth in population density	−0.030	−0.030*		−0.022	−0.021	−0.022	
	(0.019)	(0.014)		(0.024)	(0.024)	(0.023)	
M&A	−1.616**	−1.433**	−1.710**	−1.429**	−1.410**	−1.363**	−1.658**
	(0.649)	(0.559)	(0.724)	(0.558)	(0.528)	(0.533)	(0.722)
ROAA		−0.113	−0.080	−0.115	−1.604*	−0.098	−1.471**
		(0.214)	(0.171)	(0.214)	(0.754)	(0.205)	(0.589)
log(average download speed in Mbps)				−0.065	−0.061	−0.043	
				(0.096)	(0.081)	(0.125)	
small bank					−0.072	0.115	−0.042
					(0.074)	(0.339)	(0.065)
large bank					−0.134	0.179	−0.052
					(0.147)	(0.484)	(0.159)
small bank × ROAA					1.738*		1.553**
					(0.832)		(0.647)
large bank × ROAA					1.595*		1.372*
					(0.818)		(0.732)
small bank × log(average download speed in Mbps)						−0.028	
						(0.067)	
large bank × log(average download speed in Mbps)						−0.055	
						(0.129)	
Constant	−0.066*	−0.085***	0.012	0.129	0.182	0.044	−0.028
	(0.035)	(0.023)	(0.020)	(0.305)	(0.263)	(0.436)	(0.090)
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓
NUTS3 Fixed Effects	✗	✗	✗	✗	✗	✗	✓
Mean DepVar	−0.14	−0.15	−0.11	−0.15	−0.15	−0.15	−0.11
R-squared	0.08	0.08	0.09	0.08	0.10	0.08	0.19
N	1,730	1,677	2,637	1,677	1,677	1,677	2,637

Notes: The table shows results from OLS regression with the % change in branches for each bank in each region between 2013 and 2021. The dependent variable is winsorized at -100% and +100%. Bank characteristics are weighted by the share of each bank's branches located in the respective region. Detailed variable definitions are reported in Table A2. N denotes the number of bank–region observations included in each regression specification. Standard errors are clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$..

5.3 Results at the bank branch level

To gain a deeper understanding of the drivers of branch closures across countries, the analysis is extended to the individual branch level. Table 8 maintains a focus on bank-level characteristics, while augmenting the specification to capture the local competitive environment in which each branch operates. Table 9 further enriches this framework by adding an indicator of bank size. We then turn to the broader structural context in which branches are embedded: Table 10 emphasizes regional conditions, such as rurality, road density, and growth in night light intensity. Finally, Table 11 combines the rurality measure with bank-level characteristics, allowing us to jointly assess the roles of institutional and local structural factors in shaping branch dynamics. Bank

and region fixed effects are included in all specifications, except in Table 9, where we only consider region fixed effects. Estimating the regressions for the pooled sample and separately for each country allows us to compare patterns across different institutional and competitive environments. It is important to note that the number of observations is relatively low in some country-level regressions, which calls for caution when interpreting the results.

One of the most basic explanatory variables for understanding branch closures is the distance to the nearest proprietary or competitor branch (see Table A5 for descriptive statistics on branch distance).[11] This metric reflects immediate spatial redundancy or competitive pressure, which can directly influence a branch's viability. Expanding the analysis to include the number of proprietary and competitor branches within a 5km radius allows for a more nuanced view of local market saturation and competitive intensity—two rough indicators of branch concentration and strategic positioning. In addition, we include an indicator for whether the parent company is foreign-owned (GUO foreign) and continue to control for M&A activity.

The results for "distance" are presented in Panel A of Table 8. In the pooled regression, the distance to the next proprietary branch is negatively associated with closures, but this effect only remains significant in Czechia. M&A remains strongly significant both in the pooled regression and in all countries. In the Albanian case, consolidation is negatively associated with branch closures. This likely reflects that OTP Bank initially entered Albania via a greenfield investment before later merging with another bank. For Hungary, the strongly negative effect is likely due to multicollinearity as we include bank fixed effects and the M&A affected 5 out of 12 banks in 2013. Whether the parent bank is foreign-owned is also significant in many countries, though the direction of the association varies substantially. This heterogeneity is not unexpected, given that the share of foreign-owned banks differs considerably across countries (see Table 3). For example, in Czechia, the relatively high share of foreign-owned banks mechanically results in a higher coefficient for GUO foreign.

Panel B of Table 8 examines the immediate market environment of individual branches in greater detail. Specifically, we distinguish between three thresholds with respect to the number of competitor branches located within a 5 km radius. We additionally account for the share of proprietary branches within 5 km. In the pooled regression across all countries, the categories of 3–5,

[11] Distance may also capture underlying differences in local competition and profitability. As far as permitted by the data, we address this concern by incorporating additional controls, including bank-level profitability, and fixed effects.

6–8, and 9+ competitor branches are significantly negatively correlated with branch closures. On average, branches located in areas with 3–5 competitor branches are 7.8 percentage points less likely to close compared to branches in areas with fewer than three competitors.

The interaction of the three competitor branch classifications with the share of proprietary branches captures how the association between own branch share and the likelihood of closure varies across competitive environments (3–5, 6–8, or 9+ competitors). In Column (1), for example, a branch located in the vicinity of 6–8 competitor branches and with a 10% share of proprietary branches is associated with a 1.32 percentage point higher probability of closure relative to branches in areas with fewer than three competitors ($0.1132 \times 0.1 = 0.0132$).

Table 9 extends the analysis of Table 8 on the branches' market environment by considering bank characteristics. In contrast to Table 8, bank fixed effects are not included, as several key regressors—such as profitability, bank ownership, and bank size—vary only at the bank level.

The pooled regression results in Panel A of Table 9 again show significant associations between branch closures and both M&A activity and the distance to competitor branches. This finding recurs across specifications and thus is very robust.[12] By contrast, the associations of foreign ownership and ROAA with branch closures are more heterogeneous across countries. Beyond these variables, the table highlights clear cross-country differences in branch closure patterns. Panel B of Table 9 extends the specification by including bank size and its interaction with ROAA. The pooled regression again confirms the earlier pattern: distance to the nearest competitor branch, M&A activity, ROAA, and bank size are statistically significant. The interaction between the "small bank" indicator and ROAA is statistically significant in Romania, Bosnia and Herzegovina, North Macedonia, and Serbia. In these countries, higher profitability among small banks is associated with a higher (or lower) probability of branch closure, depending on the country. Overall, the estimates reveal substantial cross-country heterogeneity in both magnitude and direction. Nevertheless, the corresponding NUTS3–bank-level results in Table 7 consistently point to a statistically significant association between this interaction term and branch growth on average across countries.

To examine the role of regional conditions, Table 10 regresses the branch closure indicator on measures of rurality, road density, and growth in night light intensity. Rurality is strongly

[12] In Poland, distance to both proprietary and competitor branches has no significant effect on closures. This is likely due to the fact that we treat all cooperative banks as if they were one and the same bank and not competitors.

statistically significant across all countries. The estimates imply that, conditional on country and bank fixed effects, branches located in rural areas exhibit 13.4 percentage point higher probability of closure on average. Bosnia and Herzegovina constitutes a notable exception, where rural branches are less likely to close. By contrast, the road-density and night light growth measures do not exhibit a similarly consistent pattern across countries. While both indicators are statistically significant in selected cases, the estimated effects vary in sign. For example, a higher road density in Bulgaria is associated with a 3.6 percentage point decrease in the probability of branch closure, whereas in Czechia it is associated with a 1.2 percentage point increase.

Before proceeding to the final joint specification, we summarize the preceding branch-level analysis: First, most covariates exhibit substantial cross-country heterogeneity in their association with branch closures, both in magnitude and, in several cases, in sign. Second, measures capturing the local competitive environment suggest that greater direct competitive pressure is associated with a lower likelihood of closure, whereas greater distance to the nearest competitor is associated with a higher closure probability. Third, consolidation activity shows a relatively consistent positive effect on branch closures across specifications. By contrast, the estimated effects of ownership differ substantially across countries, varying both in statistical significance and direction. Fourth, rural location emerges as a highly consistent correlate: branches in rural areas are markedly more likely to close, whereas night light growth and road density display weaker and less stable associations across countries.

Table 11 consolidates these findings by jointly considering bank-level characteristics, measures of the local competitive environment, and the rurality indicator. All specifications include bank and region fixed effects, so the estimates are identified from within-bank and within-region variation. Both M&A activity and foreign ownership remain strongly statistically associated with branch closure. Rurality is included as a dummy variable: pooled across countries, it remains highly significant, whereas in country-specific regressions the magnitude and, in some cases, the direction of the effect vary. Finally, when interacting the rural indicator with distance to the nearest competitor (proprietary) branch, we obtain a small negative (positive) effect that is highly statistically significant. Across all countries the negative effect of distance to the next competitor branch increases in rural areas by 0.6 percentage points.

