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Banking and Industrialization

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Abstract

We establish a causal role for banking access in the spread of the Industrial Revolution over the period 1817–1881 by exploiting unique employment data from 10,528 parishes across England and Wales and a novel instrument. We estimate that a one standard deviation increase in 1817 finance employment increases annualized industrial employment growth by 0.93 percentage points. We establish the role of structural transformation as an underlying growth mechanism and show that banking access: (i) increases the industrial employment share; (ii) stimulates urbanization; and (iii) fosters inter-industry transition to high TFP, intermediate and capital-intensive sub-sectors. (JEL: O10, N23, R11.)

Keywords: Banking; Industrial Revolution; structural transformation; regional economic growth; urbanization.

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1. Introduction

Schumpeter (1934) argued that finance causes growth by stimulating the process of industrialization. Although there is broad evidence that finance causes growth (Levine, 2005), there is surprisingly little empirical evidence on the role finance plays in the underlying process of structural transformation. This paper explores the causal connection from bank access to the rate and nature of growth in industrial employment in England and Wales over the period 1817–1881. This period of the Industrial Revolution is characterized by the maturation of the early superstar sectors (such as textiles) and the shift toward new, rapidly growing sectors (such as machines and tool making). Our study affords the opportunity to consider the role of banking both in the overall growth of industrialization and in the detail of its evolution over time. We show that banks accelerated the pace of industrialization by causing structural transformation to occur across and within sectors, and across and within cities.

The role of finance in the Industrial Revolution has previously been in question since the financial revolution that began in the 17th century (Neal, 1990) did not appear directly to stimulate industrialization. The capital required by industry was also dwarfed by that raised by the state for fighting wars. Gerschenkron (1962) came to the conclusion that banks mattered for growth only in those countries left behind by industrializing England. If finance mattered for growth only in particular time periods, or only in particular countries, then we may rightly doubt the generality of a role for finance. Our findings robustly support the idea that finance was causally important in nineteenth century England and Wales. Our estimates of the historical finance-growth connection are also quantitatively similar to those found in studies of more recent data, which gives us confidence that finance does indeed fundamentally matter for structural transformation.

We employ highly detailed sectoral and geographical data. We distinguish occupational change within 10,528 parishes across England and Wales over the period 1817–1881. Our unique parish data help us to locate the effect of banks on the industrial changes that happened outside of London in small areas within the Midlands and the North of England. Since distance matters even in integrated capital markets (Guiso et al., 2004), we should thus not look for a role for banks in London to generate the industrial change in the provinces.

Using new data on local access to the small but numerous private banks that existed outside of London in the nineteenth century, we establish a robust and large causal effect of local financial services on the local growth of industrial employment.[1]

Having established the causal role for banking in determining the pace of industrial employment growth, we are able to isolate the mechanism through which banking caused growth: structural transformation. Our econometric framework focuses on three aspects of structural transformation as mechanisms of growth. First, we establish that access to banking causes the local *share* of industrial employment to increase. This finding strengthens the argument made by Schumpeter (1934) that access to finance encourages entrepreneurship as driver of a process of structural transformation in addition to causing growth (King and Levine, 1993).[2] Second, we use the geographical detail in our data to show the spatial dimension of this transformation process. We find that banks triggered a process of urbanization where the core of cities became relatively more industrial. This is consistent with Chinitz's (1961) idea of entrepreneurship as a driver of urban growth.[3] Third, since we can classify occupations at a highly disaggregated level, we identify the causal effect of

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By 'industry' we mean those sectors classified by Wrigley (2010) as 'secondary', i.e., all typical industrial sectors including construction but not including mining.

2

See Kerr and Nanda (2011) for a review of the literature on entrepreneurship and finance.

3

banks on the growth of different industrial groups: Banks generate the fastest employment growth in intermediate sectors, in sectors with the highest TFP, and in sectors that are the most capital intensive.

Our data cover 10,528 parishes in England and Wales outside London over the period 1817-1881 (Shaw-Taylor et al., 2010).[4] The dataset holds information on employment in banking which gives us the unique opportunity to analyze the effect of access to finance on industrial employment growth at a high spatial resolution (the average radius of a parish is only 2.1km). To cross-validate the banking employment information, we additionally create a panel of locations and characteristics of 'country banks' (private banks outside of London) from Dawes and Ward-Perkins (2000). As we discuss below, country banks represented the only provincial financial institutions because our initial period, 1817, predates the legalisation of joint stock banking in 1826. Since they were private partnerships and often limited to six partners, the country banks also rarely had a branch network and were of a generally similar size (cf. Beck et al., 2013). These characteristics mean we can directly measure access to financial services, helping us recover a robust role of 'traditional' banking activities.

See, e.g., Glaeser et al. (2015) for recent empirical evidence on this relationship. Rosenthal and Strange (2010) review the literature.

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We omit the 157 parishes in London because it was dominated by the Bank of England and since its financial institutions were quite distinct from the country banks in our sample.

One major concern is that 1817 access to banking is not exogenous. Even though our initial observation predates the major takeoff in aggregate per capita growth which occurred after the first quarter of the nineteenth century (Crafts, 1994), it may be that forward-looking bankers chose emerging areas in advance of their growth being realized. In that case, we would overestimate the effect of banking on future economic development. However, if bankers were correctly anticipating the imminent growth but systematically chose the wrong locations, we would expect a downward bias. To overcome any selection bias, and to identify a causal effect of finance access on regional economic growth, we suggest an instrumental variable strategy that employs the location of Elizabethan (16th century) post towns. These post towns were located along six straight routes out of London that the Crown developed at the end of the 16th century for strategic and military communication purposes. To speed up such communication, horses were changed at posts in towns spaced at regular intervals. Depending on terrain, the distance between post towns ranges between 20-24km.[5] These exogenously determined changing places are the 69 Elizabethan post towns that we use as binary instruments. Post towns turned out to be the preferred locations for country banks who benefited from being able to transport gold specie along the relatively secure connections to

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The American *Pony Express* changed horses at the same intervals–on average every 24km (Frajola et al., 2005).

London. Our first stage suggests that Elizabethan post town locations were 33% more likely to host bankers in 1817. At the same time, checks on the instrument validity clearly reject the possibility that Elizabethan post towns benefited (relative to other towns) from having better access to the overall road network which may have facilitated the flow of goods and innovative ideas. It is also clear that post roads did not have a direct effect on growth since canals and, later, railways carried much of the heavy industrial traffic that mattered for growth during the early nineteenth century.[6]

Our IV regressions suggest that the presence of a bank significantly accelerated industrialization. We estimate an industry-banking employment elasticity of 1.266. Put differently, a one standard deviation change in the log of finance employment causes annualised growth to be 0.93 percentage points higher. Our estimated effect points to the mechanism by which banking operates and the coefficient is consistent with the literature that uses contemporary cross-country data. The effect of banking is most pronounced in intermediate industrial sectors which suggests banks played a crucial role in the wider economy. Distance decay estimates further show that the impact of a bank on industrial employment growth is limited to less than 10km. Within

[6] Consider Bagwell (1974, p.60): "road haulage remained so expensive that a majority of the goods were despatched by water carriage until, by the early 1850s, the combination of an adequate basic railway network with a rational classification of goods by the Railway Clearing House, gave an increasing advantage to land carriage."

this range, we also find evidence that having a bank causes urban change: The presence of a bank means that industry becomes concentrated in proximity to the bank while the the share of agricultural employment decreases.

Our findings are robust to a variety of checks. We consider variations of our measure of finance access using a new data set on the locations of country banks to cross-validate our main variable of interest. We further show balancing tests for the instrument, discuss possibly confounding effects of first nature geography (including distance to the next port, flexible latitude-longitude controls, and terrain controls) and second nature geography (including controls for market access, wealth and education provision), show that the instrument does not apply in falsification tests, and present variations of our standard errors. Reassuringly, all these tests do not affect our findings. We simulate how sensitive our results are to a violation of the exclusion restriction (Conley et al., 2012). We find that our estimated effects are qualitatively robust to substantial violations of the exclusion restriction. Our most conservative results suggest that, as long as one is willing to rule out direct effects from being a post town that exceed a semi-elasticity of 0.1, one would still conclude that there is a causal effect of banking access on manufacturing growth. To put this into perspective, a semi-elasticity of 0.1 implies 11% higher growth over the period of 64 years. This is around the same size as the estimated effect of being located on a coal field.

We contribute to different strands of literature. First, we add to our understanding of what caused the Industrial Revolution. Two recent major contributions are Allen (2009) and Mokyr (2009) (see the survey in Crafts, 2010). Allen (2009) argues that high wages relative to the cost of energy and capital drove the invention of labour-saving technologies. Some inventors needed 'venture capital', and Brunt (2006) characterizes country banks as providing this. Our contribution is to show that an absence of such banks, by affecting the price of capital, could have fundamentally stood in the way of the technological change driven by the larger forces described in Allen (2009). Mokyr (2009) views the Scientific Revolution as key to both improving institutional quality and stimulating the intensity of technological progress necessary for unlocking modern growth. Financial innovations "were another manifestation of the belief in progress" (*ibid.*, p. 220) but, for Mokyr, it is not clear whether they were essential to growth. Our paper finds that the country banks were indeed a fundamental part of the modernization that took place. In finding this, we also update the role normally played by banking in textbook histories of the period. Quinn (2004) and Murphy (2014), hold that financial development was incidental to the Industrial Revolution.[7] This established view results partly from the fact that the *financial* revolution occurred in London

[7] Exceptions are the case studies by Hicks (1969), Hudson (1986) and Cottrell (1980) that point to more direct growth-generating mechanisms of finance during the Industrial Revolution.

and at a much earlier time (see Neal, 1990) and partly from the existence of regulations (the Usury Act of 1660, the Bubble Act of 1720) that constrained private banking (see Harris, 2000) and from the crowding-out effect caused by war finance (Barro, 1987; Temin and Voth, 2013 and Antipa and Chamley, 2016). We go beyond London and look instead at the numerous, small private banks outside of London. Doing so, we find a robust and large causal effect of financial services on growth. There was indeed a connection from finance to industrial growth, one that was highly localized and not London-based.

The finding that access to finance matters for industrial growth strengthens existing research on finance and growth in three ways.[8] First, our results support the mechanism put forward by Schumpeter (1934). We find that the effect of a bank on growth was spatially concentrated and show that new, innovating industrial sectors which produced intermediate goods benefitted most. Second, the effect in the past is quantitatively similar to findings for more recent periods. This suggests that the effect of finance does not vary substantially across countries and over time. As such, we believe our findings can inform our understanding of the role played by access to finance in countries

[8] Studies previously conducted analyses at the country level (Rajan and Zingales, 1998; Levine et al., 2000; Demetriades and Hussein, 1996; Rousseau and Sylla, 2004) or used comparatively large regions within-countries (Jayaratne and Strahan, 1996; Guiso et al.. 2004; Pascali, forthcoming). A comprehensive survey of the extensive literature on finance and growth can be found in Levine (2005) and Beck (2008). See also Townsend (2011) for a structural approach to policy evaluation in the context of finance in Thailand.

that have yet to fully industrialize. In particular, we are able to show how the importance of local finance found in micro-studies may connect to the macroeconomic consequence in terms of higher growth (for a recent survey on access to finance, see Karlan and Morduch, 2009). Third, our work expands on the literature that finds proximity to banking services matters (Petersen and Rajan, 2002; Bofondi and Gobbi, 2006).

Our work also contributes to the literature on structural transformation (Herrendorf et al., 2013) since we show that financial services cause an increase in the share of industry employment. There have been few empirical results on the fundamental determinants of structural transformation; this paper is the first to highlight a causal role for access to banking at the local level. This relates to the existence of financial frictions that cause misallocation across sectors (Midrigan and Xu, 2014) and also how that misallocation impacts economic growth (Jovanovic, 2014).

The remainder of the paper is organized as follows. Section 2 provides a brief history of country banks. In Section 3 we present our estimation strategy and discuss the two instrumental variables. The main results are presented in Section 4 and we assess the robustness of our findings and the validity of our instruments in Section 5. Section 6 exploits the geographic dimension of our data to see whether banking access in one parish affects its neighbours. In Section 7 we explore the role of banks in transformation of the economy both across space and within the industrial sector. Finally, Section 8 offers some concluding remarks.

2. A Brief History of Country Banks

> The present prosperous condition of this country is to a certain extent the offspring of the Country Bank system: it calls into being and supports many, who but for the timely aid and fostering hand of Bankers would never have risen above the dull level of the mass; character, industry and intelligence are but the raw material, like ore in the mine, rich and valuable, but unavailing and unavailable, except turned to account by the timely application of capital...
>
> *Sketch of a Country Bank Practice* (1840)

At the turn of the nineteenth century, there were three principal forms of formal banking institution in England and Wales: The Bank of England; private banks in London; and, privately owned banks outside of London – the 'country banks'. Other financial institutions at that time included the small number of savings banks and the nascent discount market in London (see Cameron, 1967). Financial services were also provided by non-specialized financial intermediaries such as attorneys (on which see Hudson, 1986). Successful merchants and aristocrats were also in positions to be important sources of capital. Often these informal financiers became the partners in the first country banks (Dawes and Ward-Perkins, 2000).

Country banks were limited to six partners and, given their limited size, they were predominantly unit banks that served their local area.[9] Pressnell (1956) puts their average capitalization at £10,000 at the turn of the nineteenth century. The number of current account holders at a typical country bank would have been in the few hundreds. We can estimate the number of workers at a country bank using Pressnell, which contains a number of country bank balance sheets and profit and loss statements. This includes information on the salaries paid by two country banks which are on average £212 per year over the period 1826–1844. Given the Clark (2010) estimates for non-farm male wages over this period of £44 per year, this means a typical country bank employed around 4.8 workers. It is likely that this is an under-estimate, however, as it does not account for the allowances paid to the managing partner and advances to partners and family, all of which would have included remuneration for additional employment.[10]

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[9] At 1798, 93% of banks had only one office; the average number of partners was around three and the number of bank customers was typically in the hundreds (Pressnell, 1956).

[10] We can compare the implied total number of bank workers to our employment data. At 1817, there are 522 country banks in our sample with an average number of 3.5 partners. Salaried staff plus partners thus make 4,333 bankers which compares favourably with our employment measure of 5,592 total workers in finance. Some workers in finance would have been on their own account (such as attorneys identifying as finance workers), or would have worked as agents to banks, so a slight discrepancy is to be expected.

The total number of country banks increased from only dozens in 1750 to around 700 in the 1820s (Cameron, 1967). Figure 1 depicts the number of country banks over the period 1750–1850. The Figure also reports the number of banks in existence that eventually merged or failed. The acceleration in the number of country banks in the early 19th century resulted partly from the increased private savings borne out of massively increased war debt (see Barro, 1987; Antipa and Chamley, 2016). This was an emerging sector – as Ashby (1934, pp.49–50) describes it was "a period of tentative experiment; of trial and error". Those early country banks slowly learned the trade of professional banking, with, for example, Martin's Bank writing down the influential pamphlet on 'Proper Considerations for Persons Concerned in the Banking Business' in 1746. Many such country banks emerged as principally agricultural concerns, while others provided financial services to emerging textile and mining areas. The early geographical spread of country banks reflected their partially non-industrial roots: At 1800, the industrial counties of the North West of England had among the lowest number of country banks per head (see Cameron, 1967).

The founders of the first country banks were drawn from a wide range of the populace, from landowners to merchants to agriculturalists and traders (Dawes and Ward-Perkins, 2000). Their clientèle was also drawn from a cross-section of the local public: Farmers and industrialists but also spinsters and labourers. One consistent feature of the early country banks is that they were often extremely long-lived and put down deep, local roots with banks subsequently run by generations of the same family. In 1658 the son of a farmer, Thomas Smith, opened in Nottingham the first private bank outside of London. This bank was run by as many as five generations of the Smith family. Between 1658 and its eventual merger into a joint stock bank in 1902 it operated only 11 branches, of which 10 remained open in 1902. The Doncaster Bank, when purchased in 1865, still had partners that were members of the family that established it 1756. Joseph Pease set up a bank in Hull in 1754 and his descendants were still partners at 1893. Dawes and Ward-Perkins (2000) charts many more of the persistent family histories from the early country banks.

As to the financial services provided by country banks, one of the most important was holding a license to issue notes, since the notes printed by the Bank of England did not circulate far beyond London (Pressnell cites a limit of about 30 miles in the early nineteenth century). Through the issue of notes, and the discounting of bills, a country bank was thus key to the circulation of money in the provinces. Of course, a note-issuing country bank needed to back its liabilities with sufficient supplies of gold specie. That meant,

> [T]here was hurrying to and fro; the hasty journey of partners... to London for supplies of the precious metal, and the hazardous return trip in the post-chaise... and the constant risk of accident or highwaymen.

Ashby (1934, p.53)

As we will see below, country banks were thus drawn to the relative security afforded by using the State-managed postal network. Country banks did not locate at post towns for the transport or communication benefit that these roads afforded, as these could be obtained much more widely. It was instead the security of passage to London that led specifically the financial sector to locate in a post town.

Country banks were also engaged in activities beyond note-issue that may be considered 'traditional banking': The provision of short- and long-term credit; overdrafts; mortgages; remittance facilities (particularly to London); the safekeeping of agricultural surpluses; the provision of legal services. As Pressnell (1956, p.265) writes, country bankers were most active in "the mobilization of funds for local investment". The funding of these activities came from providing deposit services, the resources of the bank partners and the London money markets.

Banks that emerged during the boom of country banking in early 19th century tended to be more speculative and failed in shorter order. Ashby (1934, p.48) writes that "many of these had been started by tradesmen on a very insecure foundation." Cash-ratios, for example, varied widely (Pressnell, 1956) making them highly susceptible to crisis. The legalization of joint-stock banking in 1826 was a response to these failures and created a somewhat more stable financial system. Up until 1826, the Bank of England held the legal monopoly on joint stock banking in England and Wales, a regulation that persisted in the wake of the South Sea Bubble (cf. Temin and Voth, 2013). Despite that, as Cottrell (1980, p.16) notes, "The new joint stock banks were generally hardly distinguishable from the private country banks in terms of resources, management and branch networks."

3. Estimation Strategy

The focus of this paper is on whether access to banks affects growth via the structural transformation of the economy. In an online appendix, we introduce a simple model that connects financial frictions to structural transformation and growth. The implications of this model are much like the already-established theoretical literature on the connection between financial development and growth[11] except that in our model we make explicit the role that finance plays in stimulating the shift of labour to industry. In particular, we show that better access to financial services (or a lower cost of obtaining finance) increases investment in fast-growing manufacturing and, because of non-homothetic preferences, growing consumption baskets shift toward relatively more manufactured goods. Along the transitional path to a high level of balanced growth, the economy is characterised by a structural transformation that is accelerated by access to financial services. This theoretical connection

[11] The classic contributions include Greenwood and Jovanovic (1990), King and Levine (1993b), Bose and Cothren (1996), Acemoglu and Zilibotti (1997), Aghion et al. (2005).

from the level of financial services to the change in manufacturing employment motivates our baseline regression model.

3.1. Baseline Estimation

Here, we first consider the following general relationship between finance and manufacturing employment growth,

$$\gamma_p^M = \alpha + \beta_1 FIN_p + X_p' \beta_2 + \mu_d + \varepsilon_p \tag{1}$$

where FIN_p is access to banks in parish p in 1817, $\gamma_p^M = \ln Empl_{p,1881} - \ln Empl_{p,1817}$ is the growth of manufacturing labour and where the coefficient β_1 is to be estimated. Second, in Section 7, we explore structural transformation in additional ways. In particular, we consider the change in the share of manufacturing employment, the nature of spatial spillovers and the impact on different manufacturing subsectors.

$X_{p,1817}$ is a matrix of control variables. Specifically, we include the log of initial industrial employment to account for possible catch-up; the employment share in agriculture and mining as well log total employment and log area, the female population share and the Herfindahl index of industry concentration of each parish. Moreover, we consider an indicator for whether a parish is located on a coal field,[12] and a vector of transportation infrastructure controls, including parish p's access to the turnpike road and waterway network

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(measured as network km per km^2 in 1817), the change in railway km per km^2 between 1817-1881, and the employment share in goods transportation. Finally, μ_d is a fixed effect at the level of the registration district, d. In the context of our first difference estimation, these fixed effects pick up trends on the level of 570 registration districts; on average, a registration district nests 26 parishes.[13]

The major concern with this specification is that finance is not assigned to parishes at random. Instead, we expect the provision of financial services to be at least in part determined by expected future demand. To the extent that expectations refer to future prosperity in the industrial sector, ε_p would be correlated with $FIN_{p,1817}$ thus leading to reverse causation. Related to this, omitted variables may be correlated with the initial level of finance and cause subsequent industrial employment growth. A final concern is classical measurement error. Since we measure financial employment at 1817, it may be the case that some parishes where we observe finance employment may have just established these services while other parishes established services just after. This would result in an incorrect measure of initial access to finance.

