

Inclusive Institutions and Economic Development: How Local Institutions Shaped the Geography of the Industrial Revolution*

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PRELIMINARY WORK

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Abstract

The paper studies the relationship between local institutional and economic development in England up to the Industrial Revolution. First, we document a negative relationship between economic growth during the 19th century and economic development in the medieval and modern periods, from the 11th to 17th century. Second, we show that while inclusive institutions developed in commercially prominent cities, these cities failed to adopt the new industrial technologies during the 19th century. We argue that, while inclusive institutions were complementary to early modern commercial development, these were detrimental to industrial development. Inclusive institutions contributed to the creation of local grass-rooted organizations that enabled workers threatened by labor mechanization to resist technological adoption. Higher resistance to technological adoption, in turn, resulted in the relocation of economic activities away from traditional centers of production.

JEL Code: D74, N33, O14, P16

Keywords: Development, Institutions, Conflict, Political Economy, Industrial Revolution

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1 Introduction

Sustained economic growth was first realized in England about two and half centuries ago. Critical to this development has been the adoption of new technologies that allowed large productivity gains. A remarkable feature of this transformation was the concentration of the factors of production in new industrial cities where factories put together labor and technology in unprecedented scales. While new industrial centers emerged in small provincial towns such as Manchester, old commercial cities failed to establish themselves as the centers of new industrial technology (Mokyr, 2009). What conditions explain new technologies adoption and their location has been the object of many studies. Explanations include factor endowments (Allen, 2009; Crafts and Wolf, 2014), human capital and education (Kelly et al., 2014; de Pleijt et al., 2019), the role of markets (Heldring et al., 2021), and spatial competition (Desmet et al., 2020). This paper first documents a reversal of fortunes between commercial prominence during the medieval period and industrial development in the 19th century. Second, to explain this fact, we propose and test a novel hypothesis behind technology adoption linking local inclusive institutions to conditions detrimental to industrial development.

While the literature on the institutional determinants of the Industrial Revolution largely argue that modern economic growth critically hinged on the rise of national inclusive institutions, the development of parliamentary representation, and the protection of property rights that this guaranteed (North and Weingast, 1989; Acemoglu et al., 2001), little is known about the relationship between local inclusive institutions and industrial development. We argue that while during the early modern period, the success of commercial towns was complementary to the development of inclusive institutions, during the 19th century, the institutional forces that contributed to the rise of commercial urban centers worked against the adoption of new technologies, pushing the localization of factories outside the traditional economic centers.

Our analysis begins with the Norman conquest and follows the economic and institutional development of British cities (boroughs)¹ and parishes over eight centuries. Our argument is based on several steps. First, using information from the first English census (1086 Domesday Book), we show that the geographic units displaying the highest urban population growth between the 11th and 19th centuries were the least developed at the time of the Norman conquest. This relationship is remarkably consistent when comparing across large geographic units, such as counties, and comparing boroughs and parishes within counties.²

Second, we rely on empirical and historical evidence on the link between administrative autonomy and commercial activities to show the positive relationship between early modern economic and institutional development. We collect data on the 555 boroughs that existed before 1348 and code their institutional and economic history between 1066 and 1832, including the degree of institutional autonomy enjoyed by each borough, its parliamentary history, and the degree of political representation of the local population³. Moreover, we gather information on economic activities registering the presence of trading guilds during the 13th and 14th centuries, the number of markets and fairs operating in 1600, and the level of industrial development during the 18th and 19th centuries. To measure industrial development, we identify the location of each steam engine adopted between 1700 and 1800 and digitize the complete census of textile mills operating in 1838. This includes infor-

¹A borough was a corporate body that “could act in law as if it were a single individual; thus, the town as a whole could own property, sue and be sued, and provide collective services” (Chandler, 2007, p.1).

²Using the 1851 census map in Satchell et al. (2016), we count 41 counties in England.

³For example through the size of the electorate, the number of contested elections, the role of elected officials.

mation on the number of workers, gender, age, and horsepower per factory, allowing us to precisely measure the labor to capital ratio and proxy for the skill level of the workforce.

Because merchant towns belonging to the King (royal boroughs) had geographical characteristics conducive to trade (proximity to navigable river, Roman roads, and coast) and were more likely to be granted administrative autonomies and eventually summoned to Parliament ([Angelucci et al., 2017](#)), we compare the economic evolution of royal and non-royal boroughs over time. Consistent with complementarity between commercial prominence and administrative autonomy, our results show that these towns were more likely to have a trading guild in the 13th and 14th centuries and had a larger number of markets and fairs in 1600. However, starting from 1720, royal boroughs were substantially less likely to adopt steam engines and by 1838 had a much lower level of industrial development. Our estimates show that parishes in proximity to royal boroughs (as opposed to non-royal) had fewer textile mills, fewer workers per mill, and less horsepower per worker.

