‘Why wasn’t France First?’ The Industrial Revolution in England and France: New Data and Further Thoughts on the Question.

England[1] in 1500 was lightly urbanised and predominantly agricultural by the standards of the more developed regions of Eurasia such as the Low Countries and parts of China. Yet, when Etienne Perlin, a Parisian medical student, visited England in the early 1550s, he witnessed an opulent society that compared favourably with the France of Henri II and other European nations he knew of.[2] He describes a very prosperous and mercantile nation boasting large supplies of precious metals and manufactured goods: leather, woollens, draperies, metalware, tin and lead, as well as many fisheries.[3] Perlin also noticed that living standards were high with meat-rich diets, especially for artisans such as hatmakers and carpenters who enjoyed much higher real wages than in other parts of Europe.[4] White bread, he added, was superior to that of the French for a similar price,[5] and he was very impressed by the fact that houses even in the smaller towns had several glassed windows, and that all the inns he visited on his tour were well furnished and decorated, with embroidered cushions and flowers.[6] Perlin’s evidence is

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[1] This paper concerns not Britain but England and Wales. Scotland has been excluded from the analysis because at the time of writing, no data are available on the occupational structure of Scotland before the middle of the nineteenth century. With Scots representing only 10-15 per cent of the population of mainland Britain this omission is not likely to fundamentally distort the picture of the British economy that emerges on the basis of data from England and Wales alone.

[2] It is not entirely clear what part of England he travelled through, but he seems at least to have travelled from Dover to London and then to Bristol, Cambridge, and Newcastle on his way to Scotland.

[3] Estienne Perlin, *Description Des Royaulmes d’Angleterre et d’Escosse. Composé Par Maistre Estienne Perlin* (1558), 17. ‘*il y a force argent, & l’or y est gros, & il y a force cuirs, laines, draps, métaux, bon estain, plomb, force pescheries, qui leur vallent grand deniers.*’

[4] Perlin, *Description Des Royaulmes d’Angleterre et d’Escosse. Composé Par Maistre Estienne Perlin*, 17–19. ‘*Les gens d’iceluy lieu sont de grande chère & ayme fort à bancqueter & vous verries force riches tavernes, & les taverniers qui ont coustumierement grosses bourses, ou il y a trois ou quatre bourserõs plaine d’argent, par ce moyen pouvons considerer que le pays est fort argẽteux & que les gẽs de metier gaignent plus en une semaine que ceux d’allemaigne ou d’espaigne en un mois. Car vous verris des chappeliers & menuisiers artisans iouer leu escu à la paume ordinairement, ce que ne voyes pas en un autre lieu ordinairement, & principalement à un iour ouvrier. Et en une taverne faire grãde chere plus souvent que tous les iours avec connilz, leveraux, & toutes sortes de viande*.’

[5] Perlin, *Description Des Royaulmes d’Angleterre et d’Escosse. Composé Par Maistre Estienne Perlin*, 22. ‘*ils usent du pain bien plus blanc que en la France, tellement qu’il estoit de mon tẽps en aussi bon marché qu’en France.*’

[6] Perlin, *Description Des Royaulmes d’Angleterre et d’Escosse. Composé Par Maistre Estienne Perlin*, 20.‘*Par tout les maison quasi de toutes les villes quãt est aux gens de mesiter : & sont toutes icelles maisons comme les*

certainly anecdotal, but his account shows that for a sixteenth-century European traveller, England was already notable for its commercial and industrial development and for its relatively higher living standards.

Comparing mid-eighteenth-century France and England – the two main European powers, well-endowed geopolitical rivals with similar claims to the hall of fame of the Scientific Revolution[7], and profitable colonial empires[8] – has been a regular feature in studies looking at the causes of the Industrial Revolution. If something as dramatic as the Industrial Revolution 'happened' in England during the second half of the eighteenth century, it might seem logical to wonder why a similar revolution did not take hold in France at the same time, or even earlier? After all, France was the most populous country in Europe, had more than its fair share of all European scientists, boasted the iconic vehicle of knowledge diffusion (the *Encyclopédie*), and was undeniably a great commercial power whose craftsmen and state-supported *Manufactures Royales* produced some of the most sought-after goods across wealthy European households. Yet, comparing the two countries between 1700 and 1750 as a way to elucidate the causes of the Industrial Revolution supposes: **i)** that the Industrial Revolution was an event whose causal chain was very short (the first half of the eighteenth century), and **ii)** that England and France were at a similar level of development by 1750, which would make it equally likely for either to undergo an Industrial Revolution at this point.

The first point had almost no intellectual support until after WWII. The early scholarship on the Industrial Revolution, from Toynbee to Mantoux, and up to Clapham saw it as the gradual (and in Clapham's case incomplete) culmination of a long process of Smithian growth

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ouvrerois des barbiers de France tāt par hault, que par bas, & verries a leurs ouvreoirs & fenestres tant de ville que de villages forces fleurs, & aux tavernes forces foin dessus les planchiers de boys, & forces oreillies de tapisseries sur lesquelz les voyagers se assisent'.

[7] Peter (ed) Mathias, *Science & Society 1600 - 1900* (Cambridge, 1972), 81; Joel Mokyr and Professor of Economics and History Joel Mokyr, *The Economics of the Industrial Revolution* (1985), 128.

[8] Guillaume Daudin, 'Commerce et prospérité : la France au XVIIIe siècle. 2e éd.', (2011).

and institutional and structural transformations.[9] On this view, by 1750 most of the divergence between England and the rest of Europe, including France, had already happened, and as Mantoux put it: 'the Industrial Revolution was no accident'. Looking at the causes for England's primacy necessarily required these leading early historians to turn their scholarly attention to the previous centuries.

Yet, in the black and white ideological world of the post war, the wisdom of these earlier views got lost in the clamour for brash, politically amenable conclusions. In the nascent field of comparative economic development, explaining the British Industrial Revolution became a case in point in the (academic) confrontations of the Cold War to prove the superiority and historical ineluctability of Western capitalism. The origin of this battle for history really got going with early Modernisation theorists, and especially the publication of W.W. Rostow's *Stages of Growth* in 1960, closely followed by Alexander Gerschenkron's *Economic Backwardness*, and the work of economic historians such as David Landes, and Rostow again, with a more ambitious comparative restatement of his stage theory in *How it all began*.[10] Regardless of the merit of their explanations and the nature of their analyses – which have been the subject of countless articles and pugnacious debates – all these authors share the assumption that England and France were at comparable levels of economic development in say 1750, 1780, 1800, or even 1850 in the case of Kindleberger.[11]

Coinciding with the rise of Modernisation Theory, a flurry of new publications by economists, economic historians and statisticians greatly improved the empirical basis for the

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[9] Arnold Toynbee, *Lectures on the Industrial Revolution in England* (London, 1884); Paul Mantoux, *La Révolution Industrielle Au XVIIIe Siècle* (Paris, 1906), IX; J. H. Clapham, *An Economic History of Modern Britain : Machines and National Rivalries (1887-1914) with an Epilogue 1914-1929* (1938).
[10] W. W. Rostow, *The Stages of Economic Growth. A Non-Communist Manifesto* (pp. x. 178. University Press, 1960); Alexander Gerschenkron, *Economic Backwardness in Historical Perspective* (1962); David S. Landes, *The Unbound Prometheus : Technological Change and Industrial Development in Western Europe from 1750 to the Present* (Cambridge, 1969); Walt Whitman Rostow, *How It All Began: Origins of the Modern Economy* (1975).
[11] Charles Poor Kindleberger, *Economic Growth in France and Britain, 1851-1950* (1964).

quantitative analysis of economic development in the nineteenth century. These works constructed long series of key economic indicators (including GDP) constructed using the National Accounting framework developed between the 1920s and the 1940s and adopted by most governments in the 1950s for macroeconomic surveying and forecasting. In order to apply (Keynesian) macroeconomic models to the past, one only had to re-construct series from existing statistical data and piecemeal historical records. Following in the footsteps of Nobel-laureate Simon Kuznets, statisticians and economic historians across the Atlantic started to produce similar retrospective series for their countries. Phyllis Dean and W.A. Coal published their monumental *British Economic Growth from 1688 to 1959* in 1962, arguing that the British economy experienced its first sustained growth episode between 1760-1850, the 'classical period' of the Industrial Revolution.[12] During these 'years of miracles' (Mokyr), major technological innovations came in a continuous stream and drove economic growth in a way unprecedented in human history.[13] Inventions radically decreased the cost of manufactured goods and increased their quality while vastly expanding their supply, from the refining of coke-smelted iron with coal to the mechanisation of spinning and weaving and the development of the steam engine. In this approach to development what is taken as the starting point for this miraculous story is, in fact, the tail end of a much longer technological evolution associated with using coal for industrial processes in England. This included: lime burning, by 1400, textile dying, by 1500, salt making, by 1550, brewing, before 1600, glass manufacturing, in 1612, malting, by 1650, firing pottery, in the 1670s, lead smelting, also in the 1670s, copper smelting, in 1676, iron smelting, in 1709, and finally iron refining, in 1784.[14]

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[12] Phyllis Deane and William Alan Cole, *British Economic Growth, 1688-1959: Trends and Structure* (1962).
[13] Joel Mokyr, *The Lever of Riches: Technological Creativity and Economic Progress* (1992).
[14] J. R. Harris, *The British Iron Industry 1700-1850* (Houndmills, Basingstoke, Hampshire, 1988); John Hatcher, *The History of the British Coal Industry: Volume 1: Before 1700: Towards the Age of Coal* (Oxford, 1993).

In France, too, efforts to produce long series of economic data got going after the war. Collaborative efforts by historians (Fernand Braudel and Ernest Labrousse) and economists (Jan Marczewski and Francois Perroux) led to the publications of some series by Perroux and Marczewski in 1947, but the interdisciplinary cooperation proved rather short-lived, and historians adopted their own vision of quantitative history – called *histoire sérielle* - that did not fit in the National Accounting framework.[15] It was from the mid 1960s and until the 1980s that new national accounts series were finally produced by Tibor Markovitch, Jean-Claude Toutain and Maurice Lévy-Leboyer.[16] Having retrospective series for both France and Britain suddenly made possible a new quantitative approach to the past performance of the two economies, and Marczeswki's 'Le produit physique de l'économie française de 1789 à 1913: comparaison avec la Grande-Bretagne', was the first to engage in this systematic comparative exercise.[17]

The subject of the economic performance of France over the long nineteenth century and the speed and nature of its industrialisation thus briefly became a hot topic for Anglophone economic historians in the 1980s. The publication of a series of revisionist accounts, which presented a much more optimistic outlook of the French economy, led to some striking conclusions regarding its economic performance both in the eighteenth century (seen to be on par with Britain by Richard Roehl and Rondo Cameron), and in the nineteenth century (over-

[15] François Perroux, Pierre Uri, and Jan Marczewski, *Le Revenu National* (Paris, 1947).
[16] Jean Marczewski and Jean-Claude Toutain, 'Histoire quantitative de l'économie française.', *Cahiers de l'Institut de science économique appliquée. Série AF, Histoire quantitative de l'économie française*, i (1961); Tihomir J. Markovitch, *Histoire quantitative de l'économie française: L'industrie française de 1789 à 1964. Analyse des faits*, 3 vols (Paris, France, 1966); Jean-Claude Toutain, *Histoire Quantitative de l'économie Française. IX, Transports En France 1830-1965* (Paris, 1967); Maurice Lévy-Leboyer and François Bourguignon, *L'Économie Française Au XIXe Siècle* (Paris, 1985), 185 F; Jean-Claude Toutain, *La Production Agricole de La France de 1810 à 1990 Croissance, Productivité, Structures* (Grenoble, 1993).
[17] Jean Marczewski and Tihomir J. Markovitch, 'Le produit physique de l'économie française de 1789 à 1913 (comparaison avec la Grande-Bretagne)', *Les Cahiers de l'Institut de science économique appliquée*, clxiii (1965).

performing compared to Britain by Patrick O'Brien and Caglar Keyder).[18] These positive interpretations found that France growth trends rather than absolute levels. It is after all easier to grow faster further from the frontier (catch-up growth), and France experienced an earlier demographic transition and relatively slower population growth in the nineteenth century, which inevitable skews per capita figures in its favour.

Since then, however, most economic historians have walked back on these judgments. Revised occupational and output data have largely undone the positive assessment of French economic performance both in terms of trend and levels, and following Nick Crafts, François Crouzet, Maurice Lévy-Leboyer and François Bourguignon, Paul Bairoch, and Jean-Pierre Dormois, all settled for a moderately pessimistic diagnosis for France in the nineteenth century.[19] One point worth noting is that to date a wide disagreement remains on the quantification and the performance of the French economy in the late nineteenth century. With four competing GDP series (Toutain, Lévy-Leboyer and Bourguignon, Dormois, and Ridolfi) and 50 years of impassioned discussions from which no consensus has emerged among economic historians, it is important to take any definitive judgement based on any one of these series with a light pinch of salt.[20] In recent years, especially in answer to R.C. Allen's

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[18] Rondo Cameron and Charles E. Freedeman, 'French Economic Growth: A Radical Revision', *Social Science History*, vii (1983); Richard Roehl, 'French Industrialization: A Reconsideration', *Explorations in Economic History*, xiii (1976); Patrick Karl O'Brien and Caglar Keyder, *Economic Growth in Britain and France, 1780-1914 : Two Paths to the Twentieth Century* (London, 1978).Bairoch's series (1978) also reflect this positive assessment of French economic growth relative to Britain. His series rely on Toutain's data (published in 1987), which is by far the most optimistic industrial output series for France. Lévy-Leboyer and Bourguignon (1985) and Dormois (1999) have suggested much lower figures for the value of the French industrial output.

[19] N. F. R. Crafts, 'Economic Growth in France and Britain, 1830–1910: A Review of the Evidence', *The Journal of Economic History*, xliv (1984); François Crouzet, *De la supériorité de l'Angleterre sur la France: l'économique et l'imaginaire, XVIIe-XXe siècles* (Paris, 1985); Lévy-Leboyer and Bourguignon, *L'Économie Française Au XIXe Siècle*; Paul Bairoch, *Victoires et Déboires. Histoire Économique et Sociale Du Monde Du XVI^e Siècle à Nos Jours* (Paris, 1997); Jean-Pierre Dormois, 'Évaluation et Composition Du Produit Industriel Français Avant 1914', *Annales d'Economie et de Statistique*, (1997); Jean-Pierre Dormois, 'Tracking the Elusive French Productivity Lag in Industry', *Hitotsubashi Univ. Research Unit for Statistical Analysis in Social Sciences, Inst. of Economic Research, Hitotsubashi Univ.*

[20] A discussion is available in A. Litvine (2020), French Occupational Structure, Industrialisation and Economic Growth, France, 1695 to the Present, pp.8 ff.

comparative causal explanation of the Industrial Revolution,[21] new series for France have appeared, showing that it fared slightly better than Allen thought in the eighteenth century, with relatively higher real wages[22] and sustained commercial and industrial expansion.[23] These new observations do not change, however, the modest performance of the French economy over the whole period. First, it is not surprising that wages were higher in the more industrially and technologically advanced regions like Normandy, and when compared to similar regions across the Channel the relative difference between the two countries remains significant. Second, real wages in France on the eve of the Revolution were not desperately low only insofar as food was also relatively cheap or the average diet less abundant. The French population had already reached its pre-Black Death level (around twenty million) sometime between 1600 and 1650 and Malthusian pressures must undoubtedly have been building up (although not consistently across the country) from the mid seventeenth century, unlike in England, which did not recover its pre-Black Death population until the late eighteenth century. England had thus a much more favourable land/labour ratio in the early modern period compared to much of Europe, which also coincides with the timing of the divergence between England and France (around 1650) suggested by Ridolfi's and Nuvolari's recent GDP figures.[24]

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https://www.campop.geog.cam.ac.uk/research/occupations/outputs/preliminary/france_1695_present_al.pdf. See also Jean-Claude Toutain, 'Comparaison entre les différentes évaluations du produit intérieur brut de la France de 1815 à 1938 ou L'histoire économique quantitative a-t-elle un sens ?', *Revue économique*, xlvii (1996). And for the more recent: Leonardo Ridolfi and Alessandro Nuvolari, 'L'histoire Immobile? A Reappraisal of French Economic Growth Using the Demand-Side Approach, 1280–1850', *European Review of Economic History*, xxv (2021).

[21] Robert C. Allen, *The British Industrial Revolution in Global Perspective* (Cambridge, 2009).

[22] Cédric Chambru and Paul Maneuvrier-Hervieu, *The Evolution of Wages in Early Modern Normandy (1600–1850)* (University of Zurich, 2021); Leonardo Ridolfi, 'The French Economy in the Longue Durée: A Study on Real Wages, Working Days and Economic Performance from Louis IX to the Revolution (1250–1789)', *European Review of Economic History*, xxi (2017); Vincent Geloso, 'Were Wages That Low? Real Wages in the Strasbourg Region Before 1775', *The Journal of Interdisciplinary History*, xlviii (2018); Leonardo Ridolfi, 'Six Centuries of Real Wages in France from Louis IX to Napoleon III: 1250–1860', *The Journal of Economic History*, lxxix (2019).

[23] Daudin, 'Commerce et prospérité'.

[24] Ridolfi and Nuvolari, 'L'histoire Immobile?'

Beyond the data and the conclusion regarding economic performance lies one of the most important methodological - perhaps we could even say epistemological – issues in economic history. Using the wealth of new data published in the 1960s and 1970s, Nick Crafts penned an article comparing Britain and France, which claimed that the Industrial Revolution was fundamentally a stochastic (i.e., an accidental) process.[25] His conclusion was that: 'Put in the context of England's primacy in achieving the "decisive innovations," it does not of itself necessarily imply that Britain *ex ante* in, say 1740 had the greater probability of achieving the first industrial revolution or that one should feel obliged to seek reasons for Britain's inevitable primacy going far back into her history.' Since then, Crafts has distanced himself from this interpretation, and most explanations now agree that technological change is endogenous, path-dependent, gradual and multi-factored, but his methodology in reaching this conclusion remains a powerful component of many studies in our field.[26] 'As far as economic theory is concerned', Crafts argued in the same article, 'it is in fact difficult using neo-classical assumptions to derive predictions about the rate of technological progress in general or even to support the assertions of writers such as Crouzet, Landes and Habakkuk of the beneficial effect of the "shortages" experienced by the British economy in the first half of the eighteenth century.' What conclusion should we derive from this statement? Is it that Crouzet, Landes, Habakkuk, Allen and Wrigley are wrong? Or rather that neo-classical assumptions and models based on their work may be problematic for historical knowledge production – especially in terms of causal inference. Arthur Lewis, himself a Nobel prize winner in economics, would agree with this: 'from the point of view of countries with surplus labour [definitely the case of

[25] Crafts (1977), 'Industrial Revolution in England and France: Some Thoughts on the Question, "Why was England First?"', *The Economic History Review*

[26] N. F. R. Crafts, *British Economic Growth during the Industrial Revolution* (Oxford, 1985); N. F. R. Crafts and C. K. Harley, 'Output Growth and the British Industrial Revolution: A Restatement of the Crafts-Harley View', *The Economic History Review*, xlv (1992); N. F. R. Crafts, 'Macroinventions, Economic Growth, and'Industrial Revolution'in Britain and France', *Economic History Review*, xlviii (1995).

all early-modern economies] neoclassicism is not an analytical framework which can relevantly fit [our] problems'.[27] Before trying to determine causality, should we not first apply ourselves to describing as precisely as possible the nature of the phenomena studied? This fundamental empiricism would surely spare us the absurdity of concluding that what was, could not have been. What good is it to use a probabilistic model to show that Britain's industrialisation was 'partly due to chance' and that 'France could have moved out of agriculture and into manufacturing faster than Britain, but the probability was less than 30 percent', if we can document that it was not the case?[28]

As the optimistic accounts of French economic performance were being rejected, and perhaps as part of the diminishing importance of cold-war mentality, key estimates of economic growth for Britain were also revised downwards, and the British Industrial Revolution came again to be seen as a more gradual and protracted process with early modern origins.[29] More recent work by Shaw-Taylor and Wrigley using occupational data has confirmed and extended Crafts' revisionism, showing that the growth in manufacturing employment in Britain took place between 1550 and 1750, not between 1750 and 1850 – long before any other European country.[30] Thus, logically, if both Britain and France fared less well than previously thought during the classical period of the Industrial Revolution (1760-1850), the divergence between the two countries must have originated not in the late eighteenth century but much earlier, and was clearly present in the seventeenth or, perhaps even, the sixteenth century, by the time of Perlin's visit to England.