This coal information is provided by the UK Coal Authority. It has been derived from information on abandoned coal mine plans and other coal mining related records and information held by the Coal Authority.

[13] Registration districts were early local government units between parishes and counties where the civil registration of births, marriages, and deaths took place. Clearly they will be of different geographical size since there will be some balancing out of population per district.

To overcome these endogeneity problems, we exploit exogenous variation from our instrumental variable, z_p, and estimate the following system of equations:

$$\gamma_p^M = \beta_0 + \beta_1 \widehat{FIN}_{p,1817} + X'_{p,1817}\beta_2 + \mu_d + \varepsilon_p \tag{2}$$

$$FIN_{p,1817} = \alpha_0 + \alpha_1 z_p + X'_{p,1817}\alpha_2 + \mu_d + \nu_p \tag{3}$$

For the system to be identified, the instrument z_p has to be sufficiently strong ($\alpha_1 \neq 0$) and must not violate the exclusion restriction ($cov(z_p, \varepsilon_p) = 0$). In the following, we will introduce our instrument and discuss its relevance and validity. The instrument exploits an historic incident that created location factors favourable for country banks.

3.2. Elizabethan Post Towns as Instrument

Our instrument builds on the insight that out of 150 towns that had a country bank in 1791 (see Figure 2), 130 were a post town (Dawes and Ward-Perkins, 2000). Post towns were attractive locations for banks because they facilitated communication with London and because the roads were guarded and thus safe to transport gold and money between the financial market in London and local country banks. The network of post towns spanned a total of 395 post towns towards the end of the 18th century (Robertson, 1961) and it was likely selective and established for economic reasons. However, the origin of this post town network goes back to the six 'Great Roads' of the Elizabethan post network (Robinson, 1948) which was laid for State purposes. As we will discuss now, this provides an exogenous source of variation.

In the wake of the Hundred Years' War, and given ongoing conflicts both within and outwith the British Isles, there was, in the sixteenth century, a growing need to improve and control information flows. The suspicion accorded to privately organised means of correspondence and the growing demand for secure state communication across the realm led Henry VIII to choose Henry Tuke in 1514 to be the first Master of the Posts. Tuke projected the first formal postal network in England and Wales. A post road was a route along which State correspondence could be sent securely and rapidly on horseback (Brayshay, 2014). The changing of horses took place in post towns that were ordered along these post roads. By the time of Elizabeth I, the post network had developed to connect 85 post towns to London, as depicted in Figure 2.

There are two useful characteristics of the organization of this early postal network: First, the roads were laid principally for State purposes; and, second, the post towns along those roads were spaced according to the need to change horses. Put differently, the location of post towns was *not* determined by economic considerations which raises confidence that the exclusion restriction holds. As Tuke explained in 1535, "wheresoever the King [is] there be ever posts laid from London to his Grace" (quoted in Brayshay, 2014; p.273). It was not until 1635 that Thomas Witherings, 'Postmaster-General for Foreign Parts' to

Charles I, looked to exploit the economic potential of a postal network open to private letters. Nonetheless, the importance of the post network in the defence of the realm persisted into the seventeenth century. Witherings motivated the scheme of inland posts thus,

> Any fight at sea; any distress of His Majesty's ships (which God forbid); any wrong offered by any other nation to any of the coasts of England, or any of His Majesty's forts – the posts being punctually paid, the news will come 'sooner than thought'.
>
> *Thomas Witherings, quoted in Hyde (1894), pp.73–4.*

In line with these goals, we can see in Figure 2 clear State motivations for the Elizabethan postal network. A road North permitted communication with and monitoring of Scotland at a time around the execution of Mary Stuart and the prospective succession to the English throne of James VI of Scotland. Two roads to the West allowed for communication with Wales and Ireland during the periods of Plantation that sought to Anglicise the island of Ireland. In the South West, we see a route to Cornwall that also facilitated communication with Ireland. Finally, we see to the South East another road to Dover where information from and about continental Europe, especially France, arrived.

While the start and end points of the six Great Roads where strategically determined, the post towns along those roads arose from the necessity to change horses. Fresh horses were kept in intervals of 10-15 miles along the road to speed up the Crown's dispatches. As a result, we see post towns lined up as string of pearls and a distribution of distances (see Figure 3) between the post towns shows a peak at around 24km (about 15 miles).[14] Variation in distances results from terrain conditions such as hilly or mountainous terrain, marshland, forests or rivers.[15] We choose to limit the set of post towns to observations around the peak of 24km and exclude cases where the assumption of random allocation may be violated. The distribution of distances suggests two natural cut-off points: below 16km and above 32km. This leaves us with 69 out of 85 Elizabethan post towns shown in Figure 2.[16]

The identifying assumption is that these post town locations were *not* selectively chosen based on unobserved location factors that support future manufacturing growth. In a first test, Appendix C compares the characteristics of early post towns with other locations using the Bairoch (1988) data. We show that the Elizabethan post towns were not generally larger, that their size

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14 Frajola et al. (2005) show that stations of the US Pony Express were located in similar intervals with an average distances of 24km.

15 Note that this variation restrains us from using 24km intervals between London and the roads' final destination as instrument to predict banking access. In combination with the small size of parishes, the predictions' precision would decrease with distance from London thus affecting the instrument strength. We show such a specification in Section 5.1 and as expected, the instrument is substantially weaker but the results are qualitatively the same.

16 In robustness tests, we will also consider dropping all places below the 25th and above the 75th percentile which would narrow the interval from 19.24-26.85 km including 42 post towns.

distribution is statistically indistinguishable from that of non-post towns and that they did not grow faster over the following period. This finding supports our argument that Elizabethan post towns were not selectively chosen.

In a second test, we assess more broadly the balance of pre-existing differences that might have affected the location choice of Elizabethan post towns. These include geographic characteristics including geographic distance to ports or waterways to capture differences which may give access to trading opportunities. In particular, we consider: a dummy that indicates the presence of a Domesday village within 5km of the parish centroid; distance to 1670 waterways, existing ports and the coast; average slope (in percent); a dummy that indicates access to coal; average agro-climatically attainable yield (in tons per hectare) for the four dominant crops according to the 1801 agricultural census: barley, oats, rye, and wheat;[17] and the agricultural land classification for England and Wales.[18] To test the balancedness of these characteristics across treated and non-treated locations, we regress them on the post town dummy and condition the regression on registration district fixed effects, a

[17] The productivity for different input levels is part of the Global Agro-ecological Zones (GAEZ) data published by Food and Agriculture Organization of the United Nations (FAO) spanning the period 1961-1990. To resemble historical growing condition, we assume low input level rain-fed crops for baseline.

[18] Though the classification is for today, it broadly resembles underlying soil conditions that determine the suitability.

control for territorial changes and a control for the size of the parish. These controls are our baseline controls that account for regional heterogeneity and differences in the parish size which may be the result of territorial changes.

Table 2 shows a clear picture: all post town coefficients are insignificant and close to zero. This supports our argument that the instrument is quasi-randomly assigned. As discussed above, we further believe that the instrument is a relevant predictor for finance access, because country banks were relying on the guarded roads to transport gold and money to and from the financial market in London. Appendix Figure H.1 illustrates this nicely. The likelihood of having access to finance decreases sharply with distance from Elizabethan post towns. Going one step further, we assess the relative importance of being close to a post town or a post road. We find clear evidence that post town locations are the actual attraction force. With this in mind, we will now turn to the basic estimation results.

4. Results

We analyze the effects of access to finance on industrial employment growth using the occupational geography data described in Shaw-Taylor et al. (2010) for the years 1817 and 1881 (more details and descriptive statistics are provided in Table 1 and online appendix B). These data provide a high spatial resolution and detailed occupational classification. We observe adult males in up to 539 occupations (such as coal mining, cotton textiles, and so on) classified according to the PST (Primary-Secondary-Tertiary) system devised by Wrigley (2010).[19] Individuals are nested in 10,504 consistent parishes, made up of an underlying GIS of historical parishes updated from Kain and Oliver (2001), with an average radius of just 2.1km and an average employment of 230 adult males. The parishes are nested in 570 registration districts which themselves make up 54 counties.[20]

Industrial employment in the PST classification includes manufacturing and construction. We calculate employment growth in occupation i and parish p as $\Delta_{1881,1817} \ln Empl_{ip} = \ln Empl_{ip,1881} - \ln Empl_{ip,1817}$. Our main variable of interest is access to finance. It is measured by the number of adult male employees working in 'Financial services and professions'.[21] The data for 1817 is described in Kitson et al. (2012) which introduces a 'quasi-census' from the occupational information in the baptism records over the period 1813–20

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There is no source for 1817 female employment. The 1851 census suggests that, after domestic services, female employment is predominantly in manufacturing (of textiles and clothing), although Higgs (1987) and Sharpe (1995) detail concerns about the enumeration of female occupations in that 1851 census. We control for the proportion of the population that is female in our regressions.

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Note that these numbers exclude parishes in and around London (nested in five counties) and 17 registration districts that comprise only one parish and drop out when using district fixed effects.

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Since we use the log of finance employment in our empirical model, we calculate $\ln FIN_{p,1817} = ln(FIN_{p,1817} + 1)$.

(which we refer to as 1817). Data for transport infrastructure are based on the dynamic GIS provided by the Cambridge Group for the History of Population and Social Structure. As described above, data on post towns is from Robinson (1948).

4.1. Basic Results

Table 3 presents our baseline results from regressions where we instrument access to finance with the Elizabethan post town instrument. We consistently drop London and the surrounding districts across all estimations to eliminate potential effects from the developed financial market in London (and also because our later alternative measure of finance is particular to non-London areas). All regressions include a control for territorial changes in the parish between 1817 and 1881, registration district fixed effects and log area. A registration district is generally made up of a few parishes that comprise a city or town and a larger number of surrounding semi-rural or rural parishes. Including a control for area in all regressions thus captures the main within-registration district variation. Since parishes in the same registration district may be subject to similar shocks, we cluster our standard errors on the level of 570 registration districts in our baseline specifications. Alternative and more restrictive specifications will be discussed in our robustness tests in the next Section and in online appendix D. The outcome variable is the change in the log of finance employment in parish p.

Columns 1-6 of Table 3 show IV estimates of the effect of finance on manufacturing growth. Column 1 presents the most parsimonious specification with no other control variables than the log of industrial employment at the beginning of the period in 1817 as suggested by the theoretical derivation of the estimation equation in Appendix A plus the basic controls for territorial changes and area. As expected, parishes with an initially large industrial base experience lower growth over the study period suggesting conditional convergence. Parish size has a positive effect on subsequent manufacturing growth which makes sense, since larger parishes would have initially been more rural. In Column 2, we add registration district fixed effects to absorb spatial heterogeneity and the estimated coefficient increases by about 20%.

In Column 3, we add control variables that capture differences in the parishes' employment structure. Specifically, we control for the share of agricultural and mining employment and a Herfindahl Index of industry concentration. As expected, the share of agricultural employment has a negative effect on manufacturing growth while mining employment and coal access support growth. The Herfindahl Index does not have additional explanatory power. Our coefficient of interest, access to finance, decreases by 9% once we account for the employment composition. In Column 4, we further add control variables that capture initial differences in the total employment and the female population share (since we only observe adult male employment). Total employment increases growth which points to the existence of positive agglomeration effects and the female population share has a negative though insignificant effect which might reflect the fact that females were typically in declining manufacturing sectors like textiles and clothing. The finance coefficient is not much affected by these controls. Finally, in Column 5 we include a comprehensive set of control variables that capture differences in the contemporary transportation infrastructure. Specifically, we include dummy variables indicating access to waterways and the turnpike road network, and the employment share in goods transportation. These controls account for the possibility that proximity to post roads might imply a transportation cost advantage. The transport network-specific coefficients are close to zero while the share of employees in good transportation has a positive growth effect. Importantly, including these control variables has hardly any effect on the estimated effect of finance which makes sense since the main mode of transportation at the beginning of our observation period were waterways and not (post) roads. In Column 6, we include controls for latitude and longitude that flexibly capture potentially remaining unobserved geographic differences.[22] They have no effect. For a better understanding of potential biases, Column 7 finally shows OLS results of the growth regression including the full set of control variables from our preferred specification in Column 4. They are

[22] It would also make no difference if we included higher order polynomials in latitude and longitude.

substantially smaller and we will discuss reasons for this downward bias in the next subsection.

In all IV specifications, F-statistics of excluded instruments range between 11 and 15 along with Anderson-Rubin p-values well below 0.01. This underlines the relevance of our instrument. The first stage coefficients vary in a tight range between 0.33-0.38. Our preferred estimate in Column 6 suggests that Elizabethan post towns hosted 38 percent $((e^{0.325}-1)\times 100)$ more finance employees. The second stage coefficient of interest suggests a statistically significant and positive effect of finance on industrial growth across all specifications. Our preferred estimate in Column 6 gives a coefficient of 1.266, implying that a 10% increase in 1817 finance increases industrial employment by 12.66% till 1881. Since the standard deviation of log finance in 1817 is 0.47, a one standard deviation increase in the log of 1817 access to finance causes a 60% increase in industrial employment over the next 64 years. This is two thirds of the standard deviation of the parish-level industrial growth rate during our study period, suggesting that the effect of finance on industrial growth is large in absolute terms. In terms of annualized growth, a one standard deviation change in finance employment causes annual growth of manufacturing employment to be 0.93p.p. higher.

To put this into perspective, we can compare the manufacturing growth to hypothetical situations with more or less finance access. In Table 4, we present counterfactuals that vary the intensive as well as the extensive margin. We start by asking how much a 10% or 25% increase (reduction) in finance employment in those parishes that already have finance would affect growth in manufacturing employment. Relative to the actual situation, these counterfactuals would imply 2 and 4 percent respectively (0.2 and 1.2) more (less) manufacturing employment in 1881. In another exercise, we take into account that the North has better finance access than the South[23] and assign to all parishes with finance access in the North the mean of non-zero finance employment Southern parishes and vice versa. Doing so has a substantial effect – we see 12% lower manufacturing employment in 1881, which demonstrates how important banking was to the North. Finally, we turn to the extensive margin and consider changes in the overall access to finance. We ask what would happen if all parishes we allocated the median number of finance employees observed in finance parishes in 1817. As can be seen, this implies a dramatic 160% increase in 1881 manufacturing employment. The magnitude of this effect is not surprising given the relative scarcity of finance employment in 1817; the consequence of giving every parish a bank is significant in terms of the growth of manufacturing employment.

Remarkably, the coefficient on finance access does not change a lot across all specifications once we have included our baseline controls suggesting that

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We split England and Wales at 53° North latitude since it runs from roughly 50° to 56° North.

the observed relationship between finance access and manufacturing growth is mostly independent of differences in observed control variables. In the following robustness checks, we will assess the balancedness of these controls in more detail.

4.2. Results in the Context of the Literature

Our preferred estimate of the effect of access to finance on industrial growth (Table G.3, Column 6) is about 6 times larger than the OLS coefficient of 0.206. Not surprisingly, Durbin-Wu-Hausman tests rejects the null that access to finance in 1817 may be treated as exogenous in all cases. A first plausible explanation is that the observed downward bias is caused by classical measurement error. Since we are exploiting data from a quasi-census in 1817, it might be that individual occupations are in random cases incorrectly recorded or that the time period when we measure access to finance is a noisy approximation of the "true" stock of finance that determined growth over the next 64 years.[24]

Another plausible explanation for this significant difference is a negative selection effect. For a better understanding of this argument, we can use the data in Dawes and Ward-Perkins (2000) to calculate the number of country

[24] It is also worth noting that IV estimates are regularly greater than OLS estimates in most cross-country finance and growth regressions (see Beck, 2008).

banks established over the period 1730-1830 and the average number of years they survive. From 1800-1812, we can see in Figure 1 a number of years with sharp increases in the number of country banks. At the same time, we observe a drop in the average years of survival of these banks. A more detailed analysis of the country bank data shows that the majority of banks founded during this boom failed in the following years while established banks persisted.[25] This implies that the initial stock of banks or bankers observed in 1817 overstates the banking stock that is relevant for manufacturing growth over the next decades. If new entrants based their location decision on incorrect assumptions about the future prosperity of a region, this would explain a downward-biased OLS coefficient since our instruments are targeting established banks. One explanation why new entrants made the wrong location choice might be related to the transition from water power to steam power that changed the economic geography of production (see Crafts and Wolf, 2014).

When comparing our estimates to previous findings in the literature on finance and growth, we need to keep in mind that we are looking at a continuous growth rate, measured as log-difference, over a period of 64 years. For an estimated coefficient of $\beta_1 = 1.266$, this implies that a 1% increase in 1817 finance leads to 0.02 percentage points higher annualized industrial growth

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The failure of many country banks in the 1820s led to an institutional change that allowed more partners and eventually joint stock banks.

rate over the next 64 years. In terms of standard deviations, we find that a one standard deviation (0.47) increase in 1817 finance implies an annualized growth rate that is 0.93 percentage points higher.

Given the historic context of our study, it is remarkable how close this measure is to Levine and Zervos (1998) who report that a one standard deviation increase in stock market liquidity or banking development leads to 0.7-0.8 percentage point higher annual growth in income. Levine et al. (2000) find that a one standard deviation increase in the ratio of private credits to GDP generates 0.9 percentage point higher growth. We are using labour output while these studies look at output growth. Under a strictly concave production function with constant technology we thus possibly over-estimate the impact on growth. This structural transformation can be associated with increases in the rate of technological progress, so we may be under-estimating the effect of banking on growth. We thus consider our estimates to be broadly in line with the results based on growth in modern periods.

5. Robustness Tests

5.1. Instrument Validity

In Section 3.2 we have shown balancing tests on pre-existing characteristics. They all support our claim that the instrument is independent of pre-existing location factors that might have a direct effect on manufacturing growth thus violating the exclusion restriction. In this Section, we extend the balancing tests to the set of initial controls in 1817 that are included in the basic results presented in Section 4.1.

Tables 5 presents results of regressions of our instrument on the control variables, conditional on the controls used in our preferred specification. As it turns out, post town parishes are smaller than the average, have a lower share or primary sector and mining employment and we see that they faced more territorial changes. To account for these differences, we use the instrument conditional on these controls. Otherwise, we do not see significant differences.

To further assess whether non-balancing might bias our growth-estimates, we perform an omnibus test in the spirit of Satyanath et al. (2017). The test assesses whether the non-balancing covariates drive the relationship between the post town instrument and manufacturing growth. We proceed in two steps. In a first step, we regress all controls on manufacturing growth and obtain the predicted values. Doing so isolates the variation in manufacturing growth that is explained by the control variables. In the second step, we regress the predicted values on the instrument. The intuition is to test whether the variation in manufacturing growth that is driven by the (unbalanced) control variables explains the (reduced form) association with the instrument. Reassuringly, post town status is virtually uncorrelated with predicted manufacturing growth in specifications with and without the baseline control variables. Comparing the estimated coefficient to the reduced form coefficient in a regression of manufacturing growth on post town status, we find that the instrument's effect on predicted manufacturing growth is 20-60 times smaller than its effect on the unconditioned manufacturing growth, suggesting that the relevant variation for our estimations is not explained by the non-balancing control variables. We interpret this as evidence in support of the quasi-random assignment of our instrumental variable.

Another way to probe the validity of our instrument is to conduct placebo tests. Table 6, Columns 1-5 present the results. In Column 1, we locate placebo post towns in the middle of two actual post towns along the six main post roads. Doing so gives us a negative effect, suggesting that these locations are 7.2% *less* likely to have banking access. The corresponding growth effect is negative and insignificant. In a variation of this test, we shift the post roads 15 miles to the south-west (Column 2) or the north-east (Column 3); we can also consider the locations from both shifts jointly (Column 4). In all cases, the first stage relationship is insignificant and economically irrelevant. In Column 5, we randomly draw 69 placebo post towns from the group of parishes with road access that are not in the London area and that are not part of the post town network. Again, there is no first stage relationship.

