Regional financial development and growth in the UK

Dr. Stefanos Ioannou, Oxford Brookes University
Dr. Andra Sonea, Oxford Brookes University
Prof. Dariusz Wójcik, National University of Singapore

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Non-technical summary

We take a regional perspective, to examine financial development in the UK. We ask whether regional financial development impacts regional growth, and if so, in what ways. We move beyond simplified interpretations of finance as an aggregate concept, to examine more closely the heterogeneity within it. To this end, we examine bank lending to SMEs, bank branch density, corporate listings on the stock market, and financial technology (FinTech). For our analysis, we combine descriptive statistics with a comprehensive package of econometric regressions.

We find that geographical proximity still matters in several contexts, such as SME lending and the ability of large firms to enter into the London Stock Exchange. It is by being near each other that borrowers, lenders and other financial agents develop trust and tacit knowledge, and form networks.

Our unpacking of finance reveals that the activities classified under its umbrella do not move in parallel. For example, we find no evidence of a positive correlation between broad financial development and SME lending – a note of caution against any presumption that financial expansion automatically supports smaller firms.

Our econometric analysis shows that the relationship between financial development and regional growth is characterised by an inverted-U shape. As with previous research at the national level, this finding suggests that regional financial development supports regional growth up to a point, beyond which the relationship turns into a negative one. In contrast, the impact of SME lending on growth is positive and linear. FinTech (financial technology) remains too small to matter for regional growth, with the sector highly concentrated in London. Across all our financial variables, we find limited evidence of spatial spillovers.

Overall, our findings suggest that while regional financial development holds significant potential for supporting regional growth, this is not a guaranteed outcome if such development is merely left to its own devices, accompanied by generic calls for more finance. Effective policy is required to prioritise the most growth-enhancing facets of finance, such as SME lending. Moving forward, financial regulation should take financial geography seriously.

1. Introduction

There is a paradox in the way we talk about finance. Despite general acknowledgment of the centrality of banks and other financial institutions in allowing households and firms to save, borrow and invest, policy is still largely guided not by what finance does and where, but by how large the financial sector is. The implicit assumption is that a larger financial sector is better able to serve the economy, all else the same. This is, for example, the logic that penetrates UK Government's Modern Industrial Strategy, which identifies the growth in the size of the financial sector as a major policy priority (UK Government, 2025).

A plausible source of confusion lies in statistical imprecision. Often, as in the case of UK Government's Modern Industrial Strategy, financial sector's primary contribution is proxied by its share in national gross value added (GVA), rather than by the volume and allocation of credit it provides to households and firms. This conflates finance as financial services - whose value GVA is designed to capture - with finance as money creation. While one might expect a positive relationship between the two - insofar as lending generates fee income for banks -there is a wide range of financial services, all feeding positively into finance's GVA, but without an obvious connection to growth. For example, if a bank increases its asset management fees or generates high profits through proprietary trading, its GVA goes up, supposedly suggesting an automatic positive contribution to the economy.

This conundrum became apparent in the financial meltdown of 2008, when the world's largest and most developed financial systems found themselves on the verge of implosion. Since then, empirical research has re-examined the relationship between finance and growth - previously assumed to be positive and linear - to identify an inverted-U shape. While up to some point the relationship is found positive, there comes a threshold beyond which there is too much finance.

Some have attributed this to finance's tendency to absorb too many highly skilled human resources from the rest of the economy, such that individuals who could otherwise become dentists or teachers dream of becoming hedge fund managers (Cecchetti and Kharoubi, 2012). Others have argued that besides the question of size, the pace at which finance creates money also matters (Minsky, 1978; 1986). From this point of view, there is nothing to guarantee that banks will create the right amount of money and at the right pace. At times banks might create too much money, too quickly, such as in the case of the subprime crisis; at others they might create too little money, for example when small businesses and ethnic minority households experience credit rationing.

Empirical research has traditionally focused at the national level, using aggregate proxies for the size of the financial sector. Against this background, our research contributes to existing debates in two major ways. First, we move beyond methodological nationalism, taking a regional perspective to assess how regional financial development contributes to regional growth in the UK. Second, we analyse concrete facets of finance, next to our analysis of the financial sector as a whole. To this end, we consider bank lending to small and medium enterprises (SMEs), bank branch density, corporate listings on the stock market, and financial technology (FinTech).

We start with a descriptive overview of each of these facets, focusing on their evolution in the UK in recent years and their relationship with each other. Next, we analyse econometrically the impact of the first three on regional growth, using panel data and spatial autoregressive models. The driving hypothesis in the use of the latter is that financial development in a region might impact not just the growth of that region itself but also the growth of nearby areas. Our analysis covers a scalar spectrum from the ITL1 to the ITL3 level (ITL for International Territorial Level; formerly known as NUTS).

Aligned with the FCA's secondary international competitiveness and growth objective (SICGO), our research contributes primarily to two of the FCA's core research questions: a) through what channels do financial services (FS) hubs contribute to UK GDP growth, and what is the relative contribution of London vs. regional hubs? b) do regional FS hubs generate distinct growth benefits compared with additional growth in London. In addition, by examining corporate listings, our analysis contributes in part to the FCA's research question concerning the role the London Stock Exchange plays in supporting UK growth.

Our main findings are as follows. Our starting overview reveals mixed signs in how the various financial variables correlate with each other, itself a testimony of the heterogeneity in financial development. Aggregate financial development, for example, positively correlates with corporate listings and FinTech density and negatively with branch density and bank lending to SMEs.

In the geography of corporate stock market listings, we confirm the perpetuation of what Wójcik (2009) calls 'London bias'. According to our evidence, firms in London are twice as likely to go public than firms located elsewhere in Britain. To push the analysis a step further, we also elucidate the uneven geography of corporate listings across and within ITL1 regions. We find that, for most regions, the share of firms going public in the biggest city of the region is significantly higher than the share of firms going public in the rest of that region. These findings show that despite the rapid advancement of financial technology, physical proximity between parties involved in IPOs (Initial Public Offerings) still makes a difference, due to agglomeration economies, tacit knowledge and trust.

Our evidence also sheds new light into the decay of basic banking infrastructure. From 2015 to 2025 the total number of bank branches in Britain declined by 45%, with the largest drops recorded in large urban centres. Adjusted by spatial branch density (number of branches divided by land size), however, our findings show that peripheral areas, such as Highlands and Islands and rural Wales, are the ones that have been the most disproportionately affected. This highlights the place-specificity of the benefits stemming out of a bank branch – and conversely the implications of its closure. Whereas the closure of a bank branch in London most likely means that one needs to travel one more stop on the Tube to reach a branch, the same in a rural area means that one might have to drive for an hour to reach the next available branch.

We also provide fresh evidence over the primacy of London in FinTech activity in Britain, focusing on FinTech firms directly or indirectly related to lending. Our data shows that just Inner London hosts 70% of such FinTech firms, with Greater Manchester ranking second, with a share of only 3%. Outside Manchester, the rest of the British North is largely absent in the FinTech ecosystem of Britain. The most notable exception is East Central Scotland (Edinburgh), which ranks 15th out of 45 ITL2 areas, with a share of 1% of FinTech firms. We also find a significant

positive correlation between FinTech density and the size of the financial sector at the local level. This confirms that FinTech firms tend to locate in proximity to existing financial infrastructures. Meanwhile, our data shows a negative relationship between FinTech density and bank lending to SMEs.

Our econometric analysis – based on ITL2 regions and the period 2009-2023 – demonstrates an inverted-U shape relationship between regional financial development and regional growth. The relationship is highly significant within hosting regions, while our spatial regressions reveal some mild spillovers to neighbouring regions, albeit their statistical significance is generally weak. Possibly, the limited spatial reach of regional financial development reflects the over-shadowing of regional finance by London.

Bank lending to SMEs is also statistically significant in explaining regional growth, but with insignificant spatial spillovers. Contrary to broader financial development the relationship is linear, thus indicating that adverse repercussions of the excessive financial development at the regional level are unlikely due to lending to SMEs, where the challenge is usually the under-supply of finance. Moreover, the insignificance of spatial spillovers highlights the local embeddedness of SMEs and the continuing significance of physical proximity in SME lending.

Bank branch density and FinTech density – proxied both by number of FinTech firms and estimates of FinTech employment – are statistically insignificant. The insignificance of branch density towards growth is not to under-state bank branches' implications for social welfare, but only to suggest that any such benefits do not translate into a direct impact on growth. The insignificance of FinTech shows that despite its exponential development since the early 2010s the sector is still too small when seen from the aggregate prism, even in London.

There are two notable limitations in our research. One is the exclusion of Northern Ireland. In various cases, such as corporate listings and bank lending to SMEs, Northern Ireland registers as a major outlier. The second limitation is the occasional mismatch in the spatial and temporal dimensions of the chapters that follow, due to differences in data availability among the various data sources used in our analysis. For example, whereas regional GVA data from ONS goes up to 2023, data on bank branches are available until 2025. We opted to proceed with such mismatches rather than sacrifice available data for the sake of consistency.

The rest of the report develops as follows. Section 2 provides a critical overview of the finance and growth literature, inclusive of a bibliometric analysis of relevant publications. Section 3 contains our descriptive analysis. We first provide a broad overview of the facets of financial development our research focuses on and, following, delve into each of these. Section 4 contains our econometric analysis. We first report our baseline results, using standard panel data models. Following this, we re-run our models using spatial autoregressive techniques. Section 5 concludes and reflects on policy implication of our results.

2. Finance and growth nexus: from macroeconomics to financial geography

In this section we review briefly how research on finance and growth has evolved over time, what is missing in it, and how it can be advanced, particularly from the perspective of financial geography as a multi-scalar study of relationships between finance and space (Wójcik et al., 2024a). We build here primarily on a review we conducted previously (Ioannou & Wójcik, 2021a) and that presented in Correa-Jimenez et al. (2025). It is noteworthy that scholarly references focused on the finance and growth nexus in both these reviews end on works published in 2016. This may reflect that fact that more recent work on the topic has not yet had the time to gain citations and influence. Figure 1, showing the frequency of the term finance and growth in English-language books suggests that the popularity of the topic has risen fast in the 1990s, reached its peak in the early 2000s, before the global financial crisis, and levelled off since. Figure 2, focusing on articles in scientific journals, shows fast growth in the late 2000s and the late 2010s, followed by slow decline in the last five years. Neither figure paints research on finance and growth as particularly fashionable or flourishing in the current decade, which further

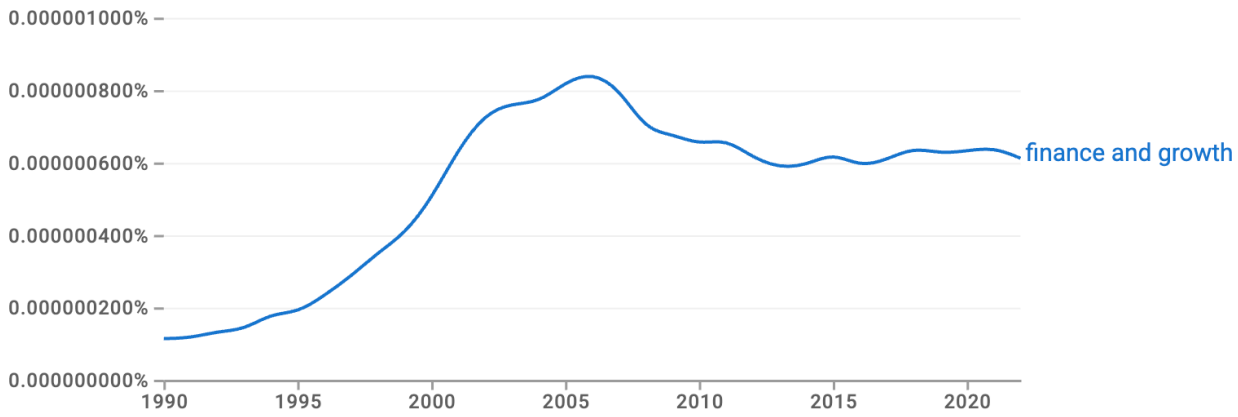


Figure 1. Frequency of the term 'finance and growth' occurring in books included in the English-language corpus of Google books, 9 March 2026. Note: The graph shows data smoothed over 3-year periods. 2022 is the last year for which data are available. Source: Authors based on Google Books Ngram Viewer.

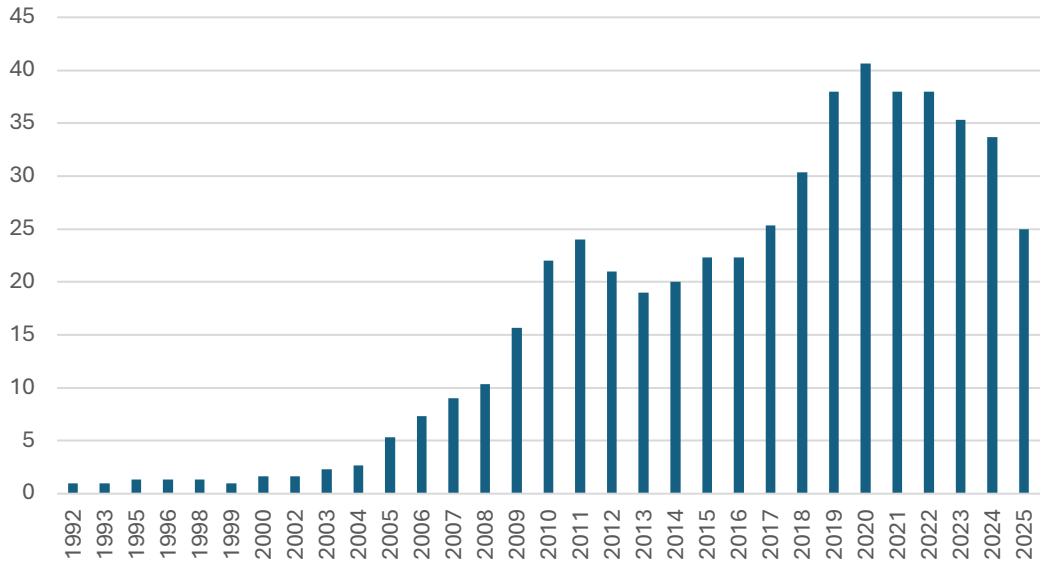


Figure 2. Number of journal articles published on finance an growth included in Web of Science Core Collection, 9 March 2026. Note: The graph shows data smoothed over 3-year periods. We counted all publications with terms 'finance and growth', 'finance & growth' or 'finance-growth nexus' included in the title, abstract or keywords. Source: Authors based on Web of Science.

underscores the role of this report and the need for conceptual, methodological, and empirical innovation in studying this important topic.

The finance and growth nexus literature first emerged in the 1990s, driven by the seminal King and Levine (1993) paper, which used data on 80 countries over the 1960-1989 period. Their analysis shows that "various measures of the level of financial development are strongly associated with real per capita GDP growth, the rate of physical capital accumulation, and improvements in the efficiency with which economies employ physical capital" (1993, 717). Levine and Zervos (1996) subsequently reinforced this finding documenting a positive relationship between stock market development and economic growth. Rajan and Zingales (1998) offered further confirmation of the relationship analysing data not only by country but also by economic sector. Their conclusion was that financial development reduces the cost of external finance to firms. All three seminal studies ground their findings in Schumpeter's views that financial intermediaries are essential for innovation and development by "mobilizing savings, evaluating projects, managing risk, monitoring managers, and facilitating transactions" (King and Levine, 1993, 717). This first wave of research on the finance-growth nexus was certainly the product of its time. Financial liberalisation and globalisation were the hallmarks of the 1990s, encouraged by the end of the Cold War, and translated into international policy prescriptions by the World Bank and the International Monetary Fund (Wójcik et al., 2024b).

Moving to the 2000s, finance and growth research took advantage of improving data availability, covering more and more non-advanced economies, including developing countries and those in

transition to a market economy. The growing geographical coverage along with theoretical and methodological advances uncovered a non-linear relationship between finance and growth. The results sometimes contradicted each other. Deidda and Fattouh (2002) for example, in a study covering 119, countries showed a strong impact of finance on growth in high-, but no impact in low-income countries. Most research however, starting among others with Rioja and Valev (2004), demonstrated the opposite, with finance having a stronger effect on growth in low- and medium-income countries than in high-income economies.

With time, the studies on the non-linear relationship between finance and growth converged around the concept of the inverted U-shaped relationship, with positive effects of finance on growth becoming weaker or negative above certain thresholds of financial development, with Shen and Lee (2006) as one of the first to propose that notion. This research and its findings fell on fertile ground in the wake of the global financial crisis of 2008, which exposed the downsides of financial innovation, and created demand to examine the thresholds beyond which certain forms of financial development become a drag on economic growth (Arcand et al., 2012; Cecchetti & Kharroubi, 2012). The former paper, for example, generated a stylised fact that finance starts having a negative effect on output growth in an economy when credit to the private sector exceeds 100% of GDP.

The literature invokes a variety of reasons that may explain the inverted U-shaped relationship between finance and growth. First, one can distinguish between two sources of growth from finance: the extensive channel of capital accumulation and investment, and the intensive channel of productivity growth. As economies move from low- to high income levels, the main channel through which finance impacts growth shifts from the former to the latter. Moreover, the latter channel typically works more slowly, which can explain why positive impacts of finance on growth diminish with growing economic development (Rioja & Valev, 2004). Arcand et al. (2012) go further by referring to literature on financial instability, including Minsky (1978) and Kindleberger (1978). What appears like high levels of financial development may basically represent the amount of speculative or even Ponzi finance in an economy, which ultimately leads to financial crises, detrimental to the economy as a whole. Beck et al. (2014) and Cecchetti and Kharoubi (2015) point to another mechanism through which finance can negatively affect growth, by attracting skilled labour into finance and away from other sectors, thus allowing finance to grow at the expense of other sectors of the economy. The ideas of 'too much finance' or a 'finance curse' also build on burgeoning interdisciplinary studies on financialisation, popular particularly in sociology, human geography and other social sciences, whereby the increasing role of finance in the economy and society is approached critically as a double-edged sword (Aalbers, 2017, 2018, 2019; Wójcik & Bratton, 2024).