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[27] W. Arthur Lewis, 'Economic Development with Unlimited Supplies of Labour', *The Manchester School*, xxii (1954).
[28] Nico Voigtländer and Hans-Joachim Voth, 'Why England? Demographic Factors, Structural Change and Physical Capital Accumulation during the Industrial Revolution', *Journal of Economic Growth*, xi (2006).
[29] Crafts, *British Economic Growth during the Industrial Revolution*; Crafts and Harley, 'Output Growth and the British Industrial Revolution: A Restatement of the Crafts-Harley View'.
[30] Leigh Shaw-Taylor and E. A. Wrigley, 'Occupational Structure and Population Change', in Roderick Floud, Jane Humphries, and Paul Johnson (eds.), *The Cambridge Economic History of Modern Britain* (2014).

Recent work by Broadberry et al. suggests that British GDP per capita stagnated from 1350 to 1650 and then grew at around 0.5% per year from 1650 to 1830.[31] Regardless of the merit of these figures, their findings do not contradict this early divergence hypothesis. Firstly, the phase of slow economic maturation, 1500-1650, that enabled more rapid 'modern' economic growth thereafter was not accompanied by large increase in GDP per capita, and in the context of a population at least doubling between 1500 and 1650, the fact that living standards did not collapse is in itself suggestive of major economic development.[32] Secondly, it should be noted that GDP estimates are controlled conjectures with significant margins of error, even if this is only too rarely acknowledged by their producers.[33] This article suggests that a key feature traditionally associated with industrialisation – occupational change – happened before 1700 in England and that it is this precocity which explains the different paths taken by the two countries before 1750. Using new occupational data at the sub-sectoral level, we conclude that it is time to rehabilitate the older, long-term view of the Industrial Revolution and pay more attention to suggestions made by Nef for the period 1540-1640, and by both Crouzet and Wrigley and Schofield on the longer period 1550-1750 regarding the early modern roots of the British industrial divergence.[34]

Nef had shown that the shift to energy-intensive forms of production in the sixteenth century meant that England had a decisive comparative advantage when it came to industrial products like saltpetre, glass, salt, dyes, alum, and in the ship building industry; but above all

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[31] Stephen Broadberry et al., 'British Economic Growth, 1270–1870', *Cambridge Core*, (2015).
[32] We do not accept Broadberry et al's suggestion that economic development is reducible to GDP per capita growth. Achieving the same GDP per capita at double the population over the same area clearly requires considerable economic development.
[33] Charles Hilliard Feinstein and Mark Thomas, 'Making History Count: A Primer in Quantitative Methods for Historians', (2012).
[34] John U. Nef, 'A Comparison of Industrial Growth in France and England from 1540 to 1640', *Journal of Political Economy*, xliv (1936); François Crouzet, 'Angleterre et France au XVIIIe siècle : essai d'analyse comparée de deux croissances économiques', *Annales*, xxi (1966); François M. Crouzet, *Britain Ascendant : Comparative Studies in Franco-British Economic History* (1990); E. A. Wrigley, *The Population History of England 1541-1871 : A Reconstruction* (Cambridge, 1981).

in coal, metal and textiles, which all helped Britain vastly expand her trade across the world between 1540 and 1640.[35] By 1700, Britain was already an exception in Europe, while France, despite episodic growth in the sixteenth and early seventeenth century, remained a relatively poor performer. Growth picked up after 1715 accompanied by population growth but limited structural change at the national level. In the word of Crouzet, 'on the eve of the Revolution the French economy was the same it had been under Louis XIV [1643-1715]. It was simply producing more.'[36] The following revolutionary decade left the French economy in tatters but laid the bases for subsequent (modest but steady) growth in the nineteenth century.[37]

1. Description of the data

This paper is an outgrowth of a collaborative international research project, The International Comparative History of Occupational Structure (INCHOS). The INCHOS project provides harmonised data to compare the development of occupational structure across 19 different countries during the period in which they industrialised and made the transition to modern economic growth. The fruits of this research will be published as Saito and Shaw-Taylor, *Occupational structure, industrialization and economic growth in a comparative perspective*. The present authors contributed chapters on England and Wales, and on France; a much fuller description of sources and methods will be found there.

For England and Wales (henceforward E&W), the published population censuses of 1851, 1861, 1871, 1881, 1891, 1901 and 1911 provided detailed enumerations of occupations by both age and sex in over 400 categories and are the source of all our occupational data for the period

[35] What has been sometime called the 'Nef thesis', his argument for dubbing this period a first industrial revolution, has been rejected, but in part – and unhelpfully we believe – for the mislabelling of early-modern economic development as a revolution. It is also true that Nef stopped his analysis in 1640 and sometimes argued that little change happened afterwards. We now know that development carried on right through, which fits very nicely with the gradualist interpretation that came out of the work of Crafts and Harley.
[36] Crouzet, *Britain Ascendant : Comparative Studies in Franco-British Economic History*, 26.
[37] Crafts, 'Economic Growth in France and Britain, 1830–1910'.

1851-1911. The 1841 census also recorded male and female occupations in considerable detail. However, while the male data are reliable, female occupations are systematically under-enumerated compared with the later censuses. We also have male data for c.1710 and c.1817, but of very different provenance. From the 1st of January 1813 it became a legal requirement to record the occupations of fathers in Anglican baptism registers. Since 90 per cent of all men married in this period and other denominations widely used Anglican baptisms, counts of the occupations of the fathers provides a quasi-census of male occupations.[38] Data were collected from virtually all 11,400 Anglican baptism registers, generating 2.5m observations over an eight-year period centred on 1817. Comparison with other sources shows that this generates a robust picture of male occupational structure.

Comprehensive data on female occupations do not exist before 1851. We have instead calculated sub-sectoral sex ratios from the 1851 population census and applied these ratios to the male occupational data for earlier periods. Of course, these would not necessarily have been the same c.1710, c.1817 and in 1851. The approach followed here is to use the 1851 sex ratios where we have no reason to believe they would have differed from those prevailing in that year. For certain sectors (textiles, agriculture and the making of clothes) the existing secondary literature strongly suggests that the ratios would have been different, and we have drawn on the secondary sector to modify the ratios accordingly.[39]

The results of this work have already proved transformative for the national history of the British Industrial Revolution. Deane and Cole believed that as late as 1760 between 60 and 80 per cent of the labour force was employed in agriculture and that this figure had fallen to 25

[38] P M Kitson et al., 'The Creation of a Census of Adult Male Employment for England and Wales for 1817'; Shaw-Taylor and Wrigley, 'Occupational Structure and Population Change'.
[39] The methodology and results are described in: Leigh Shaw-Taylor, Keith Sudgen, and Xuesheng You, 'A Preliminary Estimate of the Female Occupational Structure of England and Wales 1700–1911', (2021). Available at: https://www.campop.geog.cam.ac.uk/research/occupations/outputs/preliminary/

per cent by 1851.[40] They thus saw the Industrial Revolution as characterised by a massive change in the structure of employment. Crafts, drawing on work by Lindert and Williamson, suggested a more protracted structural transformation when he estimated that agriculture accounted for 56 per cent of the labour force in 1688.[41] Shaw-Taylor and Wrigley confirmed the size of the primary sector as 50 per cent of the labour force c.1710 but present a very different picture of secondary and tertiary-sector employment.[42]

In France, as in England, regular census-taking began in 1801 but occupational data were only compiled in the published returns after 1851, which means that for the first half of the nineteenth century little occupational data is readily available.[43] Unfortunately, until 1896 (or perhaps even 1901) the unadjusted occupational data collected during quinquennial censuses and industrial (1839-47 and 1860-65) and agricultural (1840, 1852, 1862, 1882, 1892) surveys were, generally, of poor quality, especially for female and child labour, which were both dramatically under-recorded, if at all. The data presented in this chapter are based on: **i)** new capitation tax-based estimates for the period 1695-1790 using an expanded sample from Ostroot and Snyder,[44] **ii)** new estimates based on burial, marriages and baptism records for the period 1740-1819 from the *Enquête Henry-Biraben*, **iii)** revised sectoral estimates from Marchand and Thélot for 1811-1896,[45] and **iv)** adjusted census returns from 1851 onwards.[46]

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[40] Deane and Cole, *British Economic Growth, 1688-1959*.
[41] Peter H. Lindert and Jeffrey G. Williamson, 'English Workers' Living Standards During the Industrial Revolution : A New Look', *Economic History Review*, xxxvi (1983); Crafts, *British Economic Growth during the Industrial Revolution*.
[42] Shaw-Taylor and Wrigley, 'Occupational Structure and Population Change'.
[43] The authors are currently collecting and compiling these data from the nominative census lists, but it will be many years until a national coverage is achieved.
[44] Nathalie Ostroot and Wayne Snyder, 'The Quality of Life in Historical Perspective France: 1695?1990', *Social Indicators Research*, xxxviii (1996); Wayne Snyder, 'Occupational Evolution in XVIIIth and XIXth-Century France', *The Journal of European Economic History*, xxxv (2006).
[45] O. Marchand and Claude Thélot, *Deux Siècles de Travail En France: Population Active et Structure Sociale, Durée et Productivité Du Travail* (Paris, 1991), 140 FRF.
[46] Alexis Litvine, 'French Occupational Structure, Industrialisation and Economic Growth France, 1695 to the Present.', in Leigh Shaw-Taylor and Osamu Saito (eds.), *Occupational Structure, Industrialization and Economic Growth in a Comparative Perspective*.

Four striking features emerge from a simple glance at the data presented in **tables 1a-b** and **fig.1** below: **i)** the radical difference in the level of employment in the primary sector from the early eighteenth century between the two countries (around 70 per cent of the total labour force in France, below 40 per cent in E&W). **ii)** The industrial divergence between France and E&W (measured in the relative share of employment in the secondary sector) happened well *before* the Industrial Revolution. By 1710, E&W had already 43 per cent of its active male labour force working in the secondary sector (as opposed to Crafts' previous estimate of 19 per cent in 1688), while only 16 per cent of working age males were employed in industry in France by 1725. As a consequence, the secondary sector was already by this date three times larger in E&W than in France. **iii)** The flatness of the share of the secondary sector throughout the classical period of the Industrial Revolution in E&W, and the steady growth in employment in the tertiary sector during the eighteenth and early nineteenth century, a development which has not been a feature of the dominant historical national accounts view of the Industrial Revolution so far. Inversely, the stagnation of tertiary sector employment in France until the mid-nineteenth century, which suggests a much more limited commercial integration and slower urbanisation. These points confirm the observations made by Shaw-Taylor and Wrigley, while emphasising the uniqueness and precocity of the English economy.

Although there is no reliable comparative estimate of industrial output by 1700, rough indications of output levels in 1750 can be taken from Broadberry and O'Rourke.[47] According to these figures, British industrial output per capita was twice as large as that of France by 1750. Given that French industrial output for the period 1700-1750 grew by an estimate of 52

[47] Figures from: Paul Bairoch, 'International Insutrialisation Levels from 1750 to 1980', *Journal of European Economic History*, II, ii (1982); Crafts and Harley, 'Output Growth and the British Industrial Revolution: A Restatement of the Crafts-Harley View'; Stephen Broadberry and Kevin H. O'Rourke, *The Cambridge Economic History of Modern Europe: Volume 1: 1700–1870* (Cambridge, 2010), i.

per cent,[48] and that British output grew by 34 per cent over the same period,[49] we can safely assume that French industrial output per capita was at least 60 per cent smaller than that of the British by 1700. And not only was British industrial output per capita larger, but its composition reveals a much deeper and longer structural transformation of the economy. Judging by the relative weight of sectors in the total output circa 1800 (**table 1**), the most striking feature is that the share of the food and drink industry in both the total industrial output and the industrial labour force was respectively three and eight times lower than in France. A likely explanation of the difference is that in E&W the share of food production had already shrunk with the growth of other industries, especially manufacturing, chemicals and heavy industry. Even accounting for the specialised and export-oriented wine and spirit production in France, this clearly suggests – not unlike Engel's Law (which posits that the share of income spent on food decreases as total income grows) – a much less diverse and mature industrial sector. Using the same data, we can also have an indication of relative intra-sectoral productivity gaps by looking at the ratio of the share of the labour force to their respective share in the total industrial value added by sector. This gives an idea of how much one per cent of the labour force in each sector contributed to the total industrial output by 1800. Obviously, these ratios (**table 1,** columns 3 and 6) are only meaningful indications within countries and not between them – it is worth remembering that by 1800 the industrial output per capita was 2.14 times bigger in E&W.

In the following pages we will use our new sub-sectoral data to examine: **1)** the evolution of agricultural productivity and the impact of urbanisation, **2)** the mineralisation of the economy, **3)** productivity growth and the textile industries, **4)** the role of consumer demand and market specialisation and **5)** the impact of transport on market integration.

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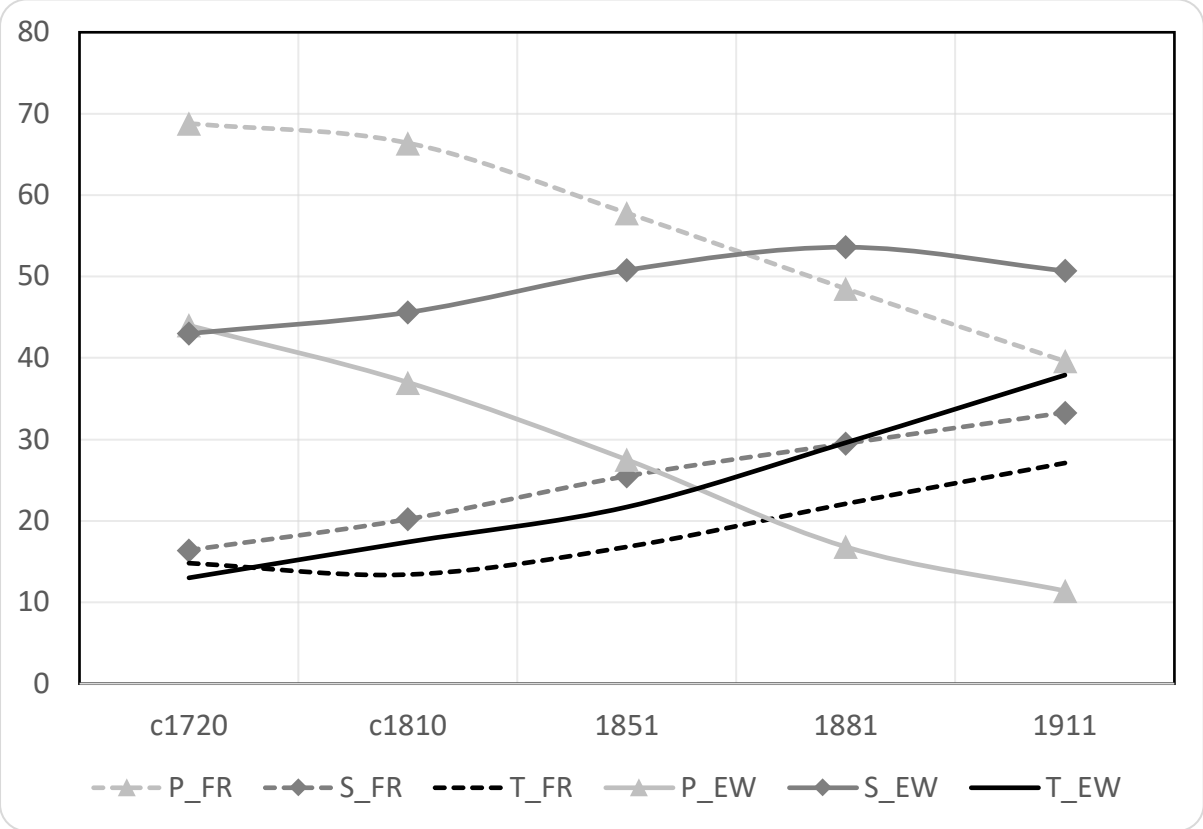
[48] Ridolfi, 'The French Economy in the Longue Durée'.
[49] Broadberry et al., 'British Economic Growth, 1270–1870'.

Fig. 1a-b Sectoral distribution of the male and female labour force (in %)



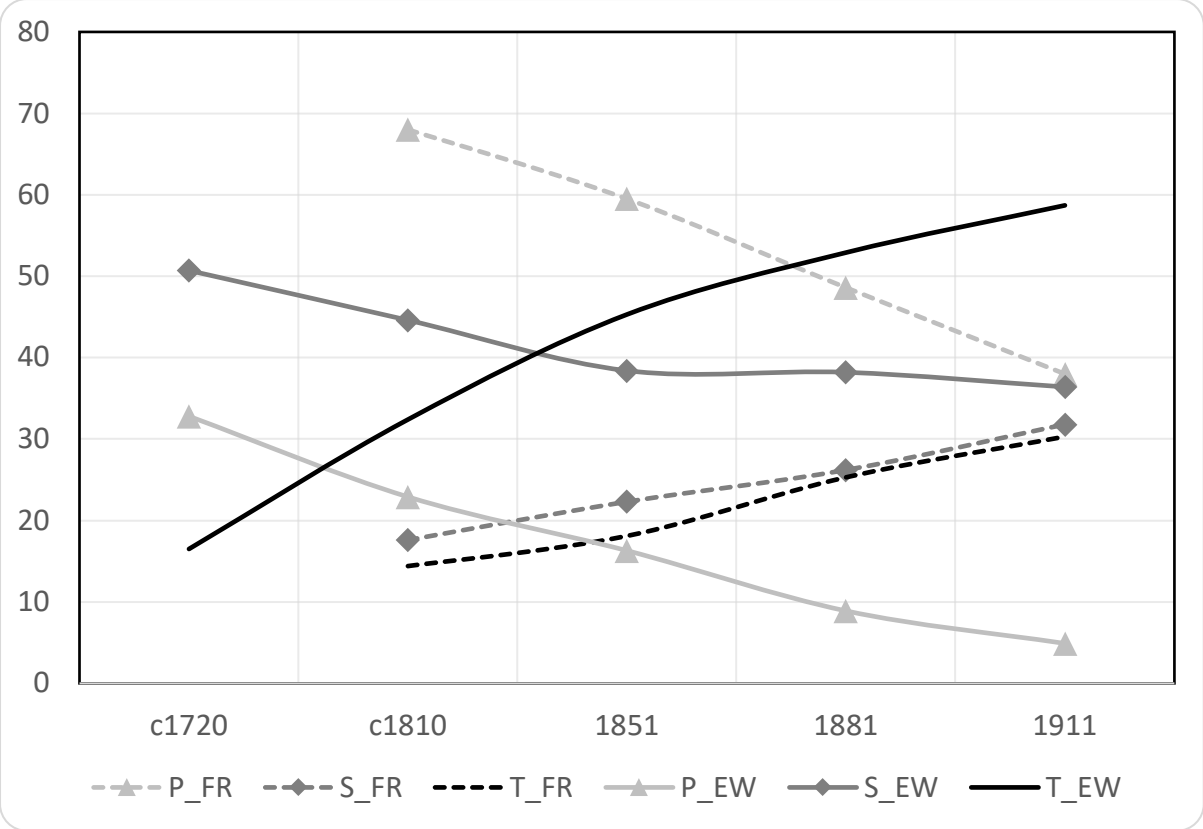


Table 1 Share of total industrial value added and share of the industrial labour force per sector in France and E&W c.1800[50]

	FRANCE			*E&W*			
	VA (1)	IndLF (2)	**(1)/(2)**	VA (4)	IndLF (5)	**(4)/(5)**	**(4)/(5)*2.14**
Mining & fuel	0.2	0.2	**1.0**	4.0	4	**1.0**	**2.1**
Metals	6	2.5	**2.4**	7.0	8.5	**0.8**	**1.8**
Chemical	1.7	0.1	**17.0**	3.2	0.1	**31.6**	**67.6**
Textiles	42	10.5	**4.0**	45.7	18	**2.5**	**5.4**
Food & drink	22.3	8	**2.8**	6.9	1	**6.9**	**14.8**
Paper	1.1	1.5	**0.7**	0.4	1.4	**0.3**	**0.5**
Construction	14	15	**0.9**	13.9	16	**0.9**	**1.9**

Nb: the margins of errors for these figures were not specified by all authors, but we can assume they are large since where they were made clear (by Feinstein), they stand between 15 and 20 per cent for this period.