In Column 6 of Table 6, we show the result of an alternative specification of our post town instrument where we calculate 24km intervals along the Elizabethan post roads between London and their final destination. 24km is the distance a horse can travel at maximum speed under normal terrain conditions. We then use these predicted post towns locations to instrument finance access in 1817. The first stage suggests that these predicted locations are 14% more likely to host a bank and the corresponding growth effect is qualitatively similar to the effect reported in Table 3. However, the second stage effect is insignificant which is due to a significantly weaker first stage relationship. This is not surprising since variation in terrain will affect the distance between post towns that maximized overall travel speed. This reduces the instrument's predictive power. It is nevertheless reassuring to see that this instrument leads to a qualitatively similar though insignificant effect of finance on growth. This is in stark contrast to the previous falsification tests which are based on placebo locations where our instruments should not apply. Here we find no plausible growth effects.

All our instrument robustness tests thus far lead to the same conclusion: Our instruments work as intended and there is no reason to believe that the exclusion restriction is violated. However, since we cannot rule out direct effects with certainty, we turn the tables and explore what would have happened if the exclusion restriction was violated. Following Conley et al. (2012), we allow the vector $\gamma = [\gamma_{PT}]$ from a hypothetical regression of manufacturing growth on finance access, our instrument and the full set of control variables to differ slightly from zero, i.e. $\gamma_{PT} \in [-\delta, \delta]$.[26] By relaxing the

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[26] In particular, $\Delta_{1881,1817} \ln Empl_p = \beta_1 FIN_{p,1817} + \mathrm{Z}_p \gamma_{PT} + X'_{p,1817}\beta_2 + \mu_d + \varepsilon_p$.

restriction $\gamma_{PT} = 0$ we allow for small direct effects of our instrumental variable on manufacturing growth and parameterize it. Specifically, we consider the following two scenarios. First, a case where we do not have prior beliefs about the direction of the bias and, second, a case where we impose a direction of the bias. In the most conservative case, we define minimum and maximum allowable violations of the exclusion restriction (Case 1). Alternatively, we assume for the instrument that γ_{PT} is uniformly distributed on the interval $[-\delta, \delta]$ (Case 2) in the symmetric case or $[0, \delta]$ (Case 3) in the asymmetric case where we assume a positive bias.

Figure 4 shows the results of this robustness test. Panel A reports results with no prior information about the bias. The dotted line represents Case 1 and the dashed line Case 2. Panel B imposes prior information that the instrument might have a positive direct effect (Case 3). The choice of the asymmetric scenario is based on the intuition that post towns may provide unobserved location factors that have a positive effect on manufacturing growth. All Figures suggest that it takes direct effects of 0.1 and above to accept the null hypothesis that banking access does not affect manufacturing growth. To put this into perspective: an effect of 0.1 assumes a direct effect that implies an 11% higher growth rate over the period of 64 years. In our preferred specification in Table 3 Column 6, this direct effect would be comparable to the estimated growth effect of being located on a coal field. This implies that it would take implausibly large violations of the exclusion restrictions to invalidate our findings.

5.2. Robustness to Changes in the Finance Measure

To contest the validity of our measure for finance employment, we construct one additional measure of access to finance based on the locations of recorded country banks. Country banks were partnerships of no more than six partners that contracted to provide financial services to a local area (see Pressnell, 1956). Surviving information on the activities of such banks is limited, but Dawes and Ward-Perkins (2000) contains information on the town, year of establishment, partnership history, ties to London and year of eventual failure or merger of those country banks for which records exist. We digitize this to create a dataset of 1,700 country banks in 600 towns over the period 1688–1953. For the period 1813–20, we observe 736 country banks that were operating in 374 of the parishes (or 3.5% of the total).

Table 7 presents results when we use country banks as alternative measure for access to finance. We find again a larger IV coefficient which is about four times the size of the OLS coefficient and Durbin-Wu-Hausman test reject the null that access to finance in 1817 may be treated as exogenous. The effect on manufacturing growth is a bit larger when using country banks. One plausible explanation is that records of the existence of country banks suffer from a survivor bias that is especially pronounced with more influential country banks or country banks in urban areas. Nevertheless, it is reassuring to see that our main findings do not change qualitatively when we use a different dataset.

Since our employee data is historical it may also be subject to outliers. We thus present in column (3) results where we include only parishes where the level of finance employment is less than or equal to fifteen people. In column (4), where we only count finance employment if our data has more than two employees in a parish. Both treatments of the finance employment variable yield similar results to the baseline in Table 3.

The country bank dataset does not contain enough early banks to consider an extensive analysis using periods before our sample. We observe only two banks founded before 1700, three banks founded before 1710, seven before 1730, and 22 before 1760. One might expect, however, there to be some predictive power of these early banks for our employment measure in 1817, as well as a relationship between these early banks and the nineteenth century growth in manufacturing employment. We report results in Table 8 where, as in Table 7, we use the log of the number of country banks. We report the coefficient on banks that existed at decadal intervals from 1750 to 1810 when we run OLS using the full set of controls from our preferred specification (column 6 in Table 3). We see some indication of the early banks predicting our preferred finance measure. The coefficient on country banks grows from 1750 to 1760, but from 1770 the coefficient declines. We see a similar relationship in the ability of early banks to predict later employment growth. The strength of the earliest banks and subsequent weakness of banks in the later period of the eighteenth century is coincident with an apparent decline in the quality of the banks being founded. As described in Section 2, the early period of country banking was formative for the sector and many banks that emerged after the first successful new banks were later to fail. This can be seen in Figure 1, where nearly all those banks established between 1750 and 1760 were eventually to merge, while half of those established over the period 1780-1790 were eventually to fail.

5.3. Further Robustness Checks

Additional robustness checks where we consider different subsamples, add further control variables that account for differences in trading opportunities and measures of market access, or modify the way we cluster our standard errors. Among these is a control for the distance to major ports (as a proxy for access to merchants that may provide alternative capital). We provide a detailed discussion of all results in online appendix Section D. Table 9 summarizes the results. Since our preferred specifications include registration district fixed effects (with a registration district covering on average 27 parishes), potentially biasing effects must come from factors that vary within registration districts, attract banks and benefit manufacturing growth at the same time. It is reassuring to see that our results are robust all these additional checks. In Appendix E we present results when we use an alternative instrument, early enclosures of land. Since there can be concerns about the exogeneity of this instrument, we confine the results to the online appendix.

6. Spatial Spillovers

So far, we have assumed that the effect of finance is localised within a parish. While the costs of distance in 1817 were significant, we may still underestimate the effect of finance in our specifications if, for instance, high population density in the parish with banking access forces industrial firms to expand to neighboring parishes. Moreover, there is modern evidence on the effect of distance in banking.[27] In this Section, we will exploit the geographic dimension of our data and test whether banking access available in neighboring parishes may have a positive effect on manufacturing growth in parish p.

To understand whether access to finance in nearby locations affects manufacturing growth and how this effect changes with distance, we determine every parish p's first and second neighbors (as defined by parish polygons that share at least one point) and count the number of finance employees among them.[28] In doing so, we assume that effects are additive. Given a parishes' average radius of 2.1km, the rings of first and second neighbors equate to two distance bands covering an average range of roughly 2-6 km and 6-10km from

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27 See Petersen and Rajan (2002) and Guiso et al. (2004).

28 We do not know up to what distance firms may benefit from better access to finance but given significantly higher costs of distance at this time, we only consider finance access in the first or second order neighbors which is roughly half the distance between two post towns.

parish p's centroid.[29] Finance employment in parish p and in its first- and second-order neighbors is instrumented with the post town dummies described before. Instruments for the first and second neighbor are defined as dummy that takes the value one if at least one neighbor complies with the instrument. Details on the construction of the finance measure and instruments for the neighboring parishes are provided in Appendix F.

The results of our spatial spillover estimations are reported in Figure 5, Panel A (the corresponding regression Tables can be found in Appendix G Table G.7 and correspond to the results in Column 3). The estimated coefficients γ_0, γ_1 and γ_2 are (Figure 5, Panel A) enclosed by the 95% confidence interval. The estimations are conditional on the controls in our preferred specification in Table G.3, Column 6 plus dummies that control for the number of neighbors and a coastal dummy. The latter two sets of controls account for the possibility that parishes with more neighbors may be more likely to have some finance access while parishes along the coast have less neighbors. Our results show less significant and much smaller effects in the first neighbor to a parish with finance employment. A 10% increase in finance in a neighboring parish increases

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We prefer using neighbors over a specification using distances between finance location and all parishes' centroids because the parishes' average diameter of roughly 4 km makes it harder to interpret distance bands of 1-2 km. In unreported specifications we use distance bands of 2km and find the effect to be restricted to a maximum distance of 4-6km which would just include the first neighbour.

manufacturing growth over the next 64 years by 2.2%, compared to a growth effect of 14.6% in the finance parishes, this is a significant drop. Finance access in a second neighbor are insignificant and close to zero for the case of finance employment.

The most natural interpretation of this strong distance decay is an informational one: The distance between a bank and a parish has a strong bearing on whether that parish can take advantage of the growth-facilitating benefits of financial services. As Guiso et al. (2004) found, distance matters; using this dataset, we are able to demonstrate just how sharply it mattered to the spread of industrialisation during 19th century England and Wales.

7. Banking and Structural Transformation

We consider three additional ways through which banking may cause structural transformation. First, since our baseline measure of structural transformation is the parish-level growth the level of manufacturing employment, it is possible that this does not reflect a change in parish-level share of manufacturing if non-manufacturing employment is increased at the same rate. We thus estimate the model with the change in the share of manufacturing employment as the dependent variable. Second, we test for the effect of a bank on urban structural transformation, i.e., an increasing concentration of manufacturing in the center of a city. Third, we consider the impact of access to finance on different industry subsectors.

7.1. Results with shares

To assess how finance access causes structural change, we estimate equation (A.20) with the full set of controls but use the change in the share of employment instead of the growth rate as the dependant variable. Table 10 reports results for four major categories of employment: Primary, Mining, Industry and Transportation. For comparison, we report OLS coefficients as well. Since we include the same set of control variables across all specifications, the first stage does not vary. Post towns host on average 38% more banking employees. The $F-$statistic is 11.2.

The effect of access to finance is to reduce the share of employment in a parish's primary sector and increase the share in the industrial sector. Specifically, a 10% increase in finance access deceases the primary sector employment share by 1.35pp. On the flip side, we see in column 6 a 1.99pp increase in industry employment for a 10% increase in finance access. The effect on mining is about five times smaller and negative (column 4). That banks do not appear to matter for the growth of transportation highlights the importance of fixed costs in that sector (column 8). The country banks we study here were too small to fund canal and railway projects. Those investing in infrastructure had to find different sources of finance (see Trew, 2010).

7.2. Results on urban transformation

Using the same method as subsection 6, we now assess the spatial dimension of the structural transformation that was caused by access to banking services. We report regression results in Figure 5, Panel B-D where we plot the coefficients on first- and second-order neighbors, enclosed by the 95% confidence interval (and in Appendix G Table G.7). In line with the parish-level findings, we observe lower employment share in the primary sectors in proximity to finance employment and by the second neighbor, the the employment share remains constant. A 10% increase in finance access within the parish decreases the primary sector employment share by 1.8pp and 10% more finance access in the neighboring parish reduces the primary sector employment share by 0.4pp. We do not observe an effect from finance access in one of the second order neighbor parishes.

For the share of industrial employment, we find opposite effects which is in line with the idea that industrialization leads to increasing urbanization with a rising share of industrial employment being concentrated in proximity to banking services. We see the strongest increase in the share of manufacturing employment among the first neighbors and again, we observe no changes in the employment shares among the second order neighbors. Comparing the employment shares in primary and industrial employment clearly shows that the phase of industrialization also implies an increase in tertiary employment in proximity to the source of banking services.

While these effects on structural change appear relatively small, the gross effect of banking on the scale of the industrial sector is a combination of structural change and increased employment density. In a last step, we look at the growth of employment density at different distances from the source of finance. As can be seen in Table G.7 Panel D, results suggest a strong growth of employment density in close proximity to the source of finance. A 10% increase in finance access within the parish implies 11.8% higher growth in employment density over the next 64 years. Among the first neighbors, the effect drops to 1.4% higher employment growth for 10% more finance access. Again, this finding suggests that access to finance attracted manufacturing firms which boosted urbanisation.

7.3. Results on industrial sector transformation

The impact of access to a bank on sectoral growth will be related to the demand for external finance in that sector (Rajan and Zingales, 1998). The demand for external finance can depend on the structure of production – if there are large fixed costs or high capital intensity, then external finance will be more important. The nature of asymmetric information in a sector can also play a role. If the sector is new, growing fast, particularly risky or technologically-dynamic, then specialized financial intermediaries can benefit growth because they are experts at evaluating investment opportunities (Greenwood and Jovanovic, 1990). Rajan and Zingales (1998) also show using modern data that, regardless of sector, young firms are more dependent on external finance than mature ones.

To understand how finance access heterogeneously affects industry subsectors, we calculate regressions with the full specification (Table 3, Column 6) but separately for different groups of industrial subsectors. To make these groups, we use Horrell et al. (1994) who construct an input output table for 1841 and classify industries by their capital intensity, their estimated TFP and whether they are intermediate or final goods. We map the industries in Horrell et al. to the employment categories in our data.

We again use the log of the number of finance employees as our measure of finance access, but now we consider its impact on the growth of each group of secondary subsectors. Table 11 reports on the impact of finance on sectors grouped using Horrell et al. (1994) by their output type (final or intermediate), their TFP (high or low) and capital intensity (high or low). Appendix Table G.8 gives the breakdown of sectors into these categories.

Our results on the subsector groupings are consistent with what we know drives the demand for external finance, which supports the fundamental role that finance is playing. Compared to industries that produce final goods such as clothing or food, we see a larger impact of finance in intermediate industries like metal manufacture, gas and fuel industries. In the light of recent work on intermediate goods and their multiplier effects (Jones, 2011), this would suggest that banking played a crucial role in the working of the aggregate economy. This may also connect to the concept of 'contractual intensity' (cf. Rauch, 1999; Nunn 2007) since intermediate goods tend to be more complex, bespoke outputs.

Taken as a group, those sectors with the highest TFP appear to benefit the most from access to finance. The contribution of financial intermediaries was to stimulate transition away from mature industries such as textiles towards those going through the most change, such as potteries, glass and minor manufactures. Finally, the biggest difference in coefficient appears when we compare sectors by capital intensity. Those which are most capital intensive, such as transport vehicles and iron and steel manufacture, appear to be benefit more from access to finance. The presence of a bank within a parish had the consequence of structural transformation *within* the secondary sector, funding expansion of those technologically-dynamic, capital intensive areas of industrial activity and away from the maturing ones. This is the Schumpeterian mechanism of 'creative destruction' at work, driven by access to banks.

8. Concluding Remarks

As Schumpeter (1934, p.106) put it, "The essential function of credit ... consists in enabling the entrepreneur ... to force the economic system into new channels". We have presented robust evidence to support the hypothesis that banks were causally important in the structural transformation that underpinned the Industrial Revolution in England and Wales. While this relationship is well known for recent periods, it is in stark contrast to textbook histories that believe finance was a corollary to the Industrial Revolution. We are able to uncover this relationship because we use new data that maps banking employment across parishes in 19th century England. As a result, we can go beyond London and focus on small country banks outside of London as source of finance. Our estimates suggest that a one standard deviation change in the log of finance employment causes annualised growth in locations outside the London area to be 0.74 percentage points higher. For the whole economy except London, access to finance at the beginning of our period explains about half of the overall growth in industry employment over the period 1817-1881.

Our findings are surprisingly similar to contemporary studies reporting that one standard deviation more finance leads to around 0.9 percentage point higher annual growth. We interpret the similarity across different development stages and institutional contexts as first evidence that the effect of finance on growth is persistent across space and time. We further show that access to finance initiated a transition process in two dimensions. First, across space with the core of cities becoming relatively more industrial. Second across industrial subsectors with employment shifting away from mature industries toward newer and more specialized intermediate industrial sectors.

While the relationship between finance and growth has attracted a lot of research, the impact of finance on the intermediate role of sectoral transformation as an underlying growth mechanism is less documented. We consider our paper as first step to address this shortcoming. Our findings support King and Levine's (1993b) idea that better access to finance initiates a process of creative destruction that acts as engine of economic growth. Unfortunately, our ability to describe the underlying process of entrepreneurship remains limited due to data constraints. We hope that future research will be able to fill this remaining gap.

Tables

TABLE 1. Parish-level descriptive statistics

	Mean	Std.Dev.
Secondary Sector Employment in c.1817	87.67	372.92
Secondary Sector Employment in c.1881	218.93	1288.68
c.1817-1881 Growth in Secondary Sector Employment	0.16	0.90
Finance Employment in c.1817 across all parishes	0.53	8.42
Finance Employment in c.1817 in parishes with finance employment	4.64	24.46
Number of Country banks across all parishes	0.05	0.35
Number of Country banks in parishes with a country bank	1.48	1.19
Area (in km^2)	14.05	17.65
Share Female c.1817 (in %)	48.99	4.04
Employment c.1817	219.84	541.71
Employment share in the primary sector (less mining) in c.1817 (in %)	60.26	21.26
Employment share in mining in c.1817 (in %)	1.34	6.32
Employment share in the secondary sector in c.1817 (in %)	26.66	15.81
Employment share in goods transportation in c.1817 (in %)	1.97	4.92
Herfindahl index for secondary employment concentration	0.36	0.17
Canal access in c.1817 (in %)	21.93	41.38
Road access in c.1820 (in %)	65.18	47.64
Elizabethan post town (in %)	0.65	8.02
Parishes where the area has changed (in %)	32.84	46.96
Parishes per registration district	26.28	14.14
Parishes per county	294.76	170.48

Notes: The Table presents descriptive statistics for our main variables. All variables are means across 10,504 parishes which excludes registration districts in and around London and singletons.

Table 2. Balance of Pre-Existing Exogenous Differences

		Coefficient	SE
1	Domesday village within 5km (dummy)	0.004	(0.022)
2	Log distance to nearest 1670 waterway	-0.159	(0.165)
3	Log distance to nearest sea port	-0.006	(0.011)
4	Distance to the coast	-0.025	(0.063)
5	Average Slope (in percent)	-0.020	(0.198)
6	Coal access (dummy)	0.017	(0.025)
7	Yield oats (in t/ha)	0.014	(0.009)
8	Yield rye (in t/ha)	0.016	(0.012)
9	Yield wheat (in t/ha)	0.014	(0.011)
10	Yield barley (in t/ha)	0.014	(0.011)
11	Soil Categories	0.041	(0.052)

Notes: Each row shows the result of a separate regression of the outcome named in the left column on the Elizabethan post town status. All regressions are conditional on registration district fixed effects, an indicator for territorial changes and a control for the differences in the size of parishes. Standard errors are clustered on the registration district level in all specifications. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table 3. Basic Results with the Elizabethan Post Towns Instrument

Dep. Variable: Δ log secondary employment	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) OLS
Log finance employment c.1817	1.168***	1.427***	1.310***	1.269**	1.266**	1.266**	0.206***
	(0.443)	(0.494)	(0.487)	(0.516)	(0.518)	(0.517)	(0.023)
Log number secondary employment c.1817	-0.224***	-0.263***	-0.329***	-0.582***	-0.560***	-0.559***	-0.598***
	(0.078)	(0.072)	(0.058)	(0.039)	(0.040)	(0.040)	(0.036)
Log area (in km^2)	0.170***	0.232***	0.280***	0.262***	0.264***	0.264***	0.214***
	(0.048)	(0.041)	(0.032)	(0.038)	(0.038)	(0.038)	(0.024)
Share primary employment c.1817			-0.803***	-1.297***	-1.175***	-1.174***	-1.918***
			(0.271)	(0.395)	(0.398)	(0.398)	(0.204)
Share mining employment c.1817			0.849***	0.237	0.343	0.346	-0.193
			(0.269)	(0.367)	(0.371)	(0.370)	(0.228)
Coal access			0.104*	0.100*	0.101*	0.102*	0.124**
			(0.060)	(0.059)	(0.059)	(0.059)	(0.060)
Herfindahl Index c.1817			0.061	0.174	0.173	0.172	0.463***
			(0.186)	(0.212)	(0.213)	(0.213)	(0.177)
Log employment c.1817				0.307***	0.284***	0.284***	0.466***
				(0.106)	(0.106)	(0.106)	(0.047)
Female population share c.1817				-0.113	-0.118	-0.118	-0.100
				(0.205)	(0.205)	(0.205)	(0.181)
Road access c.1817 (dummy)					0.020	0.020	0.014
					(0.017)	(0.017)	(0.014)
Waterway access c.1817 (dummy)					0.003	0.003	0.003
					(0.022)	(0.022)	(0.019)
Share good transportation c.1817					0.647**	0.646**	0.673***
					(0.281)	(0.281)	(0.260)
Latitude						-0.033	0.036
						(0.235)	(0.234)
Longitude						0.065	0.058
						(0.144)	(0.138)
First Stage:							
Posttown Dummy	0.378***	0.356***	0.333***	0.326***	0.325***	0.325***	
	(0.099)	(0.099)	(0.099)	(0.097)	(0.097)	(0.097)	
Observations	10,504	10,504	10,504	10,504	10,504	10,504	10,504
Number of Registration District FE		570	570	570	570	570	570
Control for Territorial Changes	Y	Y	Y	Y	Y	Y	Y
Anderson-Rubin F-test (p-value)	0.0017	0.0003	0.0006	0.0030	0.0032	0.0032	
Kleibergen-Paap Wald rk F statistic	14.70	13.07	11.34	11.23	11.19	11.19	

Notes: The Table presents results from regressions of the log change in secondary employment between c.1817 and 1881 in parish p on access to finance measured as log employment in finance. Columns (1)-(6) present instrumental variable regressions and Column (7) presents an OLS regression. The instrumental variable is a dummy variable that takes the value 1 if the parish is an Elizabethan post town. Column (1) is the most parsimonious specification without registration fixed effects that only controls for the initial 1817 manufacturing share and size as well as territorial changes in the parish between c.1817 and 1881. Columns (2)-(5) are conditional on registration district fixed effects and additional sets of control variables are gradually included. Column (6) presents our preferred outcome. Finally, Column (7) displays the results of an OLS estimation of our preferred specification in Column (6) for comparison. Standard errors are clustered on the registration district level in all specifications. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table 4. Counterfactual exercises

	Treatment	Growth rate Coefficient	SE	% change in manuf. employment
1	10% more finance employment	0.1704	0.7049	1.55
2	10% less finance employment	0.1535	0.6657	-0.15
3	25% more finance employment	0.1916	0.7587	3.73
4	25% less finance employment	0.1440	0.6453	-1.10
5	Switch finance access in North and South	0.0281	0.5603	-11.92
6	Ubiquitous access to median finance employment of parishes with finance	1.0837	0.5711	153.10

Notes: Notes: The Table presents a number of counterfactual exercises where we vary the level of 1817 finance employment. Treatments 1 to 4 vary the number of finance employees in parishes that already have finance employment. Treatment 5 allocated the mean of non-zero Southern (Northern) finance employment to those Northern (Southern) parishes that have non-zero finance employment. Treatment 6 allocates to all parishes the median finance employment of parishes that have non-zero employment.