Let us update the existing literature reviews on finance-growth nexus by focusing on studies published in the last ten years. The first group of studies in this area continues the tradition of cross-sectional analyses but also extends it in important directions. Ahmad and Law (2024), for example, relate financial development to economic growth for a panel dataset of 82 countries from 1990 to 2019, but they also measure dependencies between countries based on geographical and institutional proximity. They show positive effects of financial development on growth, but confirm the inverted U-shaped relationship, with negative effects beyond a certain threshold of financial development. Importantly, they demonstrate that the impacts of financial development spill over across borders, based on institutional and geographical proximity.

A cluster of recent studies zooms in on the impacts of FinTech (financial technology) on economic growth. Cevik (2025) covers a panel of 198 countries over the period 2021-2020, showing positive effects, which are stronger in magnitude in advanced economies, but more statistically significant in developing countries. The paper also finds that the effects of digital lending are much more important than those of digital capital raising, suggesting that it is in the area of credit where the potential of FinTech may be larger than in equity markets. Azmeh and Raeei (2024), focusing on low- and middle-income level countries, also show positive effects of FinTech on growth, particularly through digital payment systems, which also appear as possible substitute for bank branches. Tan (2025), however, finds the impacts of FinTech to be mixed depending on the type of FinTech and geography. In ASEAN, for example, FinTech credit alone had a negative impact, but positive in countries where it is combined with strong traditional banking. In contrast, in other Asian and OECD countries the combination of FinTech and bank credit has a negative impact, which could be due to credit saturation.

A number of recent studies modify the traditional finance-growth nexus literature by focusing on green economic growth. Qian et al. (2022) study 30 regions in China, showing that financial agglomeration, defined by the strong presence of financial industry, has a strong positive effect on green economic growth efficiency in terms of energy conservation and emissions reductions. Liu et al. (2023) in turn, also using data on Chinese regions, demonstrate a positive impact of digital finance on sustainable economic growth, with positive spillover effects of digital finance on neighbouring regions. Also for China, Zhou et al. (2022) show that the positive impact of FinTech innovation on green growth works through green credit and green investment. Moving to an international scale, Iftikhar et al. (2024) find positive impacts of FinTech on green growth using data on 148 countries in the period 2004-2021. Finally, Siddik et al. (2025) find positive effects of FinTech startup financing on energy efficiency, particularly in countries with more advanced financial systems.

Occasionally, but very rarely, studies of the finance-growth nexus examine subnational geographical units and cover multiple countries at the same time. Rossi and Scalise (2022) use data on 110 European regions at NUTS-2 level, including the UK, in the period 1997-2018. They find that what matters most to regional economic growth is the agglomeration of a complex financial sector rather than the mere presence of bank branches. Their definition of a financial agglomeration is based on the presence of bank headquarters, stock exchanges, and the share of the financial sector in the overall economy. As such it gets very close to the notion of financial centres used in geography, history and other social sciences (Cassis & Wójcik, 2018). The shortcoming of Rossi and Scalise (2022), however, is that they do not enquire about the potential spatial spillover effects, whereby financial development in some regions, with financial agglomerations / centres in the lead, affects growth in other regions. Neither do they examine thresholds in the relationship between financial development and growth.

Both of the above shortcomings are addressed in Ioannou and Wójcik (2021a), who use data for 75 countries and over 600 cities in these countries (all cities with metropolitan population exceeding 400 thousand) in the period 2001-2015, and define financial development as the share of financial and business services sector in total employment, which is closely related to the way other studies discussed above defined financial agglomeration. First, they show that the inverted U-shaped relationship between financial development and economic growth holds for both whole countries and for cities. Second, both the benefits of financial development and costs

(when finance grows too much) are more significant for cities and areas outside large national or international financial centres. Third, considering spatial spillovers, large financial centres can have an impact on growth across their national economies, but in doing so they complement rather than substitute local financial development. Put differently, cities and areas beyond national financial centres are highly sensitive but also vulnerable to their own financial development as well as the financial development of the national financial centres.

The findings of Ioannou and Wójcik (2021), offering the first analysis of finance and growth combining country, city, and region-level data, confirm a long tradition of studies in economic, financial, and urban geography arguing that although financial centres drive the cycles of financial instability, and are, to borrow from Gordon (2016),'capitals of boom and bust', other cities and regions can benefit but also suffer more from the excesses of financial development. The results also confirm the strand of well-established geographical literature that argues for the continued significance of local and regional financial centres for economic growth, despite waves of technological development that might seem to erase the frictions of distance in finance (Martin, 1999).

We finish our review by zooming on research focusing on the UK, which tends to concentrate on the relationship between finance and small and medium-sized enterprises (SMEs). Khafagy et al. (2025) examine the access of SMEs to external finance, with emphasis on the distinction between rural and urban firms. They find that the impact of external finance on growth is stronger for rural businesses than their urban counterparts. While different data and scale of analysis is used, this result is in line with the finding of Ioannou and Wójcik (2021a) on the finance and growth relationship being more pronounced outside financial centres. Cowling et al. (2020) after accounting for SME economic characteristics that typically influence their access to and price of short-term credit, demonstrate that their location matters, with banks charging what the authors call a "peripheral region price penalty" (648). In a follow-up study Cowling et al. (2025) map 'regional financial resilience' in the UK in the wake of the Covid-19 pandemic, with data on working capital, loans, and growth of SMEs. The resulting map shows large inequality in financial resilience across fine scales of enquiry, down to the district level. In a contribution focused on the impact of new technology and regulation, Babina et al. (2025) show that open banking in the UK enabled SMEs to establish new lending relationships.

As we can see from this review, research on the finance-growth nexus has come a long way, starting from macroeconomics and methodological nationalism, with a sole focus on countries, to more nuanced approaches to scale, from local and urban, to regional and international, and an explicit consideration of spatial spillovers. At the same time, the literature has largely grown out of its rather uncritical assumption that finance affects growth positively, with the question being how, to consider negative effects of finance on spatial and social inequality, instability and unsustainable development (Ioannou & Wójcik, 2021b, 2023). A more critical approach to the impacts of finance goes hand in hand with a more granular geographical analysis, as the latter helps uncover winners and losers of financial development in specific contexts.

At the same time, existing research on finance and growth relationships continues to raise more questions than it answers. What is the relative significance of various channels through which financial centres affect economic growth? Is it access to and cost of SME credit, public equity available through stock markets or other channels? What is the role of specific institutions, such

as stock exchanges, and specific regulations in the process? Through what channels do regional financial centres affect economic growth in addition and beyond the impact of national financial centres? And how can the finance-growth relationship be influenced by the position of firms and other economic actors in financial and corporate networks rather than a simple geographical location (Pažitka & Wójcik, 2019). All these questions are particularly pertinent in the case of the UK, with its long-established finance-led economic growth model (Oren & Blyth, 2019), and high degree of financial centralisation in London, which is also a leading international financial centre (Wójcik et al., 2023).

3. Selection of spatial scale

A starting point in our empirical analysis was the choice of regional unit of analysis. We opted for the scalar spectrum ITL1- ITL3 (formerly NUTS1- 3), the most consistent hierarchical classification system for regions, and the unit of reporting of ONS's regional data.

There are twelve ITL1 regions in the UK. London forms one, and so do Wales, Scotland and Northern Ireland each. ITL1 regions are divided further into 46 ITL2 regions and 182 ITL3 areas (45 and 171 respectively without Northern Ireland).

For most of our analysis – including the econometric part – we focus on ITL2 regions, as this spatial scale offers the best balance amongst the three layers. On the one hand, ITL1 regions are often too broad to capture meaningful regional variations. One example is SME lending, considering the local embeddedness of SME firms (Cowling et al. 2026a). On the other side, despite its higher level of granularity, the ITL3 layer can be overly restrictive. For example, a focus on ITL3 areas when assessing regional financial development, would simply result in identifying highly financially developed urban centres, next to underdeveloped rural areas, thus obscuring broader regional trends.

Figure 3 illustrates the differences in ITL1 and ITL2 boundaries, using financial sector's location quotient as an example, measured as financial sector's share in regional GVA in a region, over financial sector's share in GVA across Britain (average values for 2009- 2023). There is a striking difference in how ITL1 layer averages out some otherwise heterogeneous patterns in financial development. Scotland and London are two notable examples.

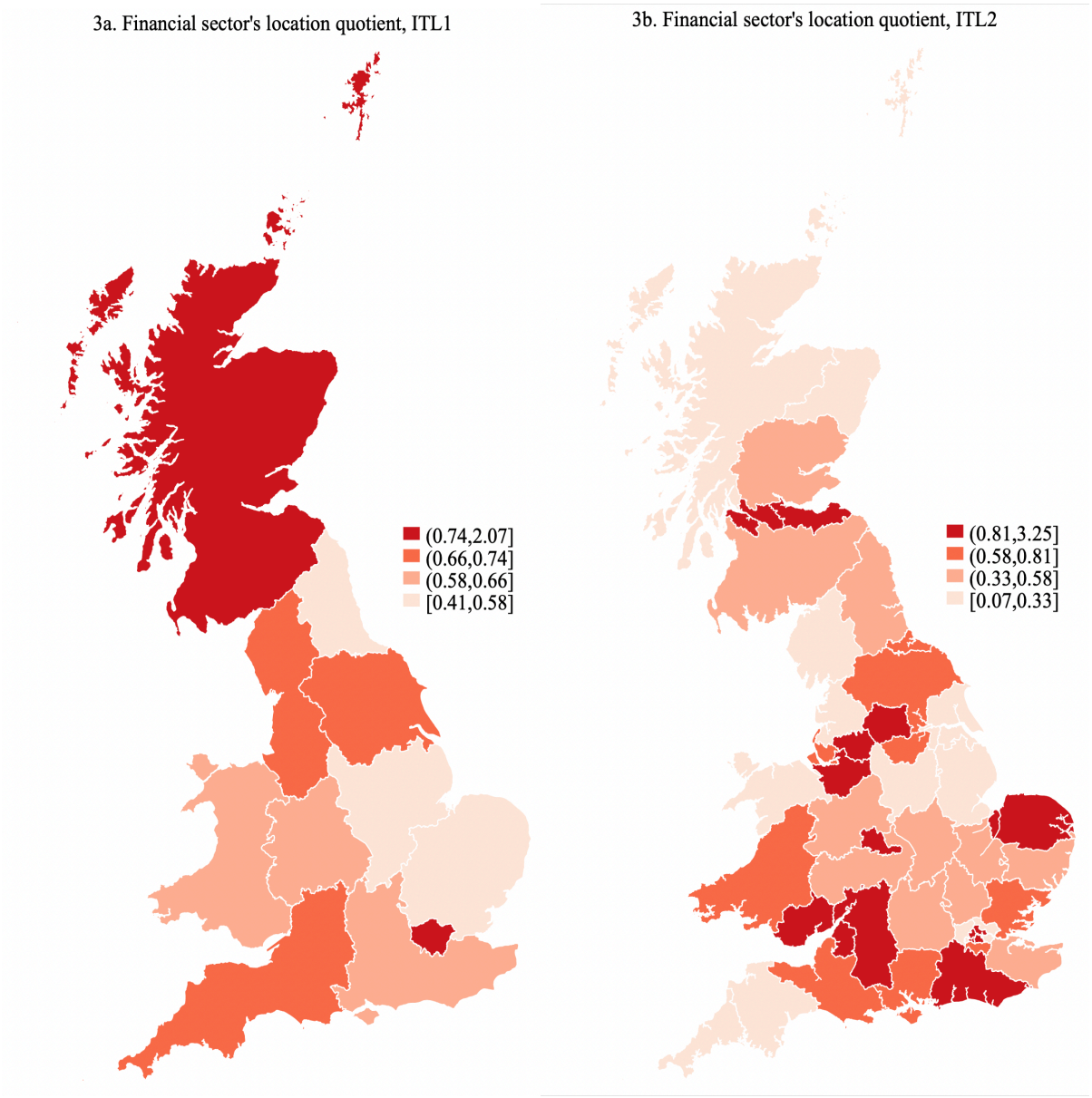


Figure 3. Financial sector's location quotient, comparison of ITL1 and ITL2 boundaries, 2009- 2023. Source: ONS

4. Facets of regional financial development

4.1. A starting overview

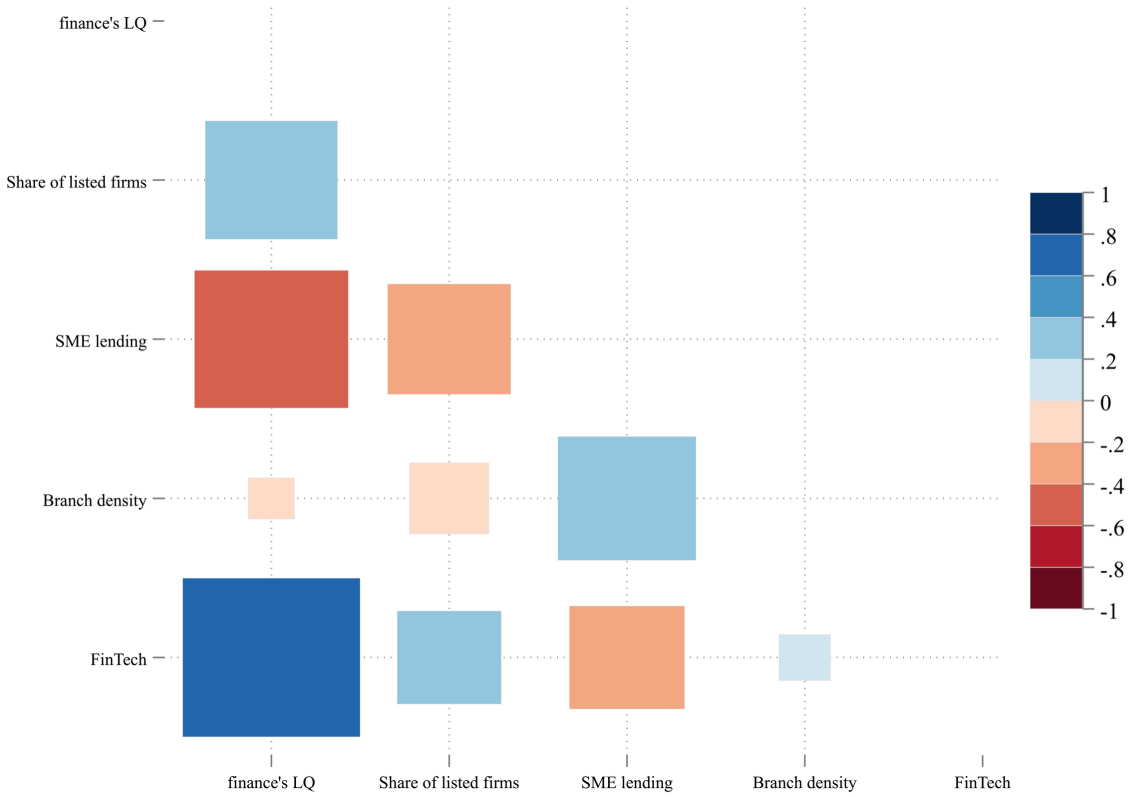


Figure 4. Correlation matrix for the financial variables of our dataset, ITL2 level, 2013-2023. Notes: LQ for location quotient. Sources: ONS, Crunchbase, Geolytix, FAME, UK Finance.

We begin with a broad overview of the financial variables included in our dataset, for ITL2 level and the period 2013- 2023, to maximise overlap. These include overall financial development, proxied here by financial sector's location quotient; corporate listings, which we measure as the share of listed firms out of total number of large firms in a region; bank lending to SMEs, which we adjust by each ITL2 region's economic size; branch density, measured as total number of bank branches per 10,000 people; and FinTech density, measured as total number of FinTech firms by 10,000 people.

Figure 4 shows the raw correlations for each pair of variables. While raw correlation is a simplified metric, since it omits information about variation and outliers, it nonetheless gives an

interesting first taste. Financial development registers positive correlations with FinTech density and corporate listings (respectively, 0.65 and 0.36), but negative correlations of with SME lending and branch density (respectively, -0.49 and -0.04). Corporate listings also register a negative correlation with the latter two, thus indicating that the various facets of financial development are not co-aligned in their development, itself another testimony over the limitation in the use of aggregate proxies for financial development. Bank lending to SMEs and branch density demonstrate a significant positive correlation of 0.4. Bank lending to SMEs also registers a negative correlation of -0.28 with FinTech density.

As bank lending to SMEs is a central tenet in regional finance, we further unpack here two of the correlations it records with other financial variables. Figure 5a displays SME lending's relationship with branch density. Next, Figure 5b displays SME lending's relationship with the overall financial development.

While perhaps expected, the positive relationship between SME lending and branch density is not necessarily obvious in advance, considering that many bank branches nowadays only provide basic financial services like cash withdrawals, without hosting business bank managers in their premises. While data does not allow for a precise differentiation of branches according to the services they provide, the positive correlation shows that proximity between SMEs and bank managers – wherever available – still matters. This finding is aligned with the financial geography and relationship banking literatures, which have long highlighted the value of proximity in establishing trust and long-term work relationships (e.g. Petersen and Rajan, 1994; Berger and Udell, 2002; Flögel, 2018).