What explains this inversion in the pattern of development? We explore several factors that might explain this change. Our leading hypothesis is based on the notion that the costs and benefits from any given technology depends largely on the institutional context ([Rosenberg, 1972](#)) and so does the location and pace of technology adoption. In the case of conflict of interest between potential producers and factor suppliers over the organization of production, local institutional factors might play a key role in shaping the geography of technology adoption.

Because during the early phase of the industrial revolution and for several sectors of the economy, technology adoption meant the transition from high-skill craft production to low-skill mass production, innovation threatened the wages and lifestyle of the workers. The transition from the cottage industry to the factory system was the most dramatic in textiles, where the cotton industry, combining the mule to steam power, shifted from mainly small firms employing at most 10 skilled workers in the 1790s to an average of 400 (primary unskilled) workers per mill in Manchester by the early 1830s ([Mokyr, 2001](#)). In several instances, this conflict between capital and labor led to active resistance to technology adoption, as testified by the large number of machine-breaking riots between 1758 and 1812 ([Randall, 1991](#); [Nuvolari, 2002](#)).

We argue that, while during the modern period, boroughs' fiscal and judicial autonomy created the conditions for an early expansion of economic activities, reducing distortionary taxation and providing merchants with incentives to develop trading and manufacturing activities, during the industrial revolution, these same institutions increased the cost of technology adoption by increasing the organizational capacity of the working force. Proximity to the political power and the recurrent practice of local and parliamentary election, combined with a growing free and skilled population, contributed to the formation of economic and political ties among the local workers ([Tilly, 1995](#); [Bohstedt, 2010](#)). This institutional and economic environment shaped popular political practices increasing the workforce organizational focus and determining patterns of collective bargaining and resistance to technology adoption, ultimately shaping factories location in the 19th century.

We collect systematic and anecdotal information on resistance to technology adoption and food riots from several sources to test this hypothesis. Moreover, we are in the process of digitizing petitions to the Crown, both related and unrelated to labor regulation and technological innovation. Preliminary results indicate a link between royal boroughs and popular politics, showing a positive association between the borough status and rioting activities from 1756s to 1830. We provide additional evidence on the mechanisms using boroughs' heterogeneous institutional characteristics.

We find that the extent of political participation and inclusiveness strongly and negatively predict technology adoption, even within royal boroughs. We measure political participation using the size of the electorate in municipal and parliamentary elections and whether a borough was captured by a local *patron*. Finally, we analyze alternative mechanisms, in particular, whether stronger protection of customary and common rights on the land in proximity to Royal Boroughs could have induced a lower level of industrialization. Information on land enclosures provides evidence against this channel.

This paper contributes to the literature in several ways. First, we contribute to the literature on the relationship between inclusive institutions and growth (North, 1973; Acemoglu et al., 2001) (North and Weingast, 1989; Mokyr, 2009; Bogart and Richardson, 2011; Acemoglu et al., 2019). Our analysis proposes a novel interpretation of this relationship, highlighting the role of popular politics and resistance to technological adoption in linking inclusive institutions and lack of industrial development. Second, we contribute to the large literature on collective action and resistance to technological innovation (Mokyr, 1992; Mokyr, 1998; Nuvolari, 2002; Hobsbawm, 1969; Tilly, 1995; Aidt and Franck, 2015; Caprettini and Voth, 2020) by pointing to a new relationship between inclusive institutions and the ability of the workers to collectively organize. Finally, we add a new hypothesis to the ones discussed in the literature on the causes of regional variation within the English process of industrial development (Allen, 2009; Crafts and Wolf, 2014; Kelly et al., 2014; de Pleijt et al., 2019; Heldring et al., 2021; Desmet et al., 2020).

2 Data

We geolocate all the information using the map in Satchell et al. (2016).

Industrial Mill: We digitized the location of textile mills in 1838 from British Parliamentary Papers (1839). An industrial mill is defined as a factory whose machines were moved by steam- engines or water-wheels. We have data about the number of working mills, the number of male, female, and child (below age 13) employment. We have 3462 working mills. 1622 were producing cotton, 411 worsted, 1003 woolen, 168 flax, and 258 silk.

Steam Engines: Information are from ?.

Information on Boroughs: We digitize information on medieval boroughs from Beresford and Finberg (1973). Charter of Liberties are coded from Ballard (1913) and Ballard and Tait (1913).