Table 5. Alternative outcomes

Panel A: Balancing Test	Coefficient	SE
Log number secondary employment c.1817	0.049	(0.063)
Log area (in km^2)	-0.435**	(0.184)
Share primary employment c.1817	-0.041***	(0.014)
Share mining employment c.1817	-0.018***	(0.004)
Access to Coal	0.006	(0.026)
Herfindahl Index c.1817	0.026	(0.020)
Log employment c.1817	0.032	(0.084)
Female population share c.1817	0.001	(0.005)
Road access c.1817 (dummy)	-0.082	(0.064)
Waterway access c.1817 (dummy)	0.010	(0.050)
Share good transportation c.1817	0.004	(0.006)
Latitude	0.001	(0.005)
Longitude	-0.000	(0.007)
Territorial Changes (dummy)	0.164***	(0.054)
Panel B: Ominbus Test		
No controls	0.020	(0.068)
Conditional on base controls	-0.006	(0.034)

Notes: Panel A presents reduced form estimations of the control variables on our instrument, the Elizabethan post town dummy and the same controls as those in the basic regressions (Table 3, column (6)) except the one that is the dependent variable. Each cell shows the coefficient from a separate regression. Rows refer to different outcome variables. Panel B presents the results of an Omnibus Test where we regress predicted manufacturing growth on the Elizabethan post town dummy. This procedure separates the variation in manufacturing growth that is explained by the control variables. We would like to see that the (potentially unbalanced) control variables do not drive the estimated effect of post town status on manufacturing growth, i.e. we would like the coefficient on the instrument to be insignificant. We assess the relationship between predicted manufacturing growth and the Elizabethan post town dummy unconditionally and conditional on fixed effects, a size control and a control for territorial changes. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

TABLE 6. Instrument Validity Tests

Dep. Variable: log finance employment 1817	(1) Between True Post Towns	(2) Shifted 15 mi South-West	(3) Shifted 15 mi North-East	(4) Shifted 15 mi N-E and S-W	(5) Random draw Road Location	(6) 24km Intervals from London
Log finance employment c.1817	-0.303	-2.072	-0.329	-1.090	22.114	0.941
	(1.215)	(4.904)	(3.465)	(2.818)	(92.127)	(0.861)
First Stage:						
Placebo Posttown Dummy	-0.076**	0.038	0.030	0.036	0.007	0.141*
	(0.038)	(0.060)	(0.065)	(0.045)	(0.029)	(0.074)
Observations	10,504	10,504	10,504	10,504	10,504	10,504
Number of Registration District FE	570	570	570	570	570	570
Control Varibales	Y	Y	Y	Y	Y	Y
Anderson-Rubin F-test (p-value)	0.8040	0.4660	0.9160	0.5930	0.1020	0.1510
Kleibergen-Paap Wald rk F statistic	4.064	0.407	0.218	0.649	0.0567	3.632

Notes: The Table presents results from regressions of access to finance measures as log employment in finance in 1817 on placebo instruments as specified in in the column title. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 but replace the actual instrument with a placebo instrument that is specified in the column title. Standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table 7. Variations of the Finance Measure

Dep. Variable: Δ log secondary employment	(1) OLS Country Banks	(2) IV Country Banks	(3) Finance Employment ≤15 employees	(4) Finance Employment ≥2 employees
Log finance employment c.1817	0.393***	1.712**	1.117**	1.241***
	(0.051)	(0.731)	(0.436)	(0.477)
Log number secondary employment c.1817	-0.606***	-0.609***	-0.564***	-0.549***
	(0.037)	(0.036)	(0.038)	(0.040)
Log area (in km^2)	0.213***	0.244***	0.253***	0.274***
	(0.025)	(0.035)	(0.035)	(0.038)
Share primary employment c.1817	-2.002***	-1.799***	-1.324***	-1.171***
	(0.207)	(0.223)	(0.323)	(0.378)
Share mining employment c.1817	-0.252	-0.097	0.151	0.314
	(0.228)	(0.253)	(0.302)	(0.360)
Coal access	0.123**	0.106*	0.118*	0.121*
	(0.060)	(0.060)	(0.063)	(0.063)
Herfindahl Index c.1817	0.508***	0.469***	0.269	0.140
	(0.180)	(0.178)	(0.188)	(0.223)
Log employment c.1817	0.489***	0.448***	0.326***	0.272***
	(0.048)	(0.055)	(0.084)	(0.099)
Female population share c.1817	-0.072	0.010	-0.111	-0.094
	(0.179)	(0.187)	(0.202)	(0.213)
Road access c.1817 (dummy)	0.015	0.022	0.014	0.021
	(0.014)	(0.015)	(0.016)	(0.017)
Waterway access c.1817 (dummy)	0.005	0.009	0.004	0.000
	(0.019)	(0.020)	(0.021)	(0.022)
Share good transportation c.1817	0.625**	0.449*	0.636**	0.651**
	(0.260)	(0.270)	(0.284)	(0.298)
Latitude	0.050	0.052	-0.017	-0.016
	(0.237)	(0.239)	(0.241)	(0.242)
Longitude	0.044	0.002	0.065	0.064
	(0.138)	(0.141)	(0.143)	(0.145)
First Stage:				
Posttown Dummy		0.241***	0.406***	0.399***
		(0.060)	(0.105)	(0.113)
Observations	10,504	10,504	10,006	9,795
Number of Registration District FE	570	570	548	546
Control for Territorial Changes	Y	Y	Y	Y
Anderson-Rubin F-test (p-value)		0.0032	0.0027	0.0016
Kleibergen-Paap Wald rk F statistic		15.85	14.81	12.47

Notes: The Table presents results from regressions of the log change in secondary employment between c.1817 and 1881 in parish p on access to finance measured as the log number of country banks in Columns (1) and (2) and employment in finance in Columns (3) and (4). Column (1) presents an OLS specification with the log number of country banks as finance measure and Column (2) displays the corresponding IV estimation. In Column (3), we use finance employment as measure of finance access and restrict it to a maximum of 15 employees and in Column (4) we focus on parishes with at least two finance employees. The instrumental variable is a dummy variable that takes the value 1 if parish p is an Elizabethan post town. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 and standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table 8. Early Banks

	(1)	(2)
	OLS	OLS
Dependent variable:	1817 Finance Employment	1817–1881 Secondary Employment Growth
Log 1750 country banks	1.039**	0.700***
[#10]	(0.497)	(0.261)
Log 1760 country banks	1.315***	0.582***
[#17]	(0.385)	(0.203)
Log 1770 country banks	0.855***	0.467***
[#38]	(0.123)	(0.115)
Log 1780 country banks	0.452***	0.528***
[#98]	(0.123)	(0.097)
Log 1790 country banks	0.318***	0.286***
[#275]	(0.074)	(0.067)
Log 1800 country banks	0.400***	0.325***
[#405]	(0.060)	(0.052)
Log 1810 country banks	0.355***	0.347***
[#687]	(0.046)	(0.047)

Notes: The Table summarizes results from regressions of the variable named in the column title on the log number of country banks in existence at the year noted in the row. Under each row label is the number of country banks observed in existence at that year (which differs slightly from the number established before these dates, as reported in the text of Section 5.2). For compactness, each cell is the result of a separate regression, reporting only the coefficient on log country banks at the date noted in the row. Column 1 reports OLS results when we regress 1817 finance employment on country banks. Column 2 reports OLS results when we regress 1817-1881 manufacturing employment growth on country banks. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 and standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table 9. Additional Robustness Tests

Specification		(1) Coefficient	(2) SE
Baseline		1.266**	(0.517)
1	Including London	1.281**	(0.514)
2	Excluding North	1.480**	(0.634)
3	10 km buffer around post roads	1.434**	(0.577)
4	Only road parishes	0.882**	(0.431)
5	Distance between post towns within p25-p75	1.148**	(0.475)
6	Log employment within 15km	1.289**	(0.518)
7	Log distance to the next port	1.276**	(0.515)
8	Market access, post town	1.263**	(0.519)
9	Market access, market town	1.287**	(0.539)
10	Soil Suitability	1.267**	(0.518)
11	Land Cover	1.327**	(0.531)
12	Wealth, measures as share of servants	1.255**	(0.520)
13	Education, measured as share of teachers	1.197**	(0.477)
14	Innovation, measured as patents	1.381**	(0.617)
15	Bartik control for predicted employment growth	1.122**	(0.520)
16	Cluster SE by county	1.266**	(0.631)
17	Cluster SE by 100km grid	1.266**	(0.546)
18	Cluster SE by 50km grid	1.266**	(0.510)

Notes: The Table summarizes results from instrumental variable regressions of the log change in industrial employment between 1817 and 1881 in parish p on access to finance measured as log employment in finance. All specifications include the same set of controls as our preferred specification in Table 3, Column 6 but restrict the sample (rows 1-4), modify the instrument (row 5), add an additional control variable (rows 6-15) or cluster the standard errors on a different spatial unit (rows 16-18). Each line is the result of a separate regression. The first line repeats the baseline results from Table 3, Column 6. Full regression results are available in the online appendix. Standard errors are clustered on the registration district level in rows 1-15 or as specified in rows 16-18. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table 10. Results with shares

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Agriculture		Mining		Industry		Transportation	
Dependent variable: Change in employment share of:	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Log finance employment c.1817	-0.022***	-0.135**	-0.004*	-0.049**	0.021***	0.199**	0.002	-0.031
	(0.004)	(0.059)	(0.002)	(0.024)	(0.003)	(0.087)	(0.001)	(0.046)
Log number secondary employment c.1817	-0.009	-0.013**	0.003*	0.002	-0.095***	-0.089***	-0.005	-0.006
	(0.006)	(0.006)	(0.002)	(0.002)	(0.008)	(0.009)	(0.003)	(0.004)
Log area (in km^2)	0.034***	0.029***	0.002*	0.000	-0.010***	-0.002	-0.003	-0.004
	(0.003)	(0.005)	(0.001)	(0.002)	(0.004)	(0.006)	(0.002)	(0.004)
Share primary employment c.1817	-0.591***	-0.670***	0.034***	0.002	0.080*	0.204***	0.004	-0.019
	(0.032)	(0.054)	(0.011)	(0.019)	(0.047)	(0.070)	(0.031)	(0.019)
Share mining employment c.1817	-0.125***	-0.182***	-0.402***	-0.425***	0.219***	0.310***	-0.034**	-0.051***
	(0.040)	(0.052)	(0.040)	(0.041)	(0.032)	(0.057)	(0.015)	(0.020)
Coal access	-0.045***	-0.043***	0.043***	0.044***	0.010*	0.007	0.004	0.004
	(0.010)	(0.009)	(0.007)	(0.007)	(0.006)	(0.007)	(0.003)	(0.003)
Herfindahl Index c.1817	0.043*	0.074**	-0.026**	-0.013	-0.050	-0.098**	-0.047*	-0.038**
	(0.024)	(0.030)	(0.010)	(0.012)	(0.047)	(0.046)	(0.028)	(0.019)
Log employment c.1817	-0.048***	-0.028**	-0.001	0.007	0.113***	0.082***	0.009	0.014
	(0.007)	(0.013)	(0.002)	(0.005)	(0.012)	(0.021)	(0.006)	(0.013)
Female population share c.1817	0.003	0.005	-0.009	-0.009	-0.002	-0.005	-0.018	-0.018
	(0.035)	(0.037)	(0.015)	(0.016)	(0.027)	(0.031)	(0.013)	(0.013)
Road access c.1817 (dummy)	-0.002	-0.002	-0.000	-0.001	0.000	0.001	0.001	0.001
	(0.003)	(0.003)	(0.001)	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)
Waterway access c.1817 (dummy)	-0.003	-0.002	-0.000	-0.000	-0.001	-0.001	0.002	0.002
	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.001)	(0.001)
Share good transportation c.1817	-0.227***	-0.225***	-0.021	-0.019	0.301***	0.296***	-0.703***	-0.703***
	(0.047)	(0.046)	(0.014)	(0.015)	(0.038)	(0.041)	(0.025)	(0.025)
Latitude	0.031	0.039	0.019	0.022	0.016	0.004	-0.033**	-0.031**
	(0.045)	(0.046)	(0.024)	(0.025)	(0.027)	(0.029)	(0.013)	(0.014)
Longitude	-0.014	-0.015	-0.014	-0.014	-0.007	-0.006	0.005	0.005
	(0.025)	(0.025)	(0.015)	(0.015)	(0.017)	(0.019)	(0.008)	(0.008)

Notes: The Table presents results from regressions of change in share of the sector noted between c.1817 and 1881 in parish p on access to finance measured as log employment in finance. The instrumental variable is a dummy variable that takes the value 1 if parish p is an Elizabethan post town. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 and standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

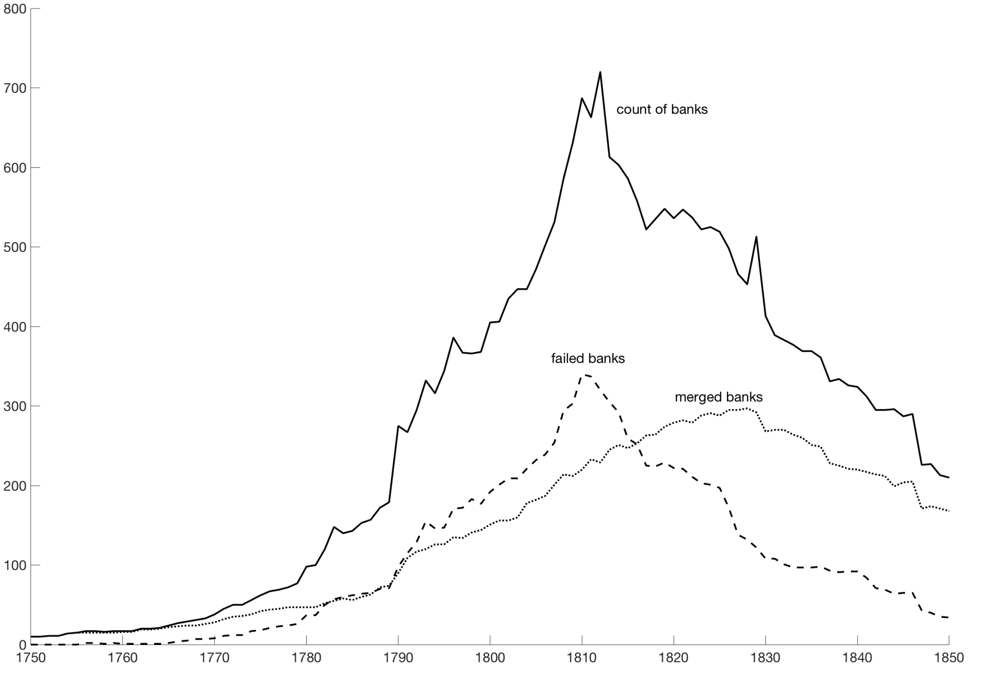
Table 11. Results On Subsector Groupings

	(1)	(2)	(3)	(4)	(5)	(6)
	Final	Intermediate	TFP		Capital intensity	
Dep. Variable: Δ log employment in:	goods	goods	High	Low	High	Low
Log finance employment c.1817	1.254**	1.529**	1.420***	1.274**	1.544***	1.201**
	(0.513)	(0.605)	(0.505)	(0.538)	(0.593)	(0.505)
Log number secondary employment c.1817	-0.659***	-0.869***	-0.778***	-0.694***	-0.837***	-0.676***
	(0.025)	(0.053)	(0.030)	(0.022)	(0.045)	(0.023)
Log area (in km^2)	0.259***	0.269***	0.208***	0.272***	0.257***	0.263***
	(0.037)	(0.047)	(0.037)	(0.040)	(0.045)	(0.037)
Share primary employment c.1817	-1.485***	-1.294***	-1.200***	-1.511***	-1.359***	-1.517***
	(0.378)	(0.295)	(0.291)	(0.377)	(0.297)	(0.364)
Share mining employment c.1817	-0.368	0.992***	-0.188	0.094	0.770**	-0.353
	(0.358)	(0.383)	(0.293)	(0.358)	(0.368)	(0.342)
Coal access	0.009	0.260***	0.067	0.093	0.212***	0.023
	(0.055)	(0.070)	(0.050)	(0.063)	(0.067)	(0.056)
Herfindahl Index c.1817	0.369*	0.135	-0.039	0.337	0.199	0.324
	(0.212)	(0.211)	(0.207)	(0.215)	(0.207)	(0.213)
Log employment c.1817	0.383***	0.360***	0.337***	0.399***	0.356***	0.400***
	(0.095)	(0.061)	(0.062)	(0.093)	(0.062)	(0.092)
Female population share c.1817	0.020	-0.012	-0.206	0.056	-0.089	0.033
	(0.198)	(0.209)	(0.211)	(0.200)	(0.202)	(0.198)
Road access c.1817 (dummy)	0.025	0.029	0.011	0.026	0.019	0.029*
	(0.017)	(0.019)	(0.018)	(0.018)	(0.018)	(0.017)
Waterway access c.1817 (dummy)	0.002	-0.011	-0.009	-0.002	-0.009	0.001
	(0.021)	(0.021)	(0.022)	(0.020)	(0.021)	(0.021)
Share good transportation c.1817	0.364	0.436	0.499*	0.319	0.721**	0.259
	(0.261)	(0.323)	(0.280)	(0.275)	(0.307)	(0.258)
Latitude	-0.185	0.013	-0.043	-0.166	-0.046	-0.167
	(0.214)	(0.245)	(0.208)	(0.228)	(0.240)	(0.221)
Longitude	0.114	-0.008	0.212*	-0.001	-0.074	0.153
	(0.126)	(0.155)	(0.124)	(0.138)	(0.150)	(0.127)
First Stage:						
Posttown Dummy	0.324***	0.294***	0.315***	0.324***	0.303***	0.325***
	(0.097)	(0.096)	(0.096)	(0.097)	(0.096)	(0.097)
Observations	10,504	10,504	10,504	10,504	10,504	10,504
Number of Registration District FE	570	570	570	570	570	570
Control for Territorial Changes	Y	Y	Y	Y	Y	Y
Anderson-Rubin F-test (p-value)	0.0038	0.0012	0.0005	0.0050	0.0008	0.0059
Kleibergen-Paap Wald rk F statistic	11.15	9.463	10.79	11.14	9.999	11.17