Figure 5b, on the other hand, indicates a negative relationship between bank lending to SMEs and financial sector's location quotient, as well as major outliers in this relationship. At one level, this result shows that regional financial development is not automatically destined to improve lending conditions for SMEs. The negative sign even shows that financial development might crowd out and divert resources from SME lending – though of course a counter-factual here is hard to prove. To be sure, the message is not to disregard the tentative benefits out of regional financial development, but to highlight the importance of designing appropriate policy for guiding it.

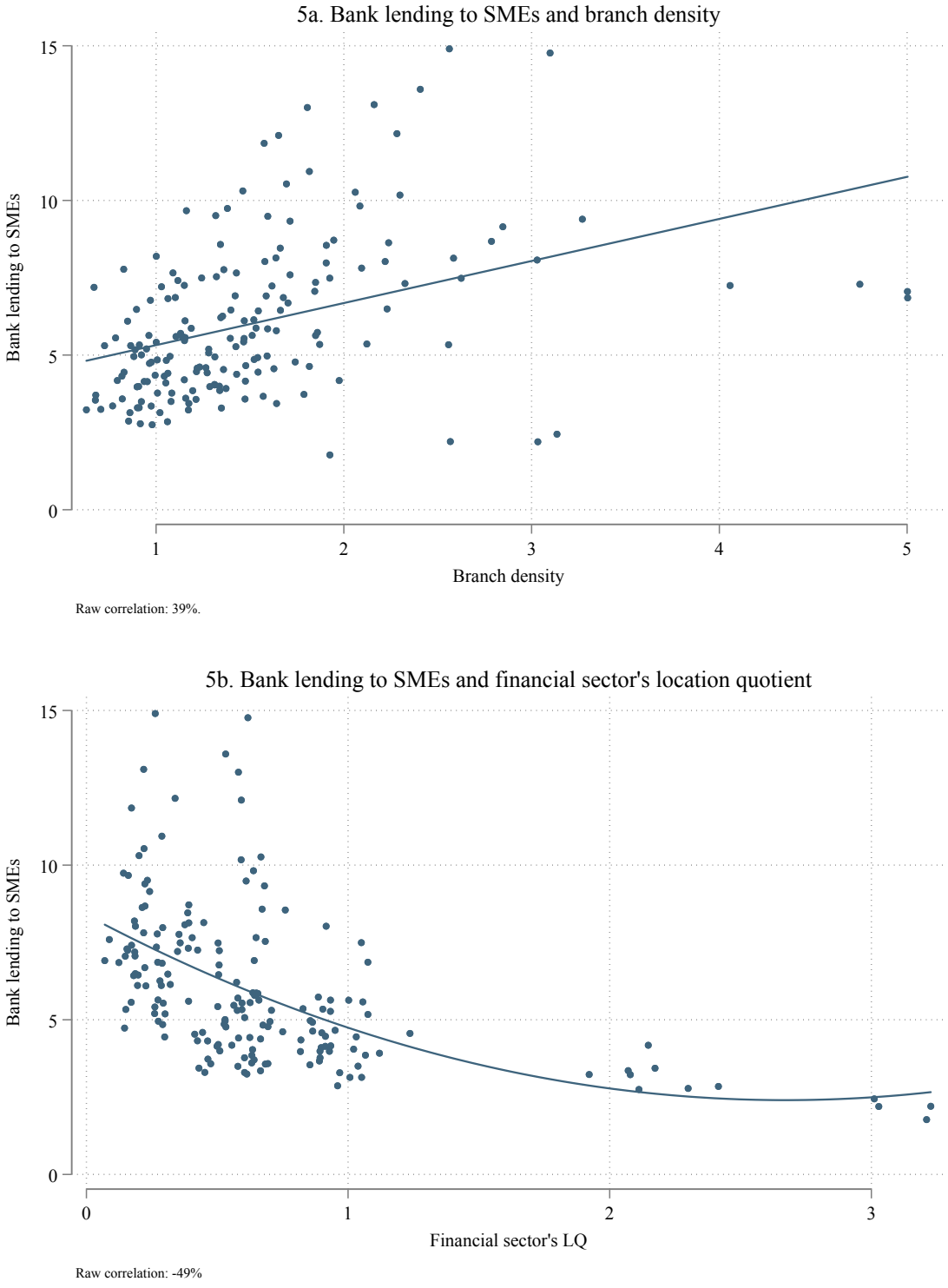


Figure 5. Bank lending, bank branch density and overall financial development, ITL2, 2013- 2023. Source: ONS, Geolytix, UK Finance.

4.2. Big city bias in stock market listings

Existing literature has offered robust evidence in support of a financial centre bias in investment and corporate practices. Wójcik (2009) shows that companies located in financial centers are more likely to go public compared to companies from other areas, in what he calls *financial centre bias*. Lee and Luca (2019) - who coin the term *big-city bias* - show that firms in big cities enjoy easier access to capital, thanks to lower transaction costs and lesser agency problems. Coval and Mosckowitz (1999) show that approximately one in ten companies in a fund manager's portfolio is in the same city as the manager. In credit ratings, Ioannou et al. (2021) offer evidence of a rating uplift for cities and regions that are hosts to global financial centers, above the ratings that would be justified by their fundamentals. In global portfolio investment, Ioannou et al. (2025) show that countries that host global financial centers are more likely to invest reciprocally.

Of the above works, Wójcik (2009) is the most relevant to our own approach. To estimate the financial centre (FC) bias index, Wójcik uses a sample of 32 countries, including the UK, and constructs the following formula:

$$FC\ Bias\ Index = \frac{\frac{N_{listed_{FC}}}{N_{large_{FC}}}}{\frac{N_{listed_{Provinces}}}{N_{large_{Provinces}}}} \quad (1)$$

Where N stands for number of firms. For the calculation of the ratio, the author focuses on large firms, defined as those with turnover more than 50 million Euros. As designed, a value greater than 1 indicates a higher share of listed firms in the country's lead financial centre, compared to the share of listed firms in the rest of the country. According to Wójcik's evidence, the index is greater than 1 in 22 of the 32 countries of his sample. In the UK, it equals 1.82, a score that places the UK in the 9th position.

Our own evidence shows that as of the end of 2025, the FC bias index in the UK stood at 1.99, indicating an increasing stickiness in what we could specifically call a "London bias".[1] This is despite the last twenty years including the global financial crisis of 2008/09, the Covid-19 crisis and the rise of Artificial Intelligence and FinTech, all of which could be listed as factors that could have potentially reduced this bias, in different ways - for example, through diminished trust in the City of London after 2008, improved information flows driven by technological progress, and the expansion of remote working in recent years.

To extend our analysis, we examine the heterogeneity in firm listings both across the rest of the UK and within London itself. To this end, we construct a big city bias index for each ITL1 region. We do so by grounding the previous formula onto the regional level, thus setting the

[1] Evidence based on 22,571 large active firms, the total available in FAME; large firms defined as firms with more than 250 staff and either annual turnover more than £44 million or total asset size more than £38 million, as per UK government's definition (see here).

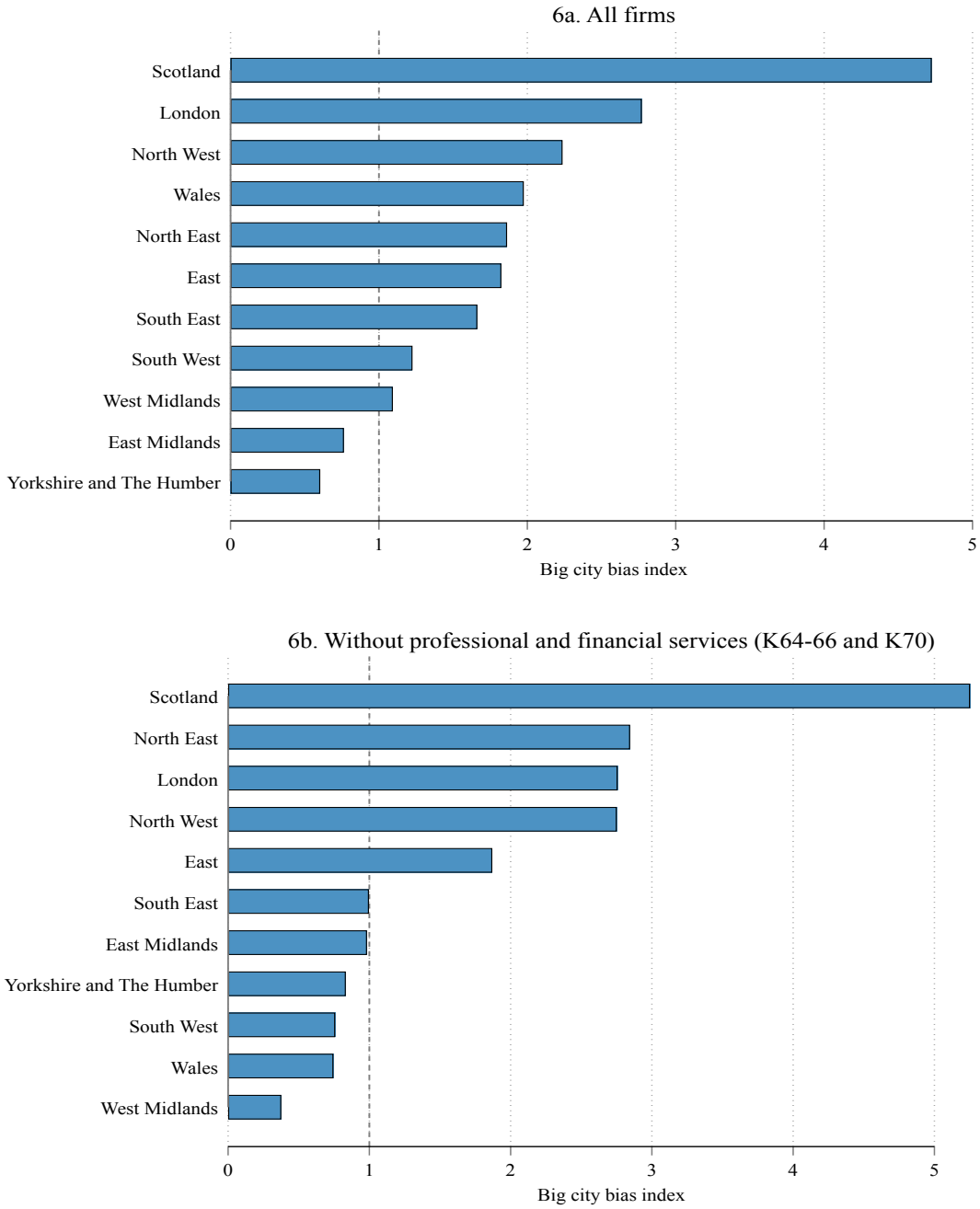


Figure 6. Big city bias within UK regions, 2025. The index demonstrates the share of listed firms in each region's biggest city (in ITL3 terms), divided by the average share of listed firms of the rest of that region. Biggest cities in each region (in brackets): Edinburgh (Scotland), Tyneside (North East), Westminster and City of London (London), Manchester (North West), South West Hertfordshire (East), Bristol (South East), West Northamptonshire (East Midlands), Leeds (Yorkshire and The Humber), Bristol (South West), Cardiff and Vale of Glamorgan (Wales), Birmingham (West Midlands). Source: FAME.

index equal to the ratio of listed firms in the biggest city of each UK region to the average share of listed firms in the rest of that region:

$$Big\ city\ bias\ index\ (UK) = \frac{\frac{N_{listed_{BC}}}{N_{large_{BC}}}}{\frac{N_{listed_{RoR}}}{N_{large_{RoR}}}} \quad (2)$$

where, as before, N stands for number of firms, BC stands for biggest city of an ITL1 region, and RoR stands for the rest of that region outside its biggest city. For our purposes, size is measured in economic output and the within-region comparison is in ITL3 areas.

Figure 6 presents our results, first for all the large firms included in our dataset (figure 6a) and subsequently for all large firms minus financial and professional services (respectively K64-66 and K70 in industrial classification), on the basis that most of these firms would tend to locate in big cities by nature of their business (figure 6b).

Figure 6a shows that when considering all firms together, all but two regions in Britain register a city bias index greater than one (the two exceptions are Yorkshire and the Humber and East Midlands; no large listed firms in Northern Ireland in our dataset). At the highest extreme, Scotland - whose largest ITL3 area in economic size is Edinburgh - registers an index value of 4.5. The heterogeneity within London is also noteworthy as our results show that the share of firms going public in Westminster and the City of London (London's largest ITL3 area in economic size) is almost three times the share of firms going public in the rest of London. This suggests that proximity matters in stock market listing not only at a regional but even at an intra-urban scale.

Figure 6b confirms that industrial composition matters. Specifically, once we remove financial and professional services from our analysis (which together account for about half our dataset), three regions register bias ratios less than one and two register a value of about one. Five regions still register a ratio greater than one, with Scotland persistently ranking at the top of the UK.

Combined, these findings show that there exists a broader city bias, next to the financial centre bias. In other words, physical proximity to big cities matters, on top of proximity to London. In Scotland, the primacy of Edinburgh is also evidence of a regional financial centre bias, given Edinburgh's role as the leading financial centre of the country. These results do not only confirm the benefits due to agglomeration economies, such as access to specialised labour markets, but also the continuing relevance of tacit knowledge and trust, aspects that further highlight the role of geography (Agnes, 2000; Bathelt et al., 2004).

4.3. The continuing decay of basic banking infrastructure

A central and often neglected aspect of financial development is *basic* banking infrastructure, defined as the physical points of service for individuals and SMEs, delivering current account related services. Face-to-face basic banking is not only a banking channel for specific vulnerable customers but a mode of operation for certain communities and, more importantly, a layer of service that contributes to the resilience to everyday banking as critical infrastructure and the resilience of the society in general.

The number of bank branches has been associated with the economic development of a country and the depth of its financial services sector (Beck et al., 2007). Moreover, the Sustainable Development Goals (SDGs) still include the number of commercial bank branches per 100,000 adults as an indicator for sustainable economic growth (SDG-8-10; United Nations, 2018). At the local level, bank branches signal the economic viability of an area, simulating local investment. The closure of bank branches has been found to have a long-term effect on loan origination for local SMEs which, in turn, affects the probability of success of local businesses (Nguyen, 2014). It has also been found to affect the economic health of the areas affected, as well as the physical and psychological wellbeing of local populations (Degryse and Ongena, 2005; Guyot et al., 2018).

We first examine the overall decline in the number of bank branches from 2015 to 2025. We then introduce a spatial accessibility indicator using the data from the Open Banking API for Bank Branches between 2019-2025 in Wales, building on our prior research (Sonea, 2025). Unlike many other measures, this indicator identifies at the most granular level the areas which currently have very low levels of such services and would thus benefit by local mitigation interventions. When combined with socio-economic profiles of these areas, it helps identify locations where the lack of face-to-face banking services constitutes a barrier to daily life for individuals and SMEs.

Our starting evidence shows that the total number of bank branches in Britain declined by 45% between 2015 and 2025, from 10,342 to 5,680. Likewise, average opening times of banks declined by about 40%. These trends do not only mark a continuation but also an acceleration of the trend of bank closures already recorded in previous years (Booth, 2023). Figure 7 offers a preliminary visual elaboration of our data.

The map of Figure 8a further highlights this trend, by illustrating the percentage decline in the number of bank branches by ITL2 area in Britain between 2015 and 2025. According to our data, Inner London - West is the ITL2 area with the largest decline during the last ten years, with an overall drop of 62%, followed by East Central Scotland (60%) and the West of England (57%). On the other hand, the mildest declines are registered in Highlands and Islands (8%), Tees Valley and Southern Scotland, both of which register a decline of 33%. To be sure, the relatively mild decline in bank branches in the Highlands and Islands is not so much by design but rather stems from the fact that the network of bank branches in the region – Britain's largest in land area - was already comparatively scarce before 2015.

The map in Figure 8b puts branch closures into perspective by dividing the percentage decline depicted in Figure 8a with spatial branch density, measured in number of branches in 2015 over land size (in hectares). Formally expressed:

$$Branch\ decline\ to\ spatial\ density\ ratio = \frac{\frac{\Delta Branches_{2025-2015}}{Branches_{2015}}}{\frac{Branches_{2015}}{Land\ size}} \quad (3)$$

As shown in the map, once the percentage decline is adjusted by spatial density, the colours flip. Inner-London-West, for example, records a decline of 0.2 in its spatial adjusted branch closure ratio, about 67 times lower than Highlands and Islands' ratio decline of 13.5 and 104 lower than Mid and South West Wales's ratio decline of 20.9.

This is of course not to play down the importance of bank closures in urban areas, but to highlight the disproportionate impact of bank closures elsewhere, particularly in remote localities. In Shetland, for example, the northernmost part of the UK, the closure of a branch means that the bank's customers need to travel for more than 200 miles, by either a ten-hour ferry or a flight, to reach the nearest available branch of that bank. Little would a simple score count of branches reveal of such realities.

