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Articles

Bank restructuring and regional economic growth in Spain. Are branches still relevant?

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Abstract:

The restructuring process of the Spanish banking sector initiated after the Great Recession of 2008 has led to a dramatic reduction in the number of bank branches. This paper analyzes the impact of branch closures on GDP per capita, labor productivity and employment per capita of the Spanish provinces in the period 2008–2018. The results show that bank branches have only a weak impact on employment, and no effect on productivity and GDP per capita. Therefore, if consumption and investment decisions of families and firms are affected by branch closures, the impact is not transferred to aggregate regional performance.

Keywords: Bank restructuring; branches; economic growth; Spanish provinces.
JEL Classification: G21; O10; R11.

Reestructuración bancaria y crecimiento económico en las regiones españolas. ¿Son las sucursales todavía importantes?

Resumen:

El proceso de reestructuración del sector bancario español iniciado tras la Gran Recesión de 2008 ha supuesto una drástica reducción del número de sucursales bancarias. Este artículo analiza el impacto del cierre de sucursales sobre el PIB per cápita, la productividad laboral y el empleo per cápita de las provincias españolas en el período 2008-2018. Los resultados muestran que las sucursales bancarias tienen sólo un impacto débil sobre el empleo y ningún efecto sobre la productividad y el PIB per cápita. Por lo tanto, si las decisiones de consumo e inversión de familias y empresas se ven afectadas por el cierre de sucursales, el impacto no se transfiere al desempeño regional agregado.

Palabras clave: Restructuración bancaria; sucursales; crecimiento económico; provincias españolas.
Clasificación JEL: G21; O10; R11.

1. Introduction

The *Great Recession* of 2008 had severe consequences for financial and banking sectors worldwide due to the accumulation of toxic assets on banks' balance sheets. For the Euro area, the crisis brought additional challenges due to the different intensity with which the crisis hit its members and the great heterogeneity of countries. The situation was especially dire in southern countries such as Greece, Italy and Spain, which needed massive amounts of economic aid to avoid bankruptcy. This paper focuses on Spain,

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whose banking sector was among the most affected and has undergone a deep restructuring that is still ongoing.

The Spanish banking system had accumulated substantial imbalances during the pre-crisis period, which led to an excess of installed capacity in terms of branches and employment that had to be corrected. Accordingly, the roadmap for the restructuring process has been oriented towards restoring banks' balances, to which end a series of mergers and acquisitions have been carried out, entailing an unprecedented decline of more than 40% of total bank branches between 2008 and 2018. According to the ECB (2016), nearly half the branches closed in the Euro area were located in Spain.

The intensity of the branch closures has been uneven across the Spanish territory. The phenomenon is particularly problematic for some rural areas, which are becoming branchless and financially excluded,[1] limiting residents' access to credit and financial services. Martín-Oliver (2019) shows how the average distance between branches has increased in Spain due to closures, with a higher probability of a municipality becoming branchless in low-income and poorly-educated areas. However, the emergence of Fintech firms and the increasingly common use of internet banking might cast doubt on the current importance of physical branches. In other words, whereas branches were in the past the only channel to access financial services, there are nowadays other alternatives that make their relevance for regional development unclear.

However, the so-called "death of distance" cannot be confirmed without further analysis. Also, the importance of branches can heavily depend on the geographical context and consumer profile. Chakravarty (2006) and Petersen and Rajan (2002) argue that advances in digital banking can only partially mitigate the negative impact of branch closures. Ergungor (2010) indicates that some banks specialize in lending to informationally opaque borrowers by collecting soft information about them, and that the cost of obtaining this information is lower when there is a physical presence in the market. More recently, Allen et al. (2016b), Nguyen (2019) and Bonfim et al. (2021) highlight the importance of physical branches for credit provision. They suggest that the soft information collected in branches still matters in gaining access to credit for small and medium-sized firms (SMEs) and low-income households. Therefore, although financial accessibility is widely recognized as being complex and multi-faceted, it remains clear that the spatial distribution of bank branches is still a critical component for some territories (Camacho et al., 2021).

Several studies have analyzed the Spanish case, shedding light on how branches are located and the impact of the restructuring processes in the country. Alamá et al. (2015) study the distribution of branches across the territory, Maudos (2017) and Martín-Oliver (2019) focus specifically on the recent process of branch closures at different levels of disaggregation (provinces vs. municipalities), and Camacho et al. (2021) examine this phenomenon in detail in specific regions. As a general conclusion, financial exclusion is increasing in Spain, especially in poor rural areas.

However, there are important pending issues which deserve attention; for instance, the question of how the decline in the number of branches is affecting regional growth. Spain is characterized by marked regional disparities. Branch closures can exacerbate the problem if branches close in areas where alternative ways to access credit are more limited. There are several factors related to proximity and access to soft information which can determine credit availability, especially for SMEs and low-income households (Nguyen, 2019). Credit constraints can have a remarkable impact on investment and the development of new ideas, which can be detrimental for productivity and, ultimately, income per capita (Diallo and Al-Titi, 2017). Studies on how branches affect economic development are, however, very scarce. For the Spanish context, the evidence is restricted to the study by Pastor et al. (2017), who analyze the impact of the expansion of the saving banks in Spain in the 1990s and 2000s after the change in the regulation that enabled these banks to expand beyond their regions of origin. They report a positive impact of the number of branches on home regions' income, but not for other areas.

Against this background, the present paper focuses on the recent restructuring period. Its main objective is to assess whether branch closures are affecting regional GDP per capita in Spain. In addition,

[1] Financial inclusion is generally defined as the ability to access mainstream financial and banking services (Allen et al., 2016a) and it has been associated with long-run economic growth (Sethi and Acharya, 2018).

the paper also explores the impact on labor productivity and employment per capita, which are the two main channels leading to increased GDP per capita. This additional analysis is rarely found in the literature and can provide insights into how bank restructuring affects regional economic performance. The study is carried out for 50 Spanish provinces during the period 2008–2018. The results show that bank branches have no effect on provincial productivity and on GDP per capita. For employment, a positive but weak impact is found.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature on the topic. Section 3 introduces the data, some descriptive statistics, and the methodology. Section 4 reports the results and, finally, Section 5 concludes and provides policy implications.

2. Literature review and research hypotheses

2.1. Financial development, bank branches and regional economic performance

The links between financial development and growth are widely documented, starting by the seminal contribution by King and Levine (1993), who found strong ties between financial development and capital accumulation, efficiency and economic growth. Subsequent studies including Rajan and Zingales (1998), Levine (2005) and Buera et al. (2011) highlighted lower cost of financing for firms located in well-developed financial systems, which leads to increased economic performance. More recently, Henderson et al. (2013) provided evidence reinforcing the strong link between financial development and economic growth and Madsen and Ang (2016) pointed at innovation, savings, investment and education as the main transmission channels. These effects are seen not only at the country level, but also more locally, reinforcing the relevance of the financial sector for regional economic performance. Vaona (2008) and Guiso et al. (2009) analyzed the Italian case and concluded that local financial development is an important determinant of regional economic success, even in an environment where there are no frictions to capital movements. Carbó-Valverde et al. (2007) provided evidence for the Spanish regions, concluding that product and service delivery innovations in the financial sector have a positive influence on regional GDP, investment and gross savings.

The density of bank branches is a specific indicator of financial development for which we find comparatively fewer studies. However, it is widely agreed that branches are essential for the provision of credit to small firms and entrepreneurs, whose activities boost regional economic activity. As noted in the Introduction, GDP per capita can be decomposed into labor productivity and employment per capita. Therefore, the effect of branches on aggregate economic performance is actually channeled through these two components. Some specific links between branches and labor productivity are presented by Diallo and Al-Titi (2017), who develop a theoretical model in which a higher number of branches reduces interest rates on loans, and increases access to credit and the probability of innovation by entrepreneurs and firms. This in turn, pushes the technological frontier, increasing productivity and, ultimately, regional income per capita. These theoretical predictions are supported empirically by the authors. In contrast, Bernini and Brighi (2018) conclude for the Italian regions that an expansion in the number of branches decreases the bank's efficiency due to the greater distance between headquarters and branches. This lower efficiency has a negative impact on local economic development that is not offset by the aforementioned benefits of a larger network.