Notes: The Table presents results from regressions of the log change in employment in the grouping noted in the Column title between c.1817 and 1881 in parish p on access to finance measured as log employment in finance. Groupings are listed in appendix Table G.8. The instrumental variable is a dummy variable that takes the value 1 if parish p is an Elizabethan post town. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 and standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

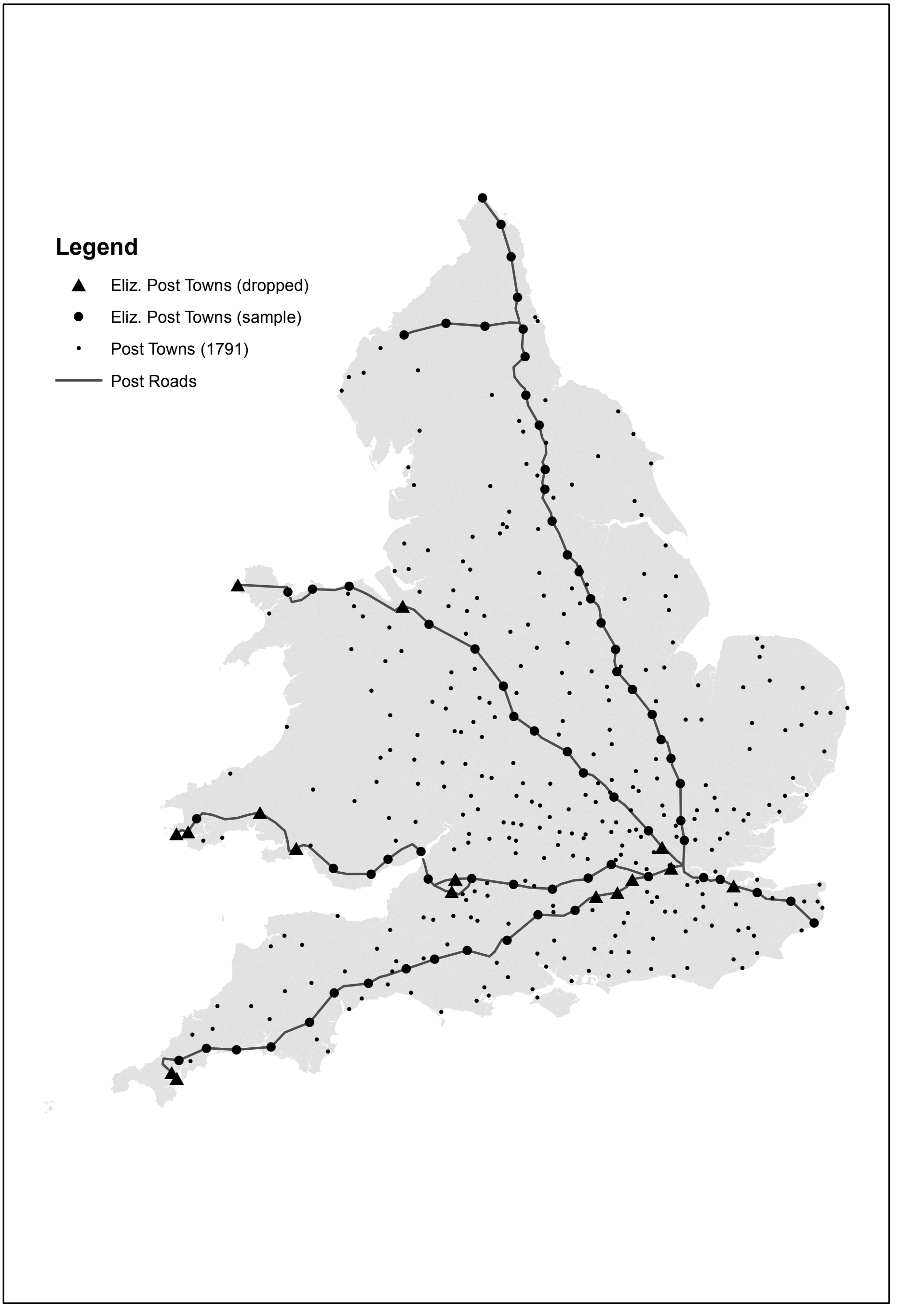
Figures

Figure 1. Country Banks, 1750–1850



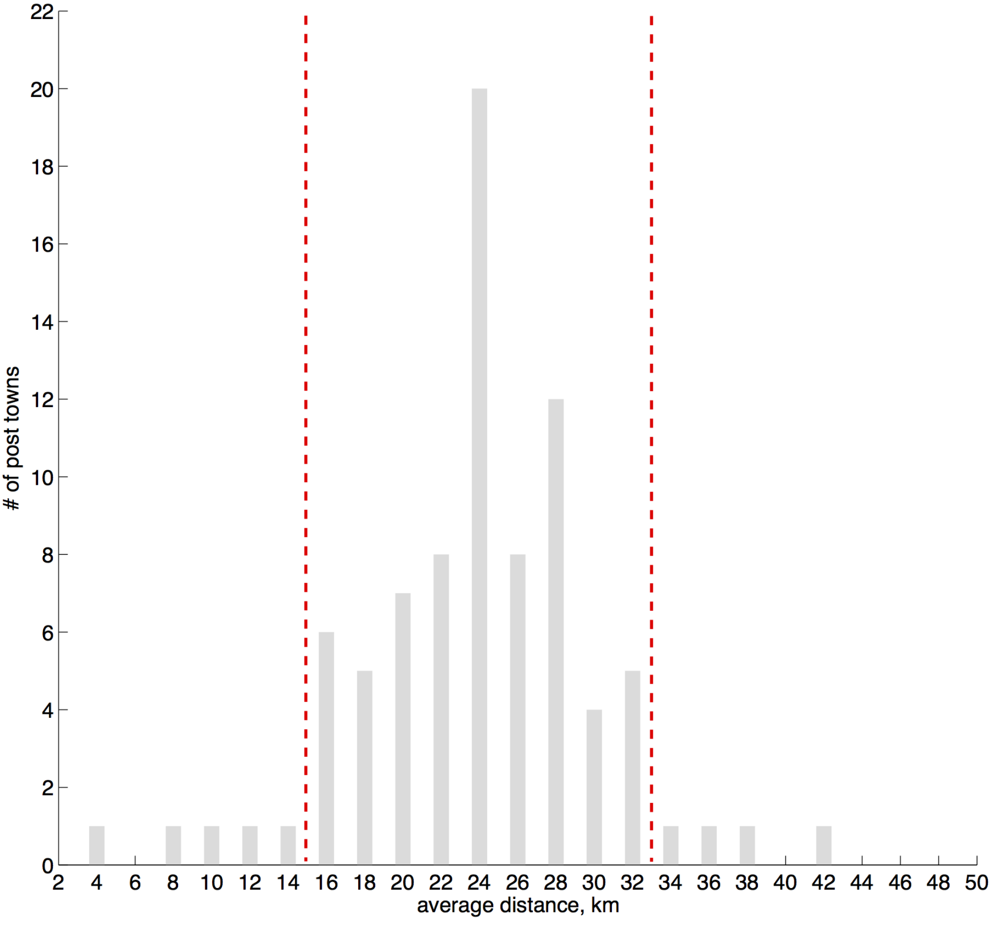
Notes: The Figure presents own calculations for country banks based on Dawes and Ward-Perkins (2000). The solid line represents the sum of country banks that were operating in a given year, including those merged, between 1750-1850. The dashed line represents the number of banks in existence that eventually failed; the dotted line the number of banks that eventually merged into another bank.

Figure 2. Post Towns



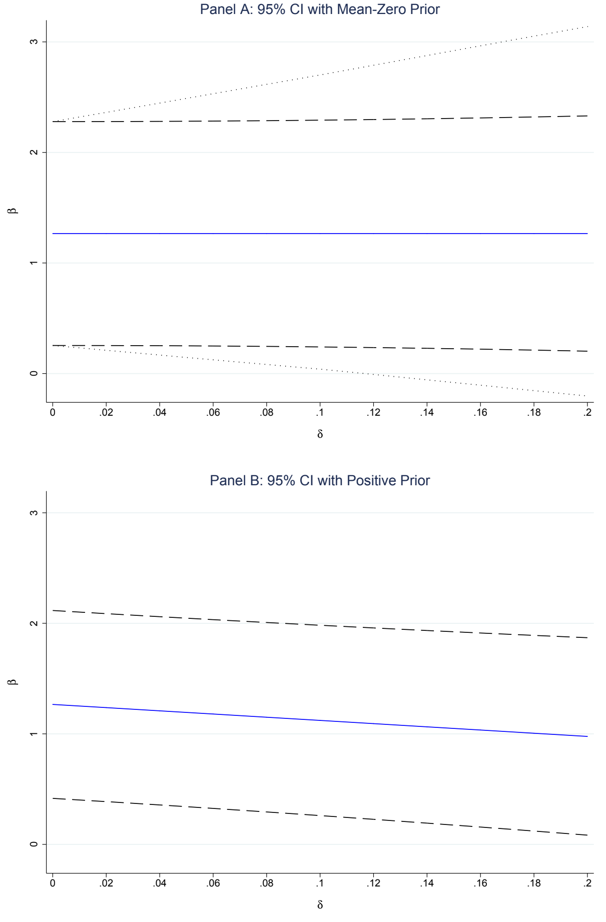
Notes: The map depicts the Elizabethan post towns in the sample (large dots); the Elizabethan post towns excluded because of their extreme average distances (triangles); and, the post towns at 1791 (small dots). The lines are the Elizabethan post roads.

Figure 3. Distances between Elizabethan Post Towns (km)



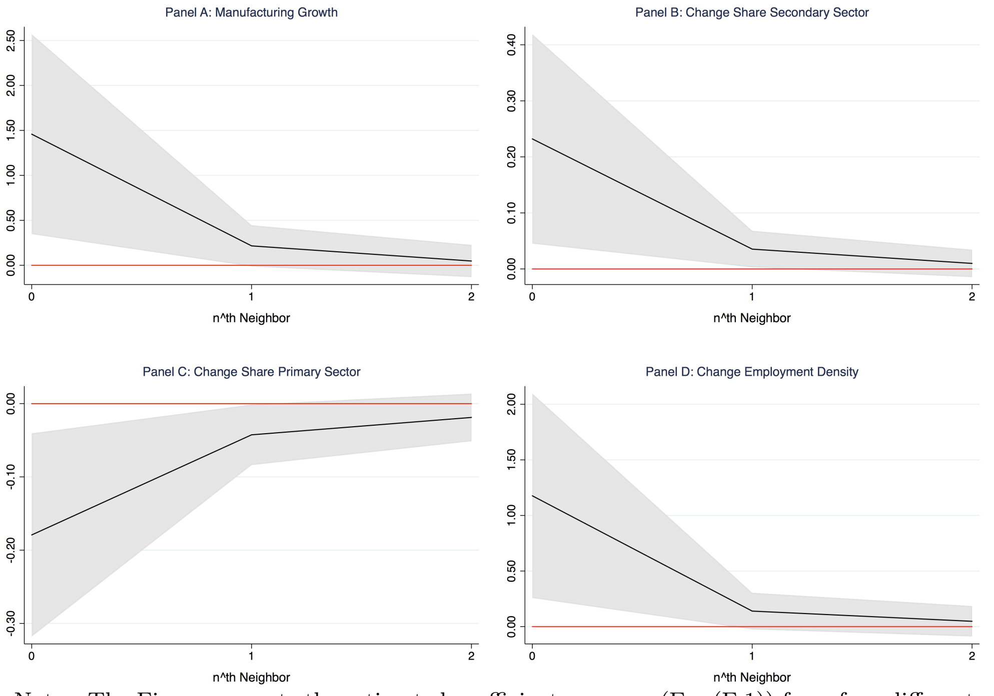
Notes: The Figure shows the distribution of pairwise distances between post towns. We see a clear peak around 24km (c.15 miles). The dashed lines denote our omitted post town distances of less than 16 and greater than 32km.

FIGURE 4. Plausibly Exogenous



Notes: The Figure shows point estimates and 95%-confidence intervals for the effect of 1817 banking access on manufacturing growth over the period 1817-1881. In Panel A, dotted lines refer to the most conservative specification that only imposed minimum and maximum allowable violations of the exclusion restriction. The dashed line assumes the same minimum and maximum allowable violations are uniformly distributed on the interval $[-\delta, \delta]$. Panel B imposes the assumption that the post town instrument has a direct positive effect on manufacturing growth, i.e. $\gamma \in U(0, \delta)$. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 and standard errors are clustered on the registration district level.

Figure 5. Distance decay of access to finance



Notes: The Figure presents the estimated coefficients $\gamma_0 - \gamma_2$ (Eq. (F.1)) from four different IV regression. The outcome variable is the 1817 and 1881 change in log industrial employment (Panel A); the share of industrial employment (Panel B); the share of primary sector employment (Panel C); and employment density (Panel D) in parish p. The treatment variable is the log of finance employees in parish p (FIN_p^0), p's first neighbor ($FIN_p^1 = \sum_{p' \in N_p^1} FIN_{p'}$), and p's second neighbor ($FIN_p^2 = \sum_{p' \in N_p^2} FIN_{p'}$). All regressions included the full set of controls specified in Table 3, Column 6. The instrumental variable is an Elizabethan post town dummy indicating for parish p and its first and second-order neighbors. Coefficients are enclosed by a 95% confidence band and standard errors are clustered on the registration district level. The full estimation results underlying this Figure can be found in Appendix G Table G.7, Panel A.

Appendices for online publication

Appendix A: A model of structural transformation and endogenous growth

Levine (2005) classifies the growth-enhancing functions that a financial sector can provide. Models capturing these functions are generally of only one-sector where greater financial development increases, for example, the intensity of research investment and thus generates higher growth. Our empirical strategy looks to understand the growth of industrial employment so we need to understand how financial development may interact with structural transformation.

We model structural transformation within a parish using a simple form of non-homothetic preferences; as income grows, so consumption demand shifts toward manufactured goods. Endogenous technological progress is sustained based on assuming that land is an excludable input to production. Firms compete for land by bidding up rent offers; the highest rent bid can include the costs of innovation as in Desmet and Rossi-Hansberg (2012). Combined with delayed diffusion and subsequent labour mobility, we can motivate firm investment in technology as maximising current-period rents without having to handle either imperfect competition or a fully dynamic problem. We introduce the mechanisms by which finance may interact with growth based on the categorisation in Levine (2005). The model is characterised by a transitional non-balanced growth path with structural transformation and an asymptotic long-run balanced growth path without structural transformation.

A.1. Consumers

Agents are infinitely-lived and endowed with one unit of labour supply each period. They each own a diversified portfolio of all land. There is no storage good so agents maximise instantaneous utility each period. Workers have preferences over the consumption of agricultural and manufacturing output with a Stone-Geary form as in Alvarez-Cuadrado and Poschke (2011),

$$u\left(c^A(t), c^M(t)\right) = \alpha \ln(c^A(t) - \gamma) + \ln(c^M(t) + \mu) \tag{A.1}$$

where $\alpha > 0$ is the weight on agricultural consumption and $\gamma, \mu > 0$ are Stone-Geary parameters: γ is a subsistence constraint on consumption of agricultural goods and μ reflects some endowment of manufactured goods (from, e.g., home production). We assume that the subsistence constraint never binds, i.e., output of agricultural sector is always greater than γ.

Households earn wages from providing labour and rental income from owning land. There are no costs of transporting output from either sector across space so we do not index relative prices by location. Labour can move freely across locations and sectors, so real wages are equal across sector and space. Below we often drop location index ℓ. The household budget constraint is,

$$w^A(t)l^A(t) + w^M(t)l^M(t) + R(t)/L = p(t)c^A(t) + c^M(t) \tag{A.2}$$

where $p(t)$ is the relative price of agricultural goods, L is total labour supply, $R(t)/L$ is per-agent rental income and l^i is share of time endowment spent working in sector i. The optimality conditions over consumption are,

$$\frac{\alpha}{c^A(t) - \gamma} = \lambda \tag{A.3}$$

$$\frac{1}{c^M(t) + \mu} = \lambda p(t) \tag{A.4}$$

where λ is the shadow price of an additional amount of income. Combining these, we have a relationship between different consumption demands, $c^M(t) = \frac{p(t)(c^A(t)-\gamma)}{\alpha} - \mu$. All output from both sectors is consumed which means that, on aggregate,

$$Y^M(t) = \frac{p(t)(Y^A(t) - \gamma)}{\alpha} - \mu. \tag{A.5}$$

A.2. Firms

A parish is composed of a continuum of firms ordered along an interval [0,1]. A firm at location ℓ in time t produces either agricultural or manufacturing output (sectors A and M) using labour and land:

$$Y^A(\ell, t) = Z^A \mathcal{F}(L^A(\ell, t), N^A(\ell, t)) \tag{A.6}$$

$$Y^M(\ell, t) = Z^M(\ell, t)\mathcal{G}(L^M(\ell, t), N^M(\ell, t)) \tag{A.7}$$

where $L^i(\ell, t)$ is labour employed in sector i at (ℓ, t), $N^i(\ell, t)$ is a fixed amount of land used in sector i, $Z^M(\ell, t)$ is technology in manufacturing and Z^A is the time- and space-invariant agricultural technology.[30] For the moment assume that $Z^M(\ell, t)$ is exogenous and constant across time and space. $\mathcal{F}(\cdot, \cdot)$ and $\mathcal{G}(\cdot, \cdot)$ are constant-return production functions with the usual concavity and Inada-type assumptions. We normalise the land used in production so that $N^i(\ell, t) = 1$ for all (ℓ, t) and i. If total labour supply is L, the above-mentioned subsistence constraint means we are assuming $Z^A \mathcal{F}(L, 1) > \gamma$. Finally, let $F(L^A(\ell, t)) \equiv \mathcal{F}(L^A(\ell, t), 1)$ and $G(L^M(\ell, t)) \equiv \mathcal{G}(L^M(\ell, t), 1)$.

Total labour is normalised to $L = 1$ and is supplied inelastically, so $L^A = 1 - L^M$. Since labour can move freely between sectors, wages in each sector are equal,

$$w^A(t) = p(t) Z^A F'(1 - L^M(t)) = Z^M(t) G'(L^M(t)) = w^M(t) \tag{A.8}$$

[30] We assume that agricultural productivity is constant across time and space purely to remove some notation. Structural transformation can be 'labour pull' (improvements in manufacturing productivity push up wages) or 'labour push' (where improvements in agricultural productivity that 'releases' labour out of agriculture since its income elasticity of demand is less than one). The difference can be observed with data on relative prices (Alvarez-Cuadrado and Poschke, 2011) and for England and Wales in this period, the evidence favours a labour pull channel, i.e., that manufacturing productivity growth was driving structural transformation.

where $F'(\cdot)$ and $G'(\cdot)$ are partial derivatives wrt labour supply. Relative prices are thus,

$$p(t) = \frac{Z^M(t)G'(L^M(t))}{Z^A F'(1 - L^M(t))} \tag{A.9}$$

To solve for equilibrium labour choices we can use (A.5) with (A.9) to obtain,

$$\frac{\mu}{Z^M(t)} = \frac{G'(L^M(t))}{\alpha F'(1 - L^M(t))} \left(F(1 - L^M(t)) - \frac{\gamma}{Z^A} \right) - G(L^M(t)) \tag{A.10}$$

Equation (A.10) implicitly defines $L^M(t) = h(Z^M(t))$ with $h' > 0$: Since the right hand side is strictly decreasing in $L^M(t)$, we see that a higher $Z^M(t)$ leads to a higher optimal $L^M(t)$ – structural transformation that results from improvements in manufacturing technology.[31]

A.3. Land, technological progress and its finance

So far we have assumed $Z^M(\ell, t)$ to be constant across time and space. Suppose that the end-of-period productivities in period $t-1$ were $Z^M_+(\ell, t-1)$. Now

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[31] That the right-hand side is also increasing in Z^A shows that agricultural productivity improvements also lead to greater $L^M(t)$ in equilibrium. While Gollin et al. (2002) show that one can explain structural change during over this period using improvements in agricultural productivity, the data suggests a steady decline in the relative price of manufacturing over the period. By equation (A.9), this suggests that the dominant channel is manufacturing productivity.

let each firm wake up each period with an initial technology $Z_{-}^{M}(t)$ that is the average of all previous period's realised productivities, i.e., $Z_{-}^{M}(t) = \int_0^1 Z_{+}^{M}(\ell, t-1)d\ell$. So 'diffusion' means that all firms imperfectly observe each others' productivities (including their own).