2. Agricultural productivity and economic development

The common wisdom is that French agriculture performed relatively poorly in the second half of the seventeenth century and throughout the eighteenth century, but with the caveat that some regions did better than others.[51] Hoffman calculated TFP growth rates for French agriculture between 1520 and 1789 and found increasing productivity in the Paris Basin and the North and South-East.[52] Similarly, Grantham observed an increase in productivity across France (albeit limited to the arable sector and excluding the Mediterranean regions) between 1600 and 1800,

[50] Markovitch, *Histoire quantitative de l'économie française*; Jean-Claude Toutain, *Le produit intérieur brut de la France de 1789 à 1982* (Grenoble, 1987); Charles H. Feinstein, 'Economic Growth Since 1870: Britain's Performance in International Perspective', *Oxford Review of Economic Policy*, iv (1988); Crafts and Harley, 'Output Growth and the British Industrial Revolution: A Restatement of the Crafts-Harley View'; N. F. R. Crafts, 'British Economic Growth, 1700-1831: A Review of the Evidence', *The Economic History Review*, xxxvi (1983); Broadberry et al., 'British Economic Growth, 1270–1870'.

[51] See Emmanuel Le Roy Ladurie and Joseph Goy (eds.), *Les fluctuations du produit de la dîme; conjoncture décimale et domaniale de la fin du Moyen Age au XVIIIe siècle.* (Paris, 1972); Fernand Braudel, Ernest Labrousse, and Pierre Léon, *Histoire économique et sociale de la France Tome III*, 4 vols (Paris, 1976), iii; Robert C. Allen, 'Economic Structure and Agricultural Productivity in Europe, 1300-1800', *European Review of Economic History*, iii (2000); Ridolfi, 'The French Economy in the Longue Durée'.

[52] Philip T. Hoffman, *Growth in a Traditional Society, The French Countryside, 1450-1815* (Princeton, N.J., 1996).

indicating divergent regional trajectories.[53] The problem with metrics such as TFP and grain yield estimates is that they come with high compound margins of errors, which makes the comparison of the performance of the primary sector across countries problematic. For this reason, we think it is preferable to consider the relative size of the primary sector as the key comparative measure – albeit indirect – of the overall efficiency of an economy in the early eighteenth century.[54] As such, the early shift out of the primary sector in E&W (**fig.3a and 3b**) indicates without any doubt a much higher level of aggregate agricultural productivity. By 1710, 44 per cent of the English active *male* population could support the other 56 per cent not working the land (imported calories are negligible), while in France at the same date the proportion was 70 to 30. These numbers indicate a spectacular difference in the carrying capacity of the primary sector (that is the share of the population able to survive without producing food themselves in an economy with limited food imports) in the two countries. And, finally, given that there is compelling evidence that the English (already comically but also enviously dubbed '*les rosbifs*' in the eighteenth century) ate much better than the French in this period, these figures underestimate the difference between the two countries.

We currently have only limited data for the proportion of French women working in agriculture in the early eighteenth century, but given that the share of the female labour force employed in agriculture in France was higher than the male share in 1800, and in E&W much lower than the male share, it is likely that the inclusion of women would not change the result (**fig.3a**), and, would only increase the size of the productivity gap. One remarkable feature, though, is the early sexual division of labour in agriculture in E&W visible in **fig.3a**.

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[53] George W. Grantham, 'Divisions of Labour: Agricultural Productivity and Occupational Specialization in Pre-Industrial France', *The Economic History Review*, xlvi (1993).
[54] E. Anthony Wrigley, 'Urban Growth and Agricultural Change: England and the Continent in the Early Modern Period', *The Journal of Interdisciplinary History*, xv (1985); Karl Gunnar Persson and Paul Sharp, 'An Economic History of Europe: Knowledge, Institutions and Growth, 600 to the Present', *Higher Education from Cambridge University Press*, (2015).

Agriculture was far more feminine in France with 35.4 per cent of the total agricultural labour force being women in 1801, against 26 per cent in Britain in 1817. Observing the large of number of women working in the fields of France was one of the most common tropes in contemporary travelogues. In July 1789 Edward Rigby, from Norwich, observed that in Northern France 'women … seem to do a great deal of labour, especially in the country. They carry great burdens, and seem to be employed to go to market with the produce of the fields on their backs.' Further, he notes that: 'the agriculture is chiefly done by women.'[55] A couple of years earlier Arthur Young had made a similar observation about Normandy where he noticed: 'women … ploughing with a pair of horses to sow barley. The difference [he added] of the customs of the two nations is in nothing more striking than in the labours of the sex; in England, it is very little that they will do in the fields except to glean and make hay … in France, they plough and fill the dung carts.'[56]

What explains this difference between the two countries? The question covers at least three distinct issues: farmers' wives and daughters, farm servants, and agricultural labourers. It is safe to assume that farmers' wives and daughters would have participated in farm work right through to the nineteenth century. However, as the proportion of farmers' households in England and Wales was falling throughout the period 1500-1851, the share of farm labour supplied by farmers' wives and daughters decreased substantially.[57] Regarding farm servants there is currently no clear indication in the literature. We still do not know whether the share of female farm servants declined over the eighteenth century, or before, or not at all. As for

[55] Edward Rigby and Elizabeth Eastlake, *Dr. Rigby's Letters from France &c. in 1789*. (London, 1880), 16.
[56] Arthur Young, *Arthur Young's Travels in France: During the Years 1787, 1788, 1789*, ed. Matilda Betham-Edwards (Cambridge, 2012), entry for May 22nd 1787.
[57] A major area of uncertainty, in both England and France, is the relative labour inputs directly into the farm by farmers' wives and daughters, compared with adult male farmers and farmers' sons. No doubt higher in pastoral areas, especially dairying, than in arable areas. We are not including in this discussion the extent to which female farm household members 'household work' should be considered as contributing to or underpinning the operation of the farm.

day labourers, the evidence is that only a modest share of day labour was ever supplied by women, and it seems (although not yet proven) that the share declined in the century after 1750. However, the share of all farm labour supplied by day labour was certainly increasing from 1500 or perhaps even before.[58] Overall, as soon as proletarianisation in agriculture began to shift labour inputs from farmers' wives and daughters to farm servants, this must have led to declining female participation.[59] The question then becomes, 'When did proletarianisation really take off in E&W: in the fourteenth, fifteenth, or sixteenth century?' The jury is still out on this aspect, but preliminary results from a survey of coroners' inquest data on accidental deaths indicate that in Southern England it was certainly before 1500 (data shows three labourers to every farmer, as much as in 1700). This early proletarianisation again suggests looking back at the early modern or even medieval roots of the precocious economic development in E&W.

Furthermore, making the reasonable assumption that the withdrawal of women from agriculture before 1750 was not absorbed by an equivalent decline in the female labour force participation rate (FLFP) necessarily means that other sources of employment became available both in the secondary sector (proto-industry and manufacturing) and, crucially, in the tertiary sector.[60] In the early nineteenth century – because of the sharp decline in FLFP caused by the mechanisation of spinning – the tertiary sector had become the fastest growing sector for female employment, and already by 1800 half of the labour force in the service industry in E&W were women (51 per cent) against just over a third in France (36.5 per cent). There, as

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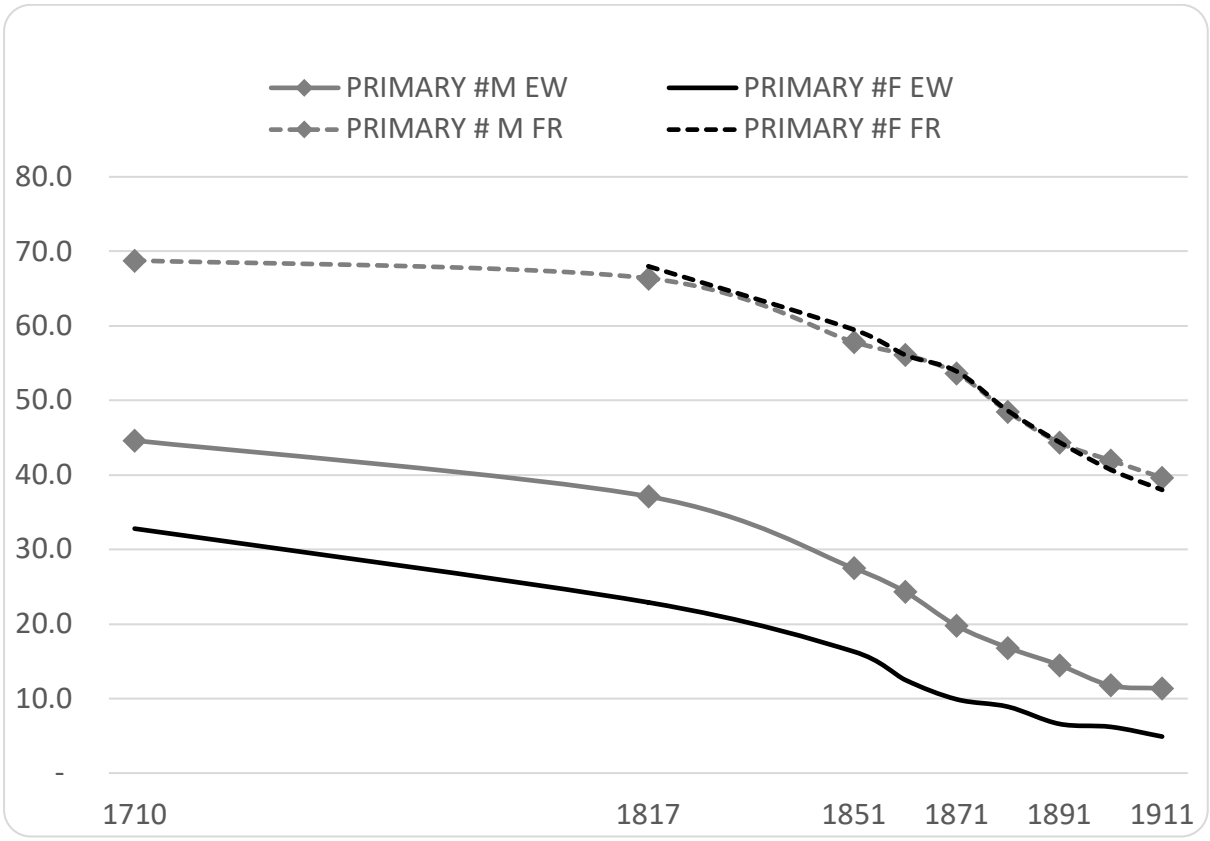
[58] Leigh Shaw-Taylor, 'The Rise of Agrarian Capitalism and the Decline of Family Farming in England', *The Economic History Review*, (2011).
[59] Ivy Pinchbeck, *Women Workers and the Industrial Revolution, 1750-1850* (London, 1930), 44, 110; Shaw-Taylor, Sudgen, and You, 'A Preliminary Estimate of the Female Occupational Structure of England and Wales 1700–1911'. Available at: campop.geog.cam.ac.uk/research/occupations/outputs/preliminary/female_estimates_lst_ks_xy_2019.pdf
[60] Women's LFPR was comparable to men's, even during marriage. See Amy Louise Erickson, 'Married Women's Occupations in Eighteenth-Century London', *Continuity and Change*, xxiii (2008).

fig.3b shows, only 14.4 per cent of the female labour force was employed in the tertiary sector, while it had already reached 32.4 per cent in E&W. This large gap is consistent with the rising pace of urbanisation in E&W (**table 2**) over the eighteenth century. Cities across Europe drew from a large pool of female migrants to work in domestic services and manufacturing[61] so that – as it was certainly the case in Paris by 1800 – cities contained substantially more women than men, and even more so in E&W (clearly visible in **figs.5a-b**). By 1851, 30 per cent (35 in 1881) of the female labour force in E&W were employed as domestic servants, but only eight per cent (13 in 1881) in France, and logically, the more urban the population, the higher the ratio of female to male workers was likely to be in the service industry (**fig.2**). This fact also suggests that the urban demand for female labour was a key determinant of the rate of exit of young females from the primary sector in E&W and contributed to its precocious structural transformations. The pattern of female emigration is already clearly visible in South-East England in 1801 but much less so in France, where male emigration dominates most of the northern half of the country (**figs.5a-b**). More generally, the fact that the sexual distribution of the French population remained so stable over the first half of the century, especially compared to the English and Welsh cases, is testament to the very limited structural (i.e., urban) transformation of the economic geography of France over this period.

Figs. 3a-b. Comparison of the evolution of the share of the labour force employed in agriculture and in the service industry for both sexes 1700s -1901

[61] Amy Louise Erickson. and A. Schmidt, 'Migration', in Christine MacLeod and Maria Ågren, eds, *The Whole Economy*, Cambridge University Press, forthcoming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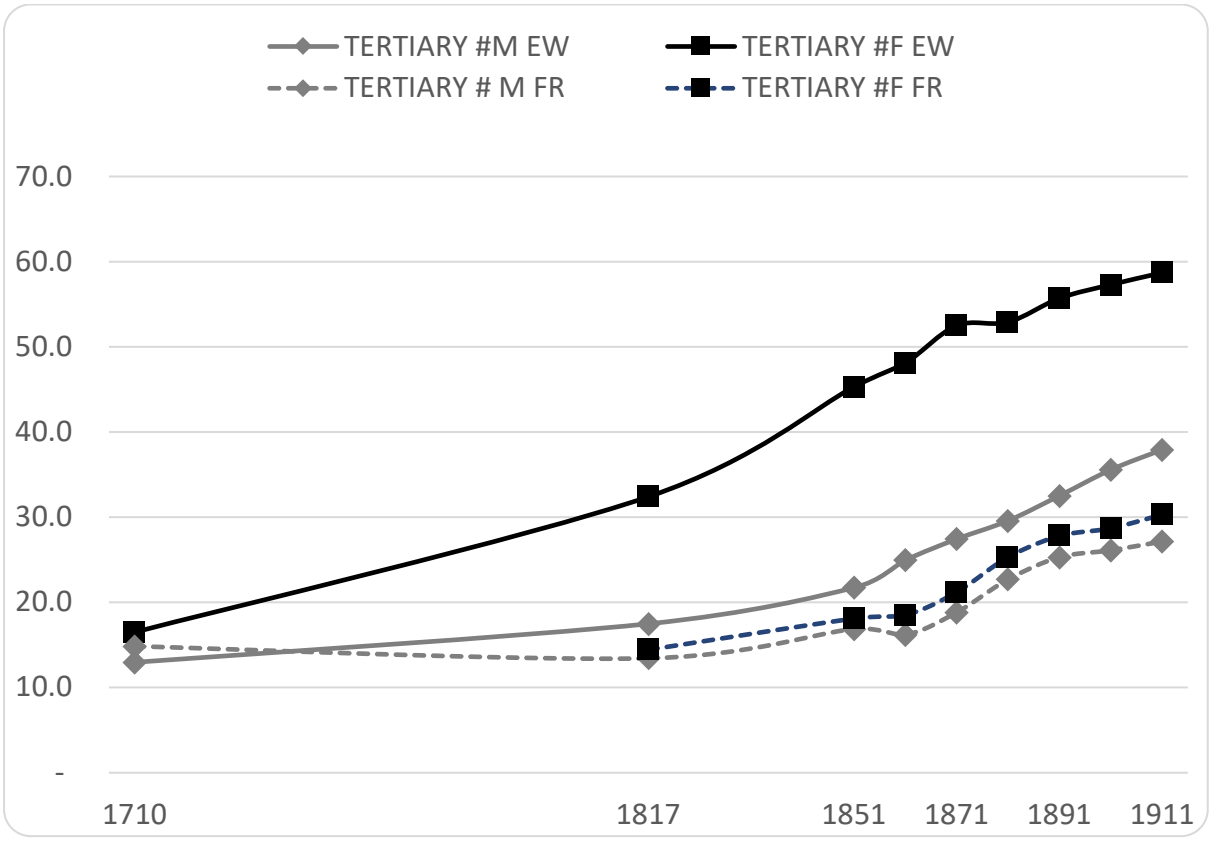
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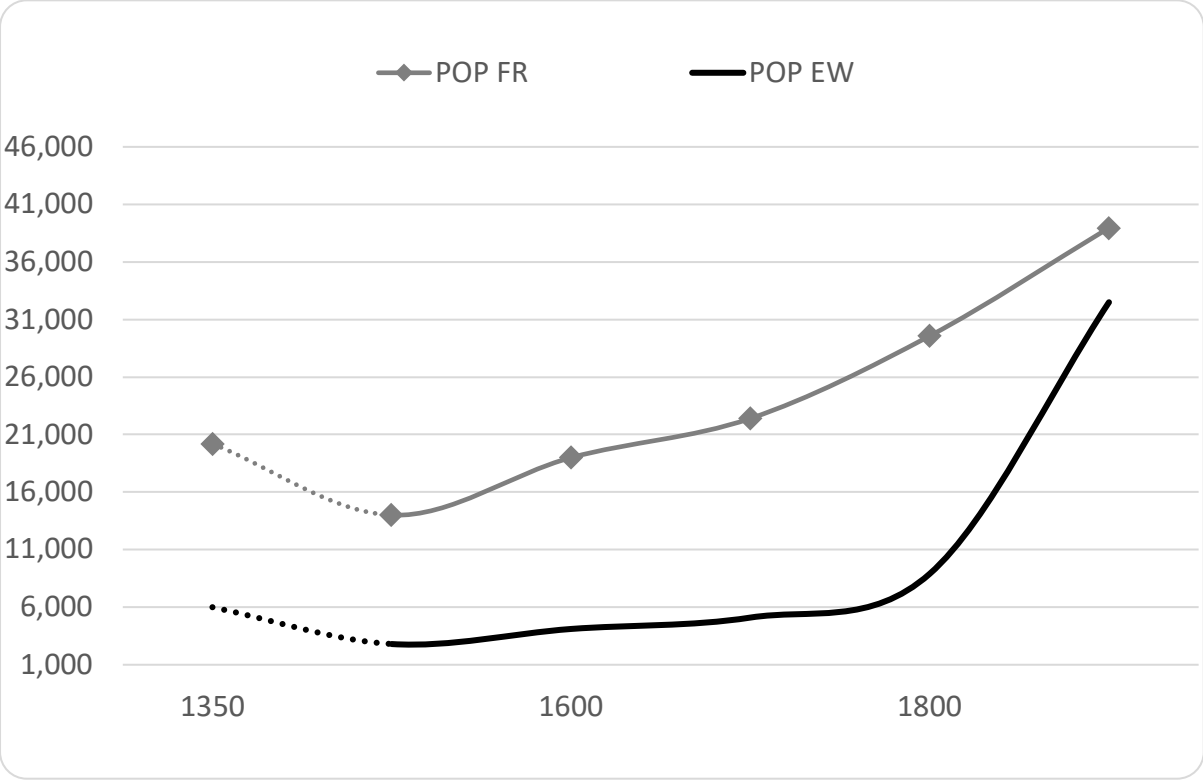
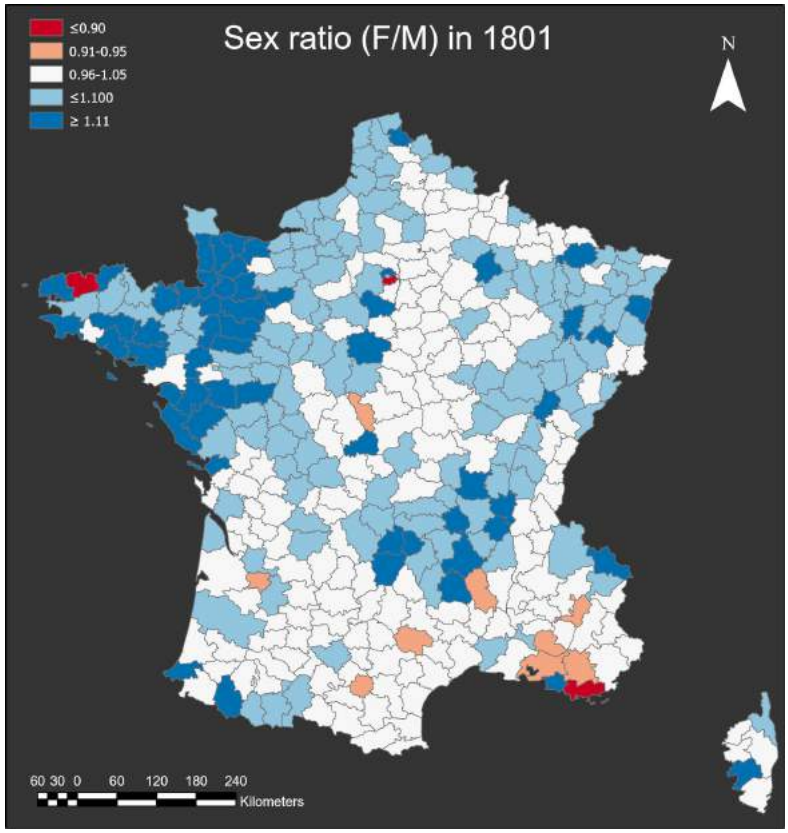
The rapid population growth in France over the sixteenth and seventeenth centuries (**fig.4**) may have precipitated an intensification of Malthusian constraints. From Sauvy to Goubert and Wrigley and Schofield, most demographic historians seem to agree that the French population was too large in the seventeenth century.[62] The eighteenth century saw a definite improvement. Dupâquier argued that France was experiencing a virtuous Boserupian cycle (pressure on resources leading to increasing agricultural productivity).[63] English population grew much more rapidly in the nineteenth centuries but strikingly did so without precipitating a Malthusian crisis.[64]