5.4 Results Across Granularity Levels and Robustness

In sum, our findings show that changes in bank branch networks are shaped by a broad set of influences, ranging from regional fundamentals to the immediate local environment in which branches operate. At the NUTS3 level, and contrary to our expectations, we do not find robust associations between growth in branches and growth in local economic activity (night light), changes in age-group composition, or tertiary education. Instead, we consistently observe a statistically significant relationship between population-density growth and growth in the number of branches. Two considerations are important when interpreting these results: first, country fixed effects absorb country specific level differences, but the estimated slope coefficients are pooled across countries and may therefore conceal cross-country heterogeneity; second, the limited number of observations at the NUTS3 level calls for caution in drawing strong conclusions. At the NUTS3×bank level, we place greater emphasis on bank characteristics rather than demand-side regional indicators. In this setting, night light growth is more strongly associated with changes in branch networks. Among the bank-level covariates, M&A activity and the interaction of profitability (ROAA) and small and large banks are related to branch growth. The branch-level analysis corroborates this pattern: M&A is a particularly consistent association, being associated with a higher probability of branch closure across countries. Finally, when examining the local branch environment, we find that branches in rural areas are more likely to close. Moreover, branches located in urban areas with a high density of competitors are also more likely to close.

We conduct several robustness checks at each hierarchical level of our empirical analysis. For regressions at the NUTS3-regional level, we cluster standard errors at the regional level to account for within-region correlation. We also use alternative control variables to capture the local economic environment: GDP per capita and, alternatively, the number of firms per capita. However, since these indicators are not available for all countries in our sample, our main regression relies on satellite data, which can be aggregated at the NUTS3 level. We also repeat regressions including non-Eurostat regional population data estimates for Bosnia and Herzegovina. At the branch level, we address potential measurement error in our closure variable—specifically, the possibility that a branch was simply relocated nearby—by redefining closures as those with no new openings within a 1km radius and re-estimating our models (see Table A9). Additionally, we test the sensitivity of our results to the definition of the independent variable by varying

the radius for counting proprietary and competitor branches (from 5km to city/village-based definitions). Finally, we estimate probit models as an alternative to linear probability models.

Table 8 Individual branch closure and the local banking landscape

	Branch closed										
	Pooled	BG	HR	CZ	HU	PL	RO	AL	BA	MK	RS
distance to next proprietary branch	−0.002***	−0.001	−0.001	−0.007**	−0.001	−0.002	−0.002	−0.004	−0.003	0.003*	0.000
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
distance to next competitor branch	0.009*	0.013***	0.007***	0.054***	0.012***	−0.002	0.023***	0.006*	−0.006	−0.029***	0.012***
	(0.005)	(0.003)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)	(0.003)	(0.005)	(0.009)	(0.002)
M&A	0.412***	0.271***	0.190***	0.452**	−0.206***	0.578***	0.373***	−0.229***	0.062*	0.087***	0.217***
	(0.051)	(0.046)	(0.033)	(0.169)	(0.017)	(0.048)	(0.021)	(0.033)	(0.032)	(0.009)	(0.031)
GUO foreign	0.021	0.401***	0.294***	0.933***	−0.300***	−0.147***	0.021*	−0.106*	0.155***	0.206***	−0.231***
	(0.050)	(0.010)	(0.038)	(0.005)	(0.006)	(0.049)	(0.012)	(0.052)	(0.039)	(0.026)	(0.024)
Constant	0.160	0.622***	−0.193***	0.191***	0.969***	0.588***	0.037	0.356**	0.469***	−0.174**	1.082***
	(0.136)	(0.071)	(0.052)	(0.053)	(0.024)	(0.023)	(0.039)	(0.155)	(0.055)	(0.067)	(0.056)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.70	0.75	0.54	0.56	0.84	0.71	0.66	0.27	0.68	0.75	0.79
R-squared	0.27	0.14	0.64	0.25	0.17	0.37	0.11	0.28	0.21	0.11	0.10
N	28,360	2,632	1,128	2,694	2,734	10,388	5,140	470	796	400	1,978
	Branch closed										
3-5 competitor branches	−0.078**	−0.091	0.037	−0.334***	−0.099	0.020	−0.149***	−0.192	−0.041	−0.126	−0.030
	(0.033)	(0.065)	(0.068)	(0.077)	(0.064)	(0.018)	(0.024)	(0.149)	(0.052)	(0.087)	(0.040)
6-8 competitor branches	−0.142***	−0.065	−0.052	−0.403***	−0.013	−0.023	−0.186**	−0.226	−0.068	−0.187	−0.105*
	(0.042)	(0.055)	(0.075)	(0.100)	(0.048)	(0.034)	(0.069)	(0.160)	(0.057)	(0.119)	(0.060)
9+ competitor branches	−0.113***	−0.149**	−0.024	−0.270***		−0.065	−0.092*	−0.141	0.030	−0.078	−0.139***
	(0.035)	(0.059)	(0.058)	(0.073)		(0.048)	(0.044)	(0.183)	(0.063)	(0.121)	(0.048)
share proprietary branches	−0.008	0.075	0.269	−0.122	0.092**	0.104**	−0.067	−0.162	−0.160	−1.131	−0.117
	(0.040)	(0.208)	(0.271)	(0.250)	(0.033)	(0.043)	(0.088)	(0.465)	(0.661)	(1.178)	(0.403)
3-5 competitor branches × share proprietary branches	0.051	−0.067	−0.557**	0.340	0.064	−0.061	−0.304***	0.660	0.805	0.757	0.021
	(0.057)	(0.307)	(0.208)	(0.301)	(0.117)	(0.051)	(0.101)	(0.668)	(0.710)	(1.816)	(0.453)
6-8 competitor branches × share proprietary branches	0.132**	−0.141	0.119	0.419	−0.106	−0.065	−0.102	0.433	0.761	2.010	−0.119
	(0.053)	(0.237)	(0.303)	(0.286)	(0.091)	(0.055)	(0.240)	(0.545)	(0.841)	(1.290)	(0.604)
9+ competitor branches × share proprietary branches	0.084*	−0.018	−0.103	0.252		0.073	−0.085	0.051	0.247	1.127	0.097
	(0.046)	(0.229)	(0.274)	(0.229)		(0.051)	(0.089)	(0.490)	(0.652)	(1.236)	(0.419)
M&A	0.417***	0.291***	0.377***	0.461**	−0.147***	0.575***	0.381***	−0.129***	0.113***	0.068***	0.223***
	(0.049)	(0.045)	(0.075)	(0.194)	(0.004)	(0.046)	(0.020)	(0.034)	(0.015)	(0.017)	(0.035)
GUO foreign	0.028	0.379***	0.609***	0.864***	−0.296***	−0.143***	0.003	−0.022	0.104***	0.245***	−0.254***
	(0.049)	(0.003)	(0.072)	(0.007)	(0.009)	(0.046)	(0.011)	(0.037)	(0.007)	(0.027)	(0.025)
Constant	0.134	0.630***	−0.021	0.305***	1.005***	0.517***	0.750***	0.212	0.613***	0.836***	1.144***
	(0.127)	(0.020)	(0.082)	(0.086)	(0.003)	(0.041)	(0.015)	(0.163)	(0.046)	(0.076)	(0.036)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.69	0.75	0.53	0.55	0.82	0.72	0.65	0.26	0.68	0.75	0.78
R-squared	0.27	0.12	0.16	0.25	0.14	0.36	0.11	0.29	0.12	0.08	0.10
N	26,163	2,567	1,064	2,576	2,328	9,311	4,756	448	771	395	1,947

Notes: The table reports linear probability model estimates for branch closure between 2013 and 2021. The dependent variable equals one if an individual branch observed in 2013 closed by 2021 and zero otherwise. Coefficients are interpreted as percentage-point changes in the closure probability. Column 1 pools all countries, while the remaining columns report country-specific estimates. All regressions include region and bank fixed effects; the pooled specification additionally includes country fixed effects. In the lower panel, 0–2 competitor branches form the omitted reference category. Standard errors, reported in parentheses, are clustered at the bank level. Detailed variable definitions are reported in Table A2. Mean DepVar denotes the sample mean of the dependent variable, and N denotes the number of branch-level observations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9 Individual branch closure and the local banking landscape: Profitability and bank size

	Branch closed										
	Pooled	BG	HR	CZ	HU	PL	RO	AL	BA	MK	RS
distance to next proprietary branch	−0.000	−0.001	−0.001	−0.010***	−0.002	0.000	−0.001	−0.006**	−0.003**	0.003*	0.002*
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
distance to next competitor branch	0.010*	0.009**	0.005*	0.055***	0.012***	0.000	0.021***	0.008*	−0.004	−0.030***	0.011***
	(0.005)	(0.004)	(0.003)	(0.001)	(0.001)	(0.006)	(0.001)	(0.004)	(0.004)	(0.009)	(0.003)
M&A	0.267***	0.240***	0.102*	0.528***	−0.249***	0.400***	0.271***	0.034	0.173***	0.200***	0.188***
	(0.042)	(0.049)	(0.050)	(0.103)	(0.048)	(0.098)	(0.066)	(0.193)	(0.038)	(0.064)	(0.018)
GUO foreign	0.053	0.052	−0.091*	0.418***	−0.353**	0.024	0.114***	0.120	0.016	0.069	0.028
	(0.042)	(0.059)	(0.049)	(0.069)	(0.103)	(0.100)	(0.028)	(0.155)	(0.060)	(0.040)	(0.053)
ROAA	−0.005	0.090***	−0.011	−0.336***	−0.005	−0.154**	−0.002***	−0.035	0.001	0.024	−0.009***
	(0.003)	(0.029)	(0.010)	(0.043)	(0.041)	(0.060)	(0.001)	(0.024)	(0.011)	(0.028)	(0.002)
small bank	−0.037	0.126*	−0.009	−0.248***	0.049	−0.160**	−0.104***	0.213	−0.003	0.088	0.047
	(0.038)	(0.060)	(0.044)	(0.037)	(0.090)	(0.069)	(0.031)	(0.159)	(0.125)	(0.060)	(0.032)
Constant	0.253*	0.603***	0.074	0.707***	0.982***	0.815***	0.031	0.296	0.511***	−0.247**	0.706***
	(0.131)	(0.097)	(0.054)	(0.094)	(0.052)	(0.146)	(0.038)	(0.175)	(0.120)	(0.100)	(0.089)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Mean DepVar	0.70	0.75	0.54	0.56	0.84	0.72	0.66	0.27	0.68	0.75	0.78
R-squared	0.16	0.09	0.61	0.23	0.13	0.23	0.08	0.16	0.14	0.07	0.06
N	27399	2632	1111	2694	2701	9703	5007	459	796	400	1896