In is noteworthy to consider that, in the middle of the Digital Transition, other forms of banking with a marked digital component are appearing, increasing financial inclusion and ultimately income per capita (Kanga et al. 2022; Song and Appiah-Otoo, 2022). Nevertheless, proximity can still positively influence access to credit and lower credit prices. Back in the 1990s, Gaspar and Glaeser (1998) concluded that while technological changes had dramatically lowered the costs of transmitting and processing information, technology was not a perfect substitute for certain types of information-intensive interactions such as lending. Recently, Kärnä et al. (2021) conclude that, despite the advances of new technologies and online banking services, branches can still be important for the provision of soft information, essential for the provision of credit. Similarly, Nguyen (2019) finds that branch closure in the USA is associated with a notable decline in lending to small firms, which constitute a clear example of an information-intensive market.

Results for other contexts are along the same lines. Ho and Berggren (2020) show how branch closures in Sweden are having a negative impact on local firm formation. In particular, the greater the distance to the banks, the higher the monitoring costs. This can be especially problematic for entrepreneurs and small firms outside metropolitan areas. These arguments are supported by the theory of agglomeration economies. The idea is that proximity reduces transaction costs at all levels, including information costs (Duranton and Puga, 2004). Face-to-face interaction facilitates certain information flows and social capital. Both of these aspects are related to the concept of relationship banking, which can promote credit flows. In the same vein, Martín-Oliver (2019) argues that a denser network shortens the distance between branches and consumers, reducing the cost of acquiring soft information about the borrower's credit quality. For the Spanish case, Martín-Oliver et al. (2020) conclude that both branch closings negatively affect the operational activities of SMEs and reduce their survival chances. The reviewed studies indicate that branches foster credit availability and at a lower price, and reduce information and monitoring costs due to face-to-face interactions. These elements are facilitators of new investments and innovations, which in turn can potentially improve regional productivity.

Moreover, bank branches can be an important source of employment in large banking systems. Indeed, considering the Polish counties, Hasan et al. (2019) find that the benefits of a larger network of branches are mainly seen in the employment level, although this result can be different for other contexts, since it depends on the size of the banking sector in terms of employment.

2.2. Bank branches in the Spanish context

The literature analyzing the geography of bank branches in Spain and their territorial impact is extensive, although most of it has focused on location patterns and the impacts on banks' performance of location decisions, and not so much on the impact of branches on regional economic performance. In any case, bank branches have played a central role in Spain in recent decades, given that there have been two important restructuring processes that have heavily influenced their territorial presence.

The first one was the approval of the 1989 law that allowed saving banks to open branches outside their home territories. As a consequence, these banks doubled their branches between 1988 and 2008 (Alamá and Tortosa-Ausina, 2012). Authors such as Fuentelsaz and Gómez (1998), Fuentelsaz et al. (2004), Illueca (2009), and Illueca (2014) define the home market of saving banks in the context of the sequential removal of geographic barriers, and analyze the impact of such expansion on saving banks' productivity, among related issues. Alamá and Tortosa-Ausina (2012) conclude that the population of municipalities and income-related factors were important determinants of branch location in that period.

A second restructuring process started after the *Great Recession*, which is characterized by the opposite tendency, that is, a massive closure of branches that especially affected saving banks, which have virtually disappeared. Conesa et al. (2016) suggest that the restructuring of the savings banks sector could threat access to banking services in some regions, particularly remote and/or disadvantaged communities. Moreover, there is an impact not yet measured in terms of relationship banking. Martín-Oliver (2019) shows that the average distance between branches has increased considerably due to branch closures, complicating credit accessibility in some places. His results also indicate that municipalities with a small population, low educational attainment levels, low employment rates and a lower proportion of people over 65 years old have a higher probability of becoming branchless. Mass branch closure in large areas can lead to *banking deserts* and their inhabitants becoming financially excluded. Camacho et al. (2021) focused on the Andalusian case, showing that municipalities with low population density, an aging population and low-income level are the most affected.

However, in a previous study, Maudos (2017) concludes that there has been only a small increase in the percentage of the Spanish population with no access to a branch in their home town, although there are important disparities across regions, with Barcelona, Tarragona, Madrid, and Valencia being the provinces where the percentage of inhabitants without a branch in their home town has increased the most. The author also concludes that although related, financial accessibility and financial inclusion are not synonyms, especially nowadays with the intense development of online and phone banking services. However, it is important to remark that the use of these alternatives is strongly conditioned by the user's educational level and financial culture, as well as access to the internet and a smartphone or computer (Maudos, 2017). Therefore, differently from other developing contexts where physical presence of financial services becomes essential (see Cruz-García et al., 2021; Dircio-Palacios-Macedo et al., 2023), in a developed country such as Spain, situations of financial exclusion are not so common. In that regard, Jiménez Gonzalo and Tejero Sala (2018) show that, indeed, branch closures in Spain do not necessarily represent a situation of financial exclusion. The authors argue that there has been a remarkable increase in the use of internet and online banking that can partially offset the branch closures. That said, access to these online services is uneven among population groups. Older people living in rural areas can barely use these services. This problem is partially addressed by initiatives such as mobile branches and financial agents that regularly serve customers in places that have become branchless.

Whereas there is an extensive literature on location patterns of branches for the Spanish context, only a few studies consider the effect of branches on aggregate economic indicators. An exception is Pastor et al. (2017), who analyze the impact of the expansion of saving banks in Spain in the 1990s and 2000s after the change in the regulation that enabled these banks to expand beyond their regions of origin. They report a positive impact of the number of branches on home regions' income, but not for other areas. Cruz-García and Peiró-Palomino (2023) found a non-significant impact of branches on regional income inequality levels in recent years. However, studies analyzing how the post-crisis restructuring process might have affected income levels and components (labor productivity and employment) is, to the best of our knowledge, nonexistent. The analysis in the following sections attempts to shed some light on this issue.

2.3. Research hypotheses

Considering the previous literature on the link between branches and economic performance and the particularities of the Spanish case, where branches have historically played an important role, we set three research hypotheses. On the one hand, we might expect a positive relationship between bank branches and an aggregate indicator of economic performance such as GDP per capita:

H1: Bank branches have a positive impact on regional GDP per capita.

On the other hand, as mentioned before, the impact on GDP per capita can be explained by the effects of branches on its components, namely labor productivity and employment per capita. Regarding the first one, the literature suggests that branches facilitate the provision of credit, particularly for SMEs, which represent the 90% of the Spanish firms. In fact, 36% are actually micro-firms with less than 10 workers. Credit availability and at a reasonable cost is an essential element for the development of innovations and investments that can positively influence productivity. Accordingly:

H2: Bank branches have a positive impact on regional labor productivity.

As for the employment component in the Spanish context, branch closures can produce a reduction in employment rates if former workers in the banking industry have difficulties to find a job in other sectors. In fact, according to the Bank of Spain, branch closures generated a reduction of nearly 90,000 jobs in the Spanish banking sector in our period of analysis (2008-2018), which represents a decline of 32%. Despite the share of employment in the banking sector over the total employment is relatively modest (around 2%), physical branches are an undeniable source of employment. Therefore:

H3: Bank branches have a positive impact on regional employment rate.

3. Empirical framework

3.1. Sample and variables

The sample comprises 50 Spanish provinces over the period 2008–2018, which includes the years of the *Great Recession*, when the restructuring process began, and the subsequent years of economic recovery, during which that process has continued. Provinces correspond to the NUTS-3 level of aggregation according to the European nomenclature. There are 52 NUTS-3 regions in Spain, but the Autonomous Cities of Ceuta and Melilla, which are both NUTS-3 regions, were excluded because of their specific characteristics. The selection of the NUTS-3 aggregation level is due to a combination of data availability and economic meaning. Spanish provinces are intermediate territorial units between the higher level Comunidades Autónomas (NUTS-2 level, 17 units) and municipalities (8,131 units).

On average, provinces have around 900,000 inhabitants (although disparities between provinces are large) and have somewhere between approximately 950 (year 2008) and 500 (year 2018) bank branches. Although there are more available data for an analysis of the Comunidades Autónomas, these regions are likely too big for our research objectives. The opposite happens with municipalities; the information is remarkably limited at that level (both in terms of variables and time span), making some of our analyses unfeasible. Moreover, most municipalities are fairly small (around 62% of the Spanish municipalities have fewer than 1,000 inhabitants). Thus, although municipalities have been used as the units of analysis in studies exploring location patterns (Alamá et al., 2015; Martín-Oliver, 2019), provinces–for which data constraints are far less of an issue–have been the focus of papers studying the economic impact of branches (see Pastor et al., 2017). Considering our objectives, provinces are the units of analysis that best solve the data availability–economic meaning trade-off. They are small enough to capture specific socio-economic environments, but at the same time big enough to represent meaningful economic realities.