Suppose now that firms can invest in research to potentially obtain a higher $Z^M(\ell, t)$ *at their location.* Firms must borrow to finance the research opportunity at a cost f. Investment in research buys a probability φ of taking an innovation step of $\Delta > 0$ at a cost $\psi(\varphi)Z^M$ with $\psi' > 0$ and $\psi'' > 0$.[32] So expected manufacturing technology at location ℓ that invests in research is.

$$E(Z^M(\ell, t)) = (1 + \varphi\Delta)Z_{-}^{M}(t). \tag{A.11}$$

The focus of endogenous growth models after Romer (1990), Grossman and Helpman (1991) and Aghion and Howitt (1992) has been on imperfect competition since in a perfectly competitive environment without land, prices equal marginal cost and there is no competive equilibrium in which firms invest in innovation. However, as shown by Desmet and Rossi-Hansberg (2012), since land is non-replicable and excludable, firms that occupy land can momentarily (up until their technology diffuses) gain from an investment in research.

[32] That the cost is proportional to technology is necessary for balanced growth in quality-ladders-type models. Otherwise continual growth would erode these costs as a proportion of potential output gains; growth would accelerate over time.

Moreover, this can form part of a competitive equilibrium because firms bid for land while taking into account the expected gains from innovation. The maximum land bid in manufacturing is,

$$R(\ell,t) = \max_{\varphi(\ell,t),L^M(\ell,t)} (1+\varphi\Delta)Z_-^M(t)F(L^M(\ell,t)) -$$

$$w^M(t)L^M(\ell,t) - (1+f)\psi(\varphi)Z_-^M(t) \tag{A.12}$$

Labour is hired, land is rented and investment in innovation happens in advance of productivity realisations. Since all manufacturing firms are identical, either they all invest or none invest: Then maximising rental bid means that the optimal choice of labour is now conditional on investment in a probability of innovation and the analysis above simply follows with $E(Z^M(t))$ instead of $Z^M(t)$. Absent any other frictions, the optimal investment into innovation satisfies,

$$\Delta F(\hat{L}^M(\ell,t)) = (1+f)\psi'(\varphi), \tag{A.13}$$

where $\hat{L}^M(\ell,t)$ is optimal choice of labour. Desmet and Rossi-Hansberg (2014) show under a similar set-up of labour mobility and productivity diffusion, firms make decisions to maximise current-period profits only.

Let $\varphi^*(f, L^M(t))$ be the optimal chosen probability of innovation given f, average manufacturing labour $L^M(t)$. By the strict convexity of ψ, we have

${\varphi^*_f}' < 0$ and ${\varphi^*_{L^M}}' > 0$: The higher is the cost of finance, the lower is the chosen probability of an increase in manufacturing productivity. Not also that there are scale effects in (A.13): The higher is manufacturing employment the greater the chosen φ^*.

A.4. Solving for growth rates

Growth accelerates during the process of structural transformation because, in the short-run, a shrinking agricultural sector drags down the aggregate growth generated by the productivity growth. Over time, the size of the agriculture sector approaches a subsistence level and growth is caused by productivity growth in manufacturing alone.

Suppose that all manufacturing firms in a parish invest in research activity each period, the growth rate of of Z^M is,

$$g_{Z^M}(f, L^M(t)) = \frac{Z^M(t+1)}{Z^M(t)} - 1 = \varphi^*(f, L^M(t))\Delta \tag{A.14}$$

The impact of a higher g_{Z^M} is a faster growth of L^M.

Total output is $Y(t) = p(t)Y^A(t) + Y^M(t)$, i.e.,

$$Y(t) = Z^M \left(\frac{G'(L^M(t))}{F'(1 - L^M(t))} F(1 - L^M(t)) + G(L^M(t)) \right) \tag{A.15}$$

Output growth is the product of technological progress in manufacturing both directly and via structural transformation. Suppose that time is continuous and we calculate growth rates based on a marginal change in Z^M,

$$\frac{\dot{Y}(t)}{Y(t)} = g_Y(t) = g_{Z^M}(f, L^M(t)) \cdot \left[1 + \Phi(t)\frac{\partial L^M(t)}{\partial Z^M(t)}\right] \tag{A.16}$$

where $\Phi(t) < 0$.[33] The aggregate growth rate increases during the structural transformation. In the short-run, a shrinking agricultural sector drags down the aggregate growth generated by the productivity growth. Over time, this stabilizes at a subsistence level: In the limit, labour in agriculture is only to provide subsistence consumption,

$$\lim_{t\to\infty} L^M(t) = \bar{L}^M = 1 - F^{-1}(\gamma/Z^A). \tag{A.17}$$

That is to say, $\lim_{t\to\infty} \frac{\partial L^M(t)}{\partial Z^M(t)} = 0$. Moreover, as $L^M(t)$ approaches $\bar{L}^M$, so g_Y approaches a long-run growth path g_{Z^M},

$$\lim_{t\to\infty} g_Y = \varphi^*(f, \bar{L}^M)\Delta \tag{A.18}$$

[33]

In particular,

$$\Phi(t) = \left\{ Z^M(t)F(1-L^M(t)) \frac{\left[\frac{F'(1-L^M(t))G''(L^M(t))+G'(L^M(t))F''(1-L^M(t))}{(F'(1-L^M(t)))^2}\right]}{\left(\frac{G'(L^M(t))}{F'(1-L^M(t))}F(1-L^M(t)) + G(L^M(t))\right)} \right\} < 0$$

A.5. Finance, growth and structural transformation

We take the the inverse of the cost of obtaining finance, f, to be our simple measure of access to financial services in a parish, that is, $FIN = 1/f$. The less costly is access to a bank in a given parish, the greater is FIN and the higher is the probability of innovation. As Levine (2005) discusses, there can be a number of different channels by which banks affect growth. In particular, a bank may: Facilitate better investment; provide pooling and diversification services; and, ease exchange and improve contracting.

Access to banking varies by parish, so FIN_p is indexed on p. In addition to access to banks, there are other determinants of changes in productivity such as variations in resource endowments or access to markets. From (A.11), the expected technology jump is, $\mathrm{d}Z_p^M = \varphi^*(FIN_p, L_p^M(t))\Delta + X_p$ where X_p is a vector of non-bank determinants of productivity growth. Using equation (A.10), we can thus write the change in manufacturing labour as,

$$\mathrm{d}L_p^M = \frac{\partial L_p^M}{\partial Z_p^M} \cdot \mathrm{d}Z_p^M = h'(Z_p^M)\left[\varphi^*(FIN_p, L_p^M(t))\Delta_p + X_p\right] \tag{A.19}$$

Equation (A.19) contains the channel through which finance causes structural transformation. The expression also highlights the problem we will face in identifying a causal relationship from finance to growth: There is a connection from L^M to the optimal research intensity. Productivity improvements which induce structural transformation will also induce greater demand for financial services.

Divide both sides of (A.19) by L^M to obtain an expression for the growth of industrial labour, and let $\gamma_p^M = \ln Empl_{p,1881} - \ln Empl_{p,1817}$. We can then approximate[34] the structural relationship between finance and manufacturing employment growth as,

$$\gamma_p^M = \alpha + \beta_1 FIN_p + X_p' \beta_2 + \mu_d + \varepsilon_p \tag{A.20}$$

where the coefficient β_1 is to be estimated.

Appendix B: Data

Descriptive statistics of the variables used in the study are provided in Table 1. We use the occupational geography data described in Shaw-Taylor et al. (2010) for the years 1817 and 1881. To provide a better understanding of the importance of local access to financial services for subsequent industrial growth, we benefit from high spatial resolution and detailed occupational classification of our data. We observe the number of adult males employed in occupations classified according to the PST (Primary-Secondary-Tertiary) system devised

[34] That is, we assume that the non-linearities in equation (A.19) can be approximated by taking FIN to be the natural log of employment in finance.

by Wrigley (2010).[35] The three Sectors (PST) are composed of 133 Groups (such as agriculture, mining, textiles, financial services etc.) and these Groups are composed of 539 Sections (such as coal mining, cotton textiles, and so on). When we refer to primary sector employment below, we always mean primary less mining.

The occupational data is observed at the level of the ancient parish. For 1817, Shaw-Taylor et al. (2010) map into 11,102 ancient parishes covering England and Wales. Most of the parishes persist over the period, but some are split and a few are merged; at 1881 there are 15,132 parishes. Both sets of parishes are made up of an underlying GIS of historical parishes updated from Kain and Oliver (2001). Using these, we form 10,738 consistent spatial units to create a panel dataset of nineteenth century parish employment. After dropping parishes with zero population in 1817 or 1881 and parishes in and around London, this number reduces to 10,521 parishes. These parishes have an average size of 14.1km^2 (an average radius of just 2.1km) and employ on average 230 adult males. Of these 10,521 consistent parishes, one third (3,463) of the parishes connect different spatial units across the two periods and we

35

There is at present no source for 1817 female employment remotely comparable to that used here for male employment. The 1851 census suggests that, after domestic services, female employment is predominantly in manufacturing (of textiles and clothing), although Higgs (1987) and Sharpe (1995) detail concerns about the enumeration of female occupations in that 1851 census. Therefore, we control for the proportion of the population that is female.

control for these particular units in all regressions. The parishes are nested in 587 registration districts which themselves make up 59 counties. Note that 17 registration districts comprise only one parish. We drop these observations since we use registration district fixed effects by default. This leaves us with 10,504 parishes within 570 registration districts and 54 counties.

The information for 1881 is based on occupational data in the census records of that year. Prior to 1841, however, the UK census did not record occupations. By an 1812 Act of Parliament,[36] it was a requirement on those recording baptisms in parishes to also record the occupation of the father. The data for 1817 thus result from a massive undertaking described in Kitson et al. (2012) to create a 'quasi-census' from the occupational information in these baptism records over the period 1813–20 (which we refer to as 1817). Whether such a source is an accurate measure of adult employment rests on whether marital fertility varied by geography and occupation. As Kitson et al. note, there is no convincing evidence that fertility systematically varied by social group within a community. Moreover, the direct evidence on occupational structure that does exist for some small areas at this time is extremely close to the occupational estimates derived from baptism registers. We thus take this data as a good, unbiased measure of the 1817 occupational structure of adult males.

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[36] This is the Parochial Registers Act of 1812, often referred to as 'Rose's Act'.

With this information, we can calculate employment growth in occupation i and parish p as $\gamma_{ip}^{M} = \ln Empl_{ip,1881} - \ln Empl_{ip,1817}$. In a typical estimation, we predict employment growth in occupation i and parish p between 1817 and 1881 as function of access to finance in 1817 conditional on initial parish characteristics observed in 1817.

Our main variable of interest is access to finance in 1817. We measure access to finance by the number of adult male employees working in 'Financial services and professions' which is a subsector of the tertiary sector, per the Wrigley (2010) classification. At the beginning of the period, 88% of the parishes do not have access to banking services in their immediate environment and only half the parishes have at least one employee working in finance within 5km.[37] At a time of poor transport connections, this distance is significant and, in practice, means that a large fraction of parishes could not easily access professional financial services. Over the next 64 years, this clearly changed and in 1881 we observe that one third of the parishes has immediate access to finance and 86% of the parishes could access finance within 5km. Considering the improvements in transportation over this time that led to a massive reduction in the importance of distance we can conclude that all regions had equal access to finance at the end of our observation period.

[37] Since we use the log of finance employment in our empirical model, we calculate $\ln FIN_{p,1817} = ln(FIN_{p,1817} + 1)$ to avoid missings.

Appendix C: Post Town Characteristics

Consistent with the idea that these early post towns were strategic, not economic, is their population size. We use the data in Bairoch (1988) to identify those cities with a population of more than 1,000 inhabitants. Out of 55 such cities in 1600, only 14 were an Elizabethan post town. Put differently, only 20% of the Elizabethan post towns had a population greater than 1,000 at 1600. An example of a large city that could have been connected but was not is Birmingham.[38]

Moreover, we can consider the (truncated) size distribution of towns. If the post towns are truly unrelated with population size, then their size distribution should match the size distribution of all towns. Figure H.3 reports the cumulative distribution of city size (excluding London) at four dates from 1500–1750, i.e., before country banks were widely established. As can be seen, the size distribution of post towns closely follows that for all towns in the run-up to the nineteenth century, matching both the size distribution within a period and the shift of that distribution over time. The two-sample Kolmogorov-Smirnov test fails to reject the Null at 5% significance level that the data are drawn from the same distribution in each period.

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[38] By contrast, one may argue that the assumption of randomness may not apply to the case of Bath since there is a clear deviation in the post road to meet it. However, dropping Bath from the set of post towns does not affect our results.

Finally, it may have been that the selection of a town to be a post town in the 16th Century caused it to grow faster over the subsequent period, putting it in a position more favourable to industrial change. Using the Bairoch (1988) data, we find no evidence that Elizabethan post towns experienced faster population growth over the period 1600–1850.

Appendix D: Robustness Checks

This Section reports estimates from several alternative specifications designed to probe the robustness of our main findings.

D.1. Geography and Effect Heterogeneity

This Section discusses the robustness tests that are summarized in Section 5.3 in more detail. We start with a number of specifications where we test the robustness of our results to the sample specification. We first ask whether the observed finance effect is driven by the faster manufacturing growth in the North. For this purpose, we split England and Wales along the 53° North latitude and run the estimation without the manufacturing-intensive north. As can be seen in column 1 of Table G.4, doing so leads to a highly significant coefficient that is somewhat larger than that obtained using the whole sample. This makes intuitive sense since the South was in a position of having to catch-up relative to the more heavily industrialized North.

Next, we assess whether the exclusion of the London parishes changes our results. As we can see in column 2, including the parishes around London has virtually no effect on the estimated finance coefficient. In column 3, we run a specification for parishes that were located within a 10 km corridor of the Elizabethan post roads. Column 4 considers a subset of parishes that had access to a turnpike roads in 1817. By restricting our sample to parishes with road access, we can test whether finance has an effect on manufacturing growth that is independent of road-specific factors. Reassuringly, the effect of finance access is smaller but remains significant. In column 5 we drop all post towns below the 25th or above the 75th percentile in the distance distribution in Figure 3. Doing so narrows the range of distance to the interval 19.24-26.85 km. Reducing the number of post towns from 69 to 42 does not affect our results suggesting that the observed relationship is not driven by post towns at the tails of the distribution where the random allocation argument may not hold. Finally, in column 6 we drop all Welsh parishes where we lack enclosure information and again do not see a substantial change in our basic findings.

Finally, it may be the case that certain soil characteristics simultaneously affect productivity in agriculture and manufacturing. To account for that, we include a set of indicators for soil characteristics from the UK National Soil Resources Institute (NSRI).[39] The NSRI 'soilscapes' classification of land is based on a variety of location characteristics that are aggregated into

[39]

27 soilscapes available for 1km x 1km cells covering England and Wales. Controlling for these functional types, we see in column 7 of Table G.4 no indication that the omission of these variables would have biased our results.

D.2. Additional Economic Effects

The next block of tests in Table G.5 considers additional controls that reflect heterogeneity in the geography of interactions between economic agents within-registration districts which may lead to a violation of the exclusion restriction. Relevant markets are not necessarily confined to political borders. We thus control for the log of employment size within a distance of 15 km.[40] Next, we extend our definition of market potential and calculate for each parish p a measure $marketaccess = \sum_{j \in J} \frac{pop_j}{dist_{pj}}$ that captures the distance weighted population where J is the set of all 305 post towns that existed in 1791 or all 579 market towns that existed in 1722. None of these market potential controls changes our baseline results.

Next, we controls address the concern that post towns might be the home to more wealthy individuals who could have been bankers as well as industrialists. We proxy wealth by the share of employment in domestic services

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The data come as raster data file with 1km x 1km cells. To aggregate this information to the parish level, we calculate zonal statistics and choose the dominant characteristic. If there are missing, we interpolate with values from neighboring cells.

40

Using 5 or 10km instead does not change the results.

as a proxy. Wealthy parishes may also have a more educated population which benefits economic growth (see Becker and Woessmann, 2009). In the absence of information on individual education, we control for the number of teachers in a parish. Additionally, we consider the number of patents in a parish and its first neighbors since we may be concerned that initial wealth triggered innovative activities or that roads may have facilitated information flows that benefit manufacturing through knowledge production. We see that including these controls does not affect our baseline results much.[41]

In a final robustness check, we account for the fact that, while 1817 was prior to the takeoff in per capita growth, there were significant industrial developments before this date. As a result, the initial industry structure may be a good predictor of future growth and correlate with finance access. To account for that, we include a Bartik shift-share control for predicted manufacturing employment based upon employment shares in manufacturing subsectors in parish p in 1817.[42] Including this control should capture all growth effects from potentially confounding initial conditions. Unsurprisingly, controlling for the predicted growth path decreases the finance effect but it remains relevant and significant. At the same time, the coefficient on our predicted employment control is negative suggesting that the industry composition in 1817 is not

41 For more details on the patent data we refer to the reader to Nuvolari and Tartari (2011)

42 $predictedgrowth = \sum_{m \in M} \frac{empl_{pm}}{empl_m} \Delta empl_{j,1817-1881}$ for all M industries in parish p.

a good predictor of future growth. This corroborates our argument that the geography of production changed over this period and it also shows that banking access was a relevant driver of this process.

D.3. Standard Errors

In this last subsection, we explore whether clustering our standard errors on the level of registrations districts is enough to absorb potential spatial autocorrelation. Registration districts are the local government level above parishes. Given the costs of distance, it seems most likely that common shocks occur at this level of aggregation. We now consider an alternative specifications where we cluster standard errors on the level of 59 counties to absorb common institutional shocks on a more aggregate level. One remaining concern is that restricting serial correlation to be within arbitrary jurisdictions may not account for technology shocks that may spread over larger spatial units without stopping at administrative boarders. To detach our cluster strategy from administrative boundaries, we follow the Bleakley and Lin (2012) application of a method by Bester et al. (2011) and cluster on the level of 100×100km or alternatively 50×50km grid squares that enclose all parishes. In Table G.6, we show the results for our two instruments separately and for the joint specification. It is reassuring to see that the standard errors are robust to these alternative strategies, suggesting that serial correlation across space does not affect our findings.

Appendix E: Alternative Instrument

In Section 5.3 of the main text we briefly described an alternative instrument, enclosures of land before the mid-seventeenth century. We present here a more detailed motivation along with the results of the basic regressions with this instrument.

E.1. Early Enclosures as Instrument

Prior to the enclosure movement, traditional, low-scale agricultural production took place within a parish on common land with common rights to its use. An enclosure involved the mapping and physical containment of land for the private use of a landowner. In practice, this was an encroachment of the landowner or his farmer on the land used by the local populace. The peasant proprietor was converted into a wage-earning labourer. The economic motivation for the landowner can have been simply to attain scale or to implement productivity-enhancing technologies such as fertilisers.

We consider two phases of enclosure in England and Wales. The first occurred during the Tudor and Stuart eras from the late 15th century to the end of the English Civil War (1642-51). During this period a vast amount of agricultural land was transferred from the old feudal-military aristocracy, the Church and the Crown, into the hands of non-noble landholders. These included merchants, professional men, state office-holders and the knight-class who had acquired large landholding, often by buying manors or estates from impoverished members of the traditional feudal aristocracy. With this change in landownership came a change from a feudal mindset to a more capitalist approach with a consequent change in the structure of agricultural production. Instead of looking at land as a means of supporting political and military power these new agricultural capitalists – often of urban professional or mercantile origin – sought to exploit the land for its market potential. As grain prices rose into the seventeenth century, so the incentives to control and expand landholdings grew.

Besides large-scale landowners, Allen (1992) documents the role played by a class of small-scale farmers, the *yeomen*, that emerged during the first wave of enclosures. An important distinction to be made is that early enclosures, which increased the scale of production in some areas, did not in practice generate productivity advantages over the yeomen farmers. Allen (1992) carefully documents that the relationship between enclosures and land yields is small, while many open field yeoman consistently adopted new technologies. In other words, while the early enclosure movement did increase farm scale, the connection, via productivity, to the release of labour for manufacturing was limited.

The pre-1650 enclosures thus created resilient, large-scale agricultural concerns that established areas of demand for agricultural banking services into the eighteenth and nineteenth centuries. An additional channel stressed by Allen (1992) is that large landowners would also present better customers to banks because their estates could serve as collateral. With the growth of the mortgage market through the seventeenth century, emerging country banks were influenced in their location decisions by the presence of large-scale farms (Pressnell, 1956).