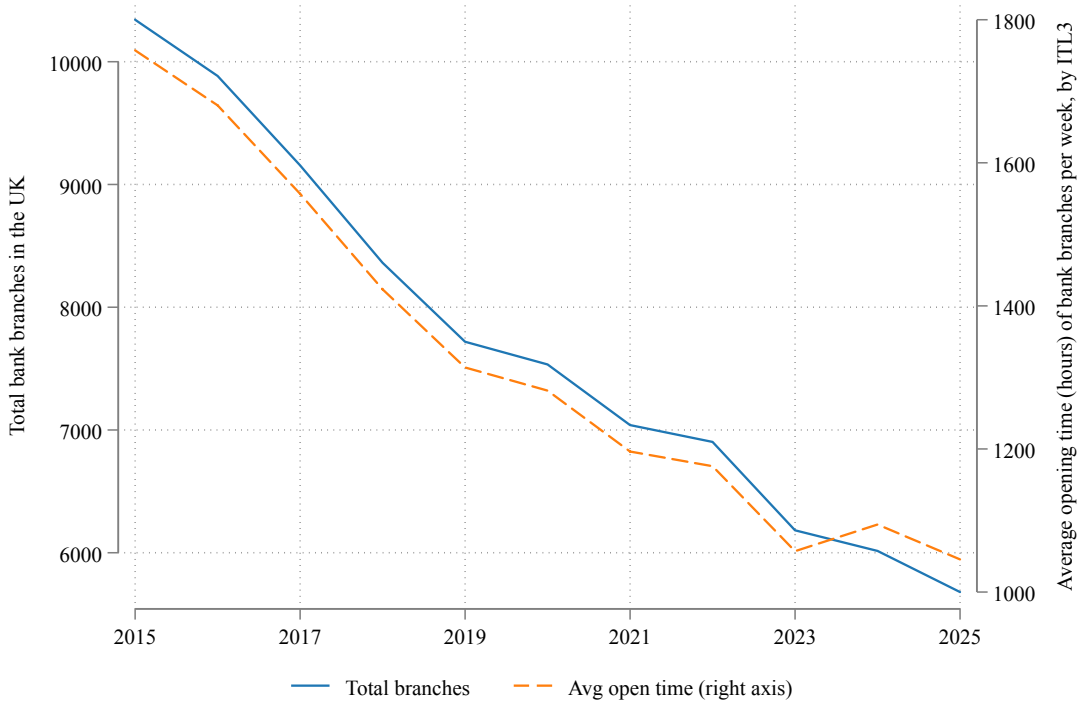


Figure 7. Changes in number of bank branches and average opening times in the UK. Data includes banks and building societies and goes up to October 2025. Opening times in hours, averaged by ITL3 area. Source: Geolytix.

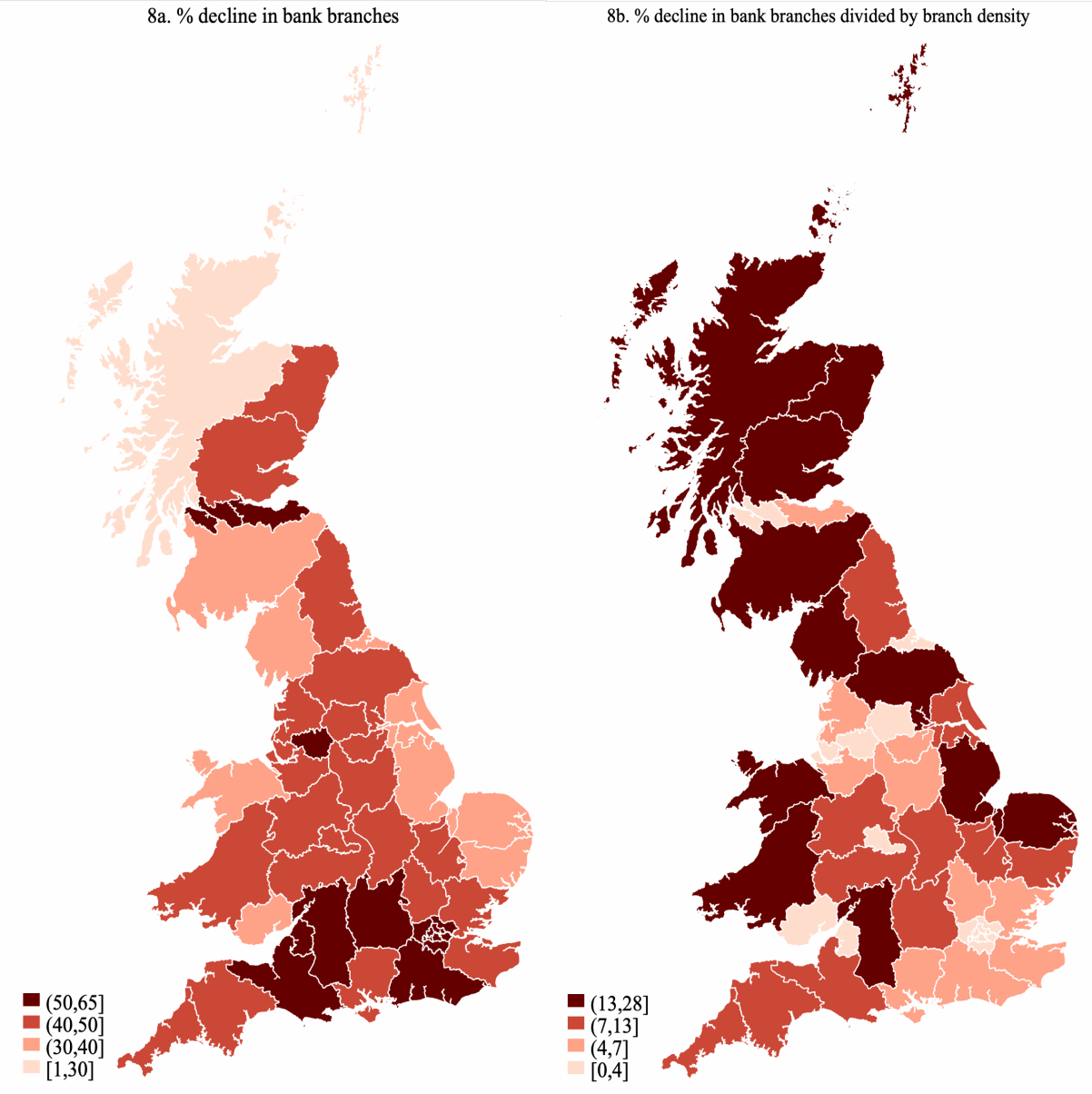


Figure 8. Percentage decline in bank branches from 2015 to 2025 by ITL2 area. Data includes banks and building societies; spatial branch density measured as number of branches in 2015 divided by ITL2 land size; data for 2025 goes up to October of that year. Source: Geolytix.

We further examine the location patterns of bank branches, banking hubs and post offices, focusing on Wales as a case study. Our inclusion of post offices in assessing the availability and accessibility of banking services is consistent with UK government's approach which appointed them as a provider of "universal banking services"(DBIS, 2015) a role reiterated over the years through Entrustment Letters (Callard, 2018; Lamb MP, 2012; Swinson MP, 2015) and banking frameworks (Post Office Corporate, 2022; 2025). Post Office Ltd (POL) delivers basic banking services not only through its own network but also through the "banking hubs" – newly created hybrid structures owned by Cash Access UK a voluntary initiative of industry stakeholders.

When closing branches, banks reiterate that banking services can be provided in "one of the 11,500 post offices" in the country. Existing evidence, however, has shown that the formal access criteria to a post office - as established by the UK government - are not fulfilled for the case of Wales, already since 2019 (Sonea and Westerholt, 2021). For example, according to the formal access criteria, it is expected that 90% of the UK population lives within 1 mile of a post office. In 2019 in Wales, only 66.29% of the population lived within 1 mile of a post office reachable by car. Post Offices vary in their typology (POL owned, agency, mobile, etc.) and bank branches vary even more – cash service only, digital service only, "local", "pop-up", etc, hence the need to differentiate them by type of services they can provide. A map of points of service where a small merchant can deposit a few thousand pounds in cash is very different from that of places where they can withdraw cash or have a discussion with a bank advisor.

For measuring access to banking with a smaller and sparser network we use a spatial accessibility indicator ($SPAI_{ij}$) measured at Output Area level *i*. The indicator accounts for a diversity of points of service *j*, with supply proxied by opening hours, demand proxied by resident population and accessibility based on actual travel distance using a given mode of transportation (Sonea, 2025). For each Output Area we calculate the Level of Service for all points of service *m* reachable within a threshold distance from the population weighted centroid of the respective Output Area.

$$SPAI_i = \frac{\sum_{j=1}^{m} Level\ of\ Service_{ji}}{Population_i} \qquad (4)$$

Using the example for Wales we show in figure 9a the type of insight such indicator provides for understanding the network. The figure highlights the change in this spatial accessibility for bank branches in Wales between July 2019 and July 2025 with lighter colours indicating lower values of accessibility even when we consider all branches within 25km distance of the centroid of an output area. While the reduction of accessibility to branch services in the more densely populated areas with younger population and higher employment in the North and South of Wales might not be a barrier to banking, other areas like Pembrokeshire farming communities or deprived communities in The Valleys are likely to experience this reduction more severely. Many areas remain underserved, even when the Post Office network is considered (Figure 9b, left-hand side). The thirteen banking hubs opened in recent years in Wales contribute an additional 520 hours of service per week, which is small relative to the reduction of over 6,000 weekly branch hours and approximately 10,000 weekly Post Office hours between July 2019 and July 2025. If banking hubs are to address gaps in provision, their placement must be more strategic; however, current

evidence suggests this is not occurring (Figure 9b, right-hand side). We suggest that it is entirely feasible to model and monitor the full network of face-to-face banking service points in real time, and doing so would be particularly valuable for preparing mitigation strategies in the event of major digital banking outages.

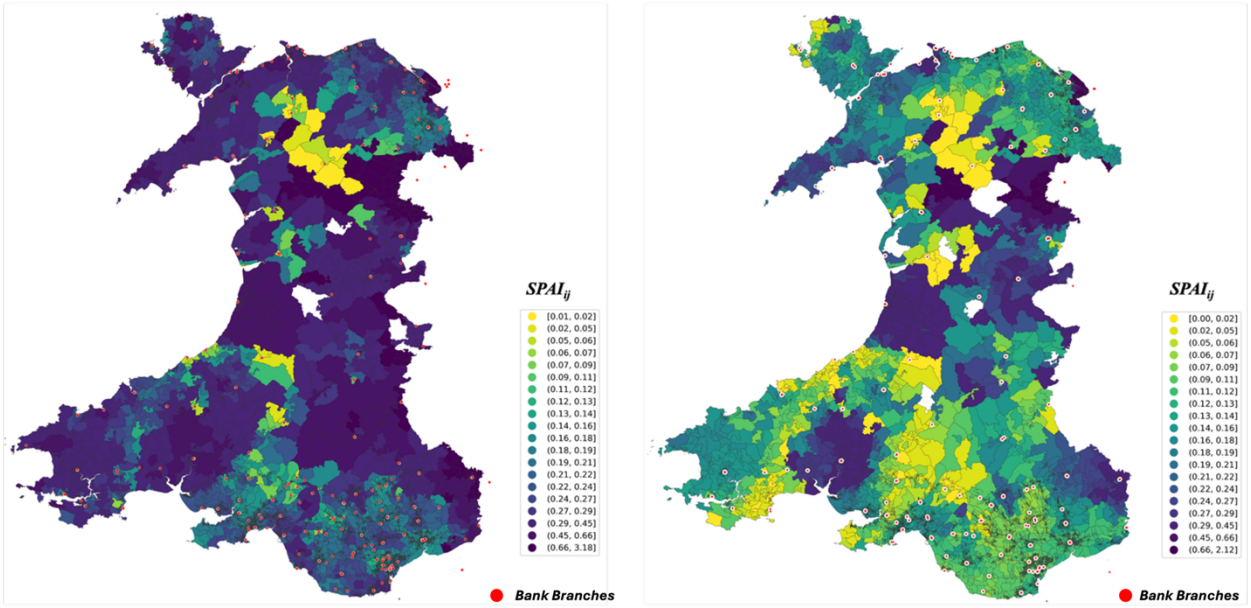
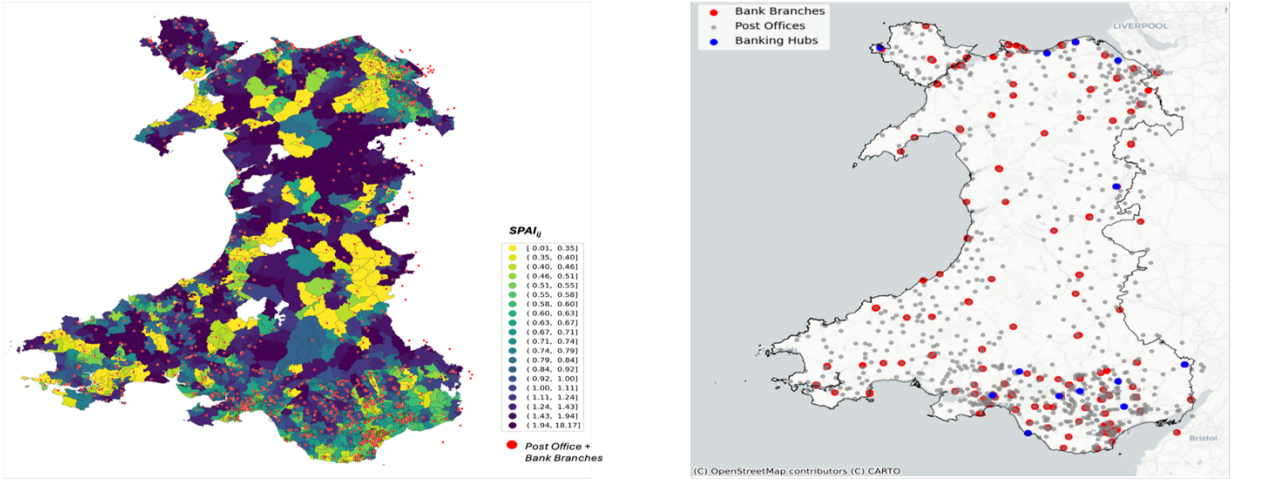


Figure 9a: Spatial access indicators for bank branches in Wales. Comparison between July 2019 and July 2025. Source: Sonea (2025).



a) $SPAI_{ij}$ Post Offices and Branches. Wales. July 2025.

b) Points of service for banking. Wales. July 2025.

Figure 9b: Spatial access indicators for bank branches and post offices, and points of service for banking, Wales, July 2025. Source: Sonea (2025).

4.4. FinTech

Financial technology (FinTech), defined as a "set of innovations and an economic sector that focus on the application of recently developed digital technologies to financial services" (Wójcik, 2021, p. 568), has seen an exponential rise since the early 2010s in the UK and globally. Wójcik et al. (2024b) document that between 2007 and 2018, venture capital and private equity investment – the two biggest funding categories for new FinTech start-ups – increased by almost 40 times. Likewise, Cornelli et al. (2021) of the Bank for International Settlements (BIS) find that FinTechs raised more than 1 trillion USD globally between 2010 and 2020.

The term 'FinTech' is generally used to include a variety of firms, including – among others - payment and deposit platforms (wallets), online banks (neobanks), peer-to-peer lending (or else marketplace) platforms, apps for financial trading, crowdfunding platforms, and digital currencies. RegTech – the part of FinTech to support regulatory monitoring, reporting and compliance – has also seen a steady growth in its adoption, particularly in developed economies like the US and the UK (Arner et al., 2017; CCAF and EY, 2019; McKinsey, 2025).

FinTech has been widely regarded as a means of improving lending conditions for SMEs, particularly for smaller firms, which are typically the most likely to face credit rationing from mainstream banks (World Bank and CCAF, 2019). Surveyed regulators ranked this as the most significant potential impact of FinTech, followed by increased consumer access to finance, enhanced competition in financial services, and improved financial inclusion, in that order (ibid).

Next to these expectations, commentators have also highlighted several risks associated with FinTech, including liquidity risks for incumbent banks due to a possible loss of deposits; credit risk for the broader financial system due to possible procyclicality and reduction in lending standards; and a possible compromise in the efficacy of monetary policy out of decentralisation in risk-taking and record-keeping (Carney, 2017; FSB, 2019; Buckmann et al., 2021; Ioannou et al., 2024).

In its geography, FinTech activity has been found to be rather sticky, with a strong tendency of FinTech firms to locate in lead financial centres (Findexable, 2021). Evidence also shows that contrary to narratives of disruption (e.g. Phillipon, 2018), FinTech firms have so far maintained a collaborative relationship with mainstream banks. There are tens of examples of incubators and accelerators set up by large banks, typically for exchanging technology for capital and infrastructure (Hendrikse et al., 2018; Harris, 2021).

The UK is a global leader in FinTech, both worldwide and in Europe. According to the Global FinTech Index published by Findexable (2021), London ranks as the second most important FinTech centre globally, following San Francisco. In the latest Global Financial Centres Index (Wardle and Mainelli, 2026), London is again placed among the top FinTech hubs worldwide, alongside Singapore and New York.

In FinTech lending to SMEs, UK's global share accounts for 11.7% (CCAF, 2022). This positions the UK second after the US, whose share is 62%, and ahead of continental Europe's combined share of 9.2%. While the UK ranks second in total FinTech lending too (consumer lending plus business lending), its global share is about half its share in SME lending (6.4%), thus indicating a relative specialisation towards SME lending compared to other parts of the world (ibid). That a number of UK FinTech lenders have recently partnered with British Business Bank to support SMEs via loan guarantee schemes further testifies to that end (BBB, 2026).