As for the variables used, three alternative dependent variables are considered in the econometric models: GDP per capita (constant 2015 euros, in logs) (*log(GDP pc)*), labor productivity (measured as GDP per worker in logs, constant 2015 euros) (*log(Productivity)*) and the number of employees per capita in all sectors (*Employment*), all of them retrieved from the Spanish *Instituto Nacional de Estadística* (INE). As already noted, GDP per capita can be decomposed into labor productivity and employment: $GDP/Population = GDP/Employment \text{ x } Employment/Population.$

Our variable of interest is bank branches per 100,000 inhabitants (*Branches*), the data for which come from the yearbooks of the Asociación Española de Banca (AEB), Confederación Española de Cajas de Ahorros (CECA) and Unión Nacional de Cooperativas de Crédito (UNACC). As control variables, we include a set of socio-demographic features and the economic structure of each province. These include the share of population using online banking[2] (*Online banking*), population growth (*Population growth*), population density (*Population density*), share of the agriculture sector (*Agriculture share*), share of the industrial sector (*Industry share*), all provided by INE, total years of education of the labor force (*Human capital*) in logs, and the private capital stock with respect to GDP (*Capital stock*), provided by the Instituto Valenciano de Investigaciones Económicas (IVIE). The dataset comprises 550 observations.

3.2. Descriptive statistics

Descriptive statistics for the variables of interest are reported in Table 1, highlighting marked disparities across the Spanish provinces. There has been a general decline in the number of branches per 100,000 inhabitants, most noticeably in Almería (83.22%), Valencia (60.43%) and Huesca (49.86%). In sharp contrast, Cuenca (3.17%), Ciudad Real (13.59%) and Albacete (18.33%) are the provinces with the smallest decline. Major differences are also found in GDP per capita levels. In 2018, Álava, Madrid and Guipúzcoa double those in Cádiz and Badajoz. These disparities are explained by large differentials in both labor productivity and employment. Thus, the analysis of these two components in the subsequent regression analysis can be very informative.

[2] This variable has been measured at the NUTS-2 level due to data constraints.

Table 1.
Variables of interest for the Spanish provinces, 2008 and 2018

	Branches		GDP per capita		Productivity		Employment	
Province (NUTS 3)	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**
Álava	89.783	60.511	38,173	35,137	65,338	71,595	0.584	0.491
Albacete	86.291	70.476	18,770	20,599	47,797	54,075	0.393	0.381
Alicante	86.493	45.192	18,783	19,314	48,742	52,818	0.385	0.366
Almería	216.735	36.372	20,986	19,165	46,271	48,465	0.454	0.395
Ávila	116.986	86.436	19,073	19,955	50,184	56,377	0.380	0.354
Badajoz	112.077	85.899	17,036	17,861	46,106	50,484	0.370	0.354
Baleares, Islas	116.792	65.196	25,930	28,226	51,988	62,054	0.499	0.455
Barcelona	106.583	43.802	28,611	29,705	55,373	62,198	0.517	0.478
Burgos	145.047	92.139	27,114	28,609	56,349	63,688	0.481	0.449
Cáceres	104.485	79.448	16,333	18,799	45,217	53,934	0.361	0.349
Cádiz	60.141	36.247	18,089	17,691	50,267	55,790	0.360	0.317
Castellón	96.484	42.295	23,597	27,222	49,360	63,197	0.478	0.431
Ciudad Real	91.128	78.742	20,072	20,826	50,797	56,400	0.395	0.369
Córdoba	86.002	58.453	17,485	17,999	45,719	50,031	0.382	0.360
Coruña, La	86.382	53.602	22,138	23,180	50,246	56,517	0.441	0.410
Cuenca	115.202	111.549	19,701	22,368	47,759	56,124	0.412	0.399
Girona	116.552	52.366	27,890	27,068	54,331	62,103	0.513	0.436
Granada	94.871	64.688	17,625	17,792	46,718	50,272	0.377	0.354
Guadalajara	106.398	70.387	20,840	20,059	50,311	58,906	0.414	0.341
Guipuzcoa	127.237	62.032	31,213	32,470	59,172	66,283	0.527	0.490

TABLE 1. CONT.
Variables of interest for the Spanish provinces, 2008 and 2018

	Branches		GDP per capita		Productivity		Employment	
Province (NUTS 3)	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**
Huelva	70.484	51.930	18,655	19,839	49,557	55,878	0.376	0.355
Huesca	206.418	103.490	27,332	27,195	54,583	59,473	0.501	0.457
Jaén	95.589	71.932	16,703	17,996	46,607	53,039	0.358	0.339
León	103.559	78.491	20,418	20,983	52,428	57,072	0.389	0.368
Lleida	133.295	73.926	28,651	27,450	55,820	60,193	0.513	0.456
Rioja, La	137.952	96.302	26,205	26,471	56,142	60,553	0.467	0.437
Lugo	98.158	71.229	19,937	22,576	47,068	56,284	0.424	0.401
Madrid	100.835	47.780	32,370	34,169	58,878	65,494	0.550	0.522
Málaga	76.123	41.009	18,275	18,383	46,467	49,489	0.393	0.371
Murcia	77.203	43.490	20,584	20,520	45,875	49,411	0.449	0.415
Navarra	123.312	74.588	30,113	30,106	57,287	63,834	0.526	0.472
Ourense	109.789	62.400	18,799	21,423	46,976	59,964	0.400	0.357
Asturias	88.044	61.464	22,271	21,996	53,421	57,303	0.417	0.384
Palencia	114.728	72.824	24,941	26,450	57,452	61,226	0.434	0.432
Palmas, Las	71.213	35.522	20,486	20,650	47,623	53,477	0.430	0.386
Pontevedra	85.693	48.738	21,240	21,940	47,401	55,425	0.448	0.396
Salamanca	113.468	72.706	19,469	20,679	48,937	52,324	0.398	0.395
Santa Cruz de Tenerife	69.388	43.102	20,640	21,263	51,430	54,263	0.401	0.392
Cantabria	83.485	56.357	22,981	23,024	52,075	58,722	0.441	0.392
Segovia	127.518	80.865	22,591	21,682	49,901	52,858	0.453	0.410
Sevilla	88.085	43.765	19,960	19,819	48,914	54,187	0.408	0.366

Table 1. cont.
Variables of interest for the Spanish provinces, 2008 and 2018

	Branches		GDP per capita		Productivity		Employment	
Province (NUTS 3)	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**
Soria	169.051	117.381	23,698	26,130	50,176	57,163	0.472	0.457
Tarragona	102.168	47.368	27,811	30,017	56,810	71,765	0.490	0.418
Teruel	164.703	136.730	25,753	24,332	55,416	58,787	0.465	0.414
Toledo	106.535	72.302	19,602	18,129	47,307	54,109	0.414	0.335
Valencia	114.462	45.291	23,157	22,564	51,079	56,179	0.453	0.402
Valladolid	93.947	58.671	24,109	26,186	50,792	56,790	0.475	0.461
Vizcaya	84.001	58.280	29,369	30,524	59,538	67,096	0.493	0.455
Zamora	139.437	103.123	18,311	19,271	50,720	55,144	0.361	0.349
Zaragoza	113.365	64.934	26,720	27,854	53,481	59,271	0.500	0.470

Notes: Branches: Number of branches per 100,000 inhabitants. GDP per capita and Productivity are measured in constant 2015 euros. Employment: Employees per capita. GDP per capita (GDP/Population) can be decomposed into Productivity (GDP/Employment) x Employment (Employment/Population).