	Branch closed										
distance to next proprietary branch	−0.000	−0.001	−0.001	−0.010***	−0.002	0.001	−0.001	−0.006**	−0.003**	0.004**	0.002*
	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
distance to next competitor branch	0.010*	0.010**	0.006*	0.055***	0.012***	0.000	0.020***	0.007*	−0.007	−0.030***	0.011***
	(0.005)	(0.004)	(0.003)	(0.002)	(0.001)	(0.006)	(0.002)	(0.004)	(0.004)	(0.009)	(0.003)
M&A	0.263***	0.248***	0.101*	0.528***	−0.279**	0.419***	0.242***	0.022	0.157***	0.184**	0.200***
	(0.044)	(0.048)	(0.050)	(0.103)	(0.092)	(0.081)	(0.071)	(0.206)	(0.041)	(0.077)	(0.021)
GUO foreign	0.053	0.066	−0.090*	0.417***	−0.352**	−0.033	0.114***	0.144	0.009	0.137**	0.029
	(0.040)	(0.061)	(0.050)	(0.069)	(0.102)	(0.092)	(0.031)	(0.178)	(0.061)	(0.048)	(0.054)
ROAA	−0.030*	0.067**	0.022	−0.364***	−0.007	−0.287**	−0.020**	−0.115	0.728***	−0.055*	0.049*
	(0.018)	(0.026)	(0.058)	(0.027)	(0.043)	(0.107)	(0.010)	(0.092)	(0.027)	(0.029)	(0.025)
small bank=1	−0.067*	0.100*	0.010	−0.300**	0.036	−0.419*	−0.105***	0.156	0.956***	0.026	0.140**
	(0.035)	(0.057)	(0.069)	(0.106)	(0.071)	(0.203)	(0.031)	(0.101)	(0.050)	(0.030)	(0.054)
small bank=1 × ROAA	0.027	0.051	−0.034	0.029	0.024	0.171	0.019*	0.091	−0.732***	0.110**	−0.058**
	(0.018)	(0.047)	(0.058)	(0.057)	(0.038)	(0.119)	(0.010)	(0.099)	(0.036)	(0.041)	(0.025)
Constant	0.276**	0.624***	0.056	0.759***	0.982***	1.070***	0.041	0.339**	−0.446***	−0.276***	0.600***
	(0.133)	(0.101)	(0.069)	(0.109)	(0.052)	(0.222)	(0.039)	(0.147)	(0.083)	(0.085)	(0.114)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Mean DepVar	0.70	0.75	0.54	0.56	0.84	0.72	0.66	0.27	0.68	0.75	0.78
R-squared	0.16	0.09	0.61	0.23	0.13	0.23	0.08	0.16	0.17	0.08	0.06
N	27399	2632	1111	2694	2701	9703	5007	459	796	400	1896

Notes: The table reports linear probability model estimates for branch closure between 2013 and 2021. The dependent variable equals one if an individual branch observed in 2013 closed by 2021 and zero otherwise. Coefficients are interpreted as percentage-point changes in the closure probability. Column 1 pools all countries, while the remaining columns report country-specific estimates. All regressions include region fixed effects; the pooled specification additionally includes country fixed effects. Bank-level controls are obtained from Bureau van Dijk. The number of observations differs from Table 8 and Table 9 because these variables are not available for all banks. Detailed variable definitions are reported in Table A2. Standard errors are clustered at the bank level. Mean DepVar denotes the sample mean of the dependent variable, and N denotes the number of branch-level observations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10 Individual branch closure and the local development indicators

	Branch closed										
	Pooled	BG	HR	CZ	HU	PL	RO	AL	BA	MK	RS
rural	0.134***	0.144***	0.072***	0.238**	0.110***	0.065**	0.244***	0.168**	−0.058*	0.122*	0.101***
	(0.025)	(0.020)	(0.017)	(0.085)	(0.013)	(0.023)	(0.030)	(0.076)	(0.030)	(0.059)	(0.026)
Constant	0.068	0.957***	0.123***	0.168***	0.659***	0.705***	−0.026	0.052	0.559***	0.267***	1.023***
	(0.134)	(0.072)	(0.021)	(0.020)	(0.018)	(0.017)	(0.058)	(0.138)	(0.084)	(0.017)	(0.082)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.70	0.75	0.54	0.56	0.84	0.72	0.66	0.30	0.68	0.75	0.80
R-squared	0.23	0.09	0.63	0.20	0.16	0.25	0.09	0.51	0.21	0.10	0.10
N	28,279	2,648	1,146	2,606	2,736	10,432	5,203	374	797	400	1,937
	Branch closed										
road density	0.001	−0.036***	0.000	0.012***	−0.026**	0.017	−0.047	−0.262***	0.129***	0.081**	0.006
	(0.007)	(0.012)	(0.010)	(0.003)	(0.008)	(0.013)	(0.033)	(0.079)	(0.029)	(0.032)	(0.010)
Constant	0.132	0.977***	0.127***	0.153***	0.672***	0.715***	−0.027	0.082	0.594***	0.251***	1.132***
	(0.135)	(0.072)	(0.019)	(0.017)	(0.018)	(0.018)	(0.062)	(0.126)	(0.083)	(0.016)	(0.096)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.70	0.75	0.54	0.56	0.84	0.72	0.66	0.30	0.68	0.75	0.80
R-squared	0.22	0.08	0.63	0.16	0.15	0.25	0.06	0.51	0.21	0.10	0.10
N	28,279	2,648	1,146	2,606	2,736	10,432	5,203	374	797	400	1,937
	Branch closed										
nightlight growth	0.014	0.008	0.030	−0.026	−0.096**	−0.011	0.286***	−0.229*	−0.092	0.115	0.007
	(0.016)	(0.085)	(0.041)	(0.033)	(0.040)	(0.016)	(0.069)	(0.111)	(0.122)	(0.181)	(0.025)
Constant	0.125	0.984***	0.113***	0.215***	0.706***	0.720***	−0.159***	0.233	0.606***	0.181*	1.125***
	(0.136)	(0.080)	(0.034)	(0.032)	(0.023)	(0.023)	(0.027)	(0.160)	(0.121)	(0.088)	(0.094)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.70	0.75	0.54	0.56	0.84	0.72	0.66	0.30	0.68	0.75	0.80
R-squared	0.22	0.08	0.63	0.16	0.15	0.25	0.06	0.50	0.21	0.09	0.10
N	28,279	2,648	1,146	2,606	2,736	10,432	5,203	374	797	400	1,937

Notes: The table reports linear probability model estimates for branch closure between 2013 and 2021. The dependent variable equals one if an individual branch observed in 2013 closed by 2021 and zero otherwise. Coefficients are interpreted as percentage-point changes in the closure probability. Column 1 pools all countries, while the remaining columns report country-specific estimates. All regressions include region and bank fixed effects; the pooled specification additionally includes country fixed effects. Detailed variable definitions are reported in Table A2. Mean DepVar denotes the sample mean of the dependent variable, and N denotes the number of branch-level observations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$..