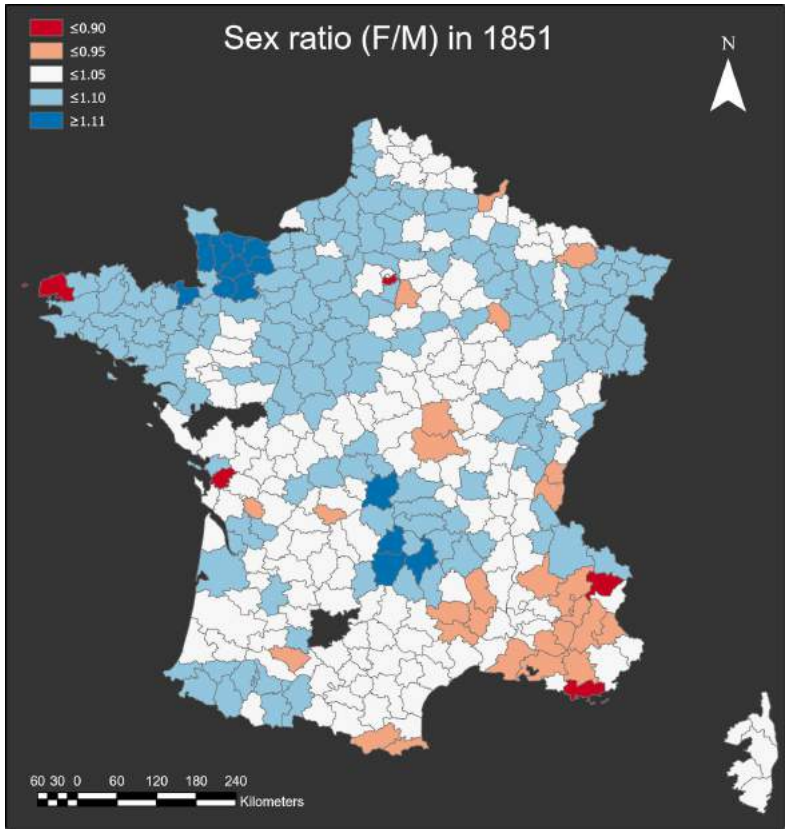
Fig. 4. Stylised evolution of population growth 1350-1900 (in million)

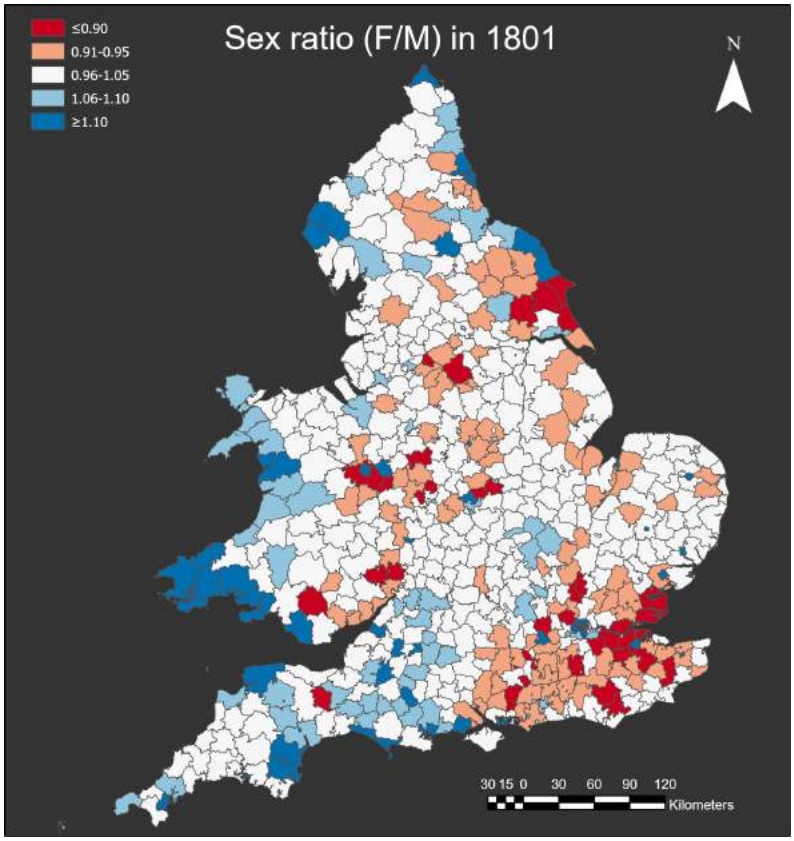


[62] Alfred Sauvy, *Théorie générale de la population.* (Paris, 1952); Pierre Goubert, *100 000 provinciaux au XVIIe siècle: Beauvais et le Beauvaisis de 1600 à 1730* (1968); Wrigley, *The Population History of England 1541-1871 : A Reconstruction*.
[63] Jacques Dupâquier, *Introduction a La Demographie Historique* (Paris, 1974).
[64] E. A. Wrigley, 'Coping with Rapid Population Growth: How England Fared in the Century Preceding the Great Exhibition of 1851', in David Feldman and Jon Lawrence (eds.), *Structures and Transformations in Modern British History* (Cambridge, 2011).

Fig. 5a-b Sex ratios in 1801 and 1851 by arrondissement and registration district






≤0.90
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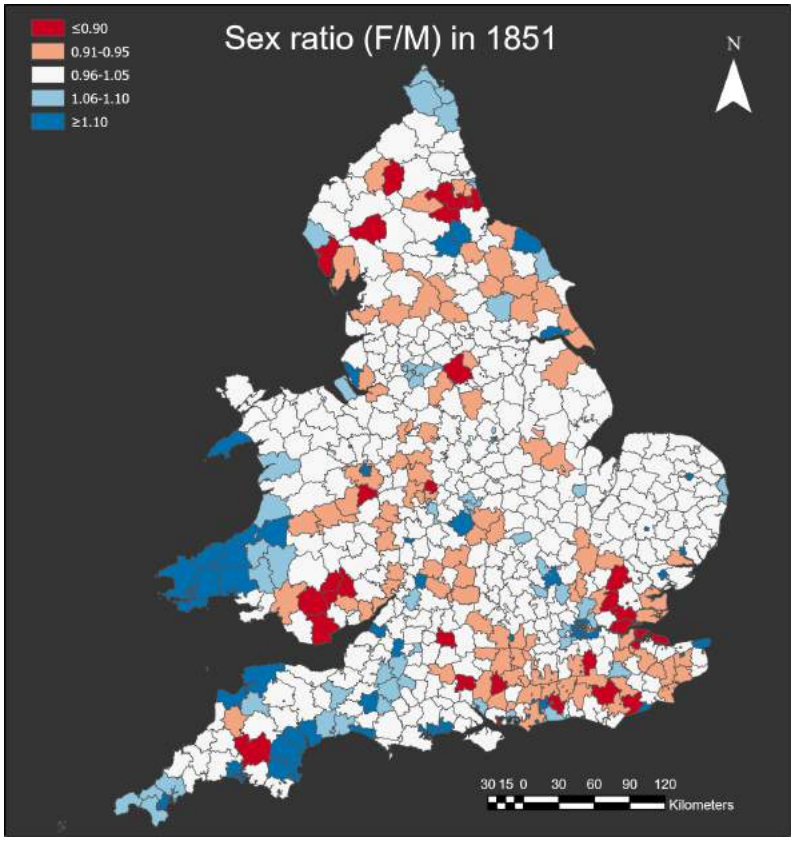
≤0.90
0.91-0.95
0.96-1.05
1.06-1.10
≥1.10
Sex ratio (F/M) in 1851
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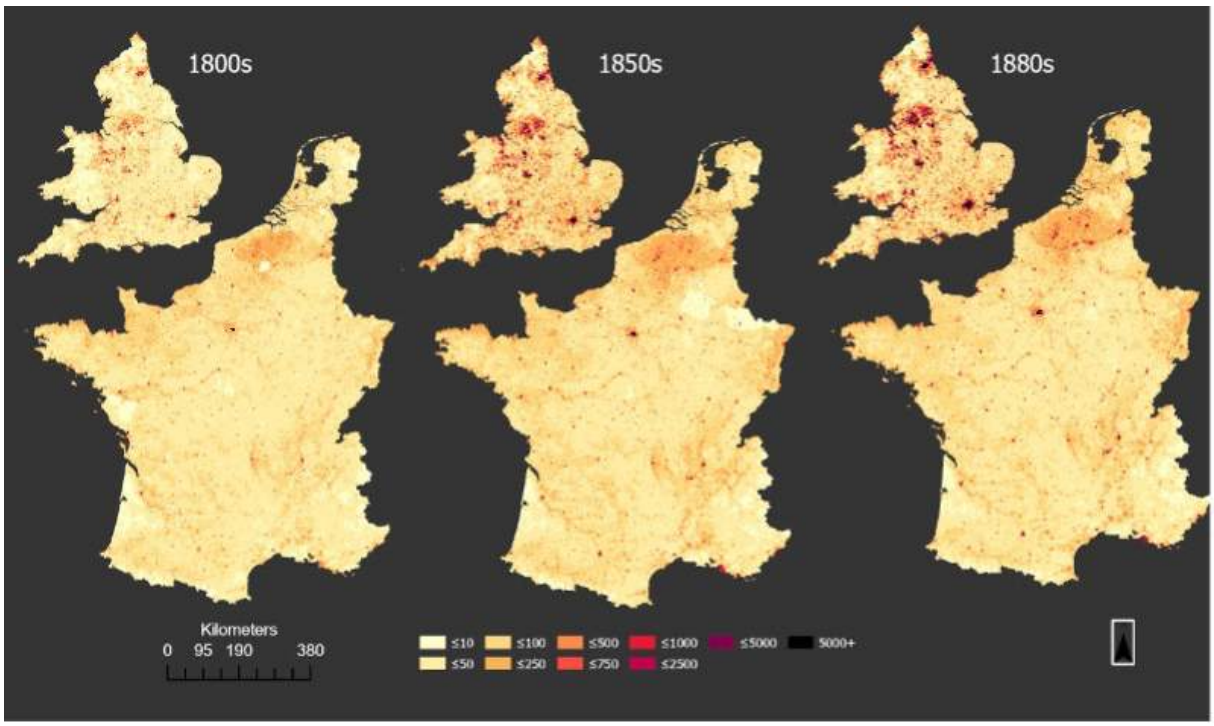
Kilometers

Fig. 6 Population density at parish/municipal level in 1794-1801, 1856-1851 and 1881[65]



More quantitative studies have confirmed this view. Weir did not identify any Malthusian pressure in France after 1740, and finally Grantham calculated that by 1800 only forty per cent of the population was required to produce all the food necessary to feed the whole population.[66] Yet, the situation might not have been as rosy as they suggest.

Firstly, national stagnation and regional improvements can coincide. Malthusian pressures dominated in most regions while some experienced faster (Boserupian) productivity growth. The divergence in regional performance in agriculture is now well documented,[67] and we know it was then a dominant factor in the geography of living standards.[68] The same was probably true across the eighteenth century.

[65] GIS-datasets for Belgium and the Netherlands kindly provided by Isabelle Devos and Rombert Stapel.
[66] David R. Weir, 'Life Under Pressure: France and England, 1670–1870', *The Journal of Economic History*, xliv (1984); Grantham, 'Divisions of Labour: Agricultural Productivity and Occupational Specialization in Pre-Industrial France'.
[67] Hoffman, *Growth in a Traditional Society, The French Countryside, 1450-1815*.
[68] Laurent Heyberger, 'Niveaux de vie biologiques, disponibilités alimentaires et consommations populaires en France au milieu du xixe siècle', *Annales de demographie historique*, cxviii (2009).

Secondly, even the more optimistic narrative does not fundamentally diminish the comparative backwardness of the French economy. The most advanced regions were able to sustain higher population density than the poorer ones, but even these remained well below levels observed in the denser regions of E&W (**fig.6**). As cross-country variations in population density were highly correlated to land productivity and technological development, just a glance at the map below should suffice to see that by 1800 Britain had reached a much higher level of development.[69] The eighteenth century looked favourably only when compared to the misery of the seventeenth century.

Third, sectoral reallocation is a consequence of economic development and not its cause. If, as contended by Grantham, only a modest share of the population sufficed to produce the calories required to sustain the whole population, while a much larger contingent was employed in agriculture, this is a clear indication of sub-optimal sectoral allocation of the labour force. Grantham himself showed that retention of a surplus rural labour force was required to match peak labour demand at harvest time, and that subsequent changes in occupational structure were fundamentally linked to improvements in transports and market integration in the second half of the nineteenth century.[70] Was this not simply the situation in most, or perhaps all, early modern societies across Eurasia at the time – apart from Britain? Here again, Britain stands as *sui generis*. The real question is why and how Britain could afford to reallocate such a large (relatively less productive) share of its population, while others were not even at similar level of GDP/capita. Older explanations were psychological (attributing the reticence to migrate to a peasant mentality) or institutional (blaming peasant property, and/or the Code Civil, for keeping unnecessary unproductive labour in rural areas), but they all work

[69] Quamrul Ashraf and Oded Galor, 'Dynamics and Stagnation in the Malthusian Epoch', *American Economic Review*, ci (2011); Oded Galor, 'The Demographic Transition and the Emergence of Sustained Economic Growth', *Journal of the European Economic Association*, iii (2005).
[70] Grantham, 'Divisions of Labour: Agricultural Productivity and Occupational Specialization in Pre-Industrial France'.

on the premise that it would have been possible to reallocate such a large share of the labour force.[71] Even Harley's recent account adopts this view:

> In France, rural labor – the peasantry – was free to move but chose to remain on the land, often substantially self-sufficient and at lower material reward than urban alternatives offered. They were able to make that choice because they owned the land. By staying on the land the peasant family chose a lifestyle that misallocated labor if we accept the criterion that marginal product should be the same in alternative uses – the retention of labor on family farms reduced the marginal product of labor in agriculture below that in the rest of the economy. In effect, peasant families chose to expend potential land rent on maintaining rural peasant status. It is hard not to accept that at least for the generations making the choice that this was an informed and rational decision.[72]

Given that France reached in 1844 the level of GDP/capita that Britain achieved in 1700 and that the share of primary sector employment in France at this date (1841) was 63 per cent of the total labour force (for both sexes), it would have taken a sectoral reallocation of 9.6 million people (that is 44 per cent of the total labour force) in order to match E&W's level of employment in the primary sector. If we do the same calculation using Britain's level of GDP/capita in 1800, which France achieved in 1874, when it had 54 per cent of its labour force in the primary sector, it would have then taken a re-allocation of over 3 million people (or 17

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[71] This includes: Paul Hohenberg, 'Change in Rural France in the Period of Industrialization, 1830â€"1914', *The Journal of Economic History*, xxxii (1972); Robert Brenner, 'Agrarian Class Structure and Economic Development in Pre-Industrial Europe', *Past & Present*, (1976); P. K. O'Brien, 'Agriculture and the Industrial Revolution', *The Economic History Review*, xxx (1977); O'Brien and Keyder, *Economic Growth in Britain and France, 1780-1914 : Two Paths to the Twentieth Century*; Maurice Agulhon et al., *Histoire de la France rurale, tome 3 : De 1789 à 1914* (1992); Patrick Karl O'Brien, 'Path Dependency, or Why Britain Became an Industrialized and Urbanized Economy Long before France', *The Economic History Review*, xlix (1996).

[72] C. Knick Harley, 'British and European Industrialization', in Jeffrey G. Williamson and Larry Neal (eds.), *The Cambridge History of Capitalism: Volume 1: The Rise of Capitalism: From Ancient Origins to 1848* (Cambridge, 2014), i.

per cent of total labour force). How likely was that to happen in a short period of time? Our argument, in a nutshell, is that France could not have reallocated such a large share of its labour force, as: **i)** the urban demand for this extra labour did not exist, **ii)** the urban infrastructure required to maintain such a large population was non-existent, **iii)** French living standards were so low that the urban penalty caused by mass urban migration would have led to a major human and demographic catastrophe, and **iv)** the institutional mitigation of the costs associated to the transfer of labour from surplus regions (the Poor Law) did not exist in France.[73] Lewis and O'Brien and Keyder were therefore probably right in describing a French path – potentially even an 'everyone-else-but-Britain' path – to economic development based on limited population growth to maintain decent levels of GDP per capita throughout the nineteenth century, and a slow release of labour from the countryside to mitigate the negative effects of rapid urbanisation.[74] After all, keeping people on the land might have been a necessary social and welfare policy for societies with very low living standards and deficient infrastructures.