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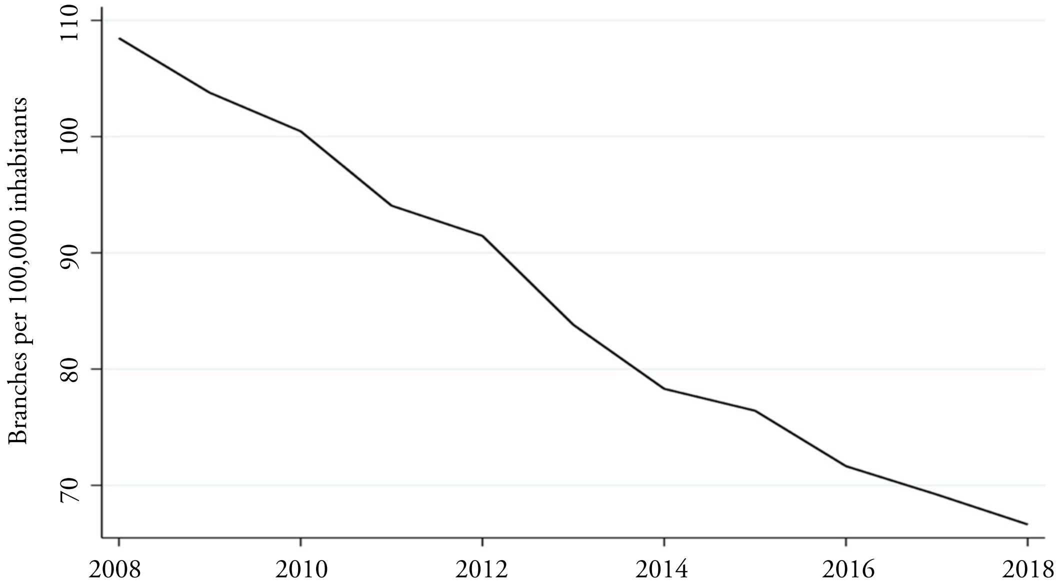
Figure 1 (a) shows the evolution of the number of bank branches considering average data for Spain, showing a sharp and unchecked drop from 2008 to 2018. The average number of bank branches per 100,000 inhabitants in 2008 was 108, while in 2018 it was 67, which represents a reduction of 61.2%. Figure 1 (b) compares the kernel density of the number of branches in 2008 and 2018. As can be seen, the density in 2018 has shifted to the left, indicating a lower number of branches. Figure 2 complements that information, mapping the number of bank branches per 100,000 inhabitants for the years 2008 and 2018. According to the maps, the density of branches has been heterogeneous. In 2008, a north-south divide is observed, with the northern provinces displaying a denser branch network than the southern ones (with the exception of Almería). This is in line with Alamá et al. (2015), whose results reveal a greater degree of over-branching (an excessive number of branches with respect to the population) for northern provinces.

FIGURE 1.
Bank branches per 100,000 inhabitants in Spain (2008–2018)

a) Evolution



b) Kernel densities

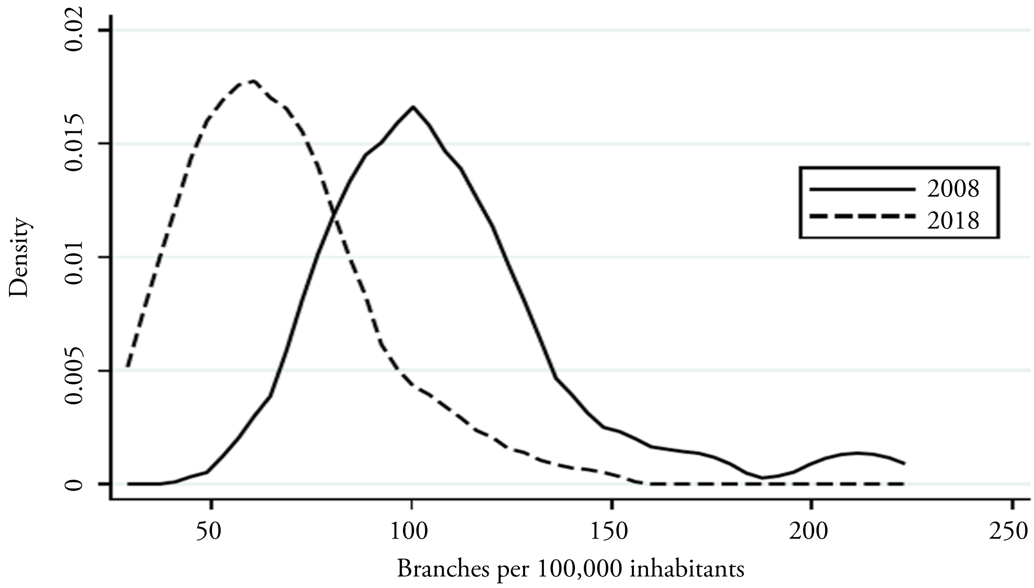
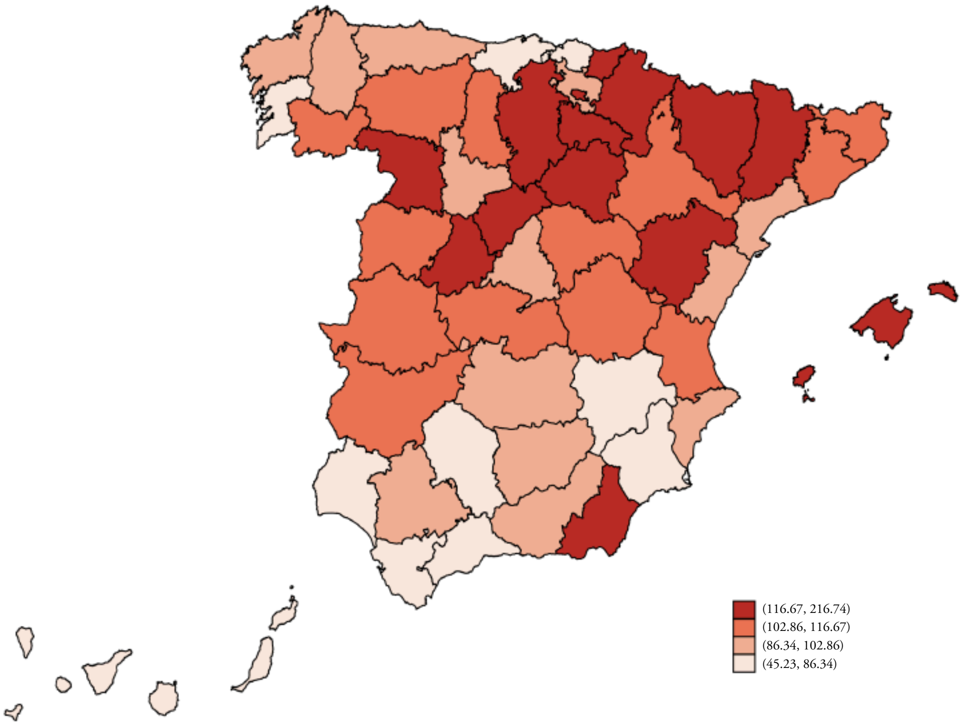
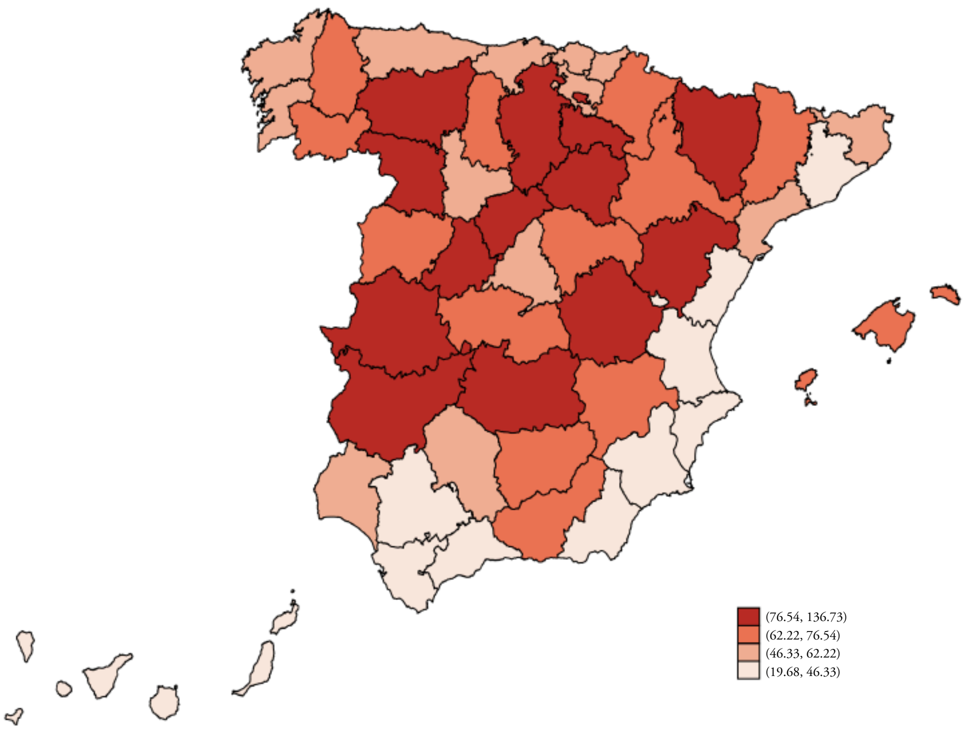


FIGURE 2.
Bank branches per 100,000 inhabitants in the Spanish provinces, 2008 and 2018

a) 2008



b) 2018



In 2018, the decline is striking, especially along the Mediterranean coast, whereas the interior provinces have a comparatively denser branch network (although the decline in absolute terms has been also noticeable). Although not directly observed in the maps, there are two different mechanisms explaining this phenomenon. On the one hand, there is the marked reduction in the absolute number of branches due to the restructuring process, which has occurred in all provinces, but has been particularly intense in some coastal areas. On the other hand, there is the economic crisis, which triggered important population movements from inland territories to coastal areas and the capital, Madrid. As a result, inland territories became sparsely populated areas, meaning the ratio of branches per 100,000 inhabitants tends to be comparatively higher in those areas.