Table 11 Individual branch closure and rural areas

	Branch closed										
	Pooled	BG	HR	CZ	HU	PL	RO	AL	BA	MK	RS
M&A	0.410***	0.280***	0.193***	0.389**	−0.208***	0.577***	0.379***	0.235***	0.066*	0.109***	0.189***
	(0.051)	(0.044)	(0.034)	(0.176)	(0.018)	(0.048)	(0.016)	(0.019)	(0.035)	(0.007)	(0.052)
GUO foreign	0.019	0.429***	0.292***	0.980***	−0.293***	−0.149***	0.033**	−0.122**	0.158***	0.249***	−0.137***
	(0.050)	(0.011)	(0.037)	(0.019)	(0.007)	(0.049)	(0.012)	(0.046)	(0.040)	(0.029)	(0.036)
distance to next proprietary branch	−0.002***	−0.002**	−0.000	−0.011***	−0.002	−0.003	−0.002*	−0.004*	−0.002	0.003	−0.001
	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
rural=1	0.121***	0.138***	0.093***	0.057	0.078**	0.111***	0.215***	0.082	0.002	0.101	0.044
	(0.016)	(0.025)	(0.022)	(0.062)	(0.032)	(0.038)	(0.031)	(0.091)	(0.033)	(0.097)	(0.035)
rural=1 × distance to next proprietary branch	0.003***	0.003*	−0.002	0.015***	0.005*	0.000	0.002	0.005*	−0.003	0.004	0.005*
	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.001)	(0.003)	(0.004)	(0.005)	(0.002)
distance to next competitor branch	0.007	0.012***	0.005*	0.028***	0.011***	−0.006	0.024***	0.000	−0.001	−0.022	0.004
	(0.006)	(0.002)	(0.003)	(0.008)	(0.001)	(0.006)	(0.002)	(0.003)	(0.006)	(0.056)	(0.009)
rural=1 × distance to next competitor branch	−0.006**	−0.004	−0.000	0.017	−0.005	−0.002	−0.011***	0.006	−0.006	−0.016	0.004
	(0.002)	(0.006)	(0.004)	(0.010)	(0.004)	(0.005)	(0.001)	(0.006)	(0.008)	(0.058)	(0.010)
Constant	0.072	0.563***	−0.206***	0.197***	0.963***	0.579***	0.040	0.233**	0.460***	−0.140	0.932***
	(0.139)	(0.070)	(0.053)	(0.060)	(0.023)	(0.022)	(0.048)	(0.088)	(0.061)	(0.103)	(0.058)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.70	0.75	0.54	0.56	0.84	0.71	0.66	0.30	0.68	0.75	0.80
R-squared	0.28	0.15	0.64	0.27	0.17	0.38	0.14	0.52	0.22	0.12	0.13
N	28,115	2,632	1,128	2,594	2,732	10,388	5,140	374	796	400	1,931

Notes: The table reports linear probability model estimates for branch closure between 2013 and 2021. The dependent variable equals one if an individual branch observed in 2013 closed by 2021 and zero otherwise. Coefficients are interpreted as percentage-point changes in the closure probability. Column 1 pools all countries, while the remaining columns report country-specific estimates. All specifications include region and bank fixed effects; the pooled specification additionally accounts for country-level differences. Standard errors, reported in parentheses, are clustered at the bank level. Detailed variable definitions are reported in Table A2. Mean DepVar denotes the sample mean of the dependent variable, and N denotes the number of branch-level observations included in each specification. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6 Conclusion

The economies of Central, Eastern, and Southeastern Europe—after a period of extraordinary bank branch growth in the 1990s and early 2000s following transition—have now joined the global trend of debranching. Our extensive data collection and analysis show that between 2013 and 2021, the number of branches across ten CESEE economies declined by more than 30%. The distribution of bank branches varies widely both across and within countries in CESEE, often reflecting differences in regional economic development. Our cross-country analysis yields several main findings. First, consolidation through M&A activity emerges as the most robust correlate of debranching across countries and specifications. Second, profitability is, on average, negatively associated with branch closures, and this relationship varies by bank size: smaller but more profitable banks are less likely to close branches. Third, regional patterns suggest that debranching has been particularly pronounced at both ends of the regional spectrum: in urban areas that experienced rising population density and economic growth, and in rural regions. This pattern is consistent with a non-linear, U-shaped relationship between debranching and the degree of regional urbanization. Fourth, local competitive pressure substantially reduces the probability of closure, although this effect is attenuated for banks with greater local market shares. Finally, the country-specific evidence indicates that proximity to a bank's own branch network becomes especially relevant in countries where digital access is already high and branch networks are relatively sparse (i.e., where the number of adults per branch is high).

The overall decline of 30% reflects both openings and closures: Roughly twice as many branches closed as new ones opened; closures outnumber openings by 85%. Since closures outnumber openings, our analysis focuses on the factors driving branch closures. We ensure that our results are robust to small, local relocation within a 1 km radius. However, to better understand the dynamics of change, it is an obvious and valuable avenue for future research to analyze closures and openings simultaneously.

Furthermore, our findings do not address the broader question of whether the observed decline in bank branches is ultimately beneficial or detrimental for economic development, financial inclusion, or inequality. However, the granularity of our data provides a strong foundation for future research linking branch locations to firm- or household-level data to whether distance to physical bank branches still matters for financial inclusion and access to finance in CESEE.

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Appendix

A: Data and Workflow

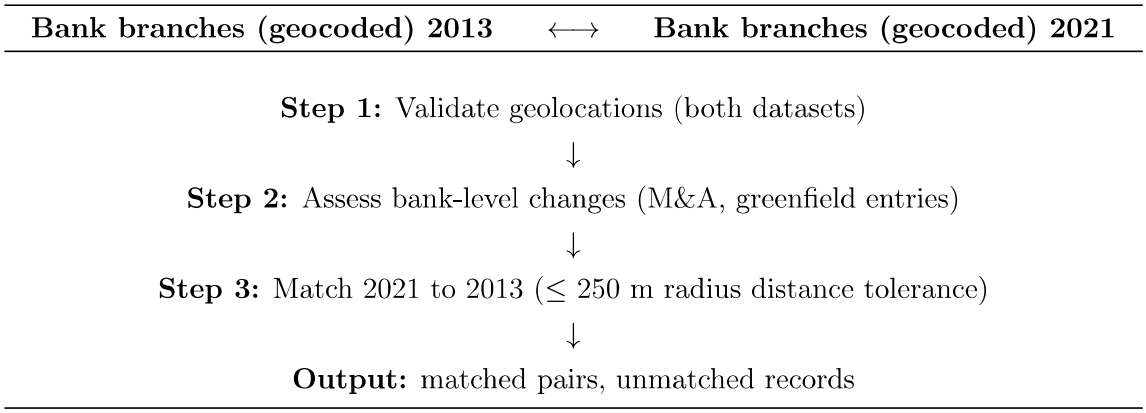


Figure 4: Branch matching workflow for geocoded bank branches (2013 and 2021).

Table A1 Data description

Data aspect	Description
a) *Branch Locations 2013*	
Source	The dataset was compiled by Beckmann et al. (2018); In some cases central banks provided comprehensive branch-level data, For most countries, the information was manually gathered from the websites of individual banks.
Countries covered	Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Albania, Bosnia & Herzegovina, North Macedonia, and Serbia.
Banks covered	All major banks serving households (214 banks in total). Some smaller institutions and banks focused exclusively on corporate clients are not covered.
Notes	The dataset collected for 2021 includes all banks operating physical branches, regardless of their client base. Where possible, we retrospectively collected data for 2013 on branches of banks that serve only corporate clients. A small coverage error still remains. We exclude banks with only one branch in a given country, since our data do not systematically capture foreign banks with a limited representative presence, such as single-branch representations, or banks operating exclusively online.
b) *Branch Locations 2021*	
Source	The data was primarily gathered through manual web scraping from the websites of individual banks. In a few cases datasets of all bank branches operating in the country are provided by national central banks.
Countries covered	Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Albania, Bosnia & Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia.

Data aspect	Description
Banks covered	The dataset collected for 2021 includes all banks operating physical branches, regardless of their client base. We exclude banks with only one branch in a given country, since our data do not systematically capture foreign banks with a limited representative presence, such as single-branch representations, or banks operating exclusively online.
Poland & Hungary	Due to incomplete coverage in 2021 we recollected the bank branch data for Poland and Hungary in 2025.
Geocoding of branch addresses	Whenever possible, coordinates were retrieved directly from banks' websites via embedded map interfaces, minimizing errors from ambiguous or incomplete address data.
Fallback geocoding	When direct coordinate extraction was not feasible, branch addresses were geocoded using Google Maps services.
Verification of geocoded locations	All retrieved coordinates were subsequently validated by querying OpenStreetMap or Google Places to confirm the presence of a bank branch with the relevant name at the specified location.
c) *Matching branches 2013 & 2021*	
Geographical matching	For each bank branch in 2021, we assess based on latitude and longitude whether a corresponding branch existed in 2013 (within 250m).
Match quality	Verification via Google Places yielded match rates between 66% (Albania) and 80% (Serbia).
Reasons for non-matches	Non-matches can occur due to (i) incorrect branch address information, (ii) incomplete or inaccurate representation of bank locations in Google Places, or (iii) erroneous translation of the address into geographic coordinates.
Albania	More than half of the 2021 branches could not be directly matched to a 2013 counterpart, although the total number of branches declined by only about 13% over this period. Branch locations for Albania were geocoded using an automated service based on a comprehensive address list provided by the Bank of Albania. This approach yielded less precise geographic coordinates compared with coordinates collected directly from individual bank websites. Therefore, for Albania branches were matched within the same bank at the city or village level instead of using precise geographic coordinates. This approach assumes that unmatched cases primarily reflect data quality limitations rather than substantial branch turnover between 2013 and 2021. The assumption is further supported by the relatively stable structure of the Albanian banking sector and the fact that many cities host only a small number, often just one, bank branch.
d) *Bank level data*	
Source	For each bank in the geographically matched dataset (2013–2021), the Bureau van Dijk (BvD) identifier is retrieved.
Divergent identifiers	If the identifier differs between 2013 and 2021—for instance, due to M&A —both identifiers are collected.