The situation could not have been more different across the Channel where higher agricultural productivity fed – literally – the very rapid urbanisation of the country. By 1600, the population of E&W was only marginally more urban than France, but two centuries later the difference was staggering (**table 2**). By 1800, the size of the population living in areas considered to be urban in E&W was a third higher than in France, and the share of the population living in large towns and cities was almost three times higher. The relationship between the growth of urban settlements and the rest of the country is a key element in the social and economic developments happening between 1550 and 1700. In a seminal article, EA Wrigley showed that the rise of cities is a signal of economic development (which made

[73] Peter M. Solar, 'Poor Relief and English Economic Development before the Industrial Revolution', *The Economic History Review*, xlviii (1995); Peter M. Solar, 'Poor Relief and English Economic Development: A Renewed Plea for Comparative History', *The Economic History Review*, l (1997).
[74] Lewis, 'Economic Development with Unlimited Supplies of Labour'; O'Brien and Keyder, *Economic Growth in Britain and France, 1780-1914 : Two Paths to the Twentieth Century*.

urbanisation possible in the first place),[75] but also that it drove further economic change: market integration, increasing agricultural productivity, the rise of a mineral economy, lower transport costs, rising real wages and demand for industrial goods.[76]

Table 2 Urbanisation rates at different thresholds in France and in E&W[77]

DATES	FRANCE			E&W		
	2,000+	5,000+	10,000+	2,500+	5,000+	10,000+
1700/1671	17	12	8	17	13	10
1806/1801	19	12	9	34	28	24
1821	20	*15*	*10*	40	34	29
1831	21	17	11	45	40	34
1841	23	*18*	*13*	49	44	38
1851	26	19	14	54	49	44
1861	28	*23*	*18*			
1871	31	*28*	*22*			
1881	35	*30*	*24*			

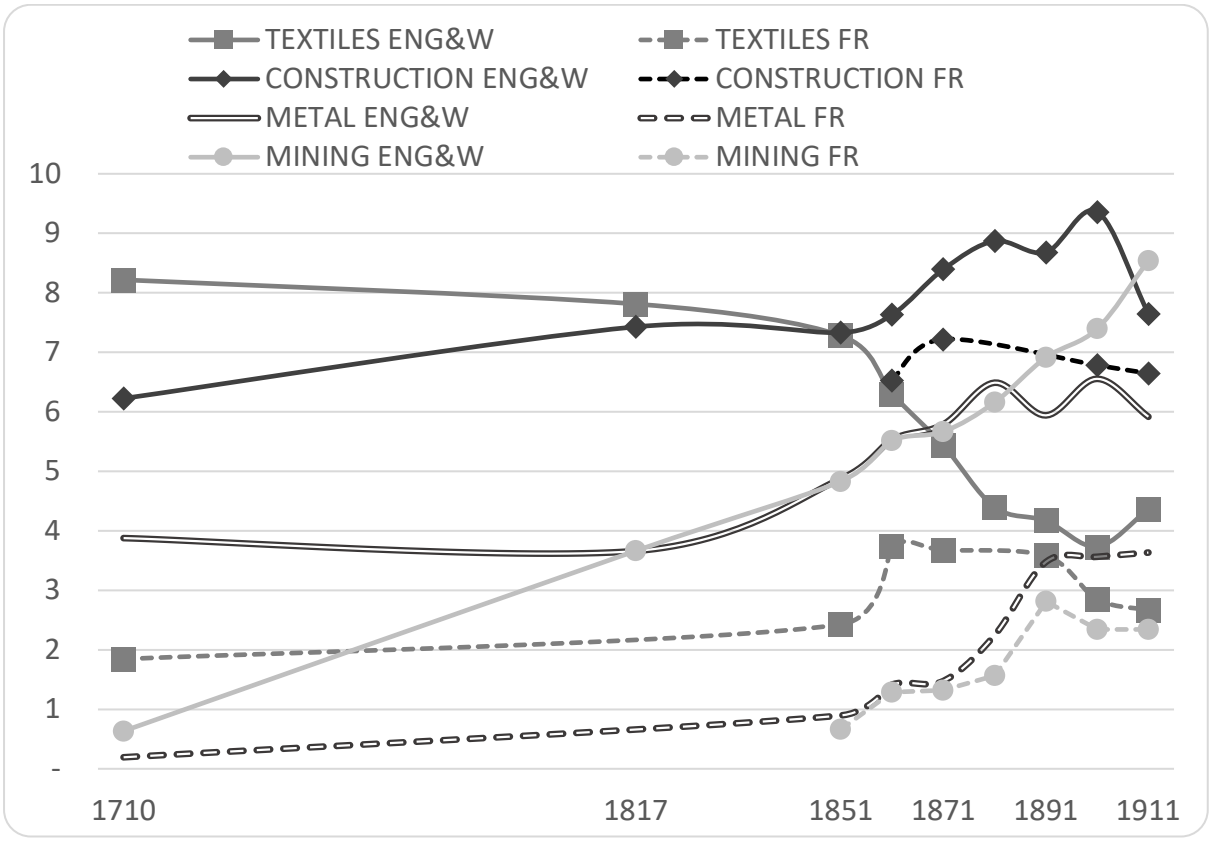
Unlike the food and processing industry, the share of the industrial labour force employed in construction was not sensitive to the increase in size of the secondary sector, i.e., that the demand elasticity of the construction industry was close to one during the second half of the nineteenth century. The expectation, however, would be that a faster rate and level of urbanisation in E&W would have led to an equivalent increase in the share of employment in the construction industries, but this is not visible in our data. Why? It might be that British

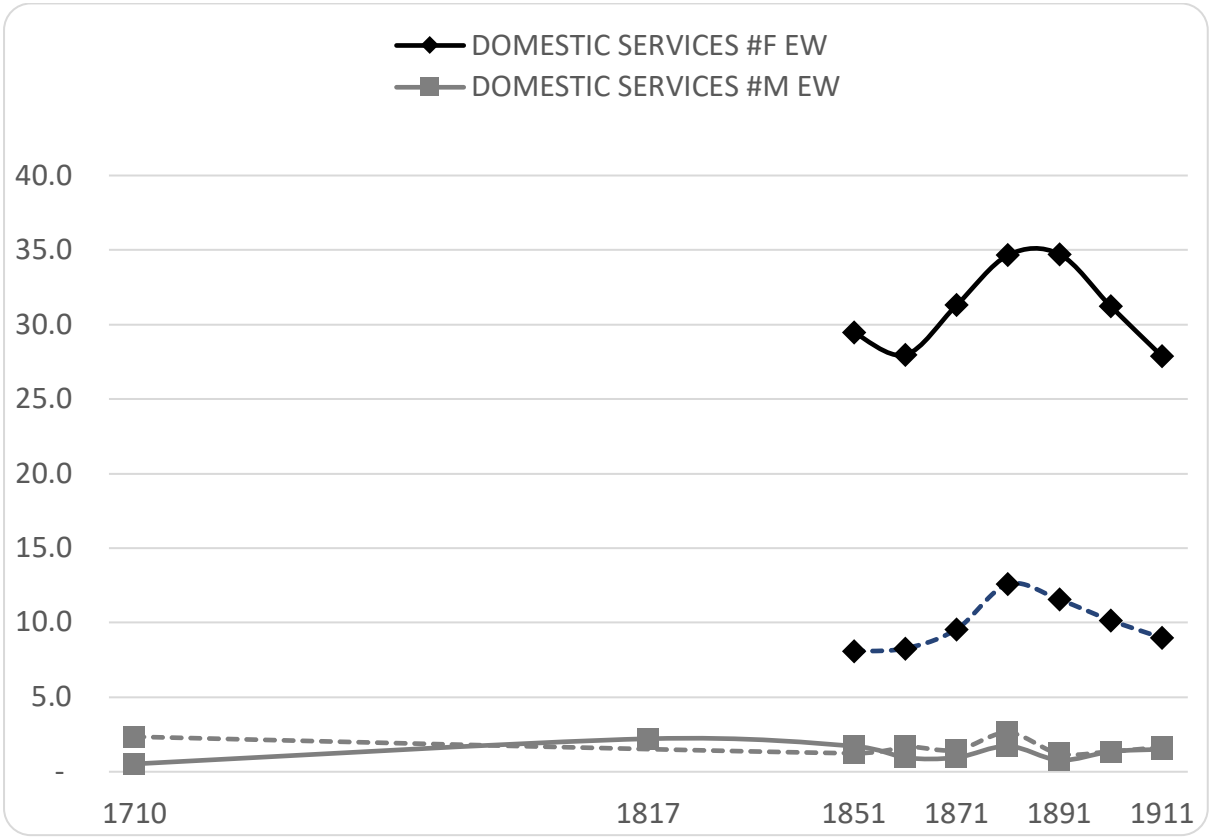
[75] E. A. Wrigley, 'A Simple Model of London's Importance in Changing English Society and Economy 1650–1750', *Past & Present*, xxxvii (1967).
[76] E.A. Wrigley, *Energy and the English Industrial Revolution* (2010).
[77] Data for France from: Jacques Dupâquier, Mée René Le, and Joseph Goy, *Histoire de La Population Française de 1789 à 1914* (Paris, 1988), iii; Paul Bairoch, Jean Batou, and Pierre Chèvre, *La population des villes européennes, 800-1850: banque de données et analyse sommaire des résultats* (1988); Marchand and Thélot, *Deux Siècles de Travail En France: Population Active et Structure Sociale, Durée et Productivité Du Travail*; Wrigley, 'Urban Growth and Agricultural Change: England and the Continent in the Early Modern Period'; Jan De Vries, *European Urbanization, 1500-1800* (1984); John Langton, 'Urban Growth and Economic Change: From the Late Seventeenth to 1841', in Peter Clarke (ed.), *The Cambridge Urban History of England, 1540 – 1840*, Book, Section vols (Cambridge, 2000), ii. The series are not homogeneous as definitions of urban population are not strictly identical. Figures in italics are linearly interpolated from the closest available census date.

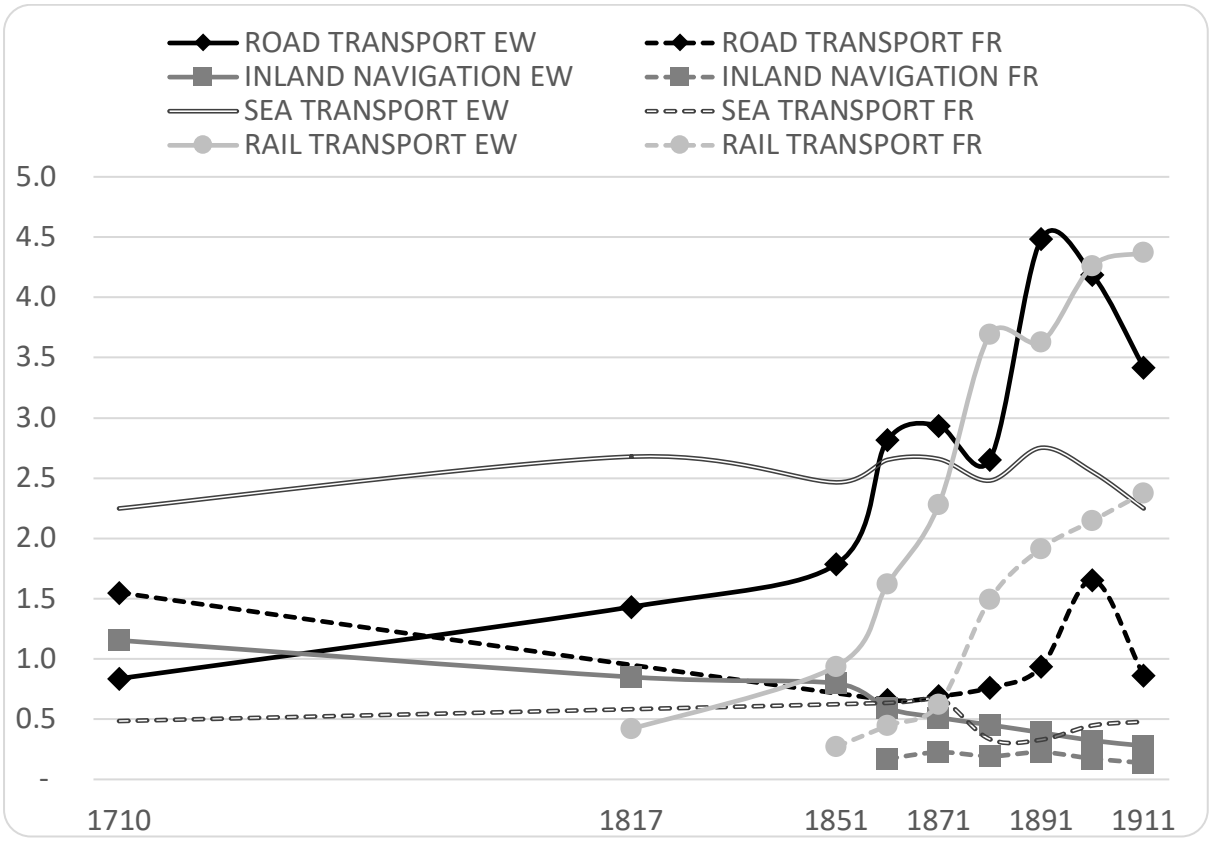
construction workers enjoyed a higher productivity, or simply a case of misreporting in the original data - but at least two more factors might explain this evolution: **i)** Britain had a major competitive advantage in brick making compared to France, and the share of total construction using brick is very likely to have been much higher in Britain than in France throughout the period, which confers a secondary advantage in productivity compared to oak or stone building; **ii)** the share of the total labour input in the construction industries used for new builds vs. renovations or repairs has never been estimated for historical periods, but given that refurbishments amounted to 42 per cent of the total output of the UK construction industry in 2020, it is not unlikely that two thirds of the labour force in the construction industries would have been employed in repair work in the early nineteenth century, when building standards and longevity were significantly lower than today.[78] If so, the more prevalent use of brick in E&W compared to timber probably increased the durability of buildings and reduced the needs for annual repairs, which in turn freed labour time for new constructions.

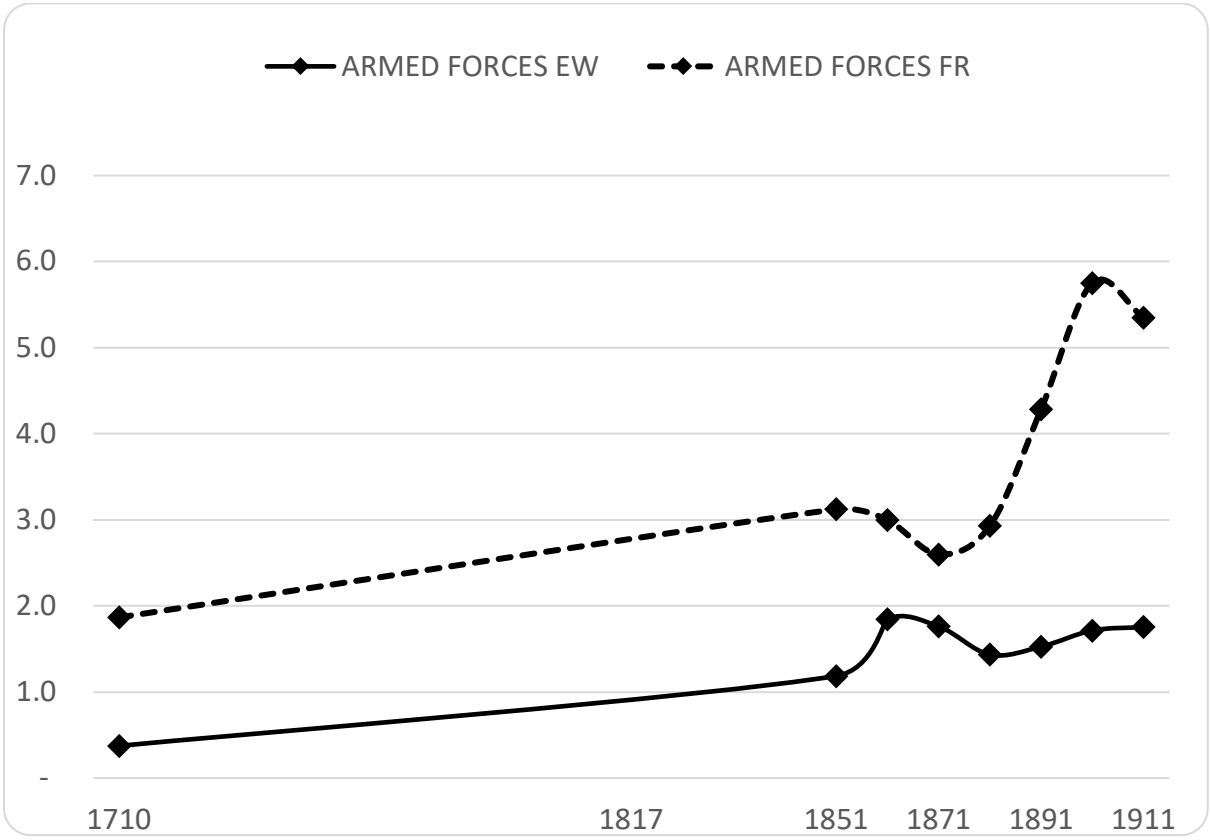
Fig.2 Distribution of the male labour force for key subsectors 1700-1911 (in %)

[78] Office for National Statistics, 'Construction Statistics, Great Britain', (2021).


TEXTILES ENG&W
TEXTILES FR
CONSTRUCTION ENG&W
CONSTRUCTION FR
METAL ENG&W
METAL FR
MINING ENG&W
MINING FR
10
9
8
7
6
5
4
3
2
1
-
1710
1817
1851
1871
1891
1911


DOMESTIC SERVICES #F EW
DOMESTIC SERVICES #M EW
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
-
1710
1817
1851
1871
1891
1911


ROAD TRANSPORT EW
ROAD TRANSPORT FR
INLAND NAVIGATION EW
INLAND NAVIGATION FR
SEA TRANSPORT EW
SEA TRANSPORT FR
RAIL TRANSPORT EW
RAIL TRANSPORT FR
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
-
1710
1817
1851
1871
1891
1911


ARMED FORCES EW
ARMED FORCES FR
7.0
6.0
5.0
4.0
3.0
2.0
1.0
-
1710
1817
1851
1871
1891
1911

3. The transition to a mineral economy and energy-intensive production

Alongside rising urbanisation, E&W underwent a radical shift in its energy base from charcoal and firewood to coal. According to Nef (1932), this energy divergence started after 1540, when the use of coal in England increased very rapidly. By 1650, and uniquely for any contemporary economy, E&W was well advanced in this process of mineralisation with a third of all the energy consumed coming from coal (**table 3**). Nef later argued that coal use in England had then stagnated until the later eighteenth century[79] – which we now know not to be the case.[80] He also added that between 1735 and 1785 'the output of coal and iron grew faster in France than in England'.[81] The higher growth rate for coal in France is factually correct with coal output growing from c.100,000 tons a year in 1720 to c.600,000 tons by 1789,[82] but it reflects first and foremost the fact that the French coal industry was so very small by 1735 that its growing rapidly was of little significance compared to the slower growth rate (but from a much larger base, around three million tons a year in the 1700s to over fifteen million by 1800)[83] in Britain. Overall, coal output and consumption grew steadily and at a much higher average annual growth rate in E&W than in France from the sixteenth to the nineteenth centuries. The comparative lens clarifies this debate: by 1800 the annual coal consumption per capita in E&W reached 41 gigajoules, and barely 0.7 gigajoules in France! By 1851, almost five per cent of the male labour force in E&W was employed in mining while it only occupied a meagre 0.7 per cent of the French male labour force. Nef's claim that 'no domestic practice marked off

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[79] John U. Nef, 'The Industrial Revolution Reconsidered', *The Journal of Economic History*, iii (1943).
[80] Paul Warde, *Energy Consumption in England & Wales, 1560-2000* (2007); Wrigley, *Energy and the English Industrial Revolution*; Astrid Kander, Paolo Malanima, and Paul Warde (eds.), *Power to the People* (Princeton, N.J., 2014).
[81] Nef, 'The Industrial Revolution Reconsidered', 18.
[82] Marcel Rouff, *Les mines de charbon en France au XVIIIe siècle, 1744-1791: étude d'histoire économique et sociale* (1922); Jean-Francois Belhoste, 'L'essor de l'usage Industriel Du Charbon En France Au XVIIIe Siècle', *Le Charbon de Terre En Europe Occidentale Avant l'usage Du Coke* (1999), 44 (NS 7).
[83] Hatcher, *The History of the British Coal Industry*; Brian R. Mitchell, *British Historical Statistics* (1988), 247.

English from Continental, and particularly French, life more sharply than the use of this newly adopted coal fire' was as true in 1640 as it was in 1800, and perhaps even in 1850.[84]

The higher energy output was driven by the energy intensive industrialisation and the growing demand for domestic coal heating spurred by rapid urbanisation, directly related to the higher share of the male labour force employed in mining in E&W (**fig.8**). This fact, already outlined by Nef and Wrigley, is not unexpected. What is more surprising is that the ratio of the share of the industrial value added to the labour force in the extractive industries should be the same in the two countries (**table 1** column 6), and that the productivity gap between the two countries (column 7) did not exceed a factor of 2. This signals the enabling rather than revolutionary role of technological change in the extractive industries before 1800. From the 1760s the key progress achieved with early steam pumps and steam haulage[85] (for getting coal up the pit shaft) made possible (by shifting the decreasing marginal return curve to the right) the large increase in coal extracted – from deeper, better ventilated shafts – but it did not fundamentally alter the apparent productivity of labour at the coalface until much later in the nineteenth century.[86] The work of a coal miner was fundamentally the same throughout the period, but technology simply made it possible to mine much more of it.