Table 2 reports some information for all the variables included in the analysis. The average number of branches per 100,000 inhabitants in the period 2008-2018 is 85.84. However, the number of branches is very uneven between provinces and years, with a minimum of 35.52 (Las Palmas in 2018) and a maximum of 216.74 (Almería in 2008). Table 3 contains a correlation matrix. It shows that *Branches*, *log(GDPpc)* and *Employment* are positively correlated. However, the correlation of *Branches* with *log(Productivity)* is negative. Figure 3 considers average data (2008–2018) and displays scatter plots of the number of branches against the three outcome variables. In line with the correlation matrix, the link is positive but notably weak for *log(GDPpc)* and *Employment* (0.082 and 0.175, respectively), and not different from zero for *log(Productivity)*. Therefore, this preliminary descriptive analysis has shown that the restructuring process has been intense, but the impact on regional performance has apparently been fairly weak.

TABLE 2.
Descriptive statistics

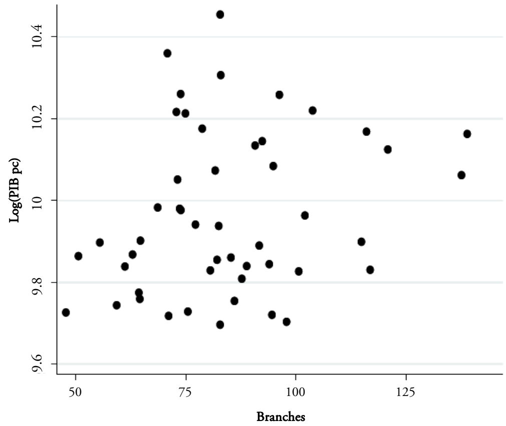
	Obs.	Mean	Std. Dev.	Minimum	Maximum
log(GDP pc)	550	9.970	0.200	9.585	10.549
log(Productivity)	550	10.917	0.091	10.719	11.188
Employment	550	0.391	0.053	0.288	0.584
Branches	550	85.840	27.712	35.521	216.735
Online banking	550	31.155	10.650	10.160	62.490
Population growth	550	0.0007	0.010	-0.039	0.061
log(Human capital)	550	2.341	0.061	2.158	2.514
Population density	550	129.569	167.061	8.590	819.332
Agriculture share	550	0.075	0.053	0.000	0.310
Industry share	550	0.165	0.062	0.040	0.340
Capital stock	550	0.179	0.061	0.083	0.624

TABLE 3.
Correlation matrix

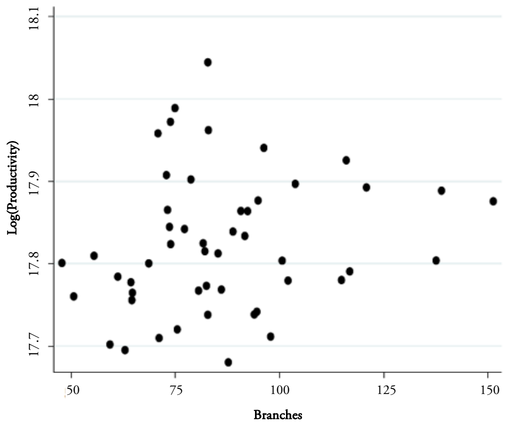
	log(GDP pc)	log(Productivity)	Employment	Branches	Online banking	Population growth	log(Human capital)	Population density	Agriculture share	Industry share	Capital stock
log(GDP pc)	1.000										
log(Productivity)	0.817	1.000									
Employment	0.923	0.540	1.000								
Branches	0.165	-0.044	0.270	1.000							
Online banking	0.421	0.622	0.198	-0.483	1.000						
Population growth	0.165	-0.177	0.377	0.148	-0.390	1.000					
log(Human capital)	0.613	0.627	0.485	-0.308	0.620	-0.089	1.000				
Population density	0.360	0.292	0.350	-0.354	0.283	0.186	0.390	1.000			
Agriculture share	-0.401	-0.465	-0.290	0.276	-0.237	-0.189	-0.495	-0.537	1.000		
Industry share	0.591	0.513	0.527	0.346	0.033	0.070	0.274	-0.097	-0.255	1.000	
Capital stock	0.024	-0.182	0.148	0.448	-0.424	0.247	-0.382	-0.248	0.203	0.187	1.000

FIGURE 3.
Bank branches per 100,000 inhabitants in Spanish provinces, GDP pc, productivity and employment (average 2008–2018)

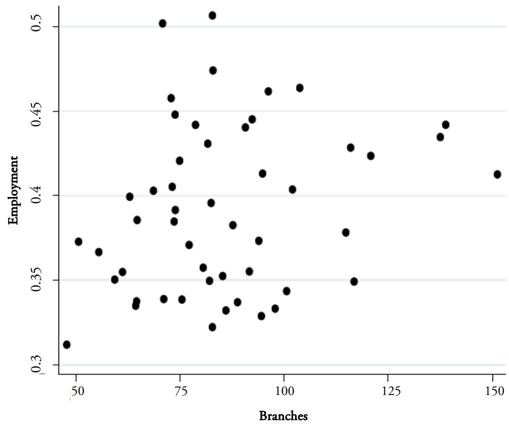
a) log(GDP pc)



b) log(Productivity)



c) Employment



3.3. Model and econometric strategy

The empirical approach consists of regressing each of the outcome variables–namely, *log(GDP pc)*, *log(Productivity)* and *Employment*–on the variables described in the previous subsection. The econometric specification is based on a Neoclassical growth model in line with Mankiw et al. (1992). This baseline model is augmented with financial development variables (branches and online banking users) and other variables capturing the regional economic and demographic features, analogously to Henderson et al. (2013), Pastor et al. (2017) and Arribas et al. (2020). All the models are panel data estimations and include province fixed effects and time effects. The former are aimed at capturing time invariant features that are not explicitly captured by our variables, while the latter reflect common shocks in every sample year. These effects are included in an effort to mitigate endogeneity biases due to omitted variables, and to isolate the impact of particular economic shocks such as the economic crisis, with a remarkable impact on the economic indicators used as dependent variable. In formal terms:

$$\begin{aligned} \mathrm{Y}_{it} &= \beta_0 + \beta_1 \text{Branches}_{it} + \beta_2\, Online\ banking_{it} + \beta_3 \text{Population growth}_{it} + \\ &+\beta_4 \text{Human capital}_{it} + +\beta_5 \text{Population density}_{it} + \beta_6 \text{Agriculture share}_{it} \\ &+\beta_7 \text{Industry share}_{it} + \beta_8 Capital\ stock_{it} + \ \varepsilon_i + \alpha_t + u_{it} \end{aligned} \tag{1}$$

where Y_{it} is one of the three dependent variables, ε_i and α_t stand for province and time fixed effects, respectively, and u_{it} is the error term of the model. The rest of the variables have been described in the previous section and the different β represent their associated model parameters.

Apart from omitted variables, endogeneity can also arise due to reverse causality. We argue that the use of levels in the dependent variable instead of growth rates can prevent that problem to some extent. If the decision to close branches is related to the economic situation, the economic cycle (growth rates) is likely to be more closely related to banks' decisions than the wealth level of the province, which is reflected by the GDP pc level and its components. In other words, whereas negative economic conditions can lead to the decision to close branches, being poor or rich is probably less related.

In any case, in an ideal scenario this problem should be addressed using an external instrument. Unfortunately, this is a considerable challenge. As argued by Ho and Berggren (2020) in a fairly similar context, finding appropriate instruments that are correlated with the endogenous explanatory variable but uncorrelated to the error term is a difficult task. In addition, our variable of interest is not the only variable which can be considered endogenous. As stated by Rodríguez-Pose and Zhang (2019), dealing with multiple and simultaneous endogeneities is not simple and renders instrumental variable analysis practically infeasible. While not free from criticism, a common alternative in the growth literature is the use of dynamic panel analysis, through a system generalized methods of moments (GMM) (Rodríguez-Pose and Zhang, 2019). Crespo et al. (2021) and Hasan et al. (2019) are two examples of studies that use GMM in similar contexts. Accordingly, we performed the two-step dynamic panel system GMM estimator developed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). In addition, this approach is able to capture the inertial effects of the dependent variable by incorporating its lagged value as an explanatory variable.