Data aspect	Description
Non-matched banks	For eight banks in 2013 and thirteen banks in 2021, no entry exists in the Bureau van Dijk database. These institutions are excluded from subsequent analyses involving bank performance indicators.
Potential bias	The non-matched institutions are mainly smaller banks. Although this may introduce some bias, these banks are not concentrated within a single country, mitigating concerns regarding systematic regional distortions.
Ownership determination	For all banks without a BvD entry, the global ultimate owner is manually researched. This enables the construction of a foreign-ownership dummy variable.
M&A assessment	Manual research is conducted to determine whether they were affected by merger or acquisition activities.
Cooperative banks in Poland	We do not attempt to match the very large number of Polish cooperative banks (445 in 2025) with the BvD database. Name-based matching is highly error-prone due to inconsistent naming conventions, special characters, and other irregularities. Moreover, smaller cooperative banks are typically not covered in BvD.
e) *NUTS level data*	
Source	Regional data at the NUTS2 and NUTS3 levels are incorporated based on branch-level geo-coordinates. All available regional indicators were obtained from Eurostatand the OeNB Euro Survey.
Coverage of EU candidates and potential candidates	For countries without official Eurostat NUTS classifications (Albania, Bosnia and Herzegovina, North Macedonia, Serbia, Kosovo, Montenegro), we use NUTS-like classifications published by Eurostat where available; otherwise, we rely on national administrative regional classifications.
Regional indicators	Each bank branch is matched to regional information including: (i) total NUTS3 area including inland waters (km^2), (ii) population data, (iii) educational attainment, and (iv) GDP per capita.
Use of time-varying data	When regional indicators change over time and data are available, values for both 2013 and 2021 are used.
Missing population data for Bosnia and Herzegovina	Owing to the lack of recent regional population data from Eurostat, Bosnia and Herzegovina is excluded from all analyses requiring regional-level population density.
f) *Satellite data*	
Nightlight data (economic activity)	We merge bank branch coordinates with nightlight intensity measures, following the approach of Henderson et al. (2012). Although nightlights are a noisier proxy for economic activity than official GDP, they offer important advantages: they are available for all countries, approximate informal activity, and can be aggregated to any spatial level.
Mobile network coverage (3G expansion)	Branch locations are linked to Collins Bartholomew's global mobile coverage dataset, which provides annual information on mobile network availability sourced from the GSMA and mobile network operators. This enables the construction of indicators reflecting the expansion of internet access during the rollout of 3G networks.

Data aspect	Description
Urban fabric and urbanicity proxy (Corine)	In the absence of current and sufficiently granular population data, we use urban fabric information from the Corine Land Cover dataset as a proxy for urbanicity in the surroundings of each bank branch.

Notes: The table shows a detailed description of the data used, how it was derived and the validation procedure.

B: Variable definitions

Table A2 Description of variables

Label	Description
a) *NUTS3-level*	
Population density	People per km^2 in the NUTS3 region, data source: Eurostat.
Night light	Mean nighttime light intensity from satellite imagery (DMSP-OLS/VIIRS), used as a proxy for economic activity `https://eogdata.mines.edu/products/vnl/`.
Change in population density (night light)	Relative (log) change from 2013 to 2021 in population density (respectively night light).
% households with internet access	Share of households with an internet connection, OeNB Euro Survey, 2013 and 2021.
% consumers using online banking	Share of consumers who use online banking, OeNB Euro Survey, 2021.
Average download speed (Mbps)	Mean measured download speed in Mbps in the NUTS3 region from `https://datavis.europeandatajournalism.eu/obct/connectivity/#`.
Small (large) bank × log(avg. download speed)	Interaction term of bank size dummy (1 if small/large; 0 if medium) with log average download speed.
GDP per capita	2013 and 2021 data from Eurostat at current market prices, computed to PPP NUTS3 level per capita data
Number of firms per capita	2013 and 2021 data from Eurostat
b) *Bank level*	
GUO foreign	Dummy variable =1 if the bank's parent company is foreign-owned, 0 otherwise. Weighted by the share of each bank's branches located in the region.
M&A	Dummy variable =1 if the bank underwent at least one merger or acquisition between 2013 and 2021 (2025), 0 otherwise. Weighted by the share of each bank's branches located in the region.
ROAA	Profitability: net income divided by average total assets (in percent). Weighted by the share of each bank's branches located in the region.
Small / Medium / Large bank	Bank size by country-specific market share (branches / national total), classified into terciles.
Small (large) bank × ROAA	Interaction of the bank size dummy with ROAA.
Strictly closed branch	No new branch of the same bank opened within a 1 km radius.
c) *Branch level*	
Distance to next proprietary branch	Distance (km) to the nearest branch of the same bank.
Distance to next competitor branch	Distance (km) to the nearest branch of a competitor bank.
Share of proprietary branches	Share of own branches in the local market (e.g., within 5 km).
3–5 (6–8, 9+) competitor branches	Dummies for competitive density by the number of competing branches within 5 km (baseline: 0–2).
3–5 (6–8, 9+) competitor branches × share of proprietary branches	Interaction term between the competitive-density dummies and own-branch share.
small bank	indicator equal to 1 if a bank's share of total banking-sector assets is below 10%, 0 otherwise
small bank = 1 × ROAA	interaction term between the small-bank indicator and ROAA, capturing how the association of profitability with the outcome differs for small banks.
rural	equals 1 if the branch is located in a low–built-up area, defined using satellite-derived urban fabric (share of built-up land within a 5/10 km radius). We compute country-specific quantiles of the built-up share (0–100%) and classify branches in the lowest quantile as rural.
road density	length of the road network per branch (satellite-derived).
nightlight growth	change in asinh(NL) between 2013 and 2021, where NL denotes satellite-recorded night light intensity.
rural =1 × distance to next competitor (proprietary) branch	interaction term between the rural dummy and the distance to the nearest proprietary competitor branch, capturing whether the association between proprietary-competitor distance and the outcome differs for rural branches.

Notes: The table shows a detailed description of all variables used.