And with this enormous increase in the supply of coal in the economy (see **table 3** below) came major positive externalities for the more voracious industrial sectors, such as the salt, brewing, glass (lead-oxide crystal), ceramics (especially stoneware) metal wares and the smelting of non-ferrous metals – all elements already mentioned by Perlin in the 1550s! The very large difference in the share of the male population (and therefore most likely of the whole population) employed in the metal industries illustrates the tail end of this process very clearly.

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[84] Nef, 'A Comparison of Industrial Growth in France and England from 1540 to 1640', 170.
[85] G. Clark and D. Jacks, 'Coal and the Industrial Revolution, 1700-1869', *European Review of Economic History*, xi (2007).
[86] G. N. Von Tunzelmann, *Steam Power and British Industrialization to 1860* (1978).

By 1800 just under 4 per cent of the total male labour force was employed in the metal industries in E&W but under 0.5 per cent of the total male labour force in France, a staggering eight-fold difference. Pig iron output figures per capital show a similar gap between the two economies: from 4,705 tons per million inhabitants in EW in 1700 to 11,250 tons per million inhabitants by 1790, compared with 1,100 tons and 3,392 tons in France at the same dates.[87]

Our data also confirm the negative correlation between increased pressures on wood resources (the so-called "timber crisis") and coal mining in France from the late eighteenth century. The higher the price of heating and fuel the stronger the incentive to overcome the natural barriers to large-scale coal mining, i.e., pumping water out and transporting cheaply large amounts of coal. Urbanisation, intensive arable farming, an increase in the share of pastoral land required for meat-rich urban diets, and the large forestry cover required to produce timber and charcoal for construction and both industrial and domestic processes, all contributed to raising wood prices up to a level that progressively made it economically viable to dig coal on an industrial scale,[88] but whereas this process started in the 1650s in E&W, our data for France show a clear scissor effect in the evolution of the share of the labour force employed in the mining and forestry industries happening only after 1850 (**fig. 8**). By 1800 mining occupied only a trivial share of the labour force. At the same time, forestry occupied eight times as large a relative share of the labour force in France than in England at what might have been France's peak dependence on wood (the share of the male labour force employed in forestry reaches its maximum in 1881). It is no surprise that current scholarship points at the mid-nineteenth

[87] Mitchell, *British Historical Statistics*, 280; Philip Riden, 'The Output of the British Iron Industry before 1870', *The Economic History Review*, xxx (1977), 443; Crouzet, 'Angleterre et France au XVIIIe siècle', 268.
[88] R. C. Allen, 'Why the Industrial Revolution Was British: Commerce, Induced Invention, and the Scientific Revolution', *The Economic History Review*, lxiv (2011).

century as the historical minimum of French forestry cover, well below its level at the last Ice Age, and current levels.[89]

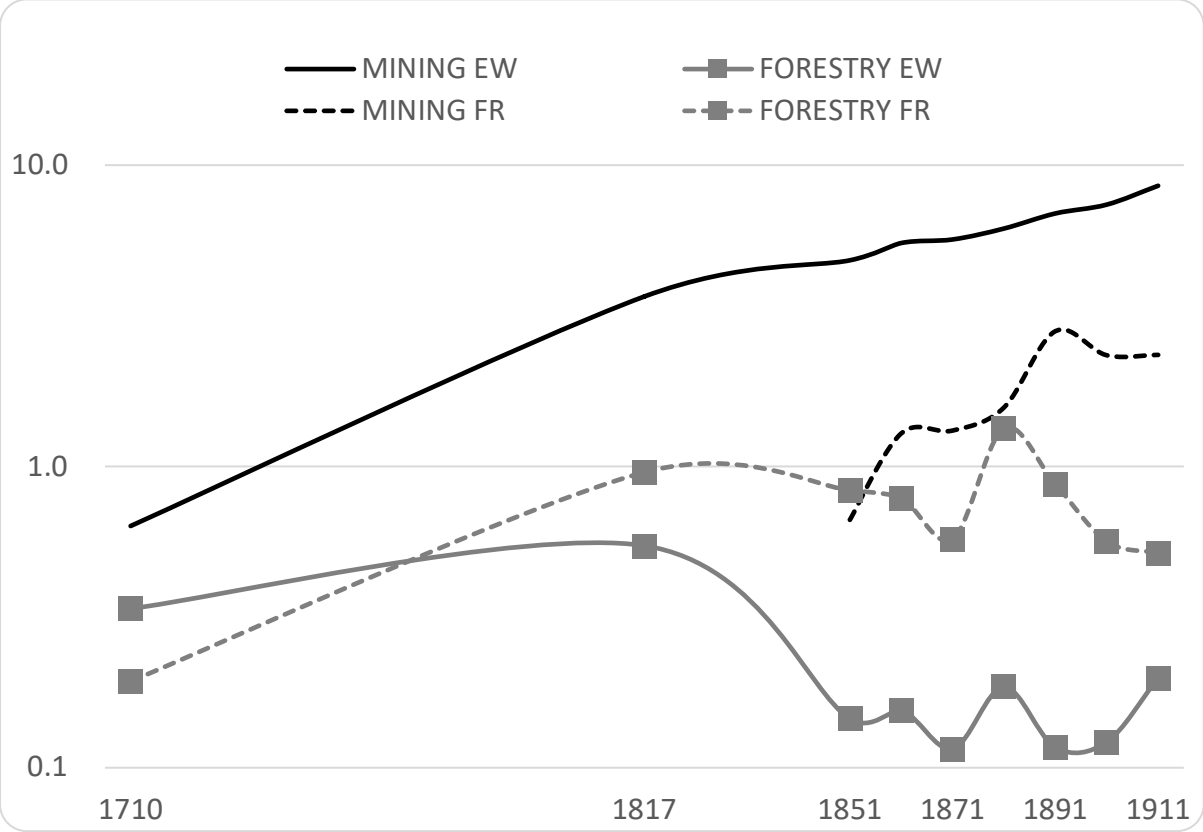
Table 3 Mineralisation of energy expenditure, 1650-1900[90]

DATE	*(EW) %*	*(FR) %*	*(EW*) GJ*	*(FR*) GJ*
1650	32.1	-	6.5	-
1700	48.6	-	14.8	-
1800	77.5	3.8	40.8	0.7
1850	91.7	27	82	5.7
1900	95.5	73.6	144.1	36

Share of coal in total energy expenditure (%) **(E&W)** and **(FR)**
Per capita coal consumption (in Giga Joules) **(E&W*)** **(FR*)**

[89] Xavier Rochel et al., 'Quelles sources cartographiques pour la définition des usages anciens du sol en France ?', *Revue Forestière Française*, (2017); J. Dupouey et al., 'Cartographie Des Forêts Anciennes de France : Objectifs, Bilan et Perspectives', *Colloque International « Géohistoire de l'environnement et Des Paysages »* (Toulouse, 2016); R. Fuchs et al., 'A High-Resolution and Harmonized Model Approach for Reconstructing and Analysing Historic Land Changes in Europe', *Biogeosciences*, x (2013); Richard Fuchs et al., 'The Potential of Old Maps and Encyclopaedias for Reconstructing Historic European Land Cover/Use Change', *Applied Geography*, lix (2015); Richard Fuchs et al., 'Gross Changes in Reconstructions of Historic Land Cover/Use for Europe between 1900 and 2010', *Global Change Biology*, xxi (2015).
[90] Warde, *Energy Consumption in England & Wales, 1560-2000*; Kander, Malanima, and Warde, *Power to the People*.

Fig. 8 Forestry and mining occupational shares, 1710-1911



4. Productivity growth in the textile industry.

By 1851 – the end of the classical period of the Industrial Revolution – the share of the male labour force employed in the secondary sector in E&W had only increased to 50.8 per cent of the male labour force: an increase of less than 15 per cent over 140 years! By 1700 the British population was not much less industrial than a century and a half later. Yet the nature of industrial labour changed dramatically over this period with the rise of more geographically concentrated and mechanised production. In France, the situation could not have been more different. By 1700 around 16 per cent of the male labour force was occupied in the secondary sector to reach just over 25 per cent by 1851 (an increase of 58 per cent). Given that over the same period the total industrial output grew by a multiple of 116 in Britain[91] but only 6.5 times

[91] Broadberry et al., 'British Economic Growth, 1270–1870'.

in France,[92] it is clear (regardless of the reliability of these figures) that British industrialisation was achieved mostly by productivity gains linked to mechanisation and regional specialisation while French industrialisation up to 1851 was infinitely slower and more labour intensive. As the French economy started from a much lower initial share of employment in the secondary sector, the effects of productivity growth in the modernising sectors (which certainly existed) remained imperceptible at an aggregate level until much later in the nineteenth century, because of the overall growth in the size of the secondary sector.

Were data available to consider figures for the both sexes together, the comparison would undoubtedly be even more striking. Between 1700 and 1851 the estimated share of the female labour force employed in the secondary sector in E&W collapsed from 51 to 39 per cent (**table 1b**).[93] Symbolic of this slump was the complete annihilation of the hand-spinning industry in the south-east caused by mechanisation and further concentration in the textile heartlands.[94] There is still sadly no equivalent data for eighteenth-century France, but it is very likely that the total share of the female labour force employed in industry grew throughout the eighteenth and nineteenth centuries alongside and *in spite* of limited mechanisation. Although in both countries, textiles represented a very large share of the industrial output in the late eighteenth century – woollens on their own represented almost twenty per cent of the French industrial output c.1790 – nowhere in Europe was the share of the labour force employed in textiles as high as in E&W.[95] Compared to France, the share of total employment in the textile industry in E&W remained three times larger (15% to 4.3%) by 1851, and still twice as large

[92] Ridolfi, 'The French Economy in the Longue Durée'; Jean-Claude Toutain and Yves Breton, *La croissance française, 1789-1990: nouvelles estimations* (Paris, 1997).
[93] Note these figures are for the total amount of labour input, not individuals in the labour force. It could be 75% of women with half of them working half time and half full time for instance. In any case, the actual number of women employed in the secondary sector will be far more than 50% in 1760.
[94] Leigh Shaw-Taylor, 'Diverse Experiences: The Geography of Adult Female Employment and the 1851 Census', in Nigel Goose (ed.), *Women's Work in Industrial England: Regional and Local Perspectives* (Hatfield, 2007). See also: www.economiespast.org
[95] Tihomir J. Markovitch, 'La croissance industrielle sous l'Ancien Régime', *Annales*, xxxi (1976).

by 1891 (12.1% to 6.8%). By 1851, it was at least twice as large for men and three times as large for women (**fig.9**), and these ratios would have been much greater a century earlier. Only perhaps in the districts which had a very high share of the female labour force employed in textiles in the late eighteenth century (especially in Normandy, but even there the amount of rural by-employment undertaken by these women considerably blurs the picture of predominant female textile employment that emerges from raw census data) mechanisation caused a de-industrialisation similar in scale to what occurred across southern England (Terki-Mignot, in progress).

The evolution of the textile industries throughout the eighteenth and nineteenth centuries in E&W also underlines another major – and often overlooked – comparative aspect, that is the very significant divergence between English and French textiles before the era of mechanised spinning and the path-dependency that resulted from this early specialisation. Unlike R.C. Allen's view that France failed to adopt the spinning Jenny because of skewed relative factor prices ('wages were too low in France to make it profitable to invest in labour replacement technology'), it is clear that French textile entrepreneurs did know and experiment with Jennies from the 1770s, but that the technology failed to catch on, not because of labour costs in spinning, but because of the major structural differences (counts spun, organisation of household production, and concentration) between French and English textile industries.[96] Nef had already argued that textiles were not the first but among the last industries to be revolutionised by mechanisation, and were rather marked by a relative absence of change in the production process throughout the early-modern period.[97] Everywhere most of the production – and certainly all the preparatory work – was organised as a loose and poorly

[96] John Styles, 'The Rise and Fall of the Spinning Jenny: Domestic Mechanisation in Eighteenth-Century Cotton Spinning', *Textile History*, li (2020).
[97] John Ulric Nef, *Industry and Government in France and England, 1540-1640.* (Ithaca, 1957); John Ulrich Nef, *The Conquest of the Material World* (Chicago, 1964).

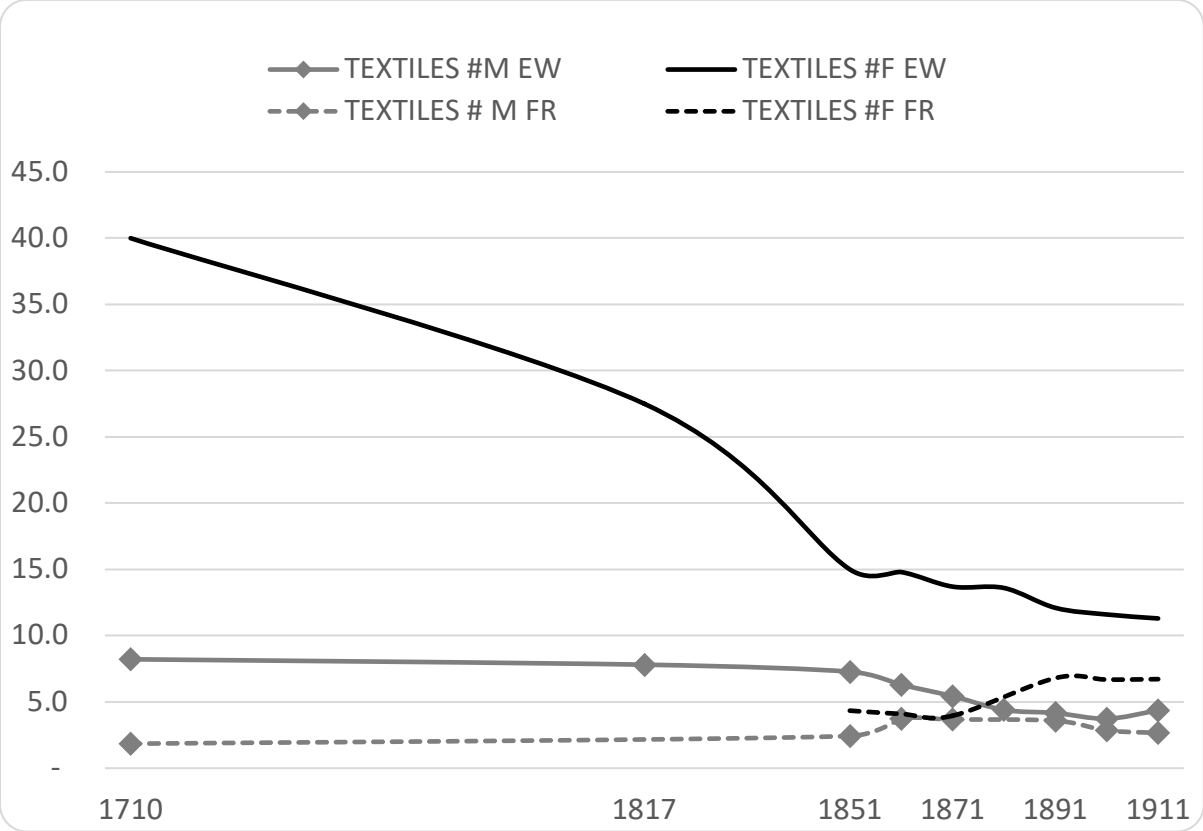
interconnected network of cottage industries. France might have held a competitive advantage in the headline-grabbing production of niche upper-market goods such as lace, tapestry, silk, and fine clothing, often supported by public investment in highly capital-intensive production, such as in the *Manufactures Royales*, but this was a superficial illusion detracting attention from the low-quality, low capital intensity, poorly integrated and regulated production of coarser yarn and fabric that dominated throughout the country. In E&W, inversely, the rapid growth in the demand for cloth and household textile goods from the expanding group of middling-sorts consumers and urbanites led to an early (c.1700) concentration in the woollens and cotton industries: in East Anglia, in the West Riding and Lancashire, but also in the finishing process in and around London, especially in the dyeing trades. The agglomeration effects derived from this concentration were unparalleled in France, and the industrial geography of nineteenth century France largely mirrors regional patterns established before 1700.

In both countries, the value added per worker was higher in the chemical industries (encompassing soap, wax and candles and gunpowder, but also critical intermediary products such as dye, potash, alkali, soda and starch). Growth in the chemical industry was proportional to the textile industries. Kerridge estimated that around a fifth of the cost of woollen cloth came from dyeing (soap and dyes), but also wax and starch for weaving linen,[98] and Barker showed that textiles (mainly cottons) and the hard soap and glass industries were the three main consumers of alkali. Given that the output of the textile industries in E&W was more than twice the value of the French output and increasing very rapidly in the late eighteenth century, demand for chemical intermediary products was also logically twice as large. The rising costs of these chemicals because of trade disruption (warfare) and rising competition for resources

[98] Brian W. Peckham, 'Technological Change in the British and French Starch Industries, 1750-1850', *Technology and Culture*, xxvii (1986).

from all European textile industries were serious additional production expenses for manufacturers, in both England and France, and led to the industrial production of synthetic substitutes.[99] Higher consumer demand and a faster rate of urbanisation in E&W might also have played a role in creating a larger market for domestic products such as candles and soap.

Fig.9 Share of the labour force employed in the textile industries, 1700-1900



5. Demand-led occupational change: food, drink and consumer goods

Although demand-led explanations of the Industrial Revolution have not convinced economic historians (including in its last incarnation, the "industrious revolution"),[100] sub-sectoral occupational data clearly indicate the impact of living standards on the development of

[99] T. C. Barker, R. Dickinson, and D. W. F. Hardie, 'The Origins of the Synthetic Alkali Industry in Britain', *Economica*, xxiii (1956).
[100] Jan de Vries, 'The Industrial Revolution and the Industrious Revolution', *The Journal of Economic History*, liv (1994); Jan de Vries, *The Industrious Revolution : Consumer Behavior and the Household Economy, 1650 to the Present* (Cambridge, 2008).

consumer-oriented industries in the early modern period, such as clothing, shoe making and more generally textiles.[101] Together, these sectors accounted for over half of the entire industrial output of both countries before 1800 (**table 1**). Our data show that the precocious specialisation of English industry in consumer goods is already notable in 1700 (**fig. 10a-c**) and contrasts dramatically with the situation in France where a strikingly high proportion of the labour force concentrated in the processing of food and drink. This difference must necessarily be the result of very different levels of demand for these goods, and therefore we would argue of living standards. By 1740, the Welsh political economist Josiah Tucker was in no doubt as to the social diffusion of these new goods across society:

> The Manufactures of the Kingdom … are more adapted for the Demands of Peasants and Mechanics, in order to appear in warm Circumstances; - for Farmers, Freeholders, Tradesmen, and Manufacturers in middling Life; and for wholesale Dealers, Merchants, and all Persons of Landed Estates, to appear in genteel Life; than for the Magnificence of Palaces, or the Cabinets of Princes. Thus it is, according to the very Spirit of our Constitution, that the English of these several Denominations have better Conveniencies in their Houses, and affect to have more in: Quantity of clean, neat Furniture, and a greater Variety (such as Carpets, Screens, Window Curtains, Chamber Bells, polished Brass Locks, Fenders, &c. &c. (Things hardly known Abroad among Persons of such a Rank) than are to be found in any other Country in Europe, Holland excepted. … Were an Inventory to be taken of the Houshold Goods and Furniture of a Peasant, or Mechanic

[101] This does not reassert demand as a cause for the Industrial Revolution but shows that higher demand was the consequence of the economic development of England before 1700.

> in France, and of a Peasant, or Mechanic in England, the latter would be found, upon an Average, to exceed the former in Value at least as three to one.[102]

There is now a growing literature on comparative living standards, mostly in reaction to Allen's high-wage economy thesis and its relation to mechanisation in the textile industry.[103] Despite all the nuances and criticisms waged at Allen's work, and the new data produced since its publication, so far none has however repudiated the fundamental fact that aggregate living standards were significantly higher in Britain than in France in the eighteenth century, and that for this simple reason aggregate demand must have been significantly higher. The size of the gap remains an open question, but not the gap itself.