Moreover, aggregate economic indicators are generally spatially correlated. In order to accommodate these spillovers, spatial SARAR models are estimated. These models are a combination of the Spatial Lag Model (SAR) and the Spatial Error Model (SEM). They allow to account for spatial spillovers in both the dependent variable and the error term. Formally:

$$\begin{gathered} \mathrm{Y}_{it} = \beta_0 + \beta_1 \text{Branches}_{it} + \beta_2\, \mathit{Online\ banking}_{it} + \beta_3 \text{Population growth}_{it} + \\ + \beta_4 \text{Human capital}_{it} + \beta_5 \text{Population density}_{it} + \beta_6 \text{Agriculture share}_{it} \\ + \beta_7 \text{Industry share}_{it} + \beta_8\, \mathit{Capital\ stock}_{it} + \lambda W \mathrm{Y}_{it} + \varepsilon_i + \alpha_t + u_{it} \\ u_{it} = \rho W u_{it} + e \end{gathered} \tag{2}$$

where W is the spatial matrix defining the neighborhood so that:

$$W = \begin{cases} w_{ij(k)} = 0, i = j \\ w_{ij(k)} = 0, i \neq j, i \notin nb\, j(k) \\ w_{ij(k)} = \frac{1}{k}, i \neq j, i \in nb\, j(k) \end{cases}$$

where, *i* and *j* are two given regions, *nb* denotes the neighborhood, and k stands for its extension. Among the different possibilities to define *W*, we implemented the *k*-nearest criterion, considering as neighbors the four closest provinces (*k*=4). This matrix ensures simplicity and notable accuracy to capture spatial dependency. Accordingly, pairs of provinces ij inside the neighborhood are assigned a value of 1 in the matrix, and 0 otherwise. Then the matrix is row-standardized so that all the rows sum to one (see for technical details, LeSage and Pace, 2009). Finally, λ and ρ are the parameters associated to the spatial spillovers in the dependent variable and the error term, respectively.

4. Empirical results

4.1. Baseline estimations

The correlation matrix in Table 3 shows that there is a strong correlation between some of the control variables and the variable of interest. The Variance Inflation Factor (VIF) reaches a value of 16.44. In order to determine the extent to which such correlations might affect the coefficient for branches, we run two different sets of models for each dependent variable. In the first one, only the variable of interest is included. In the second one, all the controls are incorporated. All the models include province and time effects. The results of the estimations are shown in Table 4. As can be observed, bank branches are non-significant in all cases. The size and significance of the coefficient are not altered when the control variables are included in the model, thus indicating that the results are not driven by high correlations among the included variables. Therefore, the empirical results do not support hypothesis one (H1), which suggested a positive impact of bank branches on regional income per capita in Spain. Analogous results are found for *Productivity*. Accordingly, our second hypothesis (H2) is not supported by the data. The last two columns report the results for *Employment*. In that case, in line with Hasan et al. (2019), a positive effect is found, which is robust to the inclusion of the control variables, and giving support to our third hypothesis (H3). The effect, though, is rather small.

Our estimations also provide some insights into the impact of other drivers of economic performance included as control variables. Regarding the *Capital stock*, which captures the investment rate over GDP, the impact is nonsignificant. For *Population growth*, a positive sign is found for *GDP pc*, which is fueled by the positive effect on *Employment* that largely offsets the negative impact on *Productivity*. This result is to be expected for Spain, a country that has relied heavily on employment to generate growth in the analyzed period. The results for *Population density* are more mixed, but mostly non-significant. In contrast, *Human capital* appears as an important booster of employment.

As for the variables capturing the economic fabric of the Spanish provinces, *Agricultural share* is negatively associated with *Productivity*, as is to be expected of a sector that is less exposed to international competition and generates relatively lower value added. In contrast, *Industry share* is not significant. These effects have to be interpreted in relation to *Services share*, which is the omitted category in our model to avoid perfect collinearity.

Our models also incorporate the share of users of online banking services (*Online banking*) in order to control for the advance of digitalization in the banking sector. As discussed in the literature review, the increasing use of digital banking can, to some extent, explain the non-significant impact of branches on regional economic performance. The results indicate a positive effect for online banking, which manifests via increases in productivity, as it can reduce transaction costs and speed up operations. However, its impact on employment is negative. This would imply that online banking would be replacing the role of bank branches but logically less employees are needed.

Table 4.
Results, baseline estimations

	Dependent variable					
	log(GDP pc)		log(Productivity)		Employment	
Branches	0.0003 (0.0002)	0.0002 (0.0002)	-0.0000 (0.0002)	-0.0001 (0.0002)	0.0002*** (0.0000)	0.0001** (0.0000)
Online banking		0.0016* (0.0009)		0.0025*** (0.0009)		-0.0006*** (0.0002)
Population growth		0.9103** (0.4495)		-0.2670 (0.2640)		0.4886*** (0.1539)
log(Human capital)		0.0877 (0.1321)		-0.1173 (0.1098)		0.0961** (0.0402)

Table 4. cont.
Results, baseline estimations

	Dependent variable					
	log(GDP pc)		log(Productivity)		Employment	
Population density		-0.0021* (0.0012)		-0.0003 (0.0007)		-0.0008 (0.0005)
Agriculture share		-0.1370 (0.0868)		-0.2414*** (0.0844)		0.0278 (0.0231)
Industry share		-0.0755 (0.1001)		0.0251 (0.0734)		-0.0241 (0.0327)
Capital stock		0.0154 (0.0759)		0.0196 (0.0561)		-0.0099 (0.0210)
Intercept	9.9840*** (0.0263)	10.0412*** (0.3729)	10.8438*** (0.0181)	11.1303*** (0.2888)	0.4235*** (0.0052)	0.3116** (0.1247)
N	550	550	550	550	550	550
R2 within	0.7550	0.7755	0.7625	0.7883	0.8785	0.9003
F	157.5000***	131.7153***	55.0400***	52.1466***	213.1800***	247.2062***
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

The R are notably high in all models due to the inclusion of two-way fixed effects. Thus, we expect that the fixed effects are to some extent preventing biases due to omitted variables in our models. This is particularly important in our setting (NUTS-3 regions), for which the amount of available information is more limited than for higher levels of regional aggregation. Our results are difficult to compare with previous findings, given that analyses considering our period have analyzed branch location and financial exclusion, but not impacts on economic performance. In any case, our results do not support those reported by Pastor et al. (2017) for previous periods. This may suggest that although branches have been important for the Spanish regional development in the past, they have not been as relevant in more recent years.

We also provide results for different types of banks, distinguishing between commercial banks, saving banks, and cooperative banks. The results for the three dependent variables are reported in Table 5. In all cases, the main results hold, suggesting no significant differences on the impact of branches of banks of different nature. The general non-significant effect of the three types of banking firms suggests that competition among them has not apparently influenced the results.[3] The only noticeable difference is in terms of employment, as only cooperative branches show a significant (positive) association.

[3] A specific analysis of how competition among the three types of banks might have influenced banking performance and how this could have ultimately affected aggregate macroeconomic indicators is beyond the scope of this paper, but can be the object of a future research.

