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## **Provincializing the First**



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Department of Economic History  
London School of Economics  
Houghton Street  
London, WC2A 2AE

Tel: +44 (0) 20 7955 7860  
Fax: +44 (0) 20 7955 7730

## Provincializing the First Industrial Revolution \*

*Patrick O'Brien*

'Il n'y a pas d'histoire, il y a une histoire du monde' (Marc Bloch as cited by Andre Gunder Frank, *ReOrient: Global Economy in the Asian Age* (Berkeley: University of California Press, 1998)).

Andre agreed with little I wrote, but I offer this essay to commemorate an intellectual of extraordinary erudition and rare courage.

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### 1. Representations of The First Industrial Revolution

In 1967 Marshal Hodgson (the godfather of global economic history) wrote these percipient words: "Without the cumulative history of the whole Afro-Asian Oikumene of which the Occident had been an integral part, the western transmutation would be almost unthinkable".<sup>1</sup> Alas, the recommendation by this eminent scholar of Islam to re-conceptualize what his essay refers to as "The Great Western Transmutation" within the wider spaces, longer chronologies and cultural frameworks of the long and interconnected history of Afro-Eurasia was not taken forward until Eric Jones published the first edition of the *European Miracle* in 1981.<sup>2</sup> Since then slowly but surely the bibliography of books, articles and debates relocating and reconfiguring the

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\* My thanks to my friends Bob Allen, Larry Epstein and Giorgio Riello for their helpful suggestions for improvement and the GEHN network for education.

<sup>1</sup> M. Hodgson, *Rethinking World History. Essays on Europe, Islam and World History*

industrialization of the west as a conjuncture in global economic history has proliferated and matured into a field that, along with accelerated trends towards a globalized economy is revitalizing interest in our subject across the humanities and social sciences. It seems timely to make an attempt to follow Marshall Hodgson's lead and attempt to "reconfigure" Britain's famous industrial revolution.

This internationally renowned episode in Hanoveriaec0604 Tm(acr)Tj13.02 061300

of workforces, employed in industry and related services and with difficulty in imperfect tabulations of national accounts, spanning long chronologies of time displaying shares of gross domestic products labelled as industrial outputs.

Although claims have been made for the Netherlands to be recognized as “the First Modern Economy”, nobody disputes that Great Britain became the first national economy to complete a transition to an industrial economy.<sup>4</sup> For more than two centuries the realm’s famous transformation has been narrated and explained under such labels as *The First Industrial Revolution*, *the First Industrial Nation* or simply as *The Industrial Revolution*. Anglo-American historians have analysed the decades and cycles of

mankind from the millennial afflictions of poverty, malnutrition, disease and early death) endemic to existence in agrarian societies was either initially constructed or fully developed during seven decades in the economic history of a small island located off the coast of Europe, there is no need to derogate the precocious range of innovatory economic achievements that came on stream over the century which succeeded Britain's decisive victory in the Seven Years War 1756-63. Defined historically as *the* century which marked discernible and irreversible accelerations *in the rates of increase* of real income per head, in shares of the increment both to rates of growth in income per capita and labour productivity emanating from technical and structural changes, and urbanization, it seems merely polemical to engage in semantic attempts designed to *purge* the label Industrial Revolution from academic discourse and public consciousness.<sup>7</sup> Considered, as Hodgson advised, in a long stream of world history, on all the indicators, that economic historians have constructed since the publication of Ashton's classic study in 1948, the transformation (although discernibly slow by subsequent standards) became rapid enough to carry the national economy forward to the position of competitive superiority that the kingdom enjoyed in relation to all other European, American and Asian economies during the Victorian boom (1846-73).<sup>8</sup>

Britain's naval and commercial hegemony (as well as the efficiency of its agriculture) had been widely recognized before the second half of the 18<sup>th</sup> century.<sup>9</sup> Thereafter, and as its industries matured, the rest of the world paid deference to clear comparative advantages exemplified by