While UK FinTech is largely geared towards London, other UK cities, such as Manchester and Cambridge, also feature in European FinTech rankings (Findexable, 2021). Manchester, for example, is ranked 8th biggest FinTech hub in Europe and 34th worldwide, ahead of cities like Barcelona and Vienna, respectively ranked as 12th and 16th in Europe. The UK has also been identified as a global point of reference in FinTech regulation (UNSGSA and CCAF, 2019 World Bank and CCAF, 2019), thanks to its pioneering role in introducing regulatory milestones to support FinTech growth, such as the introduction of Open Banking in 2016 (CMA, 2016; Fingleton, 2019).

Our own evidence – based on 3,739 active UK-based FinTech firms related directly or indirectly to payment and lending solutions – strongly reinforces London's primacy in the UK's FinTech ecosystem (data collection details in the Appendix). As shown in the treemap of Figure 10, just Inner London West and East account for 65% of all FinTech firms in our sample, with the rest of London accounting for another 5%. Somewhat consistent with the above-mentioned rankings - even if dwarfed in comparison to London - Greater Manchester ranks second after London, with 3.2% of the FinTech firms of our sample located there. This is followed by Berkshire, Buckingham and Oxfordshire which jointly account for 2.3% of FinTech firms. Northern regions outside Manchester are hardly visible in this mapping, save for East Central Scotland (Edinburgh) which ranks 15th out of a total of 45 ITL2 areas, with a share of 1%.

Our data also reveals two interesting findings on the relationship between FinTech and the broader financial sector. First, there is a significant positive correlation between FinTech density (measured by the number of FinTech firms by 10,000 people) and the size of the financial sector at the regional (ITL2) level. The positive correlation stands at 73.65% when Inner London is included, which nonetheless is by nature a major outlier. Figure 11a demonstrates this relationship without Inner London. As seen in the graph, the relationship is still positive, with a raw correlation of 28%. This finding is in line with the observed tendency of FinTechs to co-locate with banks and other financial institutions.

Figure 11b contrasts FinTech density with bank lending to SMEs, focusing again on the rest of Britain outside London to omit outliers. Here the relationship turns negative, recording a raw correlation of -41.62%. While a scatterplot is not proof of causality, this finding suggests that, at the regional level, FinTech activity does not seem to support SME lending in a significant way.

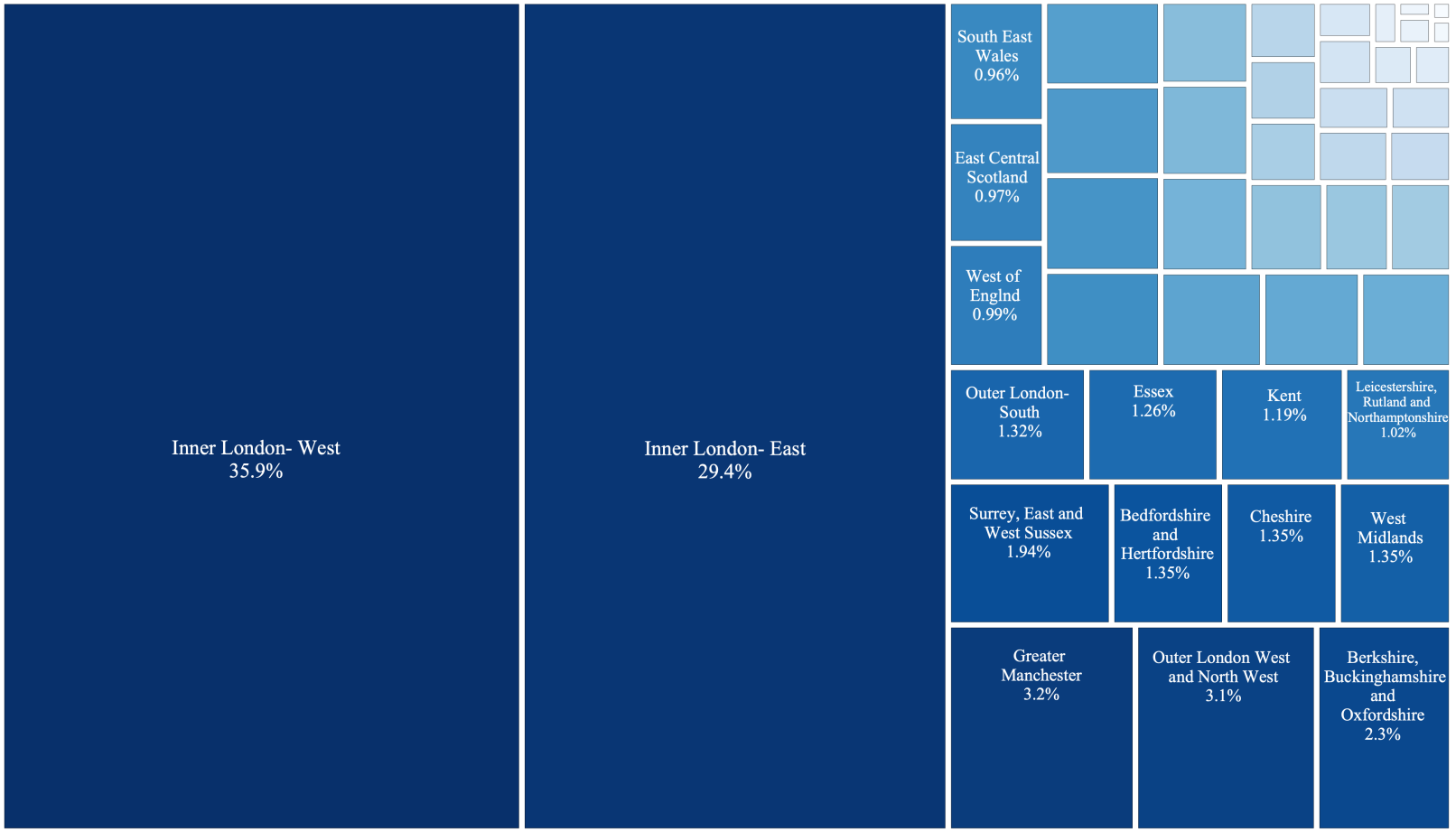


Figure 10. Geographical distribution of FinTech firms in Britain, by ITL2 area. Notes: sample includes 3,739 active UK-based FinTech firms operating in lending-related activities. Geographical allocation based on headquarter addresses. Source: Crunchbase.

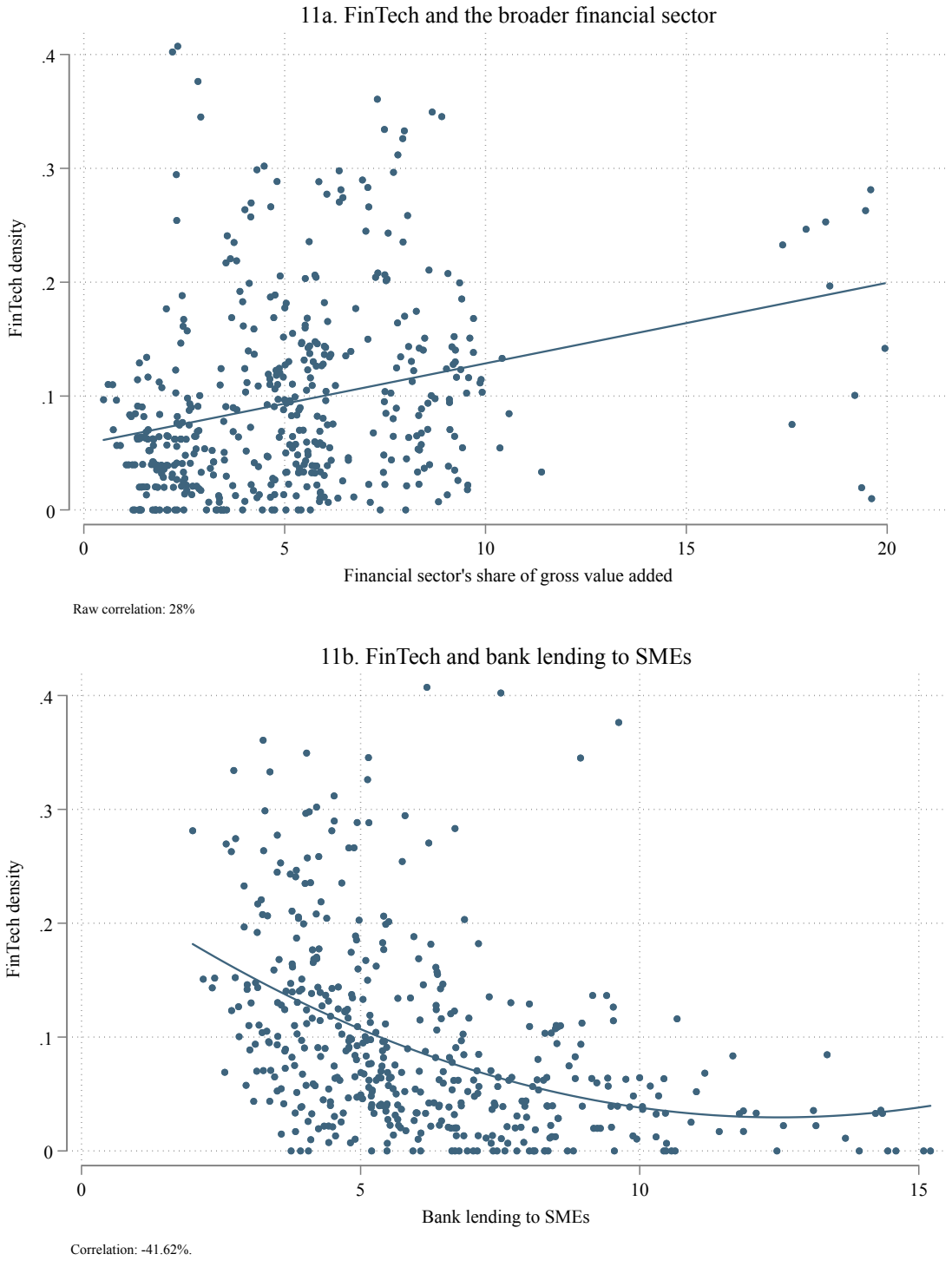


Figure 11. FinTech's relationship with the broader financial sector, ITL2 level, 2013-2023. Notes: Sample includes Britain's ITL2 areas outside Inner London East and West; FinTech density measured as total number of FinTech firms by 10,000 people (in natural logarithm to facilitate visual elaboration); bank lending to SMEs divided by local gross value added to adjust for area size. Sources: Crunchbase, ONS, UK Finance.

5. The finance and growth nexus at the regional level

In this part we examine econometrically the impact of regional financial development on regional economic growth in Britain. Our level of analysis is ITL2 regions, and our dataset encompasses all 45 ITL2 regions of Britain. Our timespan covers the period 2009- 2023, unless stated otherwise (2023 is the latest year for which the ONS has regional GVA data available). In our discussion we draw an analytical separation between London and the rest of Britain, considering London's positioning as a major outlier to the rest of the country in financial development.

In the section that follows we examine the influence of regional financial development, broadly defined. Next, we decompose the financial sector, to focus more closely on three specific facets and their potential relationship with regional growth. These include bank lending to SMEs (SME lending in short), bank branch density and FinTech activity (stock market listings not included in this part due to our lack of data before 2025). We then extend our analysis to consider possible spatial spillovers across ITL2 regions, using a range of spatial econometric models.

5.1. Regional financial development – is there a case of too much finance?

Our primary measure of financial development is the location quotient (LQ) of finance, defined as the ratio of the financial sector's gross value added (GVA) share in an ITL2 area to financial sector's GVA share in Britain. The LQ captures the degree of regional specialisation in financial activities relative to the national benchmark.

The dependent variable in our model is real GVA per capita growth. In addition to financial development, we include a set of control variables commonly identified in the growth literature as determinants of regional economic performance. These include the initial level of GVA per capita in each period (to test the convergence hypothesis), population growth, unemployment, agriculture's share of GVA, and education's share of GVA.

The convergence hypothesis implies that the starting level of GVA per capita should appear with a negative sign. Places with lower level of development are expected to grow faster. Population growth would also be expected to appear with a negative sign, given the consideration of growth in a per capita form. Unemployment and education would normally be expected to appear with a negative and positive sign respectively. The expected sign of agriculture's share of GVA is ambiguous a priori, as it may capture either structural underdevelopment or idiosyncratic features. To eliminate short-term noise in our data, we format the time-series into three-year non-overlapping averages, consistent with standard practice in the empirical growth literature.

For our econometric estimation we use a fixed effects panel model, with heteroskedasticity-robust standard errors, clustered at the ITL1 level so as to account for the hierarchical structure of our dataset (ITL2 areas within ITL1 regions). To tackle the possibility of reverse causality, we

lag all explanatory variables by one three-year period. Analytically, our baseline model is as follows:

$$gr_{it} = a + \beta_1 FD_{it-1} + \beta_2 FD_{it-1}^2 + \Gamma X_{it-1} + u_i + \lambda_t + \varepsilon_{it} \quad (5)$$

Where $i \in [1, 45]$ stands for the ITL2 units of our dataset, $t \in [1, 5]$ stands for time, gr_{it} denotes real GVA per capita growth, and FD stands for financial development. Furthermore, X is a vector that includes our control variables, u_i describes the fixed effects of the model, λ_t includes a set of time-dummies to account for macroeconomic shocks affecting all regions, such as the covid-19 pandemic, and ε_{it} is the error term of the model, assumed to be normally distributed. In addition, β_1, β_2 and the vector Γ represent the parameter values to be estimated.

Including financial development in both linear and quadratic form allows us to test for potential non-linearities in its relationship with economic growth. A positive coefficient on the linear term and a negative coefficient on the squared term - if jointly significant - would indicate an inverted-U shape relationship between financial development and growth.

For robustness, we also consider two alternative ways of measuring regional financial development. First, we re-run our main model using just the financial sector's share of GVA, i.e. without converting it in an LQ form. Second, we re-run the model using financial sector's share of salaries out of the total salaries. To demonstrate robustness to multicollinearity, we first report a basic version of the model, with just the initial GVA per capita and the financial development level and quadratic terms and, following, we re-run the model by inserting all other control variables.

Tables 1 and 2 report the summary statistics and correlation matrix of all our variables.

5.1.1. Baseline results

Table 3 presents our starting results. Column 1 presents a basic regression for all ITL2 regions, and following, column 2 presents the same model for all ITL2 regions outside London. Column 3 adds our control variables, while columns 4 and 5 show the regression output for alternative proxies for financial development. Column 6 presents the baseline model of column 3 for the full sample minus London and East Central Scotland.

Overall, Table 3 offers consistent affirmative evidence of an inverted-U relationship between financial development and regional economic growth. The joint significance test at the low end of the table confirms statistical significance of the two finance terms even for those regressions where the level term appears below the 10% significance level (columns 1 and 5).

Table 1. Summary statistics for regression analysis.

Variable	Source	Obs.	Mean	Std. Dev.	Min	Max
Real GVA growth per capita, %	ONS	225	0.89	2.52	-7.90	5.77
GVA per capita (ln)	ONS	225	10.24	0.36	9.82	12.31
Financial sector's location quotient (LQ)	ONS	225	0.68	0.57	0.07	3.23
Financial sector's % of GVA	ONS	225	6.14	5.15	0.64	30.08
Financial sector's % of total salaries	ONS	225	5.29	4.79	0.54	26.49
SME lending to GVA	UK Finance, ONS	180	6.03	2.50	1.77	14.90
Bank branch density	Geolytix, ONS	225	1.64	0.77	0.63	5.13
Bank opening time (hours per week) density	Geolytix, ONS	225	48.87	17.51	21.35	101.76
Total number of FinTech firms per 10,000 people	Crunchbase, ONS	180	0.28	1.13	0.00	11.04
Total FinTech employment (1-9 scale) per 10,000 people	Crunchbase, ONS	180	0.53	2.23	0.00	21.74
Unemployment rate	ONS	225	5.45	2.06	2.18	11.32
Population growth	ONS	225	0.61	0.41	-0.31	2.14
Agriculture's % of GVA	ONS	225	1.65	2.11	0.02	13.90
Education's % of GVA	ONS	225	6.43	1.30	3.49	10.46

Note: data in three-year non-overlapping averages.