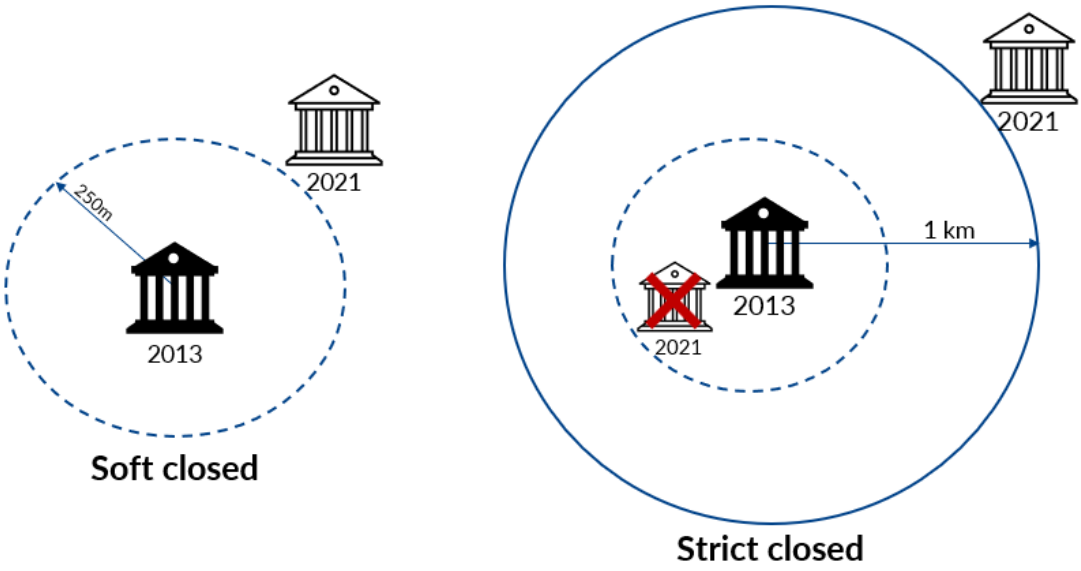


Figure 5: Variable definition: closed soft vs. closed strict

C: Descriptive evidence

Table A3 Summary statistics - NUTS3-level

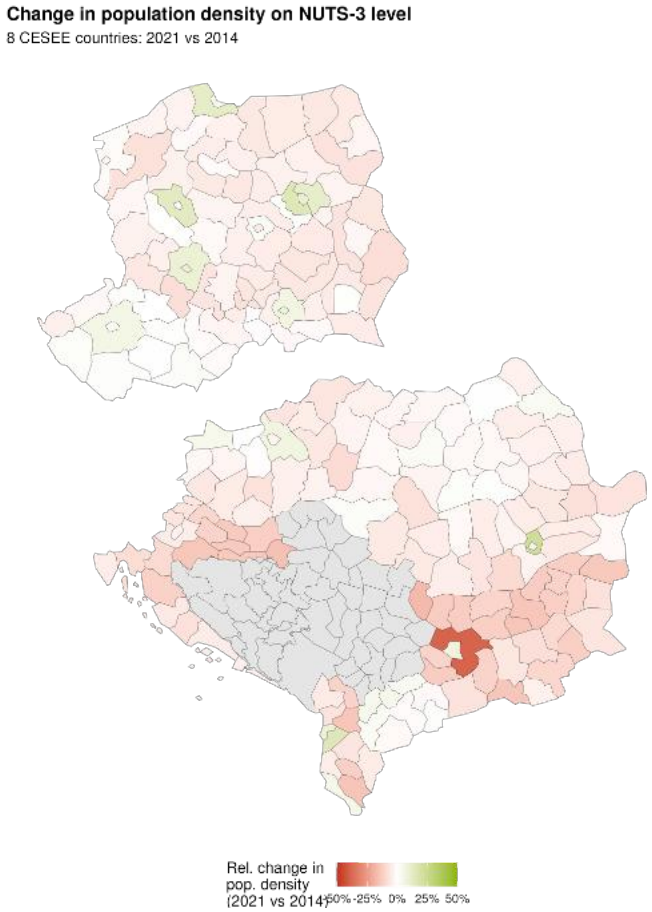
	BG	HR	CZ	HU	PL	RO	AL	BA	MK	RS
log (population density) 2013	4.02	4.24	4.98	4.39	6.07	4.42	4.49	.	4.35	.
	(0.65)	(0.93)	(0.89)	(0.23)	(1.17)	(0.82)	(0.86)	(.)	(0.70)	(.)
log (population density) 2021	3.95	4.07	5.01	4.59	5.49	4.39	4.42	.	4.35	4.29
	(0.67)	(0.84)	(0.90)	(0.89)	(1.17)	(0.84)	(0.87)	(.)	(0.72)	(0.62)
log (night light) 2013	-1.02	-0.36	-0.29	-0.59	0.23	-0.78	-0.80	-0.93	-0.79	-0.39
	(0.59)	(0.81)	(0.67)	(0.82)	(1.06)	(0.78)	(0.81)	(0.62)	(0.61)	(0.55)
log (night light) 2021	-0.22	0.34	0.79	0.23	1.38	0.07	-0.02	0.05	-0.01	0.41
	(0.50)	(0.66)	(0.72)	(0.74)	(0.93)	(0.68)	(0.69)	(0.50)	(0.54)	(0.51)
log (average download speed in Mbps)	3.92	3.49	3.87	4.73	4.48	4.77	3.08	.	3.15	3.68
	(0.24)	(0.27)	(0.24)	(0.17)	(0.22)	(0.17)	(0.30)	(.)	(0.18)	(0.27)
market share based on the number of branches	0.10	0.10	0.12	0.24	0.23	0.16	0.12	0.08	0.10	0.09
	(0.01)	(0.02)	(0.01)	(0.02)	(0.04)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
M&A	0.02	0.03	0.02	0.41	0.01	0.01	0.02	0.04	0.01	0.02
	(0.01)	(0.04)	(0.01)	(0.18)	(0.01)	(0.00)	(0.01)	(0.05)	(0.00)	(0.01)
ROAA	0.10	-0.02	0.20	0.78	0.06	0.01	0.06	-0.03	0.07	0.03
	(0.07)	(0.32)	(0.05)	(0.30)	(0.01)	(0.02)	(0.02)	(0.22)	(0.02)	(0.10)
growth in tertiary-educated	0.39	0.18	0.57	0.45	0.89	0.10	0.98	-0.06	1.13	-0.12
	(0.47)	(0.80)	(0.97)	(0.71)	(0.45)	(0.95)	(1.04)	(0.90)	(0.81)	(0.48)
growth in medium-educated	0.02	0.23	0.12	0.29	0.69	0.44	0.39	0.41	0.16	0.11
	(0.11)	(0.27)	(0.16)	(0.44)	(0.34)	(0.32)	(0.40)	(0.37)	(0.26)	(0.70)
growth in low-educated	-0.30	-0.16	-0.11	-0.14	-0.71	-0.57	-0.31	-0.21	-0.30	0.18
	(0.42)	(0.29)	(0.11)	(0.25)	(0.10)	(0.37)	(0.20)	(0.32)	(0.18)	(0.61)
growth in population (18–35)	-0.07	0.04	-0.12	-0.06	-0.23	0.00	-0.33	-0.08	-0.25	-0.05
	(0.32)	(0.45)	(0.24)	(0.44)	(0.16)	(0.37)	(0.30)	(0.22)	(0.19)	(0.58)
growth in population (66+)	-0.01	0.12	0.40	1.03	0.36	0.18	4.14	0.29	0.40	2.54
	(0.38)	(1.31)	(0.72)	(1.84)	(0.40)	(1.18)	(4.26)	(0.81)	(0.59)	(3.41)
growth in population (36–65)	0.05	0.04	0.10	-0.06	0.19	0.20	-0.07	0.15	0.13	-0.26
	(0.23)	(0.41)	(0.28)	(0.26)	(0.36)	(0.42)	(0.25)	(0.21)	(0.30)	(0.26)

Notes: The table reports country-specific summary statistics at the NUTS 3 regional level. Entries denote means, with standard deviations reported in parentheses. Variables labelled 2013 and 2021 refer to the respective years, while growth variables measure changes between 2013 and 2021. Bank-level characteristics are weighted by the share of each bank's branches located in the respective region. Missing entries indicate that the corresponding variable is not available for the respective country. Detailed variable definitions are provided in Table A2.

Table A4 Summary statistics - Bank level

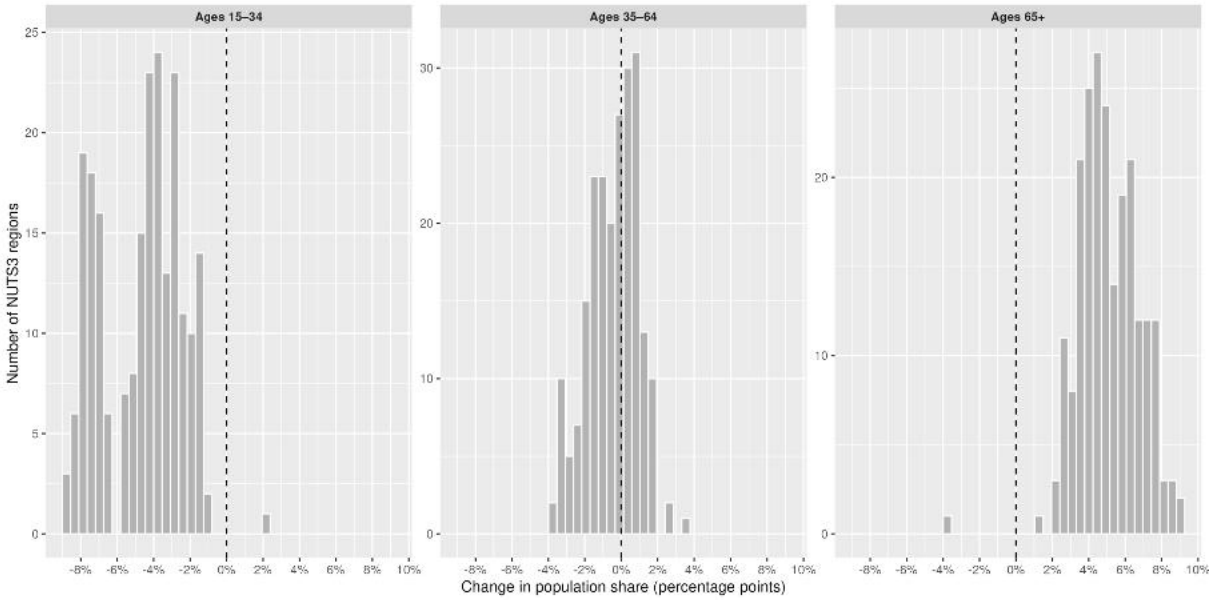
	BG	HR	CZ	HU	PL	RO	AL	BA	MK	RS
M&A	0.20	0.21	0.21	0.51	0.20	0.13	0.19	0.12	0.06	0.20
	(0.40)	(0.41)	(0.40)	(0.50)	(0.40)	(0.34)	(0.40)	(0.33)	(0.25)	(0.40)
GUO foreign	0.77	0.76	0.79	0.24	0.40	0.59	0.72	0.68	0.70	0.85
	(0.42)	(0.43)	(0.41)	(0.43)	(0.49)	(0.49)	(0.45)	(0.47)	(0.46)	(0.36)
ROAA	0.55	-0.03	1.22	0.33	1.16	-0.76	0.27	0.30	0.47	0.06
	(0.98)	(1.76)	(0.59)	(1.00)	(0.76)	(14.52)	(0.94)	(1.75)	(1.19)	(4.45)
number of banks within 5 km	11.84	9.96	7.17	3.56	8.95	12.39	8.52	9.04	9.81	13.21
	(5.93)	(7.31)	(3.81)	(2.86)	(5.83)	(7.23)	(4.36)	(5.19)	(3.60)	(6.65)
distance to next branch	0.51	0.97	0.66	1.88	1.22	1.04	0.80	0.57	0.30	0.37
	(2.30)	(2.83)	(2.02)	(2.64)	(2.68)	(2.91)	(3.00)	(2.61)	(1.42)	(2.00)
distance to next proprietary branch	6.21	11.86	5.93	5.75	5.62	7.19	9.68	11.73	10.35	9.37
	(11.86)	(18.95)	(7.42)	(8.18)	(9.12)	(12.43)	(14.61)	(15.92)	(14.16)	(13.86)
share proprietary branches within 5 km	0.59	0.39	0.44	0.47	0.53	0.58	0.44	0.33	0.46	0.47
	(0.31)	(0.30)	(0.35)	(0.33)	(0.29)	(0.32)	(0.37)	(0.31)	(0.38)	(0.33)
distance to next competitor branch	0.56	1.20	0.73	3.49	1.98	1.45	0.96	0.59	0.30	0.40
	(2.46)	(3.46)	(2.28)	(4.79)	(4.29)	(4.27)	(3.79)	(2.64)	(1.42)	(2.08)
rural	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)
road density	0.14	0.07	0.60	-0.22	-0.31	0.38	-0.04	-0.44	0.50	0.28
	(1.06)	(1.01)	(1.57)	(0.73)	(0.71)	(0.96)	(0.33)	(0.35)	(1.19)	(1.23)
change in night light	0.36	0.38	0.72	0.47	0.62	0.31	0.52	0.48	0.43	0.42
	(0.14)	(0.14)	(0.31)	(0.13)	(0.25)	(0.15)	(0.19)	(0.14)	(0.15)	(0.21)

Notes: The table reports country-specific summary statistics for the variables used in the branch-level analysis. Entries denote means, with standard deviations in parentheses. Binary variables can be interpreted as shares. Bank-level characteristics are assigned to branches of the respective bank, while local market and regional variables are measured at the branch location. Detailed variable definitions are provided in Table A2.