After 1650, the nature of the agricultural improvements associated with enclosures began to change, with a second wave of enclosures beginning in the eighteenth century. This second phase of enclosures meant the death of yeoman farming (Allen, 1992) and significant changes in agricultural productivity. Allen (2004) reports agricultural output per worker is roughly stable over the period 1300 to 1600, but nearly doubles from 1600 to 1800. The break in the nature of enclosures was partly political: Following the end of the Civil War, the tension between landowners and the Crown was, to some extent, resolved in favour of the landowners. Where previously the Crown could insulate the peasantry from excessive exploitation by landowners, the State thereafter interfered less with the economic activities of the increasingly influential landed elite (Moore, 1966; Allen, 1992; and, in a different context, Jha, forthcoming). This broke resistance to a wider enclosure movement. Around the same time, a number of new technologies (such as fertilisers, new grasses and crops) increased the incentives for all types of enclosures at different scales and with different agricultural outputs. As Tate (1967, p79) describes it, "The agricultural revolution ... now goes forward in great waves." These later (typically Parliamentary) enclosures were more related with intensive growth and were more closely associated with the processes of the Industrial Revolution (the release of labour into cities) or were even a response to it (such as the mechanization of agriculture). Given their closer connection to the rise of industry, the later enclosures may imply direct effects. As a result, we do not consider these later enclosures as instruments but focus solely on the early enclosures.

Our information on early enclosures stems from the data in Clark and Clark (2001)[43] which reports the common rights status of farm land owned by charities in England between 1500 and 1839. The dataset contains information from 18,962 maps extracted from over 40,000 pages of descriptions of charity land generated by various enquiries into charitable asset holdings from 1786 to 1912. To match the information with our data, we determine each of the 1851 parish centroids and merge them into our parish units. We then use the information on the fraction of land with common rights to determine locations that were fully enclosed by 1650 and use them to explain the location of country banks and finance employment. This leaves us with 414 parishes with an early enclosure as depicted in Figure 2. Out of those parishes, 139 (34%) hosted a bank or some finance employment. Since the enclosure information is only available for England and not Wales, this instrument is limited to 9,664 English parishes (excluding the London area).

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43 See 'The Enclosure History Data Set' available here: http://www.econ.ucdavis.edu/faculty/gclark/data.html.

To the extent that pre-1650 enclosures do not affect industrial firms' location choice, we can use early enclosure events as an instrument to predict the location of country banks founded before the industrial take-off could possibly be expected. We consider a number of potential concerns with this instrument. First, there may be a direct or indirect relationship between enclosures uprooting farm workers and the availability of a large pool of cheap, unskilled labor looking for jobs in the industrial sector (cf. Williamson, 2002). A direct relationship could be via the loss of rights to common land that yeoman farmers relied upon. However, Shaw-Taylor (2012) shows that, for the Parliamentary enclosure movement, labourers did not generally have common rights to lose. An indirect channel could be via agricultural productivity improvements that release labour but, as noted above, there is no evidence that early enclosures generated higher productivity than open farms of the period.[44] That is, enclosures were not offsetting labour, directly or indirectly, by the time of our observational period in 1817. Therefore, we should capture any potentially biasing effects with our controls at the beginning of the period controls.

[44] There is also evidence from relative prices that, at least on aggregate, the dominant cause of structural transformation over this period was productivity growth in industry (Yang and Zhu, 2013). This would imply a pull into the industrial sector because of productivity growth raising industrial wages, rather than a push out of primary occupations.

A second concern is that the agrarian sector was supplying working capital for the industrial sector. Farmers deposited their idle funds in local county banks who then made loans via the London banks to banks in industrial towns who supplied credit to industrial firms. This circulation of capital via London meant that a geographical connection from a local farm to a local manufacturer was no more feasible than between a farm and manufacturer at different ends of the country (Black, 1989). We look to account for this concern by running separate regressions for the North and South. Thirdly, agricultural productivity may be linked to a greater density of economic activity and generally a higher population density. If this implies agglomeration economies that benefited industrial firms our instruments will not meet the exclusion restriction. To overcome these concerns, we condition the instrument on the initial employment share in agriculture and a Herfindahl index of industry concentration. We additionally include controls for the transportation infrastructure because better accessibility may have affected the agricultural viability of land and manufacturing. One last concern is that those individuals who enclosed land and commercialized agriculture have specific entrepreneurial abilities and wealth that they now redirect towards industrial projects. Ventura and Voth (2015) present a counter-argument to this concern, but we anyway control for a proxy of the level of wealth in each parish.

E.2. Results with Enclosure Instrument

Table G.2 presents results from regressions where we instrument access to finance with early enclosures. The Table follows the structure of Table 3. Columns 1-6 develop our preferred IV model with all controls stepwise, Column 7 estimates the effect without post town locations, Column 8 drops Wales since we do not have enclosure data for Wales and Column 9 provides the OLS specification as baseline. All specifications show F-statistics of excluded instruments between 17 and 21 and Anderson-Rubin p-values that are below 0.01 suggesting that our second instrument is also strong. In the second stage, our estimations suggest a statistically significant and positive effect of finance on industrial growth across all specifications. Our preferred specification in column 6 suggests that 10% more finance employment in 1817 leads to 9.23% more industrial employment 64 years later. Importantly, this effect is quite similar to the coefficients of 1.266 reported in our estimations with the post town instrument (which is why we comfortably fail to reject the over-identifying restriction in the specifications where we use both instruments.

To assess the robustness of the enclosure instrument, we perform present the results of balancing tests on (i) pre-existing characteristics that might have driven the choice to enclose and (ii) balancing tests on the 1817 controls included in the IV specifications. In contrast to the post town locations, we find some significant differences in the pre-existing characteristics. They are further away form the coast, are flatter and show slightly better conditions to grow rye and wheat. While we cannot rule out some selectivity in early enclosure status, an omnibus test conditional on our base controls (registration fixed effects, parish size and territorial changes) works against the concern that these non-balancing controls might drive the estimated effect.

Next, we assess the balance of the start-of-the-period controls in 1817. We observe that enclosures are a bit larger than the average, host slightly less agricultural and mining employment and look a bit more concentrated. Again, an omnibus test where we condition the enclosure instrument on fixed effects, parish size and territorial changes suggests that the variation that is explained by the control variables is of second order importance in the estimation of the enclosure effect.

In a final check, we assess the sensitivity of our estimates to a violation of the exclusion restriction. This time, we allow the vector γ_{encl} from a hypothetical regression of manufacturing growth on finance access, our enclosure instrument and the full set of control variables to differ slightly from zero, i.e. $\gamma_{encl} \in [-\delta, \delta]$. By relaxing the restriction $\gamma_{encl} = 0$ we allow for small direct effects of our instrumental variable on manufacturing growth and parameterize it. Specifically, we consider the following two scenarios. First, a case where we do not have prior beliefs about the direction of the bias and, second, a case where we impose a direction of the bias. In the most conservative case, we define minimum and maximum allowable violations of the exclusion restriction (Case 1). Alternatively, we assume for the instrument that γ_{encl} is uniformly distributed on the interval $[-\delta, \delta]$ (Case 2) in the symmetric case or $[-\delta, 0]$ (Case 3) in the asymmetric case where we assume a negative bias.

Figure 4 shows the results of this robustness test where we assess both instruments jointly. Panel A reports results with no prior information about the bias. The dotted line represents Case 1 and the dashed line Case 2. Panel B imposes prior information that the instrument is upward biased (Case 3a) and Panel C imposes an alternative scenario where enclosures induce a negative bias (Case 3b). For the case of enclosures, we do not have a clear prior about the direction of a potential bias. Enclosures could have a positive direct effect if one believed that successful agriculturalists would also make good manufacturing entrepreneurs while we would expect a negative effect if successful agriculturalists would be systematically less inclined to switch to manufacturing. We can see that the test is a bit more sensitive to a violation of the exclusion restriction. In this case, it most conservative specification would require a direct effect of 0.4 or above to accept the null hypothesis that banking access does not affect manufacturing growth and thus invalidate our finding. In the less restrictive cases, the threshold goes up to 0.8. Given this higher sensitivity, we cautiously interpret these results as additional support for the validity of our enclosure instrument and continue with results where we use both instruments jointly.

E.3. Results with Both Instruments

Table G.3 presents our baseline results from regressions where we instrument access to finance with both the Elizabethan post town instrument and the enclosure dummy. Again, the Table follows the structure of Table 3. Columns 1-7 show IV estimates and Column 8 shows OLS results of our growth regression including the full set of control variables from our preferred specification. We develop our preferred specification in Columns 1-6 and we drop Wales in Column 7 since we do not have enclosure data for this region. In all specifications, F-statistics of excluded instruments range between 13-17 and all Anderson-Rubin p-values are close to zero. Comparing Tables 3, G.2 and G.3, it is reassuring that we find quite similar coefficients even though our instruments employ different ranges of variation.

Appendix F: Spatial Spillovers

We define neighbors in the following way. A first-order neighbor of parish p shares a co-ordinate in the GIS polygon; a second-order neighbour of p shares a co-ordinate with the first-order neighbour of p, but not with p itself. Let N_p^1 and N_p^2 be the set of parish p's 1$^{\text{st}}$- and 2$^{\text{nd}}$-order neighbors, respectively. For each p, we sum the number of finance employees or banks, in the two sets of neighbors. Let $FIN_{p,1817}^1 = \sum_{p' \in N_p^1} FIN_{p'}$ for the first order neighbors and $FIN_{p,1817}^2 = \sum_{p' \in N_p^2} FIN_{p'}$ for the second order neighbors. $FIN_{p,1817}^0$ would be the measure of finance in parish p. Following the same logic, we extend our instrument and define a post town instrument $z_{1,p}^{1} = 1$ if at least one first-order neighbor is an Elizabethan post town location and $z_{1,p}^{2} = 1$ if at least one second-order neighbor is an Elizabethan post town location.

Using this additional information, we augment our regression equations (2) and (3) in the following way:

$$\gamma_p^M = \beta_0 + X'_{p,1817}\beta_1 + \sum_{n=0}^{2} \gamma_n \widehat{FIN}_{p,1817}^{n} + \mu_d + \varepsilon_p \tag{F.1}$$

$$FIN_{p,1817}^{0} = \alpha_{00} + \alpha_{01} \mathrm{z}_p^0 + X'_{p,1817}\alpha_{02}^2 + \mu_d + \nu_{0p} \tag{F.2}$$

$$FIN_{p,1817}^{1} = \alpha_{10} + \alpha_{11} \mathrm{z}_p^1 + X'_{p,1817}\alpha_{12}^2 + \mu_d + \nu_{1p} \tag{F.3}$$

$$FIN_{p,1817}^{2} = \alpha_{20} + \alpha_{21} \mathrm{z}_p^2 + X'_{p,1817}\alpha_{22}^2 + \mu_d + \nu_{2p} \tag{F.4}$$

where we regress manufacturing employment growth in parish p on our measures of finance access in the parish itself ($FIN_{p,1817}^{0}$), the first-order neighboring parishes ($FIN_{p,1817}^{1}$), and the second-order neighboring parishes ($FIN_{p,1817}^{2}$), the full set of initial control variables $X_{p,1817}$ (used in Table G.3, Column 6), and additional controls for the number of neighbors in the first and second ring of neighbors and a coastal dummy. Controlling for the number of neighbors accounts for the fact that more neighbors increase the possibility to have at least one neighbor with finance access and the coastal dummy accounts for the fact that coastal parishes are surrounded by less neighbors. We further include registration district fixed effects (μ_d) which provide that we are comparing parishes with different degrees of finance access nearby in the same registration district. Importantly, neighbors are not restricted to be within the registration district and capture parishes in neighbouring registration districts as well. We are interested in the coefficients γ_n which indicate the impact of finance access on manufacturing growth at each band of neighbors. To account for the endogeneity of finance, we employ the Elizabethan post town instruments $\mathrm{z}^0_{1,p} - \mathrm{z}^2_{1,p}$ in the first stage.

Appendix G: Additional Tables

Table G.1. Balance of Pre-Existing Exogenous Differences for Early Enclosures

		Coefficient	SE
1	Domesday village within 5km (dummy)	-0.012	(0.013)
2	Log distance to nearest 1670 waterway	0.053	(0.060)
3	Log distance to nearest sea port	-0.010	(0.007)
4	Distance to the coast	-0.170**	(0.072)
5	Avg. Slope (in percent)	-0.043*	(0.022)
6	Coal access (dummy)	0.015	(0.011)
7	Yield oats (in t/ha)	0.003	(0.002)
8	Yield rye (in t/ha)	0.005	(0.004)
9	Yield wheat (in t/ha)	0.006*	(0.003)
10	Yield barley (in t/ha)	0.006*	(0.003)
11	Soil Categorie	-0.026	(0.018)

Notes: Each row shows the result of a separate regression of the outcome named in the left column on the Enclosure Instrument. All regressions are conditional on registration district fixed effects, an indicator for territorial changes and a control for the differences in the size of parishes. Standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table G.2. Results with Enclosure Instrument

Dep. Variable: Δ log secondary employment	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) 2SLS	(9) OLS
Log finance employment c.1817	1.728***	1.061***	1.037***	0.925***	0.922***	0.923***	0.875***	0.913***	0.206***
	(0.498)	(0.321)	(0.323)	(0.324)	(0.324)	(0.324)	(0.315)	(0.325)	(0.023)
Log number secondary employment c.1817	-0.318***	-0.213***	-0.300***	-0.595***	-0.572***	-0.572***	-0.585***	-0.557***	-0.598***
	(0.086)	(0.045)	(0.037)	(0.034)	(0.035)	(0.035)	(0.036)	(0.036)	(0.036)
Log area (in km^2)	0.219***	0.209***	0.270***	0.246***	0.248***	0.248***	0.244***	0.226***	0.214***
	(0.055)	(0.028)	(0.025)	(0.026)	(0.026)	(0.027)	(0.026)	(0.027)	(0.024)
Share primary employment c.1817			-0.922***	-1.540***	-1.416***	-1.415***	-1.366***	-1.284***	-1.918***
			(0.233)	(0.301)	(0.304)	(0.304)	(0.288)	(0.313)	(0.204)
Share mining employment c.1817			0.802***	0.061	0.169	0.171	0.169	0.021	-0.193
			(0.251)	(0.289)	(0.295)	(0.295)	(0.286)	(0.291)	(0.228)
Coal access			0.110*	0.107*	0.108*	0.109*	0.106*	0.030	0.124**
			(0.060)	(0.059)	(0.059)	(0.059)	(0.059)	(0.048)	(0.060)
Herfindahl Index c.1817			0.120	0.269	0.267	0.266	0.197	0.243	0.463***
			(0.174)	(0.199)	(0.199)	(0.199)	(0.197)	(0.198)	(0.177)
Log employment c.1817				0.367***	0.343***	0.343***	0.371***	0.355***	0.466***
				(0.067)	(0.068)	(0.068)	(0.066)	(0.070)	(0.047)
Female population share c.1817				-0.108	-0.112	-0.113	-0.069	-0.224	-0.100
				(0.193)	(0.193)	(0.193)	(0.192)	(0.204)	(0.181)
Road access c.1817 (dummy)					0.018	0.018	0.019	0.023	0.014
					(0.015)	(0.015)	(0.015)	(0.016)	(0.014)
Waterway access c.1817 (dummy)					0.003	0.003	0.008	0.010	0.003
					(0.020)	(0.021)	(0.020)	(0.021)	(0.019)
Share good transportation c.1817					0.656**	0.655**	0.673**	0.735**	0.673***
					(0.266)	(0.266)	(0.266)	(0.303)	(0.260)
Latitude						-0.010	0.010	-0.178	0.036
						(0.237)	(0.235)	(0.222)	(0.234)
Longitude						0.063	0.046	0.010	0.058
						(0.141)	(0.139)	(0.143)	(0.138)
First Stage:									
Enclosure before 1650 (Dummy)	0.135***	0.147***	0.145***	0.137***	0.137***	0.137***	0.139***	0.137***	
	(0.033)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	
Observations	10,504	10,504	10,504	10,504	10,504	10,504	10,432	9,523	10,504
Number of Registration District FE		570	570	570	570	570	566	523	570
Control for Territorial Changes	Y	Y	Y	Y	Y	Y	Y	Y	Y
Anderson-Rubin F-test (p-value)	0.0000	0.0001	0.0001	0.0008	0.0008	0.0008	0.0013	0.0010	
Kleibergen-Paap Wald rk F statistic	16.99	21.86	21.36	19.77	19.74	19.75	20.12	19.50	

Notes: The Table presents results from regressions of the log change in secondary employment between c.1817 and 1881 in parish p on access to finance measured as log employment in finance. Columns (1)-(7) present instrumental variable regressions and Column (8) presents the OLS regression. The instrumental variable is a dummy variable that takes the value 1 if parish i was fully enclosed by 1650. Column (1) is the most parsimonious specification without registration fixed effects that only controls for the initial 1817 manufacturing share and size as well as territorial changes in the parish between c.1817 and 1881. Columns (2)-(5) are conditional on registration district fixed effects and additional sets of control variables are gradually included. Column (6) presents our preferred outcome. Column (7) excludes post town locations and Column (8) excludes Wales since we do not have enclosure data for this region. Finally, Column (9) displays the results of an OLS estimation of our preferred specification in Column (6) for comparison. Standard errors are clustered on the registration district level in all specifications. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table G.3. Results with Both Instruments

Dep. Variable: Δ log secondary employment	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) OLS
Log finance employment c.1817	1.400***	1.250***	1.171***	1.099***	1.096***	1.097***	1.048***	0.206***
	(0.335)	(0.288)	(0.281)	(0.297)	(0.298)	(0.298)	(0.320)	(0.023)
Log number secondary employment c.1817	-0.263***	-0.239***	-0.314***	-0.589***	-0.566***	-0.566***	-0.552***	-0.598***
	(0.060)	(0.043)	(0.036)	(0.035)	(0.036)	(0.036)	(0.037)	(0.036)
Log area (in km^2)	0.190***	0.221***	0.275***	0.254***	0.256***	0.256***	0.232***	0.214***
	(0.042)	(0.030)	(0.026)	(0.029)	(0.029)	(0.029)	(0.030)	(0.024)
Share primary employment c.1817			-0.864***	-1.417***	-1.294***	-1.293***	-1.189***	-1.918***
			(0.214)	(0.272)	(0.277)	(0.277)	(0.286)	(0.204)
Share mining employment c.1817			0.825***	0.150	0.257	0.260	0.088	-0.193
			(0.255)	(0.289)	(0.295)	(0.295)	(0.293)	(0.228)
Coal access			0.107*	0.104*	0.105*	0.105*	0.025	0.124**
			(0.059)	(0.059)	(0.059)	(0.059)	(0.048)	(0.060)
Herfindahl Index c.1817			0.091	0.221	0.220	0.218	0.206	0.463***
			(0.168)	(0.187)	(0.187)	(0.187)	(0.182)	(0.177)
Log employment c.1817				0.337***	0.313***	0.313***	0.331***	0.466***
				(0.070)	(0.071)	(0.071)	(0.078)	(0.047)
Female population share c.1817				-0.110	-0.115	-0.116	-0.227	-0.100
				(0.199)	(0.199)	(0.199)	(0.209)	(0.181)
Road access c.1817 (dummy)					0.019	0.019	0.024	0.014
					(0.016)	(0.016)	(0.017)	(0.014)
Waterway access c.1817 (dummy)					0.003	0.003	0.010	0.003
					(0.021)	(0.021)	(0.022)	(0.019)
Share good transportation c.1817					0.652**	0.650**	0.722**	0.673***
					(0.273)	(0.273)	(0.311)	(0.260)
Latitude						-0.022	-0.186	0.036
						(0.235)	(0.223)	(0.234)
Longitude						0.064	0.012	0.058
						(0.142)	(0.145)	(0.138)
First Stage:								
Posttown Dummy	0.375***	0.352***	0.329***	0.322***	0.322***	0.321***	0.271***	
	(0.098)	(0.099)	(0.099)	(0.097)	(0.097)	(0.097)	(0.101)	
Enclosure before 1650 (Dummy)	0.133***	0.145***	0.143***	0.135***	0.135***	0.135***	0.135***	
	(0.033)	(0.032)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	
Observations	10,504	10,504	10,504	10,504	10,504	10,504	9,523	10,504
Number of Registration District FE	570	570	570	570	570	523	570	570
Control for Territorial Changes	Y	Y	Y	Y	Y	Y	Y	Y
Anderson-Rubin F-test (p-value)	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0005	
Kleibergen-Paap Wald rk F statistic	15.24	16.95	15.90	14.95	14.91	14.91	13.06	