Table 2. Correlation matrix

	Real GVA growth pc	GVA pc	Finance's LQ	Finance's % of GVA	Finance's % of total salaries	SME lending/ GVA	Bank branch density	Bank opening time density	Total num. of FinTech firms	Est. FinTech employment	Unemp.	Pop. growth	Agriculture's % of GVA	Education's % of GVA
Real GVA growth pc	1													
GVA pc	0.05	1												
Finance's LQ	0.09	0.76	1											
Finance's % of GVA	0.11	0.76	1.00	1										
Finance's % of total salaries	0.10	0.75	1.00	1.00	1									
SME lending/ GVA	-0.07	-0.46	-0.49	-0.49	-0.47	1								
Bank branch density	0.04	0.10	-0.04	-0.04	-0.03	0.40	1							
Bank opening time density	0.07	0.22	0.10	0.10	0.11	0.36	0.93	1						
Total num. of FinTech firms	0.08	0.77	0.65	0.65	0.63	-0.28	0.06	0.14	1					
Est. FinTech employment	0.08	0.77	0.66	0.65	0.64	-0.27	0.07	0.15	1.00	1				
Unemp.	0.10	-0.12	0.12	0.13	0.13	-0.09	0.14	0.26	-0.02	-0.02	1			
Pop. growth	0.25	0.04	0.05	0.06	0.07	-0.22	-0.42	-0.37	-0.13	-0.13	-0.01	1		
Agriculture's % of GVA	-0.07	-0.14	-0.40	-0.40	-0.39	0.55	0.44	0.36	-0.15	-0.15	-0.19	-0.26	1	
Education's % of GVA	0.02	-0.45	-0.19	-0.19	-0.22	-0.07	-0.31	-0.30	-0.32	-0.32	0.24	0.12	-0.23	1

Table 3. Baseline econometric growth models: overall financial sector development.

	full sample	without London				without London & East Central Scotland
Dependent variable: Real GVA per capita growth	(1)	(2)	(3)	(4)	(5)	(6)
GVA per capita (ln.)	-7.951**	-8.125**	-8.679***	-7.953***	-8.490***	-9.182***
	(-2.947)	(-2.572)	(-4.696)	(-3.915)	(-4.782)	(-5.126)
Financial sector's location quotient	**2.397**	**4.087****	**6.850****			**6.988***
	(1.127)	**(2.087)**	**(2.129)**			**(1.997)**
Financial sector's location quotient (squared)	**-1.464*****	**-3.032*****	**-4.197*****			**-4.377****
	(-3.473)	**(-3.666)**	**(-4.075)**			**(-3.002)**
Unemployment rate			-0.269*	-0.288*	-0.299*	-0.254*
			(-2.080)	(-2.153)	(-2.237)	(-2.030)
Population growth			-0.160	-0.223	-0.245	-0.042
			(-0.295)	(-0.416)	(-0.450)	(-0.087)
Agriculture's share of GVA			0.943**	0.882**	0.856**	0.933**
			(2.867)	(2.905)	(2.910)	(3.021)
Education's share of GVA			1.011**	0.924**	0.901**	0.886**
			(3.139)	(3.076)	(3.112)	(3.149)
Financial sector's share of GVA				**0.529***		
				(1.852)		
Financial sector's share of GVA (squared)				**-0.035*****		
				(-4.811)		
Financial sector's share of salaries					**0.453**	
					(1.472)	
Financial sector's share of salaries (squared)					**-0.034*****	
					(-4.856)	
Constant	81.941**	82.668**	80.499***	74.649***	80.822***	86.015***
	(2.917)	(2.552)	(3.914)	(3.348)	(4.179)	(4.430)
Joint significance test for finance terms (p-value)	0.000	0.0148	0.0021	0.0004	0.0000	0.0257
N	180	160	160	160	160	156
N_g	45	40	40	40	40	39
rho	0.920	0.770	0.893	0.871	0.870	0.856
r2_within	0.848	0.852	0.874	0.874	0.874	0.872

*Notes: all columns report panel regressions with fixed effects; data in three-year non-overlapping averages; period of coverage: 2009- 2023; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively; t-statistics in parentheses; heteroskedasticity robust standard errors used, clustered by ITL1 regions; all right-hand side variables lagged by one time-period; year dummies used in all regressions; rho describes the share of panel variance.*

Column 3 presents our baseline model with all control variables incorporated. According to the parameter values obtained for financial development, there is a positive relationship between financial development and regional growth up to 0.81 (finance's location quotient ratio at ITL2 level), beyond which the relationship turns negative.[2] To put these numbers into perspective, notice that the average value of finance's LQ across Britain is 0.68 (0.60 if London is excluded), while the variable ranges between 0.07 and 3.23 (2.17 without London). That the turning point is within the LQ bounds confirms the relevance of the relationship. Columns 4 and 5 further show that our results are not dependent on a specific way of measuring the size of the financial sector, while column 6 indicates that results are not driven by outliers.

Figure 12 visualises our evidence. First, figure 12a elaborates the distribution of finance's LQ of all ITL2 areas outside London, with the vertical line indicating the turning point suggested by the model of column 3. According to this graph, there is space for the majority of ITL2 regions to benefit by developing further their local financial infrastructure. Meanwhile, the turning point confirms that as with the national level, there exists a point beyond which finance comes to slow down economic growth – a scenario of "too much finance" (Cecchetti and Kharoubi, 2012). Figure 12b adds further strength to our findings by plotting the average regional growth rates of ITL2 areas outside London, grouped by finance LQ quintile.

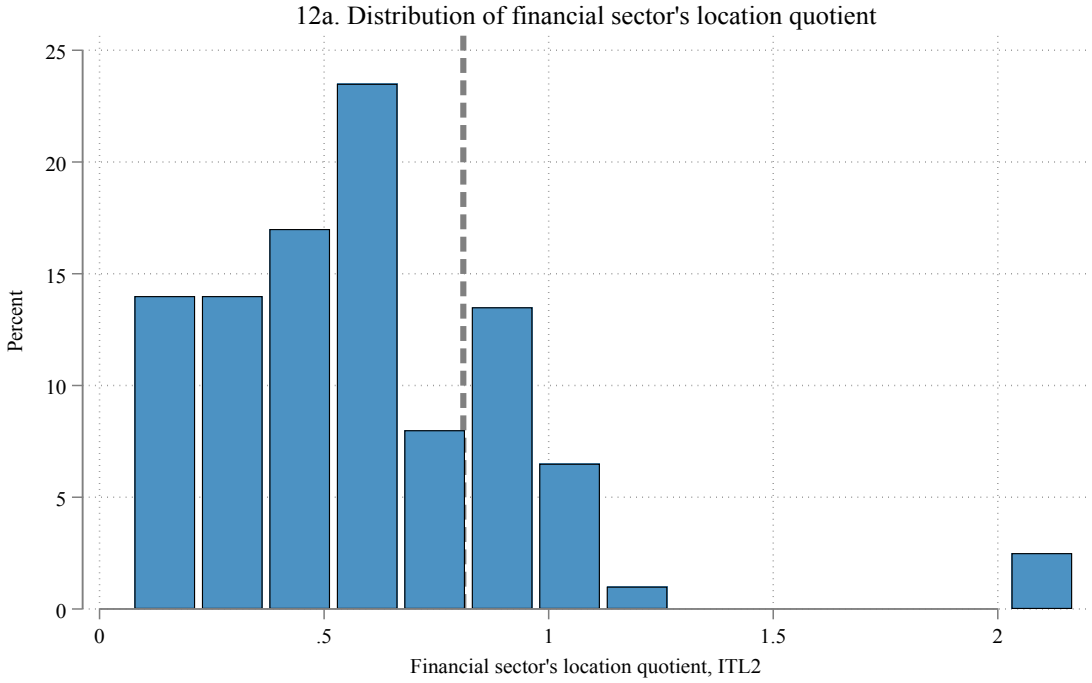
The map of figure 3b that was reported earlier on (p. 13) provides an even clearer elaboration of the ITL2 areas whose finance LQ ratio is above the turning point identified by our baseline model. These areas are captured by the top bracket and correspond to the darkest shade of red on that map. Outside London, there are ten out of forty ITL2 areas that rank above the indicated threshold, including - most notably - ITL2 areas that host major cities outside London. At the top of the list there are East Central Scotland (2.11), West Yorkshire (1.04) and West of England (1.04), respectively hosts to Edinburgh, Leeds and Bristol (finance's LQ values in brackets).

Out of the rest of our variables, the high statistical and economic significance of GVA per capita confirms the conditional convergence hypothesis, suggesting that less developed regions tend to record higher growth rates. Unemployment and education are both statistically significant and with the expected signs (in the case of education, we also tried using the share of population with a university degree as an alternative proxy, in which case the variable turned insignificant). The size of the agriculture sector is also statistically significant and positive, indicating that agriculture is not in itself a factor of regional under-development, while population growth is insignificant.

5.2. Decomposing the financial sector

Building on the above, we now delve into specific facets of the financial sector, to examine their independent influence on regional economic growth. To this end, we focus on bank lending to small-and-medium-enterprises (SMEs); branch density; and FinTech (financial technology). To

[2] Turning point = $-\beta1/\beta2$, where $\beta1$ and $\beta2$ are, respectively, the parameter values of finance LQ's level and squared terms.



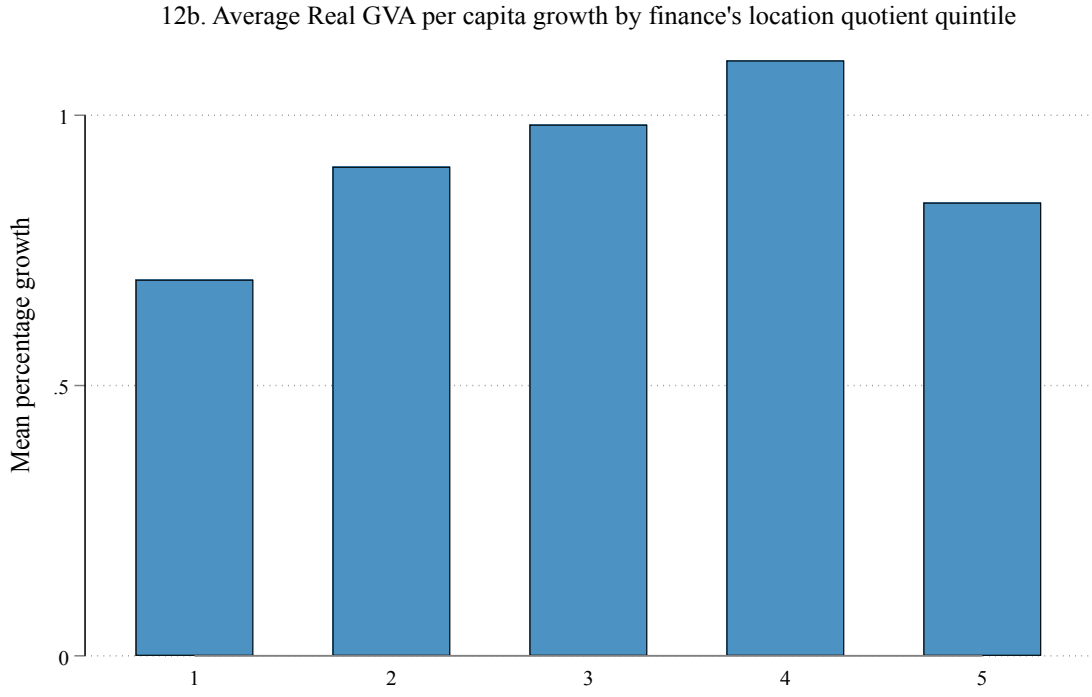


Figure 12. Regional financial development and economic growth. Notes: Finance's location quotient measured as the share of finance's GVA in total GVA of an ITL2 area, divided by the share of finance's GVA in total GVA of Britain. Data includes all ITL2 areas of Britain outside London. Source: ONS.

be sure, our aim is not to decompose the overall financial sector into every single item that is included within it - a task naturally bounded by data availability - but to examine more closely the facets of financial development which one would expect to matter the most for regional growth.

Our consideration of bank lending to SMEs, which we take as a ratio of local GVA, is similar to the most conventional proxy used for measuring financial depth at the national level, credit to GDP. Compared to total credit, the consideration of SME lending is in fact more accurate as a potential determinant of growth as it isolates the lending that is to matter the most for growth, without amalgamating it with non-productive forms of lending, such as mortgage lending. The centrality of SMEs in regional growth is highlighted by the fact that in the UK SMEs account for 60% of total private sector employment, corresponding to 16.9 million jobs in 2025 (DBT, 2025).

We also test for the significance of branch density as a further determinant of growth. As discussed earlier on, bank branches are first to be considered as necessary infrastructure to enable access to basic banking services. Whether branch density also matters for regional growth is a separate question and most closely related to the hypothesis of relationship banking. From this point of view, physical proximity between borrowers and lenders enables the development of long-term work relationships and trust, ingredients that positively feed into lending conditions, particularly for small businesses (see for example Petersen and Rajan, 1994; Berger and Udell, 1995, 2002; Kysucky and Norden, 2016). This of course assumes that existing branches continue to have business bank managers located in their premises. While the positive correlation between branch density and SME lending elaborated earlier (39%) indicates that this is likely to be the case for a group of branches, it is possible that the share of such branches out of total branches is nowadays too small to have a direct impact on regional growth.

Further, we assess the relevance of FinTech as a determinant of regional growth. The relationship between FinTech activity and regional growth is not an obvious one. First, the overall FinTech sector is still a minor fraction of the broader financial system, such that it might be too small to yet make an impact on growth. The concentration of FinTech activity in London further corroborates this concern for many parts of the country. Second, whereas FinTech is generally assumed to be beneficial as alternative means of financing, possible contribution of FinTech to financial instability could also lead to a negative sign in our regressions.

For measuring FinTech activity we use the total number of FinTech firms in an ITL2 area, divided by 10,000 people to adjust for area size. Considering FinTech activity in total number of firms allows us to assess the long-term influence of FinTech as an ecosystem over the growth of the hosting area. To ensure our results are not skewed by firm size, we also re-run our models using estimates of FinTech employment as an alternative numerator. While our source for FinTech data (Crunchbase) does not disclose precise employment figures for each FinTech firm, it provides data on employment bands (e.g. 1- 10 employees, 11- 50, etc.) which we use to construct an ordinal metric from 1-9, with higher numbers corresponding to higher employment bands (see Appendix for further details).

Table 4. Financial sector decomposition, part 1: SME lending and branch density.

	full sample	without London			full sample	without London		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GVA per capita (ln.)	-6.455	-2.354	2.055	2.581	-8.608**	-7.752**	-8.084***	-8.135***
	(-0.940)	(-0.353)	(0.334)	(0.427)	(-3.161)	(-2.278)	(-3.718)	(-3.813)
SME lending	**1.879****	**1.270****	**1.389****	**0.618***				
	(2.337)	**(2.373)**	**(2.679)**	**(2.102)**				
SME lending (squared)	**-0.051**	**-0.031**	**-0.039**					
	(-1.673)	**(-1.313)**	**(-1.650)**					
Branch density					**0.460**	**-0.155**	**-0.627**	
					(0.638)	**(-0.298)**	**(-0.864)**	
Branch opening time								**-0.021**
								(-0.848)
Unemployment rate			-0.150	-0.024			-0.338*	-0.337*
			(-0.713)	(-0.124)			(-2.152)	(-2.150)
Population growth			0.827	1.026			-0.285	-0.293
			(1.039)	(1.168)			(-0.567)	(-0.572)
Agriculture's share of GVA			-0.074	-0.171			0.798**	0.802**
			(-0.237)	(-0.519)			(2.958)	(2.986)
Education's share of GVA			1.872**	1.986**			1.009***	1.004***
			(2.789)	(2.867)			(3.912)	(3.928)
Constant	57.308	18.196	-38.562	-42.298	88.144***	80.236**	78.823***	79.348***
	(0.844)	(0.265)	(-0.606)	(-0.676)	(3.233)	(2.361)	(3.746)	(3.845)
N	135	120	120	120	180	160	160	160
N_g	45	40	40	40	45	40	40	40
rho	0.936	0.813	0.830	0.823	0.874	0.614	0.846	0.850
r2_within	0.891	0.890	0.903	0.901	0.845	0.850	0.871	0.871

*Notes: all columns report panel regressions with fixed effects; data in three-year non-overlapping averages; period of coverage: 2013- 2023; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively; t-statistics in parentheses; heteroskedasticity robust standard errors used, clustered by ITL1 regions; all right-hand side variables lagged by one time-period; year dummies used in all regressions; rho describes the share of panel variance.*

Table 5. Financial decomposition, part 2: FinTech models.

	full sample		without London		full sample		without London	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GVA per capita (ln.)	-11.492	-7.212	-5.457	1.248	-11.361	-7.082	-5.532	1.198
	(-1.514)	(-1.056)	(-0.916)	(0.193)	(-1.510)	(-1.051)	(-0.942)	(0.183)
FinTech activity (number of FinTech firms)	**0.126**	**0.044**	**-4.195**	**-4.368**				
	(0.832)	**(0.293)**	**(-1.811)**	**(-1.769)**				
FinTech activity (employment in FinTech firms)					**0.053**	**0.015**	**-1.979**	**-2.095**
					(0.714)	**(0.197)**	**(-1.549)**	**(-1.441)**
Unemployment rate		-0.409*		-0.126		-0.408*		-0.121
		(-1.958)		(-0.648)		(-1.957)		(-0.615)
Population growth		-0.609		0.573		-0.622		0.644
		(-0.928)		(0.714)		(-0.945)		(0.771)
Agriculture's share of GVA		-0.244		-0.406		-0.243		-0.410
		(-0.790)		(-1.094)		(-0.789)		(-1.069)
Education's share of GVA		1.551**		2.011***		1.554**		2.017***
		(2.637)		(3.372)		(2.643)		(3.330)
Constant	118.601	68.555	56.839	-23.160	117.258	67.212	57.584	-22.774
	(1.531)	(0.976)	(0.940)	(-0.345)	(1.527)	(0.970)	(0.967)	(-0.336)
N	135	135	120	120	135	135	120	120
N_g	45	45	40	40	45	45	40	40
rho	0.915	0.907	0.529	0.840	0.913	0.906	0.525	0.843
r2	0.879	0.891	0.885	0.899	0.879	0.891	0.885	0.899

*Notes: all columns report panel regressions with fixed effects; data in three-year non-overlapping averages; period of coverage: 2013- 2023; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively; t-statistics in parentheses; heteroskedasticity robust standard errors used, clustered by ITL1 regions; all right-hand side variables lagged by one time-period; year dummies used in all regressions; rho describes the share of panel variance.*

Table 4 presents our econometric results for SME lending and branch density. As displayed in columns 1 to 4, bank lending to SMEs exercises a positive and statistically significant effect on regional growth. The insignificance of the squared term indicates that the effect is linear rather than concave, which means that any adverse effects stemming from excessive financial development in general should not be attributed to SME lending specifically. The result holds both with and without London, and regardless of inclusion of other control variables in the model (for consistency with our baseline regressions we use the same set of controls). Column 4 also shows that the significance of the level term is not due to multicollinearity with the squared term. The coefficient obtained in this regression for the level term of SME lending is also the most reliable since the results support excluding the squared term from the model. Overall, these findings align with the view that in SME lending the challenge is not an over-supply of loans but to the contrary, the presence of a funding gap (Klagge and Martin, 2005; Lee and Brown, 2017; Cowling et al., 2026b).