Parliamentary constituencies: Data about the location of political constituencies prior to the 1832 reform comes from Bogart (2016). This dataset reports whether the constituency was rotten, the type and size of the electorate. We collected information about the year of enfranchisement from the www.historyofparliamentonline.org.

Population: Urban population in 1831 is from Bennett, 2012. Medieval information is from the Domesday Book (Hodgson et al., 2007). The population in 1801 and 1831 is from the Cambridge Group for the History of Population and Social Structure.

Natural and Geographic Characteristics: Coalfield are from Digital Geological Map Data of Great Britain scale 1: 625,000 (DiGMapGB-625) Bedrock data described in Smith (2009). Data on wheat suitability are from the GAEZ-FAO Database described in Fischer et al. (2021). We compute the parish distance from a Roman road using information from DARMC Roman Road Network

database, a digital version of the Roman roads classified in the Barrington Atlas ([McCormick et al., 2013](#)). Distances to medieval navigable rivers have been computed using the Ordnance Survey Open Rivers map, from which we have selected the part of major rivers described as navigable in medieval England in [Edwards and Hindle \(1991\)](#). We have selected the part of the rivers from the possible head of navigation until the river mouth.

Guilds: Information on medieval merchant guilds has been digitized from [Gross \(1890\)](#).

Markets and Fairs: Information on markets and fairs are from the Gazetteer, in [Letters \(2021\)](#).

Lay Subsidy: Taxes on personal property paid in 1334 are coded from the Gazetteer, in [Letters \(2021\)](#).

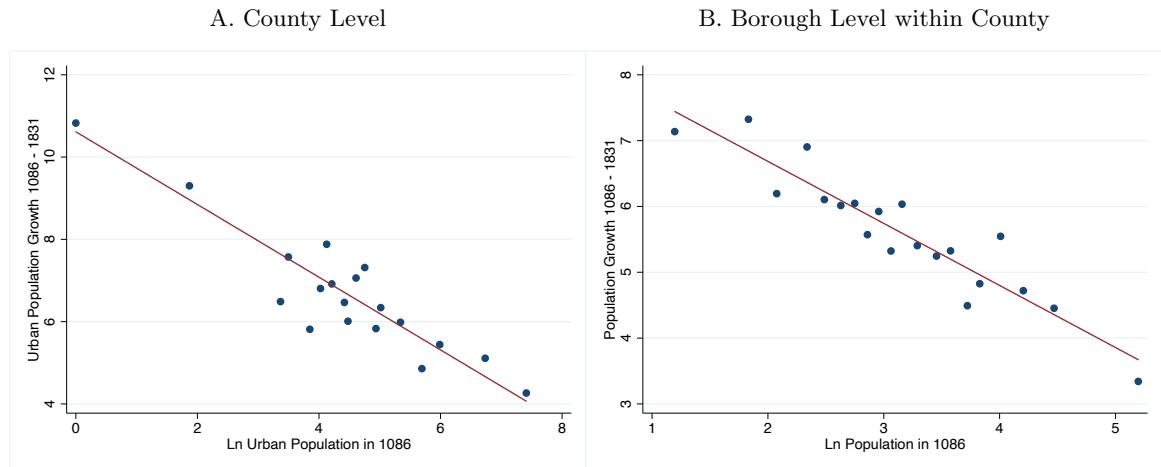
Enclosures: Information on enclosures are digitized from The Charity Commission by [Clark and Clark \(2001\)](#).

Riots: Information on riots are from several sources. We digitized the Atlas of Industrial Protest in [Charlesworth et al. \(1996\)](#). Other information are from newspapers and digitized by [Caprettini and Voth \(2020\)](#).

Petitions: Petitions are digitized from the British Parliamentary Papers from 1688 to 1834.

3 Figures and Tables

Figure 1: Reversal of Fortunes



Notes: Panel a) depicts on the y-axis the log difference between the urban population in 1831 ([Bennett, 2012](#)) and the urban (burgesses) population reported in the 1086 Domesday Book ([Hodgson et al., 2007](#)), both aggregated at the county level. The x-axis shows the urban population in 1086. In panel b), the y-axis reports the log difference between a borough population in 1831 ([Satchell et al., 2016](#)) and the population on the same geographical unit in 1086. The x-axis shows the 1086 population. The plot displays the residual variation after absorbing the county fixed effect.