TABLE 5.
Results for different types of banks

	Dependent variable								
	log(GDP pc)			log(Productivity)			Employment		
Comercial banks branches	0.0010 (0.0009)			0.0004 (0.0013)			0.0002 (0.0004)		
Saving banks branches		-0.0002 (0.0005)			-0.0004 (0.0006)			0.0002 (0.0001)	
Credit cooperatives branches			0.0002 (0.0002)			0.0000 (0.0001)			0.0001* (0.0001)
Online banking	0.0017* (0.0009)	0.0016* (0.0009)	0.0015* (0.0009)	0.0025*** (0.0009)	0.0025*** (0.0009)	0.0025*** (0.0009)	-0.0005** (0.0002)	-0.0006** (0.0002)	-0.0006** (0.0002)
Population growth	0.9616** (0.4387)	0.9761** (0.4533)	0.9289** (0.4453)	-0.2702 (0.2636)	-0.2106 (0.2574)	-0.2793 (0.2666)	0.5140*** (0.1473)	0.4851*** (0.1581)	0.5049*** (0.1520)
log(Human capital)	0.0790 (0.1343)	0.0806 (0.1396)	0.0813 (0.1319)	-0.1226 (0.1099)	-0.1358 (0.1145)	-0.1189 (0.1082)	0.0957** (0.0400)	0.1042** (0.0410)	0.0940** (0.0403)
Population density	-0.0022* (0.0012)	-0.0022* (0.0012)	-0.0021* (0.0012)	-0.0003 (0.0007)	-0.0004 (0.0008)	-0.0003 (0.0007)	-0.0008 (0.0005)	-0.0008 (0.0005)	-0.0008 (0.0005)
Agriculture share	-0.1640* (0.0853)	-0.1572* (0.0857)	-0.1281 (0.0930)	-0.2342*** (0.0828)	-0.2292*** (0.0842)	-0.2305*** (0.0857)	0.0107 (0.0227)	0.0107 (0.0232)	0.0257 (0.0247)
Industry share	-0.0629 (0.0987)	-0.0769 (0.1004)	-0.0807 (0.1003)	0.0286 (0.0747)	0.0193 (0.0749)	0.0241 (0.0733)	-0.0207 (0.0327)	-0.0211 (0.0330)	-0.0260 (0.0327)
Capital stock	0.0124 (0.0809)	0.0014 (0.0773)	0.0113 (0.0785)	0.0246 (0.0594)	0.0113 (0.0557)	0.0230 (0.0579)	-0.0145 (0.0190)	-0.0114 (0.0200)	-0.0139 (0.0202)
Intercept	10.0521*** (0.3613)	10.1119*** (0.3920)	10.0773*** (0.3613)	11.1162*** (0.2844)	11.2074*** (0.3117)	11.1215*** (0.2805)	0.3260*** (0.1209)	0.2978** (0.1316)	0.3344*** (0.1236)
N	550	550	550	550	550	550	550	550	550

TABLE 5. CONT.
Results for different types of banks

	Dependent variable								
	log(GDP pc)			**log(Productivity)**			**Employment**		
R^2 within	0.7763	0.7750	0.7758	0.7884	0.7904	0.7881	0.8982	0.8988	0.8991
F	125.7400***	124.5100***	142.1300***	53.1900***	55.4300***	52.6100***	174.5700***	195.9200***	192.8400***
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.2. Sensitivity analysis: endogeneity and spatial spillovers

The inclusion of two-way fixed effects could partially solve the problem of endogeneity due to omitted variable bias, but it is less powerful when it comes to controlling for other sources of endogeneity, such as reverse causality. In light of the previous results, a reverse causality problem is certainly not expected, given that correlations between branches and the three outcome variables are barely significant. Thus, there is no apparent statistical relationship between them. In any case, in order to ensure the robustness of our baseline estimations, we conduct an instrumental variable analysis. As discussed in Section 3.3., the difficulty of finding appropriate external instruments prompted us to estimate the models using the GMM estimator.

Table 5 reports the results. All the estimations satisfy both the statistical test that rejects second–order serial correlation[4] and the Hansen test for over–identifying restrictions (which tests the overall validity of the instruments), as can be seen at the bottom of the table. This estimation procedure also allows for the inclusion of the lagged dependent variable in the models to measure the inertia. This variable is always statistically significant. As for the density of bank branches, the results indicate a non-significant impact in all three cases. The baseline results are thus confirmed for *log(GDP per capita)* and *log(Productivity)*, but *Employment* loses significance. We therefore conclude that the significant result obtained for this latter variable in the original analysis is rather weak.

As explained in Section 3.3., we also take into account the existence of spatial spillovers by estimating SARAR models, whose main results are reported in the last three columns of Table 5. As can be observed, the main results remain virtually unaltered. Branches become again significantly related to *Employment*, as in the baseline models, but the effect is not finally transferred to *GDP pc*. The impact of online banking is positive and significant, in line with the non-spatial models. This effect is channeled via increased productivity, for which there is a clear positive coefficient that counterbalances the negative effects of online banking on the employment rate. The estimations also reveal the importance of spatial spillovers. The λ parameter, capturing the strength of these spillovers for the dependent variable is positive and significant for the three specifications, being stronger for *GDPpc* and *Employment*. The ρ parameter measures the size of the spatial spillovers embedded in the error term. In this case, the parameter is negative and significant in the *GDPpc* and *Employment* models, and non-significant for *Productivity*.[5] This implies that for the three dependent variables, positive (negative) impacts have positive (negative) spillovers for the neighbor regions, i.e. the spatial autocorrelation is positive. In contrast, the spatial component embedded in the error term suggests that the unknown elements that it includes present a negative spatial autocorrelation across provinces. The unobserved nature of the error components makes unfeasible to attribute such effect to a specific element. In any case, the incorporation of a spatial component in the error term pursues increasing the efficiency of the estimates and not an economic interpretation.

The coefficients provided in Table 5 cannot be directly interpreted as impacts. Given the nature of the SARAR models, it is necessary to compute direct, indirect and total effects. The inclusion of spatial parameters in the model implies that changes in one of the explanatory variables in a given province have effects not only on that province, but also on the neighbor provinces. There are also feedback effects, that is, the effects on the neighbors will finally affect the province where changes originally took place. Table 6 reports the average direct, indirect and total impacts, considering all provinces and years. The direct effect is the average response of the dependent variable to changes of the independent variables in the same province, after considering feedback effects from the neighborhood. Indirect effects summarize the average response of the dependent variable to changes of the independent variables in the neighbor regions. The total effects are the aggregation of direct and indirect effects.[6] The coefficients obtained for bank branches are similar in the baseline and the spatial models, meaning that the non-significance of branches in the baseline models is not driven by the presence of spatial spillovers.

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[4] By construction, the error term will have first–order serial correlation.

[5] To check the sensitivity of the results to the specification of the *W* matrix, besides considering *k*=4, the models were estimated using *k*=5, *k*=6, and a distance-based *W*, in which neighbors are provinces in a radius of 120 km. In all cases, the main results hold. These results were not included for space reasons but can be provided on request.

[6] For technical details, see LeSage and Pace (2009).

TABLE 6.
Sensitivity analyses: endogeneity and spatial spillovers

	GMM estimations			Spatial SARAR estimations		
	log(GDP pc)	**log(Productivity)**	**Employment**	**log(GDP pc)**	**log(Productivity)**	**Employment**
log(GDP pc)$_{t-1}$	0.7036*** (0.0967)					
log (Productivity)$_{t-1}$		0.3326** (0.1340)				
Employment$_{t-1}$			0.6485*** (0.1139)			
Branches	0.0000 (0.0004)	0.0001 (0.0004)	-0.0001 (0.0001)	0,0001 (0.0001)	-0,0001 (0.0001)	0.0001*** (0.0001)
Online banking	0.0053* (0.0030)	0.0047** (0.0018)	0.0003 (0.0008)	0.0011** (0.0004)	0.0021*** (0.0004)	-0.0004*** (0.0001)
Population growth	-2.9890*** (1.0544)	0.6913 (1.2585)	-0.8376** (0.3545)	0.4099** (0.1659)	-0.2549* (0.1459)	2.7392*** (0.0497)
log(Human capital)	0.6232* (0.3469)	0.1703 (0.1467)	0.2547** (0.1013)	0,0471 (0.0647)	-0.1176** (0.0564)	0.0834*** (0.0187)
Population density	0.0000 (0.0001)	-0.0000 (0.0001)	0.0001 (0.0000)	-0.0024*** (0.0004)	-0,0003 (0.0004)	-0.0009*** (0.0001)
Agriculture share	0.0559 (0.2484)	-0.1513 (0.1464)	0.1740*** (0.0597)	-0.1568** (0.0665)	-0.2419*** (0.0577)	0.0321* (0.0189)
Industry share	0.4805** (0.2293)	0.3138** (0.1190)	0.1086 (0.0667)	-0.1245* (0.0727)	0,0026 (0.0612)	-0,0085 (0.0209)
Capital stock	0.2687* (0.1602)	0.2403** (0.1027)	0.0594** (0.0257)	0,0299 (0.0262)	0,0179 (0.0221)	-0,0023 (0.0076)

Table 6. cont.
Sensitivity analyses: endogeneity and spatial spillovers

	GMM estimations			Spatial SARAR estimations		
	log(GDP pc)	log(Productivity)	Employment	log(GDP pc)	log(Productivity)	Employment
Intercept	1.2438 (0.8218)	6.6599*** (1.4758)	-0.5060** (0.2112)	5.883*** (0.1800)	7.4976*** (0.1476)	0.1150** (0.0527)
N	500	500	500	550	550	550
AR(1) test [p-value]	-2.63 [0.0080]	-3.16 [0.0020]	-3.61 [0.0000]			
AR(2) test [p-value]	-0.67 [0.5060]	-0.15 [0.8830]	-1.05 [0.2950]			
Hansen test [p-value]	36.35 [0.3600]	41.74 [0.6510]	38.80 [0.1060]			
ρW [p-value]				-0.67 [0.0000]	-0.28 [0.1289]	-0.80 [0.0000]
λW [p-value]				0.42 [0.0000]	0.34 [0.0130]	0.50 [0.0000]

Notes: Robust standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01. The models include fixed and time effects. **ρ** and **λ** denote the strength of the spatial spillovers in the error term and the dependent variable, respectively. W is the neighbor matrix, defined with the k-nearest criterion using k=4.