Columns 5 to 8 of table 4 present the results of the model with bank branch density as an explanatory variable. According to these models there is no statistically significant relationship between branch density and regional growth, thus indicating that branch density's support to growth is mostly indirect. Column 8 re-iterates our baseline model, using branches' total weekly opening time as an alternative proxy, arriving at the same result.

Table 5 presents our results for our regressions with FinTech activity. Columns 1- 4 of the table present our results with the number of FinTech firms used as a proxy for FinTech activity, first for the full sample (columns 1- 2) and then for the full sample excluding London (columns 3- 4). According to our results FinTech is insignificant as a determinant of regional growth, both with and without London. This result is also independent of whether we approximate FinTech activity by the number of FinTech firms or estimates of FinTech employment. Overall, these findings seem to suggest that despite its growth as a sector in recent years, FinTech is still too small to matter at the aggregate regional level.

5.3. Spatial spillovers

While the preceding analysis captures the impact of regional financial development on the growth of the region in which financial activity is located, it tells us little about possible spatial spillovers. In considering the latter, the starting premise is that what goes on in a region is likely to influence and be influenced by what goes on in nearby regions (LeSage, 2009). In theory, spatial spillovers can be positive (e.g. high-income regions clustered near each other), or negative (e.g. high-traffic airports neighbouring low-traffic airports).

Previous research has applied spatial growth models across a range of geographic and economic settings. For instance, Cravo et al. (2015) and Xu et al. (2021) employ spatial econometrics to analyse the impact of entrepreneurship on regional development in Brazil and China, respectively. Also focusing on Brazil, Lima and Neto (2016) investigate the spatial spillovers of physical and human capital. Within the European Union, Ricordel (2024) uses a spatial framework to contrast the growth contributions of domestic and export sectors, while Fidrmuc et

al. (2024) examine the spillover effects resulting from the distribution of EU Cohesion Policy funds across European regions.

The starting point in spatial econometric modelling is the precise configuration of the spatial weight matrix, to be used for determining contiguity. This is a pivotal choice as it identifies the neighbours whose values are to enter the model for testing for spillovers. A widely used approach is the "queen" contiguity matrix, whereby regions that share a common border or vertex are assigned the value of 1 and all other pairs receive a value of 0 (LeSage, 2009). An alternative is to take inverse distances to construct a non-binary matrix. For incorporating into an econometric model, spatial weight matrices are typically normalised so that row-sums to equal to 1. In our analysis, we use the queen contiguity matrix due to its simplicity and widespread use.

The next step is to decide how to incorporate spatial spillovers into the model. In principle, there are three ways of doing so, either through the dependent variable, through the error term, or explicitly through the independent variables of the model. Since our analysis focuses on potential spatial spillovers of regional financial development, we consider two alternative specifications.

First, we employ the spatial autoregressive (SAR) model which simply incorporates a spatial lag of the dependent variable. The model effectively tests whether growth in neighboring ITL2 areas impacts the growth recorded in an ITL2 area. Indirectly, it also captures spatial spillovers of financial development - as well as all other independent variables - via their influence on the spatially lagged dependent variable. As an alternative, we consider the spatial Durbin model (SDM), which augments the SAR model by explicitly including spatial lags of all independent variables. Between the two, the SAR model has the major advantage of being relatively light in that it only includes one spatial lag. This makes it particularly useful for small sample settings like ours, where degrees of freedom are limited.

Presented analytically, the two alternative extensions of our model are as follows:

SAR:
$$\boldsymbol{gr_{it} = \rho \sum_{j=1}^{N} w_{ij} gr_{jt} + a + B\Omega_{it-1} + u_i + \lambda_t + \varepsilon_{it}} \tag{6a}$$

SDM:
$$gr_{it} = \rho \sum_{j=1}^{N} w_{ij} gr_{jt} + a + B\Omega_{it-1} + \sum_{j=1}^{N} w_{ij}\Omega_{jt-1}\Theta + u_i + \lambda_t + \varepsilon_{it} \tag{6b}$$

Where gr_{it} stands again for real GVA per capita growth, w_{ij} is the spatial weight matrix, $\sum_{j=1}^{N} w_{ij} gr_{jt}$ is the spatial lag capturing the weighted sum of gr_{jt} in all other regions and ρ is the spatially autoregressive coefficient of the SAR model. For illustrational compactness, we use the term $B\Omega_{it-1}$ to include all independent variables of the model – what was previously denoted as: $\beta_1 FD_{it-1} + \beta_2 FD_{it-1}^2 + \Gamma X_{it-1}$ (FD for financial development and X for the vector of control variables). In the SDM specification, the term $\sum_{j=1}^{N} w_{ij}\Omega_{it-1}\Theta$ describes the spatial lag of the independent variables of the model, with Θ representing a vector of coefficients capturing the

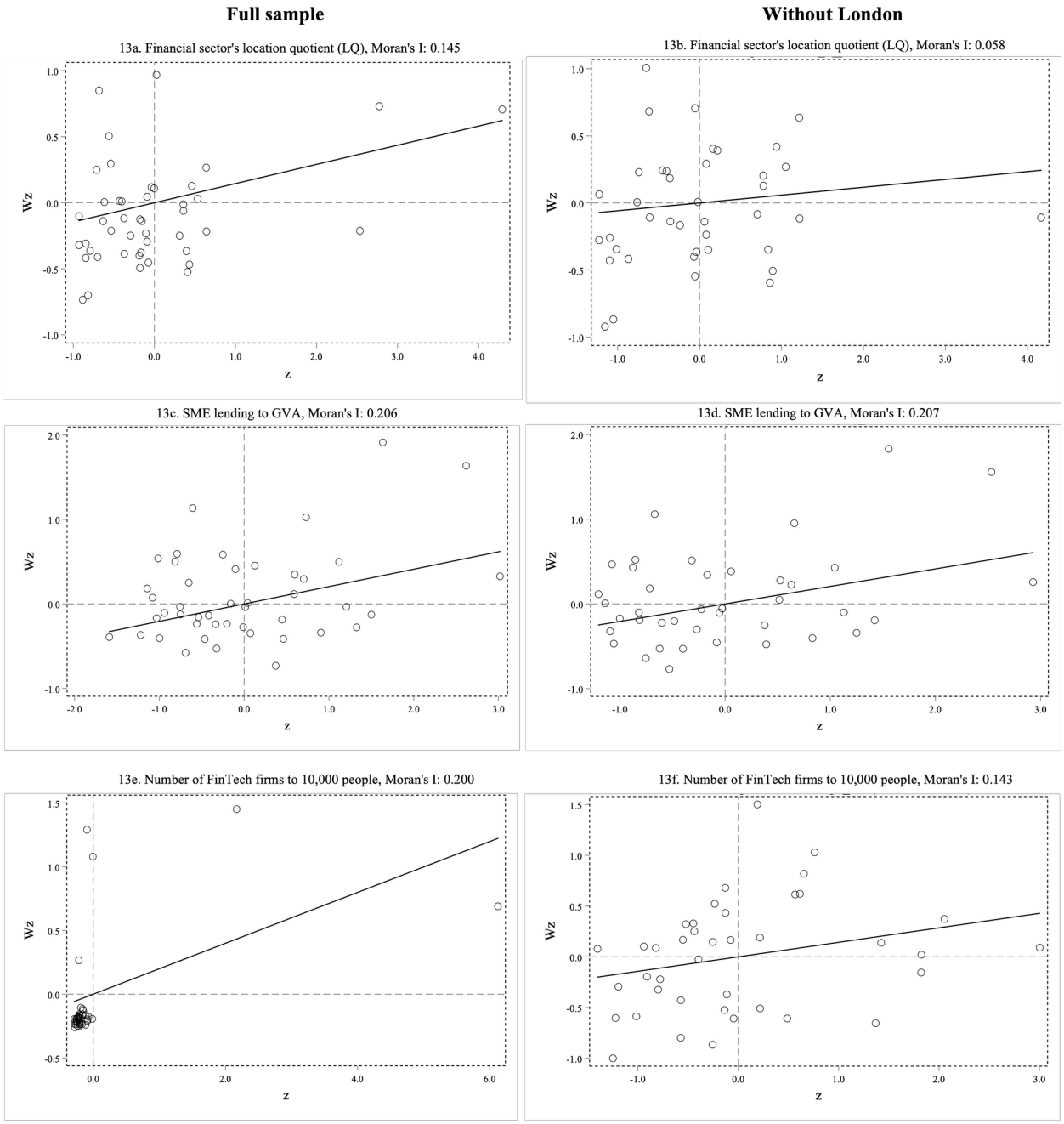


Figure 13. Moran scatterplots for selected financial variables. Data includes all ITL2 areas of Britain and describes average values for 2009- 2023 for financial sector's location quotient, and 2013- 2023 for SME lending and FinTech. Sources: ONS, UK Finance, Crunchbase.

impact of neighbours' independent variables. As with the baseline model, α stands for the constant parameter of the model and ε_{it} for the error term, assumed to be normally distributed. Likewise, the terms u_i and λ_t represent, respectively, fixed effects and time dummies, which we include in all our regressions. Similar to the baseline model, all independent variables enter into the model with a time-lag.

5.3.1. Results

We start with a visual inspection of spatial dependence for some of our key variables. Figure 13 presents Moran plots for finance's location quotient, SME lending and FinTech. Moran plots are effectively de-meaned scatterplots between a variable and its spatial lag. A clustering of observations at the north-east (north-west) and south-west (south-east) quadrants would indicate a positive (negative) spatial correlation. For financial development, for example, a clustering of values at the north-east quadrant would indicate that ITL2 areas whose financial development is above-average tend to be near each other.

Our evidence indicates weak spatial correlations. Financial sector's location quotient records some clustering of values at the south-west quadrant when London is included, but the fitted line gets significantly flatter in the sample without London (respectively, figures 13a and 13b). This is because the inclusion of London ITL2 areas, whose finance LQ values are the highest, effectively "pushes" all others to the left of the graph. On both counts, the Moran-I statistics (respectively, 0.145 and 0.058) are relatively low. On the other hand, SME lending registers a more noticeable correlation (figures 13c and 13d). The Moran-I statistic of 0.206 indicates a non-negligible spatial correlation, albeit still rather moderate. This result is very similar with and without London. Figures 13e and 13f also report results for FinTech activity, proxied by the number of FinTech firms. The two figures corroborate further the dominance of London in FinTech in Britain. As shown in figure 13e, inclusion of London dwarfs all other regions, which get jammed at the south-west quadrant. Figure 13f shows that when London is removed, FinTech in the rest of Britain registers very limited spatial correlations, as with financial sector's location quotient and SME lending.

Table 6 presents our main results, based on the SAR estimation method. For compactness, we present a selection of regressions in line with the main findings reported earlier, for variables found to be statistically significant. Columns 1- 3 demonstrate our results for models with financial sector's location quotient, first for the full sample, and subsequently for the full sample minus London. Column 4 re-runs the model of column 3, using just the share of financial sector's GVA as an alternative proxy for regional financial development. Following, columns 5-8 report results for our models with SME lending, with and without London (respectively, columns 5-6 and 7-8). On all occasions we report our results with and without control variables.

To start with, an important benefit of the spatial models is that they allow us to test our baseline results from the preceding sections. These correspond to the direct effects reported in the upper half of the table. The hypothesis here is that the results obtained from standard panel data models could be biased if spatial spillovers are unaccounted for. Against this hypothesis, Table 6 demonstrates a high degree of consistency in all variables. The broad financial sector still

demonstrates an inverted-U shape relationship with regional growth, whether proxied through its location quotient or just its share of GVA out of total GVA of an ITL2 region. It also holds with and without London, and regardless of the inclusion of other control variables. Likewise, SME lending is consistently positive, linear and statistically significant in its relationship with growth. The signs and significances of our control variables are also aligned to our earlier results.

With regards to indirect effects (spatial spillovers), our model confirms that there is indeed a spatial dependency in the economic growth of ITL2 regions in Britain. This is manifested by the consistently high statistical significance of ρ (rho), the spatially autoregressive coefficient of the model. This result holds across all models and the positive sign suggests that if neighboring regions are growing fast, a region is likely to grow fast too – and vice versa.

Our results also indicate some indirect effects for our financial variables, albeit relatively limited. For the broad financial sector, the squared term is significant in two of the four regressions (columns 1-4), whereas the level term is persistently insignificant. This finding indicates the presence of modest spatial spillovers in regional financial development. As previously, the sign of the squared term is negative, thus indicating an inverted-U relationship with growth, in support of our key finding over the benefits and risks of financial development.

SME lending records no spatial spillovers, a finding that further underscores the limited scale and geographical reach of SME activity. That these results hold despite recent leaps in credit risk assessment technology and the introduction of Open Banking highlights the continuing significance of geography. While new credit risk models might cater to SMEs using standardized platforms for accounting (e.g Inuit, Sage, etc) and sales (e.g Shopify), SMEs which cannot feed this type of data into the credit models facilitated by Open Banking are likely be left at a disadvantage. Relationship lending is likely to matter the most for these firms.

Table 7 reports the same sequence of models with the only difference that these are now estimated using the SDM estimation method. The results are broadly consistent to what reported in Table 6, indicating significant direct effects and limited indirect effects.

Table 6. Baseline spatial econometric results: Spatial Autoregressive (SAR) Model.

		Financial sector location quotient and share of GVA				SME lending		SME lending	
		full sample	without London			full sample		without London	
	Dependent variable: ***Real GVA per capita growth***	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GVA per capita (ln.)	-7.931***	-7.634**	-8.610***	-7.988***	-7.964	-6.496	-2.195	2.563
		(-2.717)	(-2.562)	(-3.163)	(-2.901)	(-1.476)	(-1.298)	(-0.387)	(0.457)
	Financial sector's location quotient	**3.114***	**3.509**	**6.271***					
		(1.693)	**(1.271)**	**(1.780)**					
	Financial sector's location quotient (squared)	**-1.737*****	**-2.466***	**-3.642****					
		(-3.855)	**(-1.648)**	**(-2.003)**					
	Financial sector's share of GVA				**0.558****				
					(1.974)				
	Financial sector's share of GVA (squared)				**-0.035*****				
					(-2.954)				
	SME lending					**0.821****	**0.724****	**0.653***	**0.564***
						(2.533)	**(2.034)**	**(1.825)**	**(1.783)**
DIRECT EFFECTS	Unemployment rate			-0.263**	-0.281**		-0.239		-0.035
				(-2.056)	(-2.151)		(-1.485)		(-0.182)
	Population growth			-0.402	-0.471		-0.208		0.705
				(-0.840)	(-0.973)		(-0.406)		(1.013)
	Agriculture's share of GVA			0.983***	0.935***		0.210		-0.215
				(3.563)	(3.334)		(0.589)		(-0.565)
	Education's share of GVA			0.858**	0.765**		1.452**		1.783***
				(2.256)	(2.077)		(2.352)		(2.644)

	GVA per capita (ln.)	-2.974*	-2.823**	-2.700**	-2.704**	-3.196	-2.490	-1.199	0.938
		(-1.910)	(-1.977)	(-2.018)	(-1.970)	(-1.150)	(-1.030)	(-0.372)	(0.375)
	Financial sector's location quotient	**1.181**	**1.369**	**2.057**					
		(1.351)	**(1.087)**	**(1.414)**					
	Financial sector's location quotient (squared)	**-0.650****	**-0.918**	**-1.166**					
		(-2.204)	**(-1.390)**	**(-1.560)**					
	Financial sector's share of GVA				**0.199**				
					(1.506)				
	Financial sector's share of GVA (squared)				**-0.012***				
					(-1.889)				
INDIRECT EFFECTS	**SME lending**					**0.333**	**0.259**	**0.356**	**0.233**
						(1.588)	**(1.364)**	**(1.497)**	**(1.448)**
	Unemployment rate			-0.084	-0.098		-0.092		-0.023
				(-1.502)	(-1.560)		(-1.088)		(-0.251)
	Population growth			-0.136	-0.174		-0.093		0.275
				(-0.799)	(-0.891)		(-0.429)		(0.879)
	Agriculture's share of GVA			0.309**	0.317**		0.069		-0.104
				(2.136)	(2.130)		(0.480)		(-0.572)
	Education's share of GVA			0.273	0.263		0.525		0.741*
				(1.640)	(1.579)		(1.466)		(1.914)
	rho	0.282***	0.279***	0.241***	0.259***	0.300***	0.272***	0.364***	0.314***
		(3.799)	(3.996)	(3.222)	(3.446)	(3.175)	(3.014)	(4.771)	(3.879)
	N	180	160	160	160	135	135	120	120
	N_g	45	40	40	40	45	45	40	40
	r2	0.151	0.512	0.276	0.304	0.187	0.174	0.503	0.567

*Notes: estimation based on Maximum Likelihood; data in three-year non-overlapping averages; period of coverage: 2009- 2023 in columns 1- 4, 2013- 2023 in columns 5- 12; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively; t-statistics in parentheses; heteroskedasticity robust standard errors used, clustered by ITL1 regions; all right-hand side variables lagged by one time-period; year dummies used in all regression; rho represents the spatially autoregressive coefficient of the model; queen contiguity spatial weight matrix used for determining the model's spatial lag.*

Table 7. Results with the Spatial Durbin Model (SDM).