Table 1: Geographical Features of Royal Boroughs

Variable	Mean	Diff. borough vs no borough	Diff. royal vs mesne
Distance to coal	61720.76	900.91***	2547.55***
Distance to navigable river	13401.09	-761.25***	-893.71***
Distance to coast	23934.31	-1867.52***	-2214.21***
Distance to Roman road	8038.72	-802.87***	-1913.51***
Wheat suitability	34.19	-0.81***	-0.24
Value of the holding to lord in 1086	10.82	9.47***	0.79
Population in 1086	11.10	2.34**	-0.55

This table shows that parishes belonging to royal boroughs had better trade characteristics than non-royal boroughs, being closer to medieval transportation networks. *Note:* *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Royal Boroughs, Privileges and Economic Activities in 13-14th century

	Property Rights	Mercantile Privileges	Fiscal Privileges	Guild Presence
	(1)	(2)	(3)	(4)
Royal Borough	0.352*** (0.0171)	0.209*** (0.0171)	0.325*** (0.0149)	0.458*** (0.0153)
Observations	4221	4221	4221	4221
Mean DV	0.252	0.188	0.127	0.174
Controls	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R ²	0.382	0.348	0.455	0.423

This table compares royal and non-royal boroughs. Outcome variables are dummies equal to one if the borough was granted a Charter of Liberty by 1307. Categories are from [Ballard and Tait \(1913\)](#) and reflect the rights to own and transfer property (1), the right to regulate and establish markets and guilds (2), the right to regulate taxes (3). Column (4) registers the presence of a guild by 1450 from [Gross \(1890\)](#). *Note:* *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Royal Boroughs and Commercial Development in 17th century

	Ln Lay Subsidy Value in 1334	Any Market or Fair in 1600	Number of Markets and Fairs in 1600
	(1)	(2)	(3)
Royal Borough	0.820*** (0.0355)	0.118*** (0.0116)	0.801*** (0.0571)
Observations	3071	4221	4044
Mean DV	0.166	0.741	2.875
Controls	Yes	Yes	Yes
County FE	Yes	Yes	Yes
R ²	0.746	0.295	0.352

The dependent variable in column (1) is the Log value of the Lay Subsidy tax on property. In column (2), the dependent variable is 1 if the borough had a market and a fair in 1600. In column (3), the dependent variable is the sum of all markets and fairs the borough had in 1600. *Note:* *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 2: Royal Boroughs and Steam Engines Adoption



Notes: The figure shows the total number of steam engines registered in a given year in royal and non-royal boroughs.

Table 4: Royal Boroughs and Industrial Development

	N. Factories	N. Workers	Workers per Factory	Total Horse Power	Horse Power per Worker
	(1)	(2)	(3)	(4)	(5)
Royal Borough	-1.600*** (0.161)	-197.9*** (30.19)	-0.0689*** (0.0181)	-49.01*** (5.469)	-0.0417*** (0.00570)
Observations	17532	17532	17419	17532	17532
Mean DV	2.449	514.6	0.167	86.89	0.158
Controls	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
R ²	0.220	0.248	0.137	0.246	0.176

The table shows that proximity to a royal borough (as opposed to a non-royal borough) decrease the number of textile mills (1), the number of workers in textile mills (2), the number of workers per textile mills (3), the total horsepower used (4) and the horsepower per worker (5). Observations are at the parish level. *Note:* *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Royal Boroughs and Resistance to Technology Adoption

	Swing Riots 1830-1832	Attacks on any machine 1758-1829	Industrial Protests 1756-1830
	(1)	(2)	(3)
Royal Borough	29.59*** (1.619)	61.37*** (5.435)	0.156*** (0.0320)
Observations	4221	4221	4221
Mean DV	6.612	6.519	0.423
Controls	Yes	Yes	Yes
County FE	Yes	Yes	Yes
R ²	0.654	0.407	0.348

The table shows that royal boroughs were experienced more agricultural riots during the 1830-1832 Swing Riot crises (1), more attacks on machines (including agricultural machines) between 1758 and 1829 (2), and more industrial protest between 1756 and 1830. *Note:* *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Royal Boroughs and Enclosed Land

	Share of Land Ever Enclosed by Parliament	Indicator: Never had Parliamentary Enclosure	Share of Common Land Enclosed by 1820
	(1)	(2)	(3)
Royal Borough	-0.0131* (0.00682)	0.0323*** (0.00985)	-0.345*** (0.0730)
Observations	7807	7807	10213
Mean DV	0.147	0.215	2.821
Controls	Yes	Yes	Yes
County FE	Yes	Yes	Yes
R ²	0.124	0.184	0.312

The table shows that parishes further away from royal boroughs had a smaller share of land enclosed by Parliament (1), a larger probability of never having a parliamentary enclosure (2), and a lower share of common land enclosed by 1820. *Note:* *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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