The relative size of the footwear industry provides indirect evidence of this. By 1700 the share of the male labour force employed in the footwear industry was twice as large in E&W than in France, and it was still at least 50 per cent larger in 1850. Shoes were – and perhaps still are for a large part of lower income countries, especially for children – among the most visible tell-tale sign of economic development. Our comparative data are supported by other evidence. In eighteenth-century France, indigents were commonly called '*va-nus-pieds*', denoting the strict footwear hierarchy of poverty. Beyond social standing, the relationship between footwear quality and living standards was commonly accepted as a reliable indicator

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[102] Josiah Tucker, *Instruction for Travellers*, 1758, p.40. Quoted in Neil McKendrick, *The Birth of a Consumer Society : The Commercialization of Eighteenth-Century England* (London, 1982), 25–6; Margaret Spufford, *Great Reclothing of Rural England: Petty Chapman and Their Wares in the Seventeenth Century* (1984), 4.

[103] Apart from the literature on real wages mentioned above, see Ugo Gragnolati, Daniele Moschella, and Emanuele Pugliese, 'The Spinning Jenny and the Industrial Revolution: A Reappraisal', *The Journal of Economic History*, lxxi (2011); Craig Muldrew, '"Th'ancient Distaff" and "Whirling Spindle": Measuring the Contribution of Spinning to Household Earnings and the National Economy in England, 1550–17701', *The Economic History Review*, lxv (2012); Jane Humphries and Benjamin Schneider, 'Spinning the Industrial Revolution', *The Economic History Review*, lxxii (2019) and the ensuing debate with Allen, including:; Jane Humphries and Benjamin Schneider, 'Losing the Thread: A Response to Robert Allen', *Economic History Review*, lxxiii (2020); Judy Z. Stephenson, 'Mistaken Wages: The Cost of Labour in the Early Modern English Economy, a Reply to Robert C. Allen', *The Economic History Review*, lxxii (2019), and the ensuing debate with Allen in EHR; John Styles, 'Robert Allen's Spinning Jenny Is Still Broken.', *The Spinning Project*, (2019); Humphries and Schneider, 'Losing the Thread'.

of impoverishment.[104] The intendant Vauban described the immiseration of late seventeenth-century peasants as suffering 'from hunger and nudity,' with 'three quarters of them only wearing – in both summer and winter – half rotten and torn fabric *and clogs, which they wear bare foot throughout the year. If they do happen to own shoes, they are only worn on Sundays and holidays*.'[105] The iconography of footwear is equally revealing. Take two paintings by Louis Le Nain (**illustrations 1a-b** below) both dating from 1642 with a remarkably similar composition: in the first one, *Les Petits joueurs de cartes*, a group of youngsters are playing cards under the vigilant care of a maid and either an older brother or a young servant. The two boys in the foreground, clearly from a less affluent household than the children on the other side of the table, are barefoot. We cannot see the feet of the other children, but in another version of this painting held in the Royal collection, the elegantly dressed boy coming through the door on the right-hand side very visibly dons a pair of leather shoes. As is often the case in Le Nain brothers' paintings of peasants' interiors, shoes reveal the social dynamic of the group. The second painting is even more revealing in this regard. In *Repas de paysans* Le Nain puts together an allegoric triptych of the social condition of French peasantry: in the middle a rich farmer dressed in a shiny coat with a white-collar shirt and a carefully trimmed beard accompanied by his son, dressed in the same manner and holding a violin; on the left a relatively wealthy peasant household represented by a man with simple unsullied woollen shirt and trousers slightly damaged at the knees, indicating his working condition, and his wife and son both dressed in a similar manner. The man wears shoes. Finally, on the right-hand side, a

[104] Giorgio Riello, *A Foot in the Past: Consumers, Producers and Footwear in the Long Eighteenth Century* (2006).
[105] Sébastien Le Prestre Vauban, *Description géographique de l'élection de Vézelay: contenant ses revenus, sa qualité, les moeurs de ses habitants, leur pauvreté et leur richesse, la fertilité du pays et ce que l'on pourrait y faire pour en corriger la stérilité et procurer l'augmentation des peuples et l'accroissement des bestiaux*, ed. Jean-François Pernot (Saint-Léger-Vauban, France, 1986). 'Il ne faut donc pas s'étonner si des peuples si mal nourris ont si peu de force. A quoi il faut ajouter que ce qu'ils souffrent de la nudité y contribue beaucoup, les trois quarts n'étant vêtus, hiver et été, que de toile à demi pourrie et déchirée, et chaussés de sabots, dans lesquels ils ont le pied nu toute l'année. Que si quelqu'un d'eux a des souliers, il ne les met que les jours de fêtes et dimanches.

miserable, landless day labourer and his son, both dishevelled and barefoot. The father sits on a rugged three-legged stool, looking away absent-mindedly.

A few years later, Defoe also used clogs as a symbol of the comparative misery of the French, '*our Neighbours … reduced to Black Bread, Garlick, and Wooden Shoes*',[106] and Boulainvilliers, the French dilettante historian, seconded him. In his *Etat de la France* published five years after his death, in 1727, he noted that in hard times the number of people wearing clogs and clog making increased significantly: '*On fabrique … das toutes les Forêts beaucoup de Sabots, que la pauvreté à rendu beaucoup plus communs qu'ils n'étoient du tems de nos Peres*.'[107] The Swiss traveller Cesar de Saussure, who was in England between 1725 and 1729, was surprised to see that, unlike on the Continent, 'the lower classes are usually well dressed, wearing good cloth and linen. You never see wooden shoes in England, and the poorest individuals never go with naked feet'.[108] The situation – and the analysis – were not very different by the time Arthur Young visited France in 1787:

> All the country, girls and women, are without shoes or stockings [he remarked] and the ploughmen at their work have neither sabots nor feet to their stockings. This is a poverty that strikes at the root of national prosperity*;* a large consumption among the poor being of more consequence than among the rich: the wealth of a nation lies in its circulation and consumption; and the case of poor people abstaining

[106] Daniel Defoe and Henry Sacheverell, *A Speech without Doors* (1710), 13.
[107] Henri de (1658-1722) Auteur du texte Boulainvilliers, *État de La France, Dans Lequel on Voit Tout Ce Qui Regarde Le Gouvernement Ecclésiastique, Le Militaire, La Justice, Les Finances, Le Commerce, Les Manufactures, Le Nombre Des Habitans, & En Général Tout Ce Qui Peut Faire Connoître à Fond Cette Monarchie. Tome 1 / . Extrait Des Mémoires Dressez Par Les Intendans Du Royaume, Par Ordre Du Roi, Louis XIV... Avec Des Mémoires Historiques Sur l'ancien Gouvernement de Cette Monarchie Jusqu'à Hugues Capet. Par Monsieur Le Comte de Boulainvilliers. On y a Joint Une Nouvelle Carte de La France... Tome Premier [-Second]* (1727), 260.
[108] César de Saussure, *A Foreign View of England in the Reigns of George I and George II.: The Letters of Monsieur Cesar de Saussure to His Family; Translated and Edited by Madame Van Muyden* (1902), 113.

> from the use of manufactures of leather and wool ought to be considered as an evil of the first magnitude. It reminded me of the misery of Ireland.[109]

Edward Rigby, who travelled through France a year after Young, also noted of French women – perhaps not without some excitement on his part – that 'their legs are quite naked, with neither shoe nor stocking.'[110] Malthus, too, when travelling on the Continent in 1829 made a series of similar observations: in Western Flanders he remarked on 'women without shoes, and later on, going towards Coblenz, he wrote down: 'people looking poor - women and children without stockings and shoes.'[111] From the seventeenth century onwards footwear clearly denoted living standards, and British travellers consistently remarked on the general bareness of Continental feet.

At the bottom of this footwear hierarchy were those too poor to own shoes, followed by a very large group of impoverished rural households who either had to make their own footwear or could only afford a couple of pair of clogs per year, which meant that several members of the household (and clearly women in most cases as seen above) still went barefoot or with makeshift substitutes. Using clog output estimates for the late nineteenth century (**table 4**) it is possible to calculate that each adult used between two and three pairs of clogs per year – which corresponds to contemporary descriptions of the wear and tear of wooden shoes. By 1700, only better off farmers might have used three pairs of clogs per year and perhaps owned a pair of thick leather shoes worn on Sundays, and their urban counterparts, qualified artisans, a couple of pairs of thick (often goat) leather or fabric shoes sometimes protected with gaiters, but most of the rural population had no option but managing with much more limited makeshift footwear. As it is unlikely (given the already optimistic output per worker figure for 1870

[109] Young, *Arthur Young's Travels in France*, 27.
[110] Rigby and Eastlake, *Dr. Rigby's Letters from France &c. in 1789.*, 6.
[111] Patricia James, *The Travel Diaries of Thomas Robert Malthus* (2009), 231, 237, and 240.

shown in **table 4** below) that clog makers unassisted by machines could produce over 5 pairs per day, day in, day out, 300 days per year, even if in the better cases an improved division of labour only involved the carving out from an existing wooden block, it seems clear that a very large number of agricultural labourers before the mid nineteenth century would have been producing/mending their own footwear when they owned some. Standing apart from the great majority and topping the footwear hierarchy, the gentry and aristocracy donned elaborate made-to-measure shoes adorned with ribbons, lace, velvet and fine leather, and produced at great expense by a small number of exclusive shoemakers all located in larger cities. But like Young himself noted, this top end consumption gives a very distorted picture of the very limited aggregate demand for consumer goods.

Before mechanisation (which began in earnest in the second half of the nineteenth century) we can safely assume that the share of the labour force employed in shoemaking is a reliable comparative indicator of footwear consumption in both countries. A higher share of the population employed in the shoe making industry therefore signals a larger demand for market-produced footwear and a substitution effect from clogs (or no shoes at all) to more labour-intensive leather shoes. Using this metric, we can observe that by 1700 the share of the male labour force employed in the footwear industry was twice as large in E&W than in France, and that it was still at least 50 per cent larger in 1850 (**fig. 10b**).

The gap had disappeared by 1901, but by then the effects of mechanisation make this ratio a much less telling measure of living standards. In England, productivity gains caused by the introduction of the sewing machine and agglomeration effects through lower transport costs led to lower share of the population employed in this industry. In France, productivity gains combined with English imports forced small-scale urban shoemakers to specialise on upmarket

luxury goods and almost completely wiped out the scattered rural shoe industry.[112] It is perhaps more revealing to look at the fate of the rural clog making industry after 1850 to have an idea of relative living standards. First, if we assume that clogs were typical Giffen goods (with negative elasticity of demand - i.e., the richer people were, the fewer clogs they bought), the persistence of the clog making industry would signal stagnating living standards. This is not based on empirical research, but it was certainly how Young, Defoe, Boulainvilliers and almost every traveller saw it, apart, perhaps, from a handful of folklorists of the later nineteenth century who romanticised clogs as an image of an idyllic peasant civilisation. After a very painful personal experiment by one of the authors trying to wear clogs for a couple of days, we would dare anyone to defend any form of cultural relativism in this respect. Secondly, the absence of productivity gains in the clog industry allows us to track the evolution of demand over the second half of the century. Clog making remained the work of individual '*sabotiers'* providing footwear to fellow villagers or selling them at local markets. Data from the *Gazette du Sabotier*, regardless of their accuracy, show that mechanisation in France only took hold in the early twentieth century, and that millions of pairs were still being produced each year, even as late as the 1930s.[113] By this date, exactly half of the French population (that is around 20 million people) still lived in rural areas, and if we were to believe these numbers, 34 million pairs of wooden shoes were produced per year! What would Defoe or Young have thought of children stuffing clogs with barley straw to go to school in the 1930s? Yet, this was a reality.

Table 4 Clog output and productivity, 1870-1930

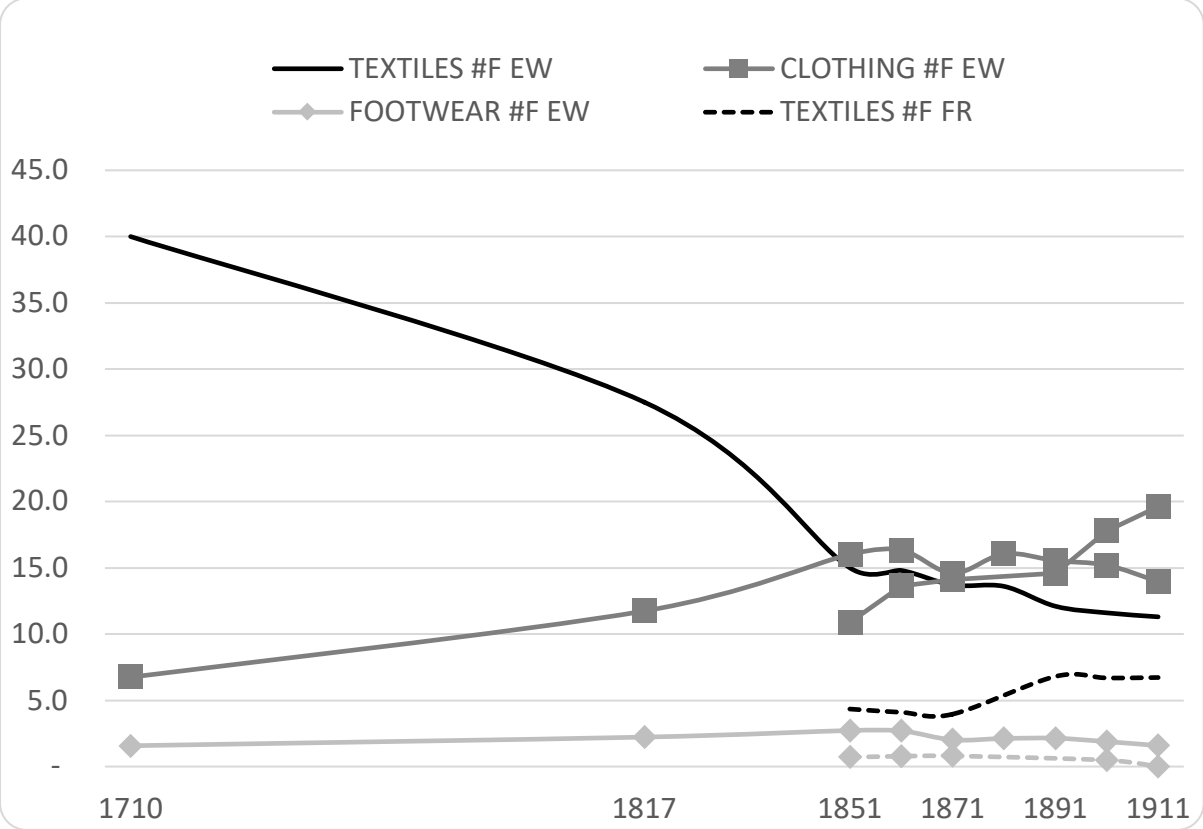
DATE	***(1)***	***(2)***	***(3)***	***(4)***

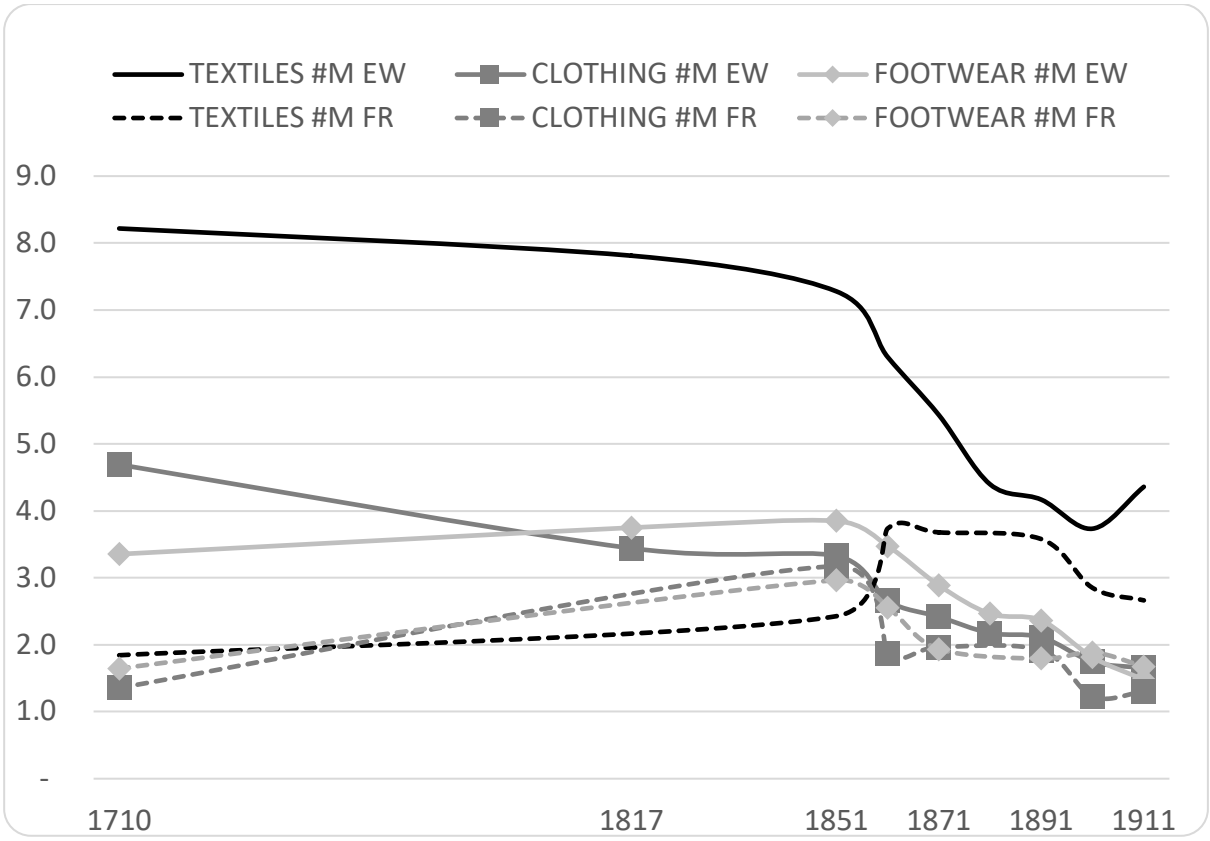
[112] Alain Cottereau, 'Problemes de Conceptualisation Comparative de l'industrialisation: L'exemple Des Ouvriers de La Chaussure En France et En Grande-Bretagne', in Susanna Magri and Christian Topalov (eds.), *Villes Ouvrières, 1900-1950*, Book, Section vols (Paris, 1989).
[113] J. Daydé, 'L'industrie des sabots et galoches en France et particulièrement dans le Sud-Ouest', *Revue géographique des Pyrénées et du Sud-Ouest. Sud-Ouest Européen*, vi (1935).