Table 7.
Direct, indirect and total effects from the spatial models

	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Branches	0.0001 (0.0001)	0.0000 (0.0001)	0.0001 (0.0002)	-0.0001 (0.0001)	-0.0000 (0.0001)	-0.0001 (0.0001)	0.0001*** (0.0000)	0.0001** (0.0000)	0.0002*** (0.0001)
Online banking	0.0011*** (0.0004)	0.0008* (0.0004)	0.0019** (0.0008)	0.0022*** (0.0005)	0.0010 (0.0006)	0.0032*** (0.0009)	-0.0004*** (0.0001)	-0.0004*** (0.0002)	-0.0008*** (0.0003)
Population growth	0.4291*** (0.1555)	0.2881* (0.1658)	0.7173** (0.3006)	-0.2617* (0.1557)	-0.1231 (0.1163)	-0.3848 (0.2517)	0.2930*** (0.0538)	0.2571*** (0.0866)	0.5501*** (0.1298)
log(Human capital)	0.0493 (0.0658)	0.0331 (0.0484)	0.0825 (0.1123)	-0.1207* (0.0583)	-0.0568 (0.0494)	-0.1775* (0.0973)	0.0892*** (0.019)	0.0783*** (0.0265)	0.1674*** (0.0423)

TABLE 7. CONT.
Direct, indirect and total effects from the spatial models

	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Population density	-0.0025*** (0.0005)	-0.0017** (0.0008)	-0.0042*** (0.0011)	-0.0003 (0.0003)	-0.0001 (0.0002)	-0.0004 (0.0006)	-0.0009*** (0.0001)	-0.0008*** (0.0002)	-0.0017*** (0.0003)
Agriculture share	-0.1642** (0.0691)	-0.1103*** (0.0679)	-0.2745** (0.1299)	-0.2484*** (0.0620)	-0.1168 (0.0814)	-0.3653*** (0.1214)	0.0343 (0.0221)	0.0301 (0.0230)	0.0644 (0.044)
Industry share	-0.1303* (0.0686)	-0.0875 (0.0668)	-0.2178* (0.1294)	0.0027 (0.0603)	0.0013 (0.0325)	0.0039 (0.0911)	-0.0091 (0.0217)	-0.0080 (0.0195)	-0.0170 (0.0408)
Capital stock	0.0313 (0.0301)	0.0210 (0.0262)	0.0523 (0.054)	0.0184 (0.0225)	0.0086 (0.0130)	0.0270 (0.0339)	-0.0025 (0.0080)	-0.0022 (0.0078)	-0.0047 (0.0157)

Notes: Simulated standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

5. Conclusions and policy implications

The Spanish banking system was severely hit by the *Great Recession* of 2008. As a response to the crisis, the banking system underwent a profound restructuring characterized by mergers and acquisitions, and accompanied by the closure of hundreds of branches. It is important to mention though, that branch closures are reducing financial accessibility, but differently to developing countries, this is not necessarily driving to situations of financial exclusion if people can access to bank services through other channels or driving short distances.

This paper has analyzed whether these closures have had any impact on regional economic performance in the decade 2008–2018, also distinguishing by effects on labor productivity and employment per capita. The results suggest that the closure of branches is not having an effect on aggregate regional output, finding only a weak impact on employment. There are some potential, non-exclusive explanations for this.

First, the numerous branch closures do not actually result in the financial exclusion of many people. Maudos (2017) shows that only a small proportion of people live in areas without any branch at all and, even if this is the case, the nearest branch is still relatively close. The adjustment could thus be correcting a problem of over-branching in some regions (Alamá et al., 2015), generated by the huge expansion of saving banks during the 1990s and the 2000s. Second, while poorly educated, low-income households may actually be excluded, these groups contribute less to increases in productivity and growth. Third, it is possible that new entrepreneurs, particularly those in the most productive sectors, are more familiar with digital technologies and can obtain financial resources from alternative sources such as digital banking or even new instruments such as crowdfunding (Cumming et al., 2019; Martínez-Cháfer et al., 2023). In fact, the share of users of online banking services is a positive predictor of GDP pc in our models, channeled via higher productivity. Fourth, the reduction of branches actually has a negative impact on aggregate output, which can be offset by an increase in bank efficiency (Bernini and Brighi, 2018); this compensation would yield a non-significant effect in the econometric models. And fifth, despite the fact that Pastor et al. (2017) found a positive effect of branches on provincial income per capita for a previous period, the province level might no longer be the appropriate unit of analysis to detect such an impact. In that respect, we are heavily constrained by the Spanish administrative aggregation system and, more importantly, by the availability of data needed to carry out the analysis.

Our results have important implications for regional policies. First, the fact that branch closures are not having a significant impact on regional economic performance should alleviate, at least partially, some recent concerns regarding the risk of financial exclusion and its negative consequences. This study has provided a nuanced analysis, exploring the impact of branches on the two main drivers of GDP per capita, namely the employment rate and labor productivity levels.

Regarding policies for the employment channel, it is important to consider the potential negative effects of branch closures on jobs. Our estimations show that the branch density can be related to the employment rate, although the coefficient is rather small. This might suggest that the workers being made redundant are finding jobs in other sectors. Also, a substantial proportion of workers close to retirement age have opted for early retirement, encouraged by substantial compensation packages offered by the banks. In any case, the bank restructuring is still ongoing and regional policies should be aimed at requalifying and readapting former workers of the banking industry to the new reality that emerges with the Digital Transition.

As for the labor productivity channel, both the non-significant impact of branches and the positive influence of online banking should guide the future of regional policies. As mentioned, regions are now involved in the Digital Transition. The increasing use of online banking services is a direct consequence of this, and a non-negligible proportion of the EU Next Generation Funds are precisely oriented to improve digitalization in the European territories. Accordingly, policies should reinforce the advance of digitalization to boost regional productivity, particularly in rural provinces where digitalization levels are comparatively lower.

However, whereas digitalization seems to be related to increased productivity, such process can also exacerbate the existent disparities if regions differ in their technological readiness (Maucorps et al., 2022; 2023). Without the appropriate policies, the decrease in the number of branches can increase inequality in the years to come, since the poorest households or poorly educated people likely have no access to the new technologies or may struggle to understand financial products and secure credit via online. In addition, both the financial illiteracy of these more vulnerable people and the difficulty for banks to verify their information can exacerbate a problem of information asymmetry and distrust between parties, which can make it impossible to carry out credit operations that would have been possible in a face-to-face interaction.

Policies should then be aimed at bridging this gap through comprehensive digital literacy programs. Equitable access to technology can become a key driver for economic development, which channels through increased productivity. Therefore, improving technological readiness and fostering digital literacy are paramount to preventing the emergence of a digital divide that could leave certain individuals or communities behind in the midst of the ongoing digital transition. In parallel, it could be worth providing basic financial services in local stores or petrol stations in branchless places (Martín-Oliver, 2019), which would be particularly important for people with mobility restrictions. Another alternative in that direction is the use of mobile branches, such as bus-based branches, which can access rural areas that have become branch deserts and have low technological readiness.

All in all, the general conclusion of our analysis is that the density of bank branches is apparently unrelated to regional economic performance, which may imply that the rapid advance of digitalization–a phenomenon that is sure to speed up in the near future following, is actually eliminating the distance, at least in sufficiently developed countries such as Spain. Testing the complementarity/substitutability of branches and online banking can be a natural extension of the current research, although more refined indicators of online banking than the one we use in this study are first necessary.

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Conflict of interest

None of the authors have any conflict of interest.

Data availability

The database used in this study can be available upon request.

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