		Financial sector location quotient and share of GVA				SME lending		SME lending	
		full sample	without London			full sample		without London	
	Dependent variable: ***Real GVA per capita growth***	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GVA per capita (ln.)	-7.917***	-8.247***	-8.667***	-7.356**	-6.000	-4.618	-0.764	3.041
		(-2.755)	(-3.080)	(-3.149)	(-2.542)	(-1.152)	(-0.912)	(-0.142)	(0.498)
	Financial sector's location quotient	**2.963**	**4.772**	**7.010****					
		(1.317)	**(1.602)**	**(1.993)**					
	Financial sector's location quotient (squared)	**-1.810****	**-3.283****	**-3.479***					
		(-2.127)	**(-2.146)**	**(-1.789)**					
	Financial sector's share of GVA				**0.760****				
					(2.387)				
	Financial sector's share of GVA (squared)				**-0.042*****				
					(-3.009)				
	SME lending					**1.088*****	**1.065****	**0.942****	**0.902****
						(3.309)	**(2.473)**	**(2.521)**	**(2.116)**
DIRECT EFFECTS	Unemployment rate			-0.183	-0.186		-0.215		-0.052
				(-1.260)	(-1.174)		(-1.319)		(-0.277)
	Population growth			-0.812	-0.796		-0.058		0.946
				(-1.187)	(-1.203)		(-0.061)		(0.910)
	Agriculture's share of GVA			1.096***	1.035***		0.562		0.169
				(3.622)	(3.052)		(1.448)		(0.371)
	Education's share of GVA			0.853**	0.824**		1.457**		1.787**
				(2.023)	(2.024)		(2.252)		(2.457)

	GVA per capita (ln.)	0.530	1.531	2.765	6.512	9.711	18.254	2.092	4.712
		(0.088)	(0.228)	(0.297)	(0.769)	(0.747)	(1.114)	(0.156)	(0.299)
	Financial sector's location quotient	**-0.683**	**14.632***	**11.005**					
		(-0.082)	**(1.692)**	**(1.640)**					
	Financial sector's location quotient (squared)	**-0.857**	**-9.265***	**-4.469**					
		(-0.214)	**(-1.680)**	**(-1.072)**					
	Financial sector's share of GVA				**1.002**				
					(1.578)				
	Financial sector's share of GVA (squared)				**-0.043**				
					(-1.196)				
	SME lending					**-0.388**	**-0.231**	**-0.513**	**-0.259**
INDIRECT EFFECTS						**(-0.696)**	**(-0.393)**	**(-0.891)**	**(-0.473)**
	Unemployment rate			-0.303	-0.175		-0.055		0.223
				(-0.989)	(-0.526)		(-0.128)		(0.480)
	Population growth			1.252	1.300		-0.604		0.453
				(1.011)	(1.008)		(-0.453)		(0.208)
	Agriculture's share of GVA			1.058	0.978		1.072		1.497
				(1.074)	(0.909)		(0.755)		(1.035)
	Education's share of GVA			2.099**	2.531**		3.984**		3.296*
				(2.032)	(2.518)		(2.496)		(1.705)
	rho	0.289***	0.284***	0.133	0.150*	0.350***	0.225**	0.382***	0.245***
		(3.735)	(3.653)	(1.528)	(1.748)	(4.077)	(2.513)	(4.990)	(3.131)
	N	180	160	160	160	135	135	120	120
	N_g	45	40	40	40	45	45	40	40
	r2	0.134	0.428	0.276	0.300	0.220	0.131	0.450	0.318

*Notes: estimation based on Maximum Likelihood; data in three-year non-overlapping averages; period of coverage: 2009- 2023 in columns 1- 4, 2013- 2023 in columns 5- 12; *, ** and *** denote significance at the 10%, 5% and 1% levels respectively; t-statistics in parentheses; heteroskedasticity robust standard errors used, clustered by ITL1 regions; all right-hand side variables lagged by one time-period; year dummies used in all regression; rho represents the spatially autoregressive coefficient of the model; queen contiguity spatial weight matrix used for determining the model's spatial lag.*

6. Conclusions and policy implications

Our report contributes to the ongoing debate on financial development in the UK (UK Government, 2025), and FCA's research questions on the contribution of regional financial services (FS) hubs to UK GDP growth and their comparison to London. We examine the differences among British regions in their financial development, while also opening the black box of finance, to study some of its concrete facets. These include bank lending to small and medium enterprises (SMEs), bank branch density, corporate listings on the stock market, and financial technology (FinTech).

Our findings show that physical proximity in finance remains relevant, despite fast technological development in the sector. Availability of bank branches positively correlates with bank lending to SMEs, in line with existing research in financial geography and relationship lending (Petersen and Rajan, 1994; Berger and Udell, 2002; Flögel, 2018). In other words, ability to talk to someone in person is still of value to SME managers and owners.

Our results also show evidence of a financial centre bias in the spatial reach of the London Stock Exchange – as well as broader big city bias. The share of listed firm in London is about twice that of the rest of Britain; that of Edinburgh is about 4.5 higher than the share of listed firms in the rest of Scotland.

The development of FinTech to this date also demonstrates an extreme centralization in London, whose FinTech ecosystem hosts about 70% of total FinTech firms in our sample. Rather than technology making geography redundant, geography has been a major pull factor for financial technology. That the second biggest FinTech hub in Britain (Greater Manchester) hosts just 3% of FinTech activity is indicative of London's primacy.

The second major finding of our work is the heterogeneity among the various components of the financial sector. Many of our finance variables demonstrate weak or even negative correlations with each other, thus highlighting that regional financial development is not a harmonious process in which the various facets of finance develop in parallel. Aggregate regional financial development, for example, correlates positively with corporate listings and FinTech activity but not with bank lending to SMEs.

Regarding the impact of regional financial development on regional growth, our econometric findings confirm the inverted-U shape previously suggested in the "too-much-finance" literature. While positive up to a point, there comes a threshold beyond which further financial development becomes a drag on regional growth. Additional regressions show a positive and linear effect of bank lending to SMEs on regional growth, thus suggesting that any adverse effects out of excessive financial development are unlikely due to SME lending, wherein the main problem is typically a lack rather than an over-supply of finance. Bank branch density is insignificant, thus indicating that its positive impact on growth is mostly indirect, via its support for SME lending. FinTech is also statistically insignificant, suggesting that the sector is still too small to exercise an independent effect on growth. Furthermore, we only find weak spatial spillovers for regional financial development. Likely, this further corroborates the continuing

overshadowing of regional FS hubs by London. In SME lending, the weak spillover effects further highlight the local embeddedness of SMEs and the significance of physical proximity. Improved lending conditions for SMEs in Glasgow, for example, are likely to matter little for SMEs in Perth or Sterling, neighboring areas to Glasgow in ITL2 terms.

To be sure, the inverted-U shape relationship between regional financial development and regional growth, and the heterogeneity of regional financial development, should not be seen as reasons to abort the idea of geographical de-centralisation in finance, in which case we would be throwing away the baby with the bathwater. Rather, they highlight the crucial role public policy must play. Our findings rather suggest that regional financial development is not automatically destined to support regional growth, if left to its own devices. Appropriate policy needs to be in place to orient it towards the most growth-enhancing pathways.

That most of the areas beyond the inverted-U threshold in our regressions are hosts to UK's largest cities outside London highlights that to be successful in promoting regional growth, regional financial development ought to go beyond urban boundaries. Furthermore, targeted policies to support SME lending should be prioritized over policies that call for general growth in the size of finance; most importantly, the latter type of policies should not be assumed to feed positively into the former. Concrete ways to re-establish proximity should be explored. While it is perhaps utopian to expect private banks to go back and re-open their branches any time soon, an alternative idea for supporting SME lending could for instance be the provision of infrastructure for banks to locate business managers in near proximity to SMEs, even without re-opening brick-and-mortar branches. In as much as bank branches serve a broader welfare function, beyond economic growth, the possibility of establishing a public retail bank to cover basic banking needs of marginalized populations should be explored, moving beyond the presumption that banking is necessarily to be left in private hands.

Private financial institutions of national significance should take geography seriously rather than assume no or low friction of distance and other geographical factors in their operation. The London Stock Exchange, for example, as we demonstrated, contributes to a landscape of very, and in fact increasingly uneven stock market participation of companies across the country, after we control for company size as the primary factor affecting the decision to go public. As prior studies showed (Wójcik, 2009), while the financial centre bias of the UK stock market 20 years ago was larger than the bias found in the USA, Japan, and most European countries, it has got worse since. If we believe in the positive impact of stock market listing on access to funding, and consequently on business and overall economic growth, the map of uneven stock market participation must be taken into account rather than assumed as a benign product of market forces. In our view, the London Stock Exchange itself and capital market regulators should take notice of and responsibility for the map they co-create as their geographical footprint. The effectively monopolistic role of the London Stock Exchange on the UK stock market only underlines this responsibility. To reduce the financial centre and big city bias in stock market listings, further research is necessary to examine reasons for the uneven participation of companies in the stock market, including proximity to capital market intermediaries, corporate governance, and other institutional factors.

Another take-away message of our analysis is that the policy to support regional financial centres in the UK must be aware that financial development can vary significantly within subnational regions, and some aspects of financial development need to be monitored and managed at local level as well. Put differently, the monitoring of financial development and its impacts needs to be multi-scalar, with emphasis on different facets of financial development at different scales. Starting at the local scale, the emphasis of monitoring should include access to basic financial infrastructure, such as bank branches of their equivalents or substitutes. At a regional level, it should include business participation in capital markets. At national level, it could focus on the impacts of FinTech, while at the international level on the contribution of UK financial centres, with London in the lead, to export financial services.

One way forward, in analytical terms, would be to develop a financial development typology of the UK regions to capture the relative strengths and weaknesses of financial development in different regions, defined at different scales. To the best of our knowledge, such typology does not exist for any country, and as such it could represent a research-driven regulatory innovation, with positive impacts on the international role of the UK financial regulators.

To follow up on our analysis and the implications of its results, it is essential that ideas shaping financial regulation and policy in the UK are developed in collaboration with geographers and other social scientists, in addition to economists and lawyers as the usual suspects in the field. Financial geography, as a burgeoning sub-discipline of geography, evolving in an open dialogue with economics and other disciplines, is ready to contribute concepts, theories, as well as methods to this debate.

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Appendix. Data sourcing, geo-location coding, and variable construction.

Note of disclosure on data mapping:

Original data sources provided mainly by ONS and NRS were collected at different geographic and statistical area levels: OA21CD, Postcode, Postcode Sector, Counties and Local Authorities. All these geographical and statistical areas have suffered many changes between 2013-2025 which were the years of interest for our study (e.g. counties Cumbria, North Yorkshire, Somerset do not exist since 2023; many postcodes have been withdrawn and new ones were introduced; ITL codes appeared only in 2021, and they have known three versions since; etc.) An ONS authoritative direct mapping between any of these units and IT225CD was therefore very unlikely and individual mapping paths were created for each of the variables used. A granular mapping path between Census Output Areas and ITL3 was built spatially considering Output areas crossing multiple ITL areas as being assigned to the ITL with the biggest overlap.

Variables:

Financial sector's location quotient: Source: ONS, 'Regional gross value added (balanced) by industry: all ITL regions' dataset. Measured as the ratio of the financial sector's (K64-66) gross value added (GVA) share in an ITL2 area to financial sector's GVA share in Britain.

Financial sector's share of total salaries: Source ONS, 'Regional gross value added (balanced) per head and income components' dataset. Measured as the share of salaries of the financial sector (K64-66) out of total salaries in an ITL2 area.

Bank lending to SMEs. Source: UK Finance, 'SME Lending within UK Postcodes' dataset. Data available from 2013 to 2023. Data aggregates the quarterly volumes of outstanding stocks of loans and overdrafts provided by UK's largest retail banks (Barclays, Lloyds, HSBC, RBS, Santander, Virgin Money), plus Co-Operative Bank, and reports them at the postal sector level. **Mapping path to ITL:** ITL2 *map to* ITL3 *spatial join with* OA21CD *map to* Postcode *map to* Postcode Sector.

Bank branch density. Source: Geolytix. Data available from 2015 onwards. Geolytix provides a file with the locations of 21 banks and 14 building societies. There is only one set of opening times which is assumed to be the for the last period provided in the dataset (July 2025). *Banks:* Allied Irish Bank, Bank of Ireland, Bank of Scotland, Barclays, Clydesdale Bank, Coutts, Danske, Halifax, Handelsbanken, HSBC, Lloyds, M&S Bank, Metro Bank, NatWest, Royal Bank of Scotland, Santander, The Co-operative Bank, TSB, Ulster Bank, Virgin Money, Yorkshire Bank. *Building societies:* Coventry Building Society, Cumberland Building Society, Leeds Building Society, Newbury Building Society, Newcastle Building Society, Principality Building Society, Progressive Building Society, Monmouthshire Building Society, Nationwide, Skipton Building Society, The Cambridge Building Society, The Nottingham, West Bromwich Building Society,

Yorkshire Building Society. Extraction of precise location and opening times for bank branches for July 2019 and July 2015 using web-scrapping for TSB and Metro and the Open Banking APIs for Barclays, Bank of Ireland, Bank of Scotland, Danske Bank, FTNI, Halifax, HSBC, LBG, Nationwide Building Society, NatWest, Royal Bank of Scotland, Santander, Ulster Bank. *Assumptions:* i) Branch assumed closed within a year assumed to be closed on 30/06 of that year; ii) Opening times of individual branches stayed the same over the years; iii) Branches without opening time were allocated the average opening time/branch for that year. Mapping path to ITL: geolocation of the branches based on the postcode and then spatial join with ONS provided boundaries for ITL3. Variable construction: bank branch density measured as total number of bank branches by 10,000 people. Extrapolated backwards to 2011 in econometric estimations to improve estimation efficiency on the assumption of a persistent declining trend already before 2015. Opening time density measured as total branch opening time per week (in hours) by 10,000 people.

FinTech. Source: Crunchbase. Filters: companies founded between 01/01/2013 and 31/12/2023, from "Industry Group" Financial Services *and* assigned to one of the following "Industries": Fintech, Funding platform, Microlending, Commercial Lending, Crowdfunding, Lending, Consumer Lending, Banking, Mobile payments, Payments, Impact Investing, FS as a Service, Insurtech, Software. Out of 4,065 companies extracted we eliminated duplicates, companies wrongly located in the UK, companies wrongly marked by Crunchbase as active, but which were liquidated or dissolved according to the Companies House records. We obtained 3,739 companies. Extensive manual searches were required for the identification of the companies which could not be geographically located strictly on Crunchbase information. Mapping path to ITL: geolocation of the firms based on the postcode and then spatial join with ONS provided boundaries for ITL3 areas. Variable construction: Total number of FinTech firms by 10,000 people to adjust for area size. Employment estimates based on employment bands. Crunchbase separates between 9 employment bands (number of employees): 1-10; 11-50; 51-100; 101-250; 251-500; 501-1,000; 1,001-5,000; 5,001-10,000; 10,001+). For our analysis we construct an ordinal metric ranging from 1 to 9, with lower numbers corresponding to lower employment bands. Divided by 10,000 people to adjust for area size.

Corporate listings in London Stock Exchange. Source: FAME. Filters: Extraction date: 13/12/2025**.** Primary trading address: England, Scotland, NI, Wales**.** The geolocation of individual companies was done using the latitude and Longitude provided or if these were not available using the geographic centroid of the postcode provided. If none of these were available, companies were identified manually in the Companies House register. Mapping path to ITL: Companies were assigned to ITL225CD through the spatial join with the ONS provided boundaries for ITL3.

Variables used for spatial accessibility indicator (SPAI):

- Bank branches: location and opening times for July 2019 and July 2025.
- Post Offices: location and opening time. Source: https://www.postoffice.co.uk/branch-finder; Regular web-scraping of the location and opening times by the authors.
- Banking Hubs: location and opening time. Source: https://www.cashaccess.co.uk/hubs/; Regular Web-scraping of the location and opening times by the authors.
- Population: calculated based on population density at output area level (Census 2021)

- Distances from population weighted centroids of Output Areas to each point of service: Calculated using Openrouteservice.org (Heidelberg Institute for Geoinformation Technology, 2020)

List of look-up files:

ONS Postcode Directory (November 2025) for the UK	ONS	UK	2,720,556 postcodes
Output Areas (December 2021) Boundaries EW BFE (V9)	ONS	England & Wales	188879 Output Areas (OA21CD)
2022 Census Output Area boundaries – Extent of the Realm	NSR	Scotland	46363 Output Areas (OA22CD)
Mapping OA22CD to ITL3	NSR	Scotland	OA22CD to ITL325CD
TS006 - Population density	ONS. NOMIS.	England and Wales	Population density at output area level.
Output Areas (December 2021) EW Population Weighted Centroids (V4)	ONS	England and Wales	Population Weighted Centroids for Output Areas
Local Authority District to County (April 2023) Lookup in EN	ONS	England	Mapping LAD23CD to England Counties
International_Territorial_Level_3_(January_2025)_Boundaries_UK_BFC_V2	ONS	UK	182 ITL3 areas (ITL325CD)
International Territorial Level 2 (January 2025) Boundaries UK BFE	ONS	UK	(ITL225CD)