Notes: The Table presents results from regressions of the log change in secondary employment between c.1817 and 1881 in parish p on access to finance measured as log employment in finance. Columns (1)-(7) present instrumental variable regressions and Column (8) presents the OLS regression. The instrumental variable is either a dummy variable that takes the value 1 if parish i is an Elizabethan post town or a dummy variable that takes the value 1 if parish i was fully enclosed by 1650. Column (1) is the most parsimonious specification without registration fixed effects that only controls for the initial 1817 manufacturing share and size as well as territorial changes in the parish between c.1817 and 1881. Columns (2)-(5) are conditional on registration district fixed effects and additional sets of control variables are gradually included. Column (6) presents our preferred outcome. Column (7) excludes Wales since we do not have enclosure data for this region. Finally, Column (8) displays the results of an OLS estimation of our preferred specification in Column (6) for comparison. Standard errors are clustered on the registration district level in all specifications. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

TABLE G.4. First Nature Geography

Dep. Variable: Δ log secondary employment	(1) Without North	(2) With London	(3) 10km around Post Road	(4) Only Road-Parishes	(5) Dist. Post Town p25-p75	(6) Soil Suitability	(7) Yield Land Cover
Log finance employment c.1817	1.480**	1.281**	1.434**	0.882**	1.148**	1.267**	1.327**
	(0.634)	(0.514)	(0.577)	(0.431)	(0.475)	(0.518)	(0.531)
Log number secondary employment c.1817	-0.563***	-0.559***	-0.481***	-0.590***	-0.564***	-0.562***	-0.562***
	(0.043)	(0.040)	(0.069)	(0.047)	(0.039)	(0.039)	(0.039)
Log area (in km^2)	0.301***	0.274***	0.319***	0.259***	0.259***	0.274***	0.287***
	(0.047)	(0.038)	(0.061)	(0.033)	(0.036)	(0.039)	(0.041)
Share primary employment c.1817	-1.051***	-1.373***	-0.952**	-1.423***	-1.257***	-1.187***	-1.176***
	(0.387)	(0.372)	(0.481)	(0.374)	(0.360)	(0.400)	(0.408)
Share mining employment c.1817	0.460	0.281	1.055**	0.087	0.286	0.358	0.361
	(0.395)	(0.363)	(0.529)	(0.369)	(0.348)	(0.377)	(0.392)
Coal access	0.126	0.109*	0.200	0.116*	0.104*	0.104*	0.120**
	(0.082)	(0.059)	(0.134)	(0.063)	(0.060)	(0.059)	(0.057)
Herfindahl Index c.1817	0.186	0.323	0.201	0.241	0.204	0.178	0.190
	(0.206)	(0.212)	(0.342)	(0.236)	(0.200)	(0.212)	(0.215)
Log employment c.1817	0.297**	0.252**	0.155	0.383***	0.304***	0.278***	0.266**
	(0.115)	(0.112)	(0.131)	(0.095)	(0.100)	(0.106)	(0.108)
Female population share c.1817	-0.030	-0.082	-0.559	-0.156	-0.116	-0.084	-0.091
	(0.235)	(0.208)	(0.449)	(0.251)	(0.200)	(0.205)	(0.206)
Road access c.1817 (dummy)	0.035*	0.017	-0.001		0.019	0.018	0.018
	(0.020)	(0.017)	(0.036)		(0.016)	(0.017)	(0.017)
Waterway access c.1817 (dummy)	0.005	-0.001	-0.048	0.001	0.003	0.002	0.007
	(0.025)	(0.022)	(0.048)	(0.025)	(0.021)	(0.022)	(0.022)
Share good transportation c.1817	0.490	0.496*	0.778	0.986***	0.649**	0.632**	0.596**
	(0.303)	(0.286)	(0.474)	(0.308)	(0.275)	(0.281)	(0.287)
Latitude	-0.146	-0.035	1.284**	-0.202	-0.025	-0.026	-0.007
	(0.281)	(0.235)	(0.628)	(0.275)	(0.236)	(0.225)	(0.226)
Longitude	0.169	0.061	0.173	0.160	0.064	0.059	0.077
	(0.158)	(0.144)	(0.338)	(0.169)	(0.142)	(0.141)	(0.142)
First Stage:							
Posttown Dummy	0.369***	0.321***	0.321***	0.381***	0.476***	0.328***	0.325***
	(0.112)	(0.097)	(0.101)	(0.141)	(0.134)	(0.097)	(0.097)
Observations	8,341	10,644	2,689	6,839	10,504	10,504	10,504
Number of Registration District FE	427	588	230	556	570	570	570
Control for Territorial Changes	Y		Y	Y	Y	Y	Y
Anderson-Rubin F-test (p-value)	0.0039	0.0028	0.0019	0.0154	0.0050	0.0026	0.0019
Kleibergen-Paap Wald rk F statistic	10.92	11.04	10.04	7.288	12.70	11.37	11.21

Notes: The Table presents results from regressions of the log change in secondary employment between c.1817 and 1881 in parish p on access to finance measured as log employment in finance. The instrumental variable is a dummy variable that takes the value 1 if parish p is an Elizabethan post town. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 but restrict the sample (Columns (1)-(5)) or add an additional control variable that is specified in the column title of Columns (6) and (7). Standard errors are clustered on the registration district level in all specifications. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table G.5. Second Nature Geography

Dep. Variable: Δ log secondary employment	(1) Employment within 15km	(2) Distance Port	(3) Market Access Post Town	(4) Market Access Market Town	(5) Wealth	(6) Teachers	(7) Innovation	(8) Predicted Employment
Log finance employment c.1817	1.289**	1.255**	1.263**	1.287**	1.255**	1.197**	1.381**	1.122**
	(0.518)	(0.507)	(0.520)	(0.540)	(0.520)	(0.477)	(0.617)	(0.520)
Log number secondary employment c.1817	-0.561***	-0.561***	-0.559***	-0.559***	-0.614***	-0.565***	-0.557***	-0.478***
	(0.040)	(0.039)	(0.040)	(0.040)	(0.046)	(0.038)	(0.041)	(0.034)
Log area (in km^2)	0.269***	0.258***	0.265***	0.262***	0.270***	0.258***	0.272***	0.244***
	(0.038)	(0.038)	(0.038)	(0.037)	(0.038)	(0.035)	(0.043)	(0.041)
Share primary employment c.1817	-1.159***	-1.174***	-1.174***	-1.167***	-1.360***	-1.157***	-1.163***	-0.987***
	(0.399)	(0.388)	(0.397)	(0.405)	(0.417)	(0.389)	(0.415)	(0.328)
Share mining employment c.1817	0.339	0.314	0.348	0.345	0.146	0.347	0.344	0.380
	(0.374)	(0.371)	(0.369)	(0.371)	(0.389)	(0.359)	(0.378)	(0.345)
Coal access	0.089	0.089	0.102*	0.099*	0.100*	0.103*	0.101*	0.095
	(0.059)	(0.058)	(0.059)	(0.060)	(0.059)	(0.059)	(0.060)	(0.058)
Herfindahl Index c.1817	0.164	0.173	0.172	0.167	0.091	0.161	0.176	-0.009
	(0.213)	(0.210)	(0.212)	(0.216)	(0.211)	(0.214)	(0.215)	(0.177)
Log employment c.1817	0.279***	0.285***	0.283***	0.283***	0.328***	0.305***	0.276**	0.262***
	(0.106)	(0.104)	(0.106)	(0.107)	(0.112)	(0.096)	(0.113)	(0.090)
Female population share c.1817	-0.118	-0.110	-0.119	-0.112	-0.120	-0.134	-0.100	-0.082
	(0.206)	(0.203)	(0.205)	(0.206)	(0.205)	(0.203)	(0.210)	(0.200)
Road access c.1817 (dummy)	0.021	0.022	0.020	0.020	0.020	0.020	0.019	0.022
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.016)	(0.017)	(0.016)
Waterway access c.1817 (dummy)	0.002	0.002	0.003	0.003	0.003	0.003	0.000	0.005
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.021)	(0.022)	(0.021)
Share good transportation c.1817	0.686**	0.649**	0.652**	0.626**	0.420	0.677**	0.629**	0.596**
	(0.283)	(0.274)	(0.281)	(0.283)	(0.296)	(0.276)	(0.288)	(0.274)
Latitude	-0.008	-0.124	-0.041	-0.006	-0.034	-0.026	-0.024	-0.010
	(0.234)	(0.224)	(0.235)	(0.234)	(0.235)	(0.234)	(0.236)	(0.234)
Longitude	0.057	0.061	0.061	0.071	0.062	0.063	0.073	0.059
	(0.144)	(0.141)	(0.145)	(0.143)	(0.143)	(0.143)	(0.145)	(0.141)
Additional Controls as specified by Column	0.099*	-0.332***	0.072	-0.211	-1.064***	2.503**	-0.333	-0.089***
	(0.052)	(0.119)	(0.185)	(0.257)	(0.274)	(1.007)	(0.270)	(0.031)
First Stage:								
Posttown Dummy	0.326***	0.329***	0.323***	0.313***	0.324***	0.326***	0.279***	0.296***
	(0.097)	(0.098)	(0.097)	(0.096)	(0.097)	(0.097)	(0.094)	(0.097)
Observations	10,504	10,504	10,504	10,504	10,504	10,504	10,504	10,504
Number of Registration District FE	570	570	570	570	570	570	570	570
Control for Territorial Changes	Y	Y	Y	Y	Y	Y	Y	Y
Anderson-Rubin F-test (p-value)	0.0024	0.0030	0.0034	0.0037	0.0038	0.0022	0.0061	0.0083
Kleibergen-Paap Wald rk F statistic	11.26	11.31	11.11	10.59	11.16	11.20	8.885	9.294

Notes: The Table presents results from regressions of the log change in secondary employment between c.1817 and 1881 in parish p on access to finance measures as log employment in finance. The instrumental variable is a dummy variable that takes the value 1 if parish p is an Elizabethan post town. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 plus an additional control variable that is specified in the column title. Standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table G.6. Alternative clustering of the standard errors

Dep. Variable: Δ log secondary employment	(1) Baseline	(2) County	(3) 100km	(4) 50km
Log finance employment c.1817	1.266**	1.266**	1.266**	1.266**
	(0.517)	(0.631)	(0.546)	(0.510)
Observations	10,504	10,504	10,504	10,504
Control Variables	Y	Y	Y	Y
Number of Clusters	570	54	29	94

Notes: The Table presents results from IV-regressions of the log change in secondary employment between c.1817 and 1881 in parish p on access to finance measures as log employment in finance. Each Column presents a different way of clustering standard errors. Column (1) sets the baseline where standard errors are clustered on the registration district level. In the following columns, we then cluster on the level of counties, 100x100km arbitrary grid cells, and 50x50km arbitrary grid cells. The instrumental variable is a dummy variable that takes the value 1 if parish p is an Elizabethan post town. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 and standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

Table G.7. Neighbor effects

	(1) OLS	(2) IV	(3) OLS	(4) IV
	Panel A: Δ log secondary employment		*Panel B: Δ Share Primary Sector*	
Log finance access c.1817	0.217***	1.459***	-0.024***	-0.179**
	(0.023)	(0.566)	(0.004)	(0.071)
Log finance access c.1817, 1st neighbor	0.125***	0.216*	-0.017***	-0.043**
	(0.016)	(0.117)	(0.003)	(0.021)
Log finance access c.1817, 2nd neighbor	0.031**	0.048	-0.004*	-0.019
	(0.013)	(0.091)	(0.002)	(0.017)
	Panel C: Δ Share Secondary Sector		Panel D: Δ Log Employment Density	
Log finance access c.1817	0.021***	0.232**	0.216***	1.177**
	(0.003)	(0.095)	(0.019)	(0.468)
Log finance access c.1817, 1st neighbor	0.008***	0.035**	0.106***	0.140*
	(0.002)	(0.017)	(0.012)	(0.084)
Log finance access c.1817, 2nd neighbor	0.001	0.010	0.028***	0.048
Neighbor and Coast Controls	N	Y	N	Y
Observations	10,504	10,504	10,504	10,504
Number of Clusters	570	570	570	570

Notes: The Table presents results from regressions of finance access measured as log employment in finance on the log change in secondary employment (Panel A), the change in the share of primary sector employment (Panel B), the change in the share of secondary sector employment (Panel C) and the change in the log of employment density (Panel D) between c.1817 and 1881 in parish p on access to finance. Columns (1) and (3) report OLS regressions and Columns (2) and (4) report IV regressions. The instrumental variable is a dummy variable that takes the value 1 if parish p (or its first or second neighbor) is an Elizabethan post town. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 plus a control for the number of neighbors and whether the parish is located at the coast. Standard errors are clustered on the registration district level. *** significant at the 1 percent level, ** significant at the 5 percent level and * significant at the 10 percent level.

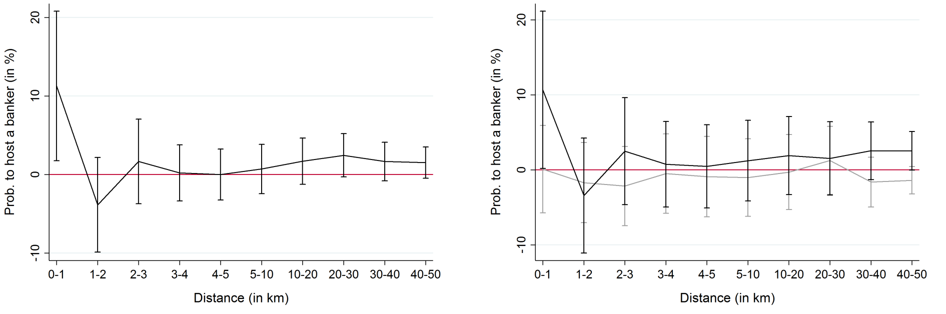
Table G.8. Sector Mapping from Horrell et al. (1994) to PST

HHW industry	Capital intensity	Good type	TFP	PST categories
Food, drink and tobacco	Low	Final	High	Food industries. Drink industries. Tobacco industries
Metal manufacture	High	Intermediate	Low	Iron and steel manufacture and products. Non-ferrous metal manufacture and products
Textiles, clothing and leather goods	Low	Final	Low	Textiles. Clothing. Footwear. Industries using leather, bone etc.
Metal goods	High	Intermediate	Low	Instrument making. Metal working. Machines and tools, making and operation.
Bricks, pottery and glass	Low	Intermediate	High	Brick and tile manufacture.
Other manufacturing	High	Final	High	Furnishing. Minor manufactures and trades
Construction	Low	Final	Low	Building and construction.
Gas and water	High	Intermediate	High	Gas equipment. Fuel industries.
Transport	High	Final	Low	Road transport vehicles. Boat and ship building. Rail transport vehicles.

Notes: This Table reports the Horrell et al. (1994, HHW) industries along with their characteristics reported in HHW: capital intensity (higher or lower than median); good type (final or intermediate); TFP (higher or lower than national average). The PST categories are the Sector-Group level employment categories that we relate to the HHW industries for use in Table 11.

Appendix H: Additional Figures

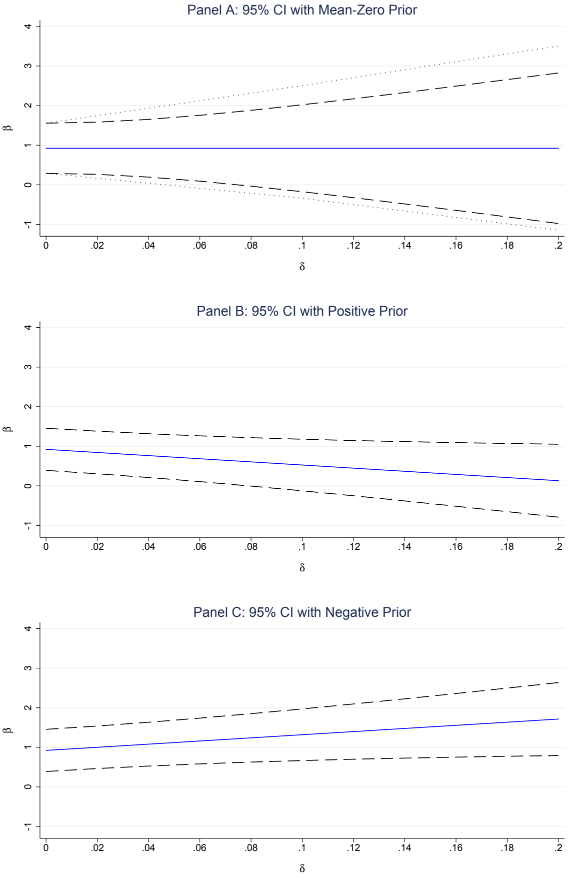
FIGURE H.1. Distance decay around Post Roads in Access to Finance



(a) Distance Decay (unconditional) (b) Distance Decay (conditional)

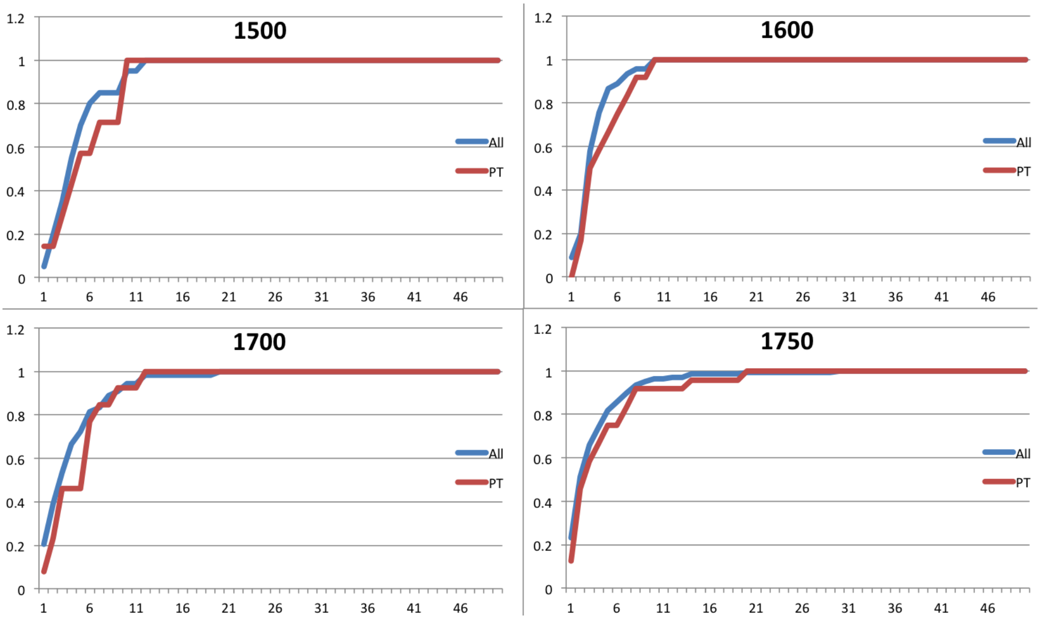
Notes: The Figure shows the coefficients of distance decay regressions where we regress the log of the number of country bankers on distance bins that indicate the distance from the nearest post road. 95% confidence intervals enclose the coefficients.

FIGURE H.2. Plausibly Exogenous



Notes: The Figure shows point estimates and 95%-confidence intervals for the effect of 1817 banking access on manufacturing growth over the period 1817-1881. In Panel A, dotted lines refer to the most conservative specification that only imposed minimum and maximum allowable violations of the exclusion restriction. The dashed line assumes the same minimum and maximum allowable violations are uniformly distributed on the interval $[-\delta, \delta]$. Panel B imposes the assumption that the enclosure instrument has a direct positive effect on manufacturing growth, i.e. $\gamma \in U(0, \delta)$. Panel C imposes the assumption that the enclosure instrument has a direct negative effect on manufacturing growth, i.e. $\gamma \in U(0, \delta)$. All estimations are conditional on the controls in our preferred specification in Table 3 Column 6 and standard errors are clustered on the registration district level.

FIGURE H.3. Cumulative distribution of city sizes: All vs. Elizabethan PTs



Notes: The Figure shows the cumulative distribution of city size (excluding London) at four dates before country banks were widely established. We rely on Bairoch (1988) to identify cities in England and Wales with a population of more than 1,000 inhabitants. In 1600, only 14 out of 55 listed cities were an Elizabethan post town. The size distributions of post towns closely follows that for all towns in the run-up to the nineteenth century and the two-sample Kolmogorov-Smirnov test fails to reject the Null at 5% significance level that the data are drawn from the same distribution in each period.

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