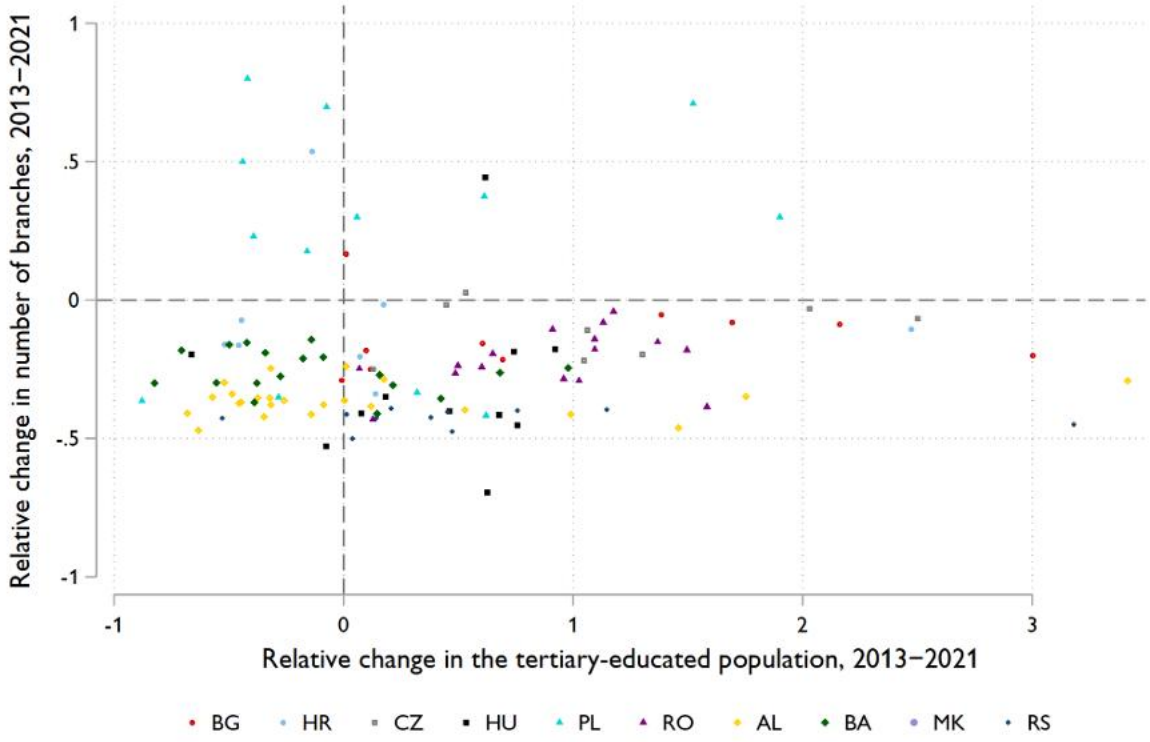
Note: Relative change of population density (15+ years old) at NUTS3 level in 8 CESEE countries, 2014 to 2021. This map is based on Eurostat population data.

Figure 6: Relative change of adult population on NUTS3



Note: This graph is based on Eurostat population data and displays the change from 2014 to 2021 for Bulgaria, Croatia, Hungary, Poland, Romania, and Albania.

Figure 7: Changes in the age structure in 8 CESEE countries on NUTS3 level



Note: Each dot represents a NUTS 3 region. The figure plots the relative change in the number of bank branches against the relative change in the tertiary-educated population between 2013 and 2021. Dashed lines indicate zero change; colors and markers distinguish countries.

Figure 8: Growth in tertiary educated adults versus branch growth

Table A5 Average distance to next branch (NUTS 3) by country

Panel A: 2013

Country	Country Average	NUTS3 min.	NUTS3 max.	NUTS3 max.–min.
Albania	1.401	0.301	4.685	4.385
Bosnia and Herzegovina	0.950	0.029	4.784	4.755
Bulgaria	0.833	0.092	3.996	3.904
Croatia	1.194	0.066	3.180	3.114
Czechia	0.656	0.056	1.382	1.327
Hungary	0.802	0.122	1.697	1.574
Kosovo	-	-	-	-
Montenegro	-	-	-	-
North Macedonia	0.367	0.075	0.747	0.672
Poland	1.443	0.120	3.369	3.249
Romania	1.405	0.100	3.268	3.168
Serbia	0.570	0.107	1.717	1.610

Panel B: 2021

Country	Country Average	NUTS3 min.	NUTS3 max.	NUTS3 max.–min.
Albania	1.691	0.330	6.744	6.414
Bosnia and Herzegovina	0.932	0.225	4.143	3.918
Bulgaria	1.029	0.157	2.825	2.668
Croatia	1.552	0.103	4.909	4.806
Czechia	0.513	0.083	1.152	1.069
Hungary	1.822	0.229	2.866	2.637
Kosovo	0.478	0.478	0.478	0.000
Montenegro	0.856	0.856	0.856	0.000
North Macedonia	0.586	0.270	0.938	0.668
Poland	1.691	0.187	3.449	3.262
Romania	2.254	0.114	4.495	4.381
Serbia	1.023	0.049	4.512	4.463

Notes: The table shows the average distance between branches per country and NUTS3 region for 12 CESEE countries. Note that for Hungary and Poland the data in Panel B is from 2025. In case of Montenegro and Kosovo we do not have bank branch data in 2013. There is no further regional subdivision at the NUTS3 level within Montenegro or Kosovo.

Table A6 Openings, Closures and Branch Stocks by Country (2013–2021)

Country	Branch closures	Branch openings	Branches (2013 & 2021)
Bulgaria	1,986	1,005	662
Croatia	618	301	528
Czechia	1,525	339	1,182
Hungary	2,307	700	431
Poland	7,466	4,895	2,966
Romania	3,447	1,588	1,756
Albania	129	68	342
Bosnia and Herzegovina	543	483	254
North Macedonia	300	279	100
Serbia	1,562	1,018	422

Notes: The table reports country-level counts of bank branches by status between 2013 and 2021. Branch closures refer to branches observed in 2013 but not in 2021, while branch openings refer to branches observed in 2021 but not in 2013. Branches in the final column are observed in both years and are classified as continuing branches.

D: Additional regression results & robustness

Table A7 Bank branch density and dynamics: Correlates at the NUTS3 level

Dependent variable	Relative change in number of branches (2013–2021)						
growth in population density	−0.036***	−0.044*	−0.049***	−0.044*	−0.063***		
	(0.008)	(0.023)	(0.008)	(0.022)	(0.012)		
growth in night light	0.036	0.024	0.024	0.025	0.024	0.020	0.030
	(0.036)	(0.038)	(0.037)	(0.037)	(0.036)	(0.036)	(0.037)
growth in population (18-35)		−0.083		−0.083	−0.077	−0.060*	−0.067
		(0.051)		(0.051)	(0.042)	(0.030)	(0.038)
growth in population (66+)		−0.003		−0.003			0.000
		(0.013)		(0.013)			(0.007)
growth in tertiary-educated			−0.005	−0.001	−0.001	−0.001	0.007
			(0.006)	(0.008)	(0.007)	(0.010)	(0.008)
growth in population density × growth in tertiary-educated					0.072*		
					(0.031)		
growth in population (18-35) × growth in tertiary-educated						0.001	
						(0.029)	
growth in population (66+) × growth in tertiary-educated							−0.011***
							(0.003)
Constant	−0.203***	−0.151*	−0.148**	−0.150*	−0.169**	−0.178***	−0.164**
	(0.044)	(0.068)	(0.049)	(0.070)	(0.054)	(0.049)	(0.065)
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓
R-squared	0.41	0.62	0.61	0.62	0.63	0.59	0.59
N	128	92	94	92	94	130	126

Notes: The table shows the results of OLS regressions. The dependent variable is the relative change in the number of bank branches between 2013 and 2021 at the NUTS 3 regional level. This Table extends Table 6. The interaction term combines growth in the population groups with growth in the tertiary-educated population. Detailed variable definitions are reported in Table A2. All regressions include country fixed effects. Standard errors are reported in parentheses and clustered at the country level. N denotes the number of regional observations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A8 Robustness analysis for Table 10 Branch closed no new open ≤ 1km