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<sup>7</sup> R. Cameron, "The Industrial Revolution Fact or Fiction" in François Crouzet and Armand Cle

several sectors of British manufacturing while re

for enterprise and innovation that could be readily transferred to rival but retarded economies on the mainland, which became rational enough to adopt best practice (i.e. British) technologies, modes of economic organization and institutional frameworks for production.<sup>12</sup>

In short, a modern wave of historical scholarship has been concerned to educate students to become aware of the European, Asian and Imperial dimensions of the British Industrial Revolution; and to observe the rather rapid convergence of Western economies to comparable levels of per capita income and labour productivity in terms of the peculiarities of each national case and theories of path dependency. Diffusion models which, in effect, elevated the status of Britain's precocious transition to a paradigm case are no longer regarded as an illuminating way to comprehend the industrialization of mainland Europe, the United States and East Asia let alone as a basis for policy recommendations to countries still stru



women born in Staffordshire, but in colours and designs derived from  
Classi

causes among economic historians.<sup>17</sup> Indeed, (and as I will suggest), it may now prove possible to paint Britain's famous transition as a "conjuncture" in the long run global history of material progress that came on stream when and where it did in large measure as the outcome of favourable national endowments (including location) and massive investments by t



from far less “benign” historical forces which included conquest, internal colonization, the violent expropriation of ecclesiastical and common land, the systematic accumulation of power by closed aristocratic elites which, over time severely attenuated rights of access to the Island’s cultivable land, forests and minerals by smaller freeholders and peasant families.<sup>22</sup> families.

favourable environmental endowments (particularly grass) had encouraged the steady accumulation of sheep, cattle, pigs and above all horses is now commonplace in agrarian history.<sup>25</sup> By the Civil War the kingdom's large population of animals provided the high value outputs, extra supplies of energy and flows of organic fertiliser that had carried English agriculture to the head of European league tables and up onto a plateau from where the primary sector could (with increasing help from colonized Irish land and labour) lend support to accelerated population growth, proto-industrialization and extensive urbanization. Geography not only matters more than institutions, it goes a long way towards explanations for their form and evolution.

Wrigley has brought back into the foreground of the First Industrial Revolution, another and equally significant natural advantage that Britain derived from easy access by waterbor

remained underground until well into the 20th century?<sup>28</sup> Mainland European and East Asian economies and cities found substitutes such as peat, wood, water, wind and human energy but the advantages for earlier industrialization of using the cheaper and more efficient thermal form of energy turned out to be substantial. For example, wind and waterpower is less reliable and predictable. Coal replaced the land, used to feed horses and oxen as well as the manpower employed in forestry. As a substitute for wood fuel, coal allowed more land and other resources to be devoted to growing food and agrarian raw materials. Given that the energy from a ton of coal equals the energy from two tons of timber and an acre of land produces two tons of dry wood, Britain's coal output for 1815 implies that 15 million acres (equivalent to 88% of the arable area) had counterfactually by then been released from forestry to grow grains, vegetables, animal products and industrial raw materials.<sup>29</sup>

Heat intensive industrial processes in metallurgy, glass making, brewing, refining sugar and salt, chemistry, in baking food and bricks etc. could all be conducted more efficiently with cheap coal. The feedbacks and technological spin-offs from these industries to metallurgy and to the making of kiln's, pots, vats and containers also turned out to be important for industrial development. Cheaper fuel which kept workers warmer at home and work diminished their needs for calories in order to generate greater human efforts required for production. While lower cost bricks and metals for the construction of houses in cities, towns and industrial

analysis of transitions to modern systems of production requiring diversified sources of energy. At a time when technological progress which augmented labour productivity remained slow and confined to a few sectors of industry, countries favourably endowed with fertile land, minerals, natural waterways and above all with a cheaper fuel linked to a maturing but leading network technology (steam power), enjoyed a head start in the “leap forward” to become industrial market economies.<sup>30</sup>