1870	25,000	0	37.5	0
1880	25,000	3	37.5	0.036
1890	23,000	10	34.5	0.12
1900	22,000	10	33	0.12
1910	20,000	45	30	0.54
1920	18,000	500	27	6
1930	15,000	1000	22	12

(1) Number of clog-makers; **(2)** Number of machines**;** (**3)** Hand output (millions); **(4)** Mechanical output (millions)

Fig.10a-b Consumer industries




TEXTILES #M EW
CLOTHING #M EW
FOOTWEAR #M EW
TEXTILES #M FR
CLOTHING #M FR
FOOTWEAR #M FR
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
-
1710
1817
1851
1871
1891
1911

Illustrations 1a-b Louis Le Nain (1642), *Repas de paysans*[114] and *Les Petits joueurs de cartes* (1642)[115]

[114] 2015 RMN-Grand Palais (musée du Louvre) / Mathieu Rabeau, https://collections.louvre.fr/ark:/53355/cl010059565
[115] 2006 RMN-Grand Palais (musée du Louvre) / René-Gabriel Ojéda, https://collections.louvre.fr/ark:/53355/cl010065568

On the other end of the productive scope stood the luxury industries. The inventories of most wealthy Europeans in the eighteenth century included French luxury clothing and fine decorative household goods, which constituted a major export market for French artisans renowned across Europe for their fashion-setting wares: embroidered silks dresses, printed cottons (Oberkampf), furs (Révillon), *biscuit* porcelain (Sèvres), crystal glass (Baccarat), very elaborate and decorative clocks (Bréguet) were staples of European courts in the late eighteenth century. As a Frenchman exiled in Berlin wrote in 1786, the European gentry and nobility 'dress in the French fashion, accommodate their interiors with French furniture, and cook in the French way.'[116] The apocryphal quote attributed to Colbert ('fashion is to France what the gold mines of Peru are to Spain') was already a trope in the 1780s, and was used to portray and

[116] Jean-Pierre Erman, *Mémoires pour servir à l'histoire des réfugiés françois dans les États du roi* (1786), 245.

advertise French refinement and fashion as a trade and diplomatic policy. The nineteenth century did not depart from this trajectory of luxury craftmanship, and most of the names would not sound unfamiliar to a modern reader: Guerlain, Hermès, Cartier, Vuitton, etc. But what does all this glitter tell us about French economic performance? While France enjoyed a niche comparative advantage in labour-intensive high-end production, this has often distracted observers from the hiatus in the nature of French industrial outputs. Whether in textiles, potteries or clockmaking, the finest pieces cohabited with a much larger production of coarser, low quality products, crowded out from the mid-market segments by more productive and better-quality British competitors. In Britain the earthenware and pottery manufacture and the making of precision instrument occupied a much larger share of the labour force (at least four times bigger, **Table 5**). Only the precious metals and jewellery industries – more specifically oriented towards luxury products – did reveal a substantial comparative advantage for France.

Table 5. Comparison of share of the labour force in the decorative and precision industries

	E&W		**FR**	
	1851	**1861**	**1851**	**1861**
Earthenware, pottery manufacture	0.4	0.4	< 0.1	0.1
Precious metals and jewellery	0.2	0.3	0.6	0.4
Instrument making	0.4	0.5	0.1	0.1

The market specialisation in high-end craftsmanship and the crowding out from mass production extended in the nineteenth century to the sectors that underwent some element of mechanisation in the production process. France, for example, enjoyed a comparative advantage in paper making before the steam age. The paper industry was composed of a string of typically small workshops located along rivers on the outskirts of towns and which were

reliant on waterpower and large rags supply (from urban centres) for their production. In the seventeenth century, France was the major European exporter of paper products, with two major centres of production in Auvergne and around Charenton providing paper across France and Europe. In the eighteenth century, however, the geography of paper making slowly evolved with many small paper mills, spreading along rivers in Northern France, German lands, the Low Countries and Britain to meet the growing demand for paper. After 1800 the industrial geography of paper making was almost completely reversed. Between 1800 and 1860, the British paper output was multiplied by six thanks to the combined benefits of technological change (the Robert and Fourdrinier machines after 1806), agglomeration benefits, cheap energy, reduced transport costs, and the enormous increase in the demand from the indigenous printing industry caused by the emergence of the world's largest mass media.[117]

6. Market integration

Our data also point towards key differences in the integration of both labour and commodities markets in the two countries. Market integration in the eighteenth and early nineteenth centuries was almost entirely determined by the economic connectivity made possible by transport infrastructures. More integrated markets unlock the positive externalities of regional comparative advantage and specialisation. Recent works have revealed the role of early developments in E&W in lowering freight costs.[118] Market integration through transport infrastructure is also reflected in our data. While 2.2 per cent of the male labour force was employed in transport by 1700 in France, at the same date it occupied twice as large a share of

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[117] Juha-Antti Lamberg et al., *The Evolution of Global Paper Industry 1800¬–2050: A Comparative Analysis* (2012).

[118] On the coaching network: Alan Rosevear, Dan Bogart, and Leigh Shaw-Taylor, 'The Spatial Patterns of Coaching in England and Wales from 1681 to 1836: A Geographic Information Systems Approach', *The Journal of Transport History*, xl (2019); on turnpike trusts and canals: Dan Bogart, 'Turnpike Trusts and the Transportation Revolution in 18th Century England', *Explorations in Economic History*, xlii (2005); Dan Bogart, Michael Lefors, and A. E. M. Satchell, 'Canal Carriers and Creative Destruction in English Transport', *Explorations in Economic History*, lxxi (2019); and on coastal navigation: Dan Bogart et al., 'Speedier Delivery: Coastal Shipping Times and Speeds during the Age of Sail', *The Economic History Review*, lxxiv (2021).

the male labour force (4.5 per cent) in E&W (see **fig.2 above**). This ratio peaked to 3.8 times in 1861, only to go back progressively to 2.4 by 1911. Between 1700 and 1911, the transport sector in E&W was consistently two to four times larger than in France. If we now weight these figures by the potential area covered (c.151,000 sq.km for E&W, c.535,000 sq.km in 1700 and between 1871 and 1914 for France) the balance tilts even more in favour of E&W, which had 2.98 per cent of the male labour force employed in transport per hundred thousand square kilometres, and France only 0.41 per cent per hundred thousand square kilometres, with the caveat that in E&W a larger fraction of transport workers were employed in the overseas branch than in France.

Sub-sectoral data for the transport sector reveals further differences in the degree of connectivity and integration of the two economies. First, by 1700 Britain was already comfortably leagues ahead in both maritime and inland navigation with a combined 3.4 per cent of the male labour force employed in those sectors compared with only 0.8 per cent in France. Even if we discount oceanic trading to focus solely on coastal (i.e., domestic) trade, we can assume that the difference between the two nations was no less significant. Based on Nef's claim that perhaps up to half of all merchant fleet was used for coastal shipping,[119] and applying the same ratio to France (although this is undoubtedly an exaggeration given the much more limited amount of coastal trade by 1700), and while ignoring the fact that oceanic crews would be larger, we can make an educated guess that the share of the labour force employed in costal shipping would have occupied over one per cent of the male labour force in E&W and less than a quarter of a per cent in France. The steady increase in the naval dominance of E&W across the eighteenth and nineteenth centuries and the crushing of the French naval power after 1800 significantly strengthened the disparity between the two countries. By the late nineteenth

[119] Nef, *The Conquest of the Material World*, 165.

century, E&W's lead in maritime transport had more than doubled, and the share of the labour force it employed was eight times larger in E&W than France. It is true that the distribution of the naval labour force was necessarily concentrated on the coast, and since the coastline of E&W is more extended than the French one (c.8.9 thousand kilometres for E&W vs. c.5.8 thousand kilometres for France) one would logically expect a larger commercial fleet in E&W. Yet: **i)** even this does not compensate for the gap between the two countries. The longer coastline also means **ii)** that a larger portion of the territory (coastal areas) was connected to regional and national markets through maritime links in Britain than in France, and **iii)** that France was split in two between more integrated Atlantic regions and landlocked territories.[120] It is a famous saying that the sea unites and the land divides, and if so, it clearly worked in favour of Britain.

There is more to it than natural endowment and the insular position of Britain, though. Data for inland navigation show that despite a very abundant network of navigable rivers, France also lagged in this respect. Bogart et al. have shown that improvements to rivers and the construction of canals and roads were the largest infrastructure investments in England during the industrial revolution and that inland waterway network increased significantly the development of regions connected to it.[121] The transport of heavy and bulky goods on barges unlocked the access to raw material and lowered the cost of imports – especially coal – for urban markets, while faster, more regular and cheaper road transport delivered the lighter and more valuable commodities. Across the eighteenth and nineteenth centuries many more goods were being produced in often specialised areas and needed to be distributed to more distant

[120] Edward Whiting Fox, *History in Geographic Perspective: The Other France* (1972).
[121] Dan Bogart et al., 'Turnpikes, Canals, and Economic Growth in England and Wales, 1800-1850', *Working Paper*, (2017).

markets and the very rapid rise in road transport employment throughout the nineteenth century illustrates this effect.

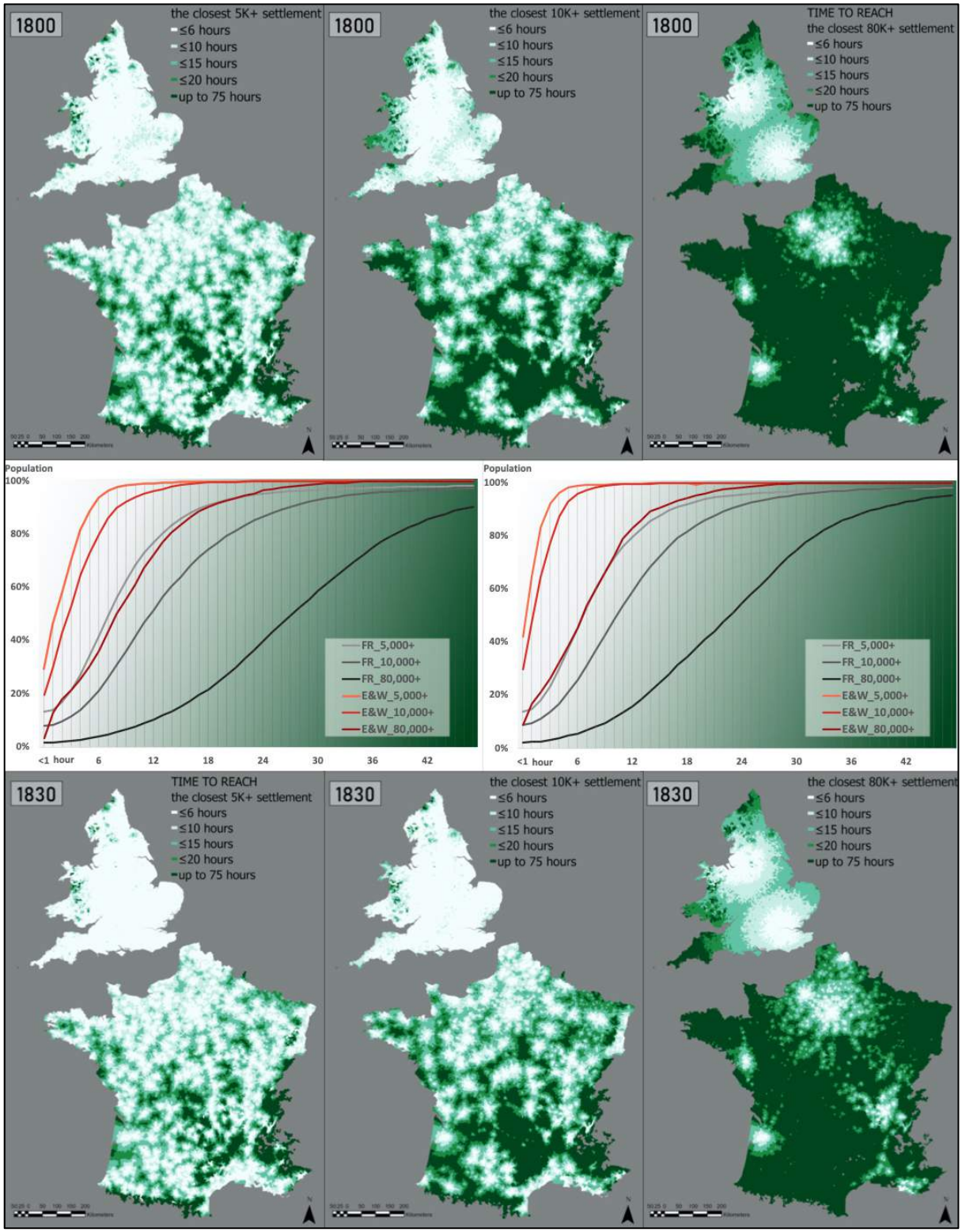
Data recently produced by Litvine and Mimeur for the ANR-Communes project confirm this bleak view of French spatial integration before the railways.[122] Using their new multi-modal model of transport for France and comparing it with similar data produced by the Cambridge Group for the History of Population and Social Structure for E&W, it is possible to visualise and quantify the difference in terms of level of connectivity for each individual parish/municipality across the two economies for different dates. These maps (**fig. 11**) demonstrate the striking connectivity gap between the two countries in the nineteenth century. The relative share of the territory within a six-hour range of a 5000+ settlement differs significantly both in 1800 and 1830, but the left behind areas in France are remote and less populated, but when it comes to larger settlements, carrying much larger market potential, the difference between the two countries is stark. Only a small section of North-Western France, the Mediterranean coast, Burgundy and the Northern Rhône valley display continuous areas with significant accessibility to settlements over 10,000 inhabitants, and only one contiguous area along the Seine for large urban centres over 80,000 inhabitants. If we plot the cumulative share of the population by the time taken to reach the closer settlement (**fig.11**), we can see that the accessibility to 5000+ settlements in France fits exactly that of 80,000+ settlements in E&W. By this simple visual metric the market potential (that is to say the pool of potential consumers for the goods produced in a given place for a given journey time) was sixteen times higher in E&W than in France. All this confirms that the French economy was fundamentally regional and not national in the first half of the nineteenth century, which is consistent with observations in the literature that regional specialisation happened at the intra-regional level

[122] All data will be available at *French Historical GIS, 1700-2020. Administrative units, Populations, Transports, Economy*. (forthcoming 2022), doi.10.5281/zenodo.3727274

and that cases of national concentration,[123] like in the wool industry in the Nord,[124] did not result from the effect of existing comparative advantage but from path-dependency externalities caused by agglomeration effect a la Krugman.[125] Specialisation only picked up in the nineteenth century when market integration improved, well into the railway age.[126] However, our new data invalidates assertions that France enjoyed a market access equivalent or superior to Britain.[127]

[123] Daudin, 'Commerce et prospérité'.
[124] Markovitch, 'La croissance industrielle sous l'Ancien Régime'.
[125] Paul R. Krugman, 'Intraindustry Specialization and the Gains from Trade', *Journal of Political Economy*, lxxxix (1981).
[126] Pierre-Philippe Combes et al., 'The Rise and Fall of Spatial Inequalities in France: A Long-Run Perspective', *Explorations in Economic History*, xlviii (2011).
[127] Guillaume Daudin, 'Domestic Trade and Market Size in Late-Eighteenth-Century France', *The Journal of Economic History*, lxx (2010).

Fig.11 Comparative connectivity indices for France and E&W, 1800/1830 (Mimeur/Litvine)



Another way to look at the low integration of the French economy using our occupational data is to observe the level of structural by-employment in the economy. By-employment here means any gainful employment in another sector in addition to a person's main occupation. In France, slow urbanisation combined with population growth between 1500 and 1715 and then faster demographic growth and urban stagnation between 1715 and 1800 suggests that almost all excess population was absorbed by rural areas. The low level of urbanisation in 1851 and the lack of regional specialisation combined with limited productivity growth in industry before the 1830s also indicate that the bulk of the increase in industrial output between 1740 and 1850 must have relied largely on rural industries and chronic intersectoral by-employment, either seasonal or throughout the working day. This was already the case in the seventeenth century,[128] and it remained so well into the nineteenth century: peasants could be occasional miners, masons, ditch diggers, road builders, flax spinners, knife grinder, etc., but industrial workers also left their workshops to help out in the fields, especially during the harvests when wages were higher in agriculture than in the workshops.[129] We can now quantify these intersectoral flows across the nineteenth century.[130] Although the share of total labour input concerned was relatively moderate (the data presented in **table 6** below shows that by 1891 three per cent of the total labour input by both men and women employed in the primary sector went to secondary-sector activities), around ten per cent of both the male and female labour force was regularly by-employed throughout the century, which means that out of a theoretical working year of 300 days one in ten worker would have taken c.90 days off (ten per cent of the labour force for three per cent of the total labour input) per year to work in

[128] Pierre Goubert, *Cent mille provinciaux au 17e siècle : Beauvais et le Beauvaisis de 1600 à 1730* (1977); Pierre Goubert, *La Vie Quotidienne Des Paysans Francais Au XVIIe Siecle* (Paris, 1982).
[129] Pierre Sicsic, 'City-Farm Wage Gaps in Late Nineteenth-Century France', *The Journal of Economic History*, lii (1992).
[130] For a fuller description, see: Litvine, 'French Occupational Structure, Industrialisation and Economic Growth France, 1695 to the Present.'

another sector. This might have little macroeconomic significance as sectoral flows more or less compensated each other, but it is revealing of both the inability of the agricultural sector to support a large enough labour force for the peak season in spite of an oversupply of labour, and the inability of the industrial sector to retain its labour force throughout the year. Why was it necessary to hire factory hands during the harvest? And why did agricultural labourers, often holders of small plots also work in industry? This suggests that the French economy functioned as a juxtaposition of smaller regional economies, which, in most cases, did not reach the scale required to support independent industrial and agricultural sectors as the regional labour pool responded to seasonal wage incentives. This long-lasting symbiotic relationship between the two sectors also acted as a life insurance policy for households able to rely on the food supply and income – however limited they might be – to face the vagaries of industrial cycles. Inversely, our new data for in England, and especially evidence from probate inventories have shown that already by the early eighteenth century, and unlike previous assumptions in the literature, by-employment in manufacturing (except for domestic spinning) had become very infrequent, and that it played virtually no role in the nineteenth century.[131]

Table 6 Intersectoral by-employment labour flows in the second half of the nineteenth century

	1851		**1891**	
Labour inputs (in % of total)	**M**	**F**	**M**	**F**
Primary ⊱ Secondary	2.3	2.8	3.0	3.0
Secondary ⊱ Primary	2.4	3.2	1.9	2.4
Total labour inputs for both sexes	5.1		5.1	

7. Conclusion

[131] Sebastian A. J. Keibek and Leigh Shaw-Taylor, 'Early Modern Rural By-Employments: A Re-Examination of the Probate Inventory Evidence', *The Agricultural History Review*, lxi (2013).

In 1968, Eric Hobsbawm asked: 'if we placed ourselves in the Britain of 1750 without the wisdom of hindsight, would we have predicted the imminent Industrial Revolution? Almost certainly not.' Yet, he added, 'looking back, we can see that no other country was as well-prepared for the Industrial Revolution.'[132] Every word of this still stands today, and comparing England and France confirms the validity of his pronouncement. England by 1700 was already in a unique position in Europe, if not the world. Since Hobsbawm's assessment, lengthy debates about past economic performance have hinged on comparisons of national accounting series, and especially GDP. Occupational data complement these metrics by offering a set of robust and comparable data reflecting the nature and structure of past economies. Our data gives an unflinching account of the divergence between England and the rest of the world (and in the case of this article, France) well before the classical period of the Industrial Revolution, and it puts to rest any argument that by 1700 or 1750 France might have been a serious contender to industrial primacy. As such our argument stands as the sectoral counterpart of the "little divergence" between the two countries shown in recent studies of GDP and real wages from the sixteenth to the eighteenth century. Because it works at the sectoral and industrial level it tells a richer story about changes in the two countries.

Compared to England, France was fundamentally a poorly integrated agrarian economy, with small islands of commercial and industrial prosperity dotted in an ocean of relative immiseration. The major achievements of French scientists, the riches accumulated in some trading towns, the global repute of French luxury goods and artistic production, the industrial prowess and technical achievements often supported by state investments, and the economic leadership of some enlightened administrators, were but fig leaves hiding the

[132] Hobsbawm (1968), *Industry and Empire*, ch.1, pp.10-11

bareness of the *ancien* regime economy. French roads in the late eighteenth century were symbolic of this French economic mirage: they were beautiful, built at amazing expense by the State with large and ingenious works of civil engineering, and Arthur Young – who otherwise pulled no punches in his observations on France – thought they were among the best roads in Europe, but, he also noted, they enjoyed very little traffic, at least nothing like the commercial hustle and bustle he was used to witnessing on a typical busy English road.

Yet, France's backwardness was obviously not absolute but only relative to England. French development in sixteenth century and seventeenth centuries, however modest and episodic, was undoubtedly accompanied by some growth of the secondary sector. Seventy per cent of the labour force employed in agriculture as witnessed in 1700 is high compared with England, but much lower than really underdeveloped economies.

As Hobsbwam pointed out, being in the best position to industrialise is in no way the same as explaining why and when it did. In this article, we have not explored in any meaningful way the causal mechanisms that led England to experience such a rapid and sustained wave of innovations in the eighteenth century (i.e., "why was England first?") but our data make a strong case for the return to a much longer periodisation of the technological and social enabling factors of the Industrial Revolution, in line with the older literature from Mantoux to Nef.