	Branch closed										
	Pooled	BG	HR	CZ	HU	PL	RO	AL	BA	MK	RS
rural	0.140***	0.143***	0.158***	0.286***	0.149***	0.051*	0.216***	0.106*	0.077	0.098**	0.225***
	(0.037)	(0.030)	(0.037)	(0.082)	(0.008)	(0.028)	(0.039)	(0.056)	(0.044)	(0.044)	(0.032)
Constant	−0.028	0.904***	−0.005	0.113***	0.560***	0.385***	0.001	−0.008	−0.119	0.881***	1.135***
	(0.099)	(0.059)	(0.015)	(0.027)	(0.022)	(0.017)	(0.092)	(0.094)	(0.083)	(0.024)	(0.246)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.35	0.26	0.30	0.44	0.67	0.34	0.30	0.24	0.20	0.15	0.32
R-squared	0.33	0.24	0.46	0.21	0.19	0.38	0.14	0.56	0.26	0.21	0.39
N	38,806	3,653	1,447	2,913	3,423	15,327	6,791	437	1,280	679	2,856
	Branch closed no new ≤ 1km										
road density	−0.013*	−0.020	−0.029***	0.007	−0.032***	−0.010	−0.046***	−0.153***	0.061	0.034	−0.021***
	(0.007)	(0.014)	(0.009)	(0.006)	(0.008)	(0.022)	(0.015)	(0.042)	(0.036)	(0.025)	(0.006)
Constant	0.051	0.939***	0.003	0.124***	0.578***	0.389***	0.051	0.017	−0.095	0.876***	1.359***
	(0.099)	(0.058)	(0.017)	(0.021)	(0.026)	(0.018)	(0.068)	(0.096)	(0.083)	(0.018)	(0.272)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.35	0.26	0.30	0.44	0.67	0.34	0.30	0.24	0.20	0.15	0.32
R-squared	0.32	0.22	0.45	0.16	0.18	0.38	0.12	0.56	0.25	0.21	0.36
N	38,806	3,653	1,447	2,913	3,423	15,327	6,791	437	1,280	679	2,856
	Branch closed no new ≤ 1km										
nightlight growth	−0.004	−0.036	−0.060	−0.037	−0.104**	−0.007	−0.038	−0.207*	0.001	0.031	0.108***
	(0.013)	(0.052)	(0.041)	(0.046)	(0.037)	(0.013)	(0.054)	(0.102)	(0.079)	(0.072)	(0.034)
Constant	0.056	0.953***	0.043*	0.182***	0.611***	0.396***	0.053	0.143	−0.111	0.859***	1.326***
	(0.100)	(0.060)	(0.023)	(0.032)	(0.014)	(0.020)	(0.073)	(0.114)	(0.094)	(0.045)	(0.269)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.35	0.26	0.30	0.44	0.67	0.34	0.30	0.24	0.20	0.15	0.32
R-squared	0.32	0.22	0.45	0.16	0.18	0.38	0.11	0.55	0.25	0.20	0.36
N	38,806	3,653	1,447	2,913	3,423	15,327	6,791	437	1,280	679	2,856

Notes: Regressions explain the probability of an individual branch closing between 2013 and 2021 and no new branch opening in the ≤ 1km vicinity of the branch, estimated using linear probability models. Standard errors are clustered at the bank level. All regressios include bank fixed effects, column 1 pools all countries and includes country fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A9 Robustness analysis for Table 8 Branch closed no new open ≤ 1km

	Branch closed										
	Pooled	BG	HR	CZ	HU	PL	RO	AL	BA	MK	RS
distance to next proprietary branch	−0.000	−0.001	−0.001	−0.007**	−0.002	0.000	−0.000	−0.003	−0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)	(0.001)
distance to next competitor branch	0.010**	0.027***	0.023***	0.062***	0.013***	0.001	0.009**	0.004	0.009	0.011	0.018*
	(0.004)	(0.004)	(0.004)	(0.003)	(0.001)	(0.002)	(0.004)	(0.002)	(0.011)	(0.013)	(0.009)
M&A	0.225***	0.123***	0.167***	0.407**	−0.224***	0.303***	0.202***	−0.220***	0.396***	−0.034**	0.095***
	(0.050)	(0.027)	(0.058)	(0.166)	(0.019)	(0.093)	(0.017)	(0.027)	(0.048)	(0.013)	(0.030)
GUO foreign	0.015	0.528***	0.396***	0.860***	−0.292***	−0.056	0.139***	−0.086**	0.463***	0.693***	−0.145***
	(0.048)	(0.014)	(0.072)	(0.013)	(0.008)	(0.092)	(0.015)	(0.037)	(0.103)	(0.030)	(0.020)
Constant	0.084	0.560***	−0.331***	0.200***	0.947***	0.406***	−0.011	0.271	−0.495***	−0.126	1.300***
	(0.126)	(0.074)	(0.067)	(0.046)	(0.027)	(0.032)	(0.056)	(0.155)	(0.065)	(0.139)	(0.220)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.48	0.36	0.38	0.48	0.84	0.50	0.40	0.23	0.32	0.25	0.46
R-squared	0.31	0.24	0.46	0.23	0.17	0.34	0.12	0.29	0.27	0.24	0.30
N	28,284	2,632	1,128	2,641	2,734	10,388	5,140	456	796	400	1,969
	Branch closed no new ≤ 1km										
3-5 competitor branches	−0.082**	−0.047	−0.014	−0.354***	−0.075	0.008	−0.147	−0.206	0.054	−0.090	−0.047
	(0.036)	(0.105)	(0.054)	(0.068)	(0.058)	(0.016)	(0.095)	(0.165)	(0.076)	(0.125)	(0.044)
6-8 competitor branches	−0.156***	−0.307**	−0.043	−0.485***	−0.021	0.000	−0.184	−0.183	0.087	−0.206	−0.297***
	(0.051)	(0.137)	(0.055)	(0.101)	(0.022)	(0.048)	(0.129)	(0.171)	(0.104)	(0.122)	(0.084)
9+ competitor branches	−0.117***	−0.030	−0.022	−0.340***		−0.042	−0.137	−0.035	−0.024	−0.376**	−0.226***
	(0.042)	(0.092)	(0.063)	(0.071)		(0.064)	(0.105)	(0.210)	(0.150)	(0.147)	(0.048)
share proprietary branches	−0.021	0.116	0.075	−0.113	0.070**	0.070	0.057	−0.221	−0.285	0.571	−1.026***
	(0.043)	(0.348)	(0.132)	(0.257)	(0.029)	(0.047)	(0.101)	(0.647)	(0.307)	(1.214)	(0.220)
3-5 competitor branches × share proprietary branches	0.043	−0.316	−0.481**	0.278	0.017	−0.034	−0.494***	0.842	0.836**	−1.600	1.039***
	(0.063)	(0.471)	(0.180)	(0.352)	(0.109)	(0.076)	(0.163)	(0.787)	(0.395)	(1.485)	(0.203)
6-8 competitor branches × share proprietary branches	0.094	0.143	−0.178	0.414	−0.058	−0.216***	−0.195	0.259	0.123	0.861	1.590***
	(0.067)	(0.458)	(0.192)	(0.323)	(0.055)	(0.059)	(0.227)	(0.764)	(0.407)	(1.356)	(0.318)
9+ competitor branches × share proprietary branches	−0.022	−0.334	−0.229	0.242		−0.103	−0.203	−0.027	0.524	−0.108	0.836***
	(0.057)	(0.394)	(0.141)	(0.263)		(0.073)	(0.145)	(0.743)	(0.362)	(1.265)	(0.184)
M&A	0.229***	0.147***	0.178***	0.422**	−0.178***	0.298***	0.208***	−0.185***	0.410***	−0.015	0.098***
	(0.047)	(0.029)	(0.058)	(0.188)	(0.009)	(0.089)	(0.018)	(0.043)	(0.063)	(0.022)	(0.030)
GUO foreign	0.037	0.512***	0.442***	0.824***	−0.284***	−0.033	0.146***	−0.017	0.517***	0.775***	−0.197***
	(0.046)	(0.007)	(0.066)	(0.005)	(0.012)	(0.089)	(0.012)	(0.035)	(0.102)	(0.027)	(0.024)
Constant	0.087	0.648***	−0.331***	0.385***	0.947***	0.436***	0.260***	0.255	−0.686***	−0.004	1.382***
	(0.117)	(0.090)	(0.056)	(0.094)	(0.044)	(0.069)	(0.083)	(0.252)	(0.157)	(0.095)	(0.218)
Region Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DepVar	0.46	0.34	0.36	0.46	0.82	0.48	0.41	0.23	0.31	0.25	0.45
R-squared	0.29	0.23	0.46	0.23	0.16	0.31	0.14	0.32	0.29	0.28	0.34
N	26,088	2,567	1,064	2,524	2,328	9,311	4,756	434	771	395	1,938

Notes: Regressions explain the probability of an individual branch closing between 2013 and 2021 and no new branch opening in the ≤ 1km vicinity of the branch, estimated using linear probability models. Standard errors are clustered at the bank level. All regressios include bank fixed effects, column 1 pools all countries and includes country fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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