### **3. The Nature and Economic Significance of Britain’s Maritime Strategy for Security with Development**

Debate about the precise nature and significance of foreign trade for The British Industrial Revolution is unresolved. Views on that connexion range all the way from “trivial and dispensable” to “necessary and sufficient”.<sup>31</sup> Contemporary perceptions and histories which maintained that commerce overseas could through all kinds of mechanisms (not captured within a modern and statistical framework based upon national accounts) have been a s

quotient reached 12% in the reign of George III. At least half of the increment to industrial production which came on stream over a long 18<sup>th</sup> century (1688-1815) was sold overseas. Shares of the outputs exported of the most rapidly growing and technically progressive of British industries (cottons, woollens, metals, shipbuilding) became outstanding. For the development of a British economy led by modernizing industries, the nation's multi-faceted involvement with the world economy has now emerged as an unmistakably significant precondition for the growth with structural change and diversification, that took place before and during the Industrial Revolution. Already by the close of the Seven Years War, something like half of the nation's workforce (de-linked from agriculture) depended directly and indirectly on markets overseas for its livelihood. Revenues from exports exchanged for strategic materials (pitch, tar, hemp, timber, bar iron) vital for the naval defence of a mercantilist realm; as well as taxable tropical foodstuffs such as sugar, tea, coffee and spices and fibres for the rapidly gr31 Tc -0.00101 Tw 13.03y34 Tw1 408.56062 Tm0.000



commodities and services, exchanged across the world's frontiers between 1660 and 1846, but few historians would disagree that Britain (not France, Portugal, Spain, the Netherlands, let alone China or Japan) reaped a lion's share of the gains from international trade and commerce over that period.<sup>34</sup>

Some part of the growth in commerce that generated feedbacks and spin-offs for the transition to an industrial economy occurred because the world economy as a whole was led forward at a faster rate by the continued expansion of the Atlantic economy coupled with the forging of closer commercial connexions between Europe and the Americas across the Indian and Pacific oceans with India, South East Asia, Japan and China. Indeed the British economy did exceptionally well during a long upswing in global trade that succeeded the consolidation of the Manchu dynasty (1644-83) and which coincided with the break-up of the Mughal Empire in India (1761-1818).<sup>35</sup>

Was that (as new and old Whigish historians maintain) because the country's institutions (particularly its Parliamentary system, framework of law and embedded cultures of enterprise) had evolved to become clearly more hospitable to private investment and innovation than institutions conditioning the development of rival

worlds of “surprising resemblances” across a rang

For reasons that cannot be expanded in a short essay, that conception took a long time to evolve into a constitutional consensus. Maturity came after nearly two centuries of fiscal stasis, economically malign disputes over religion, persistent acrimony between Parliament and the Crown's over rights to levy taxes and above all, from a reordering of political culture during an interregnum of destructive civil war and republican rule. Following on from the Restoration of monarchy and aristocracy, Britain's elite sustained the political consensus required to form a highly effective fiscal naval state.<sup>41</sup> With vicissitudes (including regime change, following from the Dutch coup d'état of 1688, and the loss of sovereignty over 13 American colonies in 1783) the restored British state became outstandingly successful in raising the funds (taxes and loans) required for external security, for the stability of an essentially *ancien regime*, for the maintenance and protection of an established and inegalitarian system of property rights.<sup>42</sup> The rights to own and use: natural resources and capital located within a unifying kingdom; merchant shipping and merchandize on the high seas; and bases, plantations, mines and slaves in colonies of an expanding empire became better protected for Britons than for any other propertied elite in Western Europe, the Americas, Africa and Asia.

This quite exceptional level of protection, stability and good order supplied by the State for its wealthier citizens rested upon an expanding fiscal and financial base.<sup>43</sup> Between 1670 and 1815 total revenues from taxes rose by a factor of around 17, while national income increased by a multiplier of 3. Most of these appropriations were allocated by central government to service a national debt incurred to fund no less than eleven wars against other European powers and economic rivals – mainly

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<sup>41</sup> H. Roseveare, *Financial Revolution* (London: Longman, 1991).

<sup>42</sup> J. Brewer, *The Sinews of Power: War, Money and the English State 1688-1783* (London: Unwin-Hyman, 1991).

<sup>43</sup> L. Prados De La Escosura, *Exceptionalism and Industrialization*.

conflicts with France and Spain, but including four naval wars against the Netherlands.

From a nominal capital of less than £2 million in the reign of James II Britain's national debt grew to reach to the astronomical sum of £854 million or 2.7 times the national income for 1819 and the shares of taxes devoted to servicing what appeared to taxpayers as an incubus of public debt jumped from modal ratios of 2-3% before the Glorious Revolution to 60% after the Napoleonic War.<sup>44</sup>

When Castlereagh signed the Treaty of Vienna all Europeans were acutely aware of the costs of geopolitical strife. Yet the, by then, United Kingdom of England, Wales, Scotland and Ireland enjoyed virtually complete security from external aggression, possessed the la

equilibria wrought by taxation, or unmeasured crowding out effects that flowed from high levels of government borrowing look like interesting, but anachronistic exercises in applied economics.<sup>47</sup> They are surely irrelevant to questions of whether the state had raised and allocated the resources that carried the kingdom and its economy to a plateau of safety, political stability and potential for future development attained and envied by the rest of Europe, at the Congress of Vienna. Since nobody then (or historians later) elaborated alternative strategies which combined security for the realm and internal order with growth for the economy, the comparison of an entirely explicable maritime strategy for security and development pursued by the British state with strategies pursued by other European and Asian powers could only lead to a Panglossian conclusion that *virtually everything that was done looks unavoidable, was undertaken for the best in the worst of all possible worlds and paid off.*<sup>48</sup>

Inaugurated under the republic, the essence of Britain's strategy for geopolitical security with economic power can be read from tabulations of its state's relative and persistently high levels of expenditure on the Royal Navy.<sup>49</sup> That sustained commitment provided the kingdom with the world's largest fleet of battleships, cruisers and frigates, manned by a largely coerced workforce of able seamen, under the command of a highly motivated and well rewarded corps of professional officers.<sup>50</sup> The fleet was constructed and maintained in readiness for multiple missions at sea by an onshore workforce of skilled shipwrights, carpenters and other artisans and sustained by an infra-structure of ports, harbours, dockyards,

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<sup>47</sup> J. Glete, *War and the State in Early Modern Europe* (2002 (London: Routledge, 2002), and A. Digby et al (eds.) *New Directions in Economic and Social History* (Basingstoke: Macmillan, 1992) 37-48.

<sup>48</sup> L. Gomes, *Foreign Trade and the National Economy* (Basingstoke,:Macmillan, 1987).

<sup>49</sup> *Parliamentary Paper 1869-69 (XXXV)*, C. Chandaman, *English Public Revenue 1660-88* (Oxford: Oxford University Press, 1975). F. Dietz, *English Government Finance 1458-1641* (New York: Frank Cass, 1964).

<sup>50</sup> N. Rodger, *The Command of the Ocean. A Naval History of Bi-0.0006 Tc8 0 0 10.98 vol0.98 327.193*

stores for victuals and spare parts, ordnance depots and other facilities  
under collaborative and coordinated public and priv

mercantilist and imperial missions pursued at sea, but to sustain surprisingly high levels of military expenditure.<sup>54</sup> Paradoxically and throughout the period 1688-1815, expenditures on armies by the

its Celtic fringes and to protect hierarchy and property rights against challenges to law and order.<sup>57</sup>

From time to time prospects for internal trade within a less than United Kingdom came under threat from within the potentially seditious provinces of Scotland and Ireland; particularly the latter where a colonized Catholic population resented “English” property rights and the metropole’s discriminatory regulation of Irish commerce and industry.<sup>58</sup> With external security taken for granted, other public goods such as stability, good order, the maintenance of property rights and support for hierarchy and authority over potentially unruly employees became the key political-cum-economic interest for landowners, merchants, farmers, industrialists and other businessmen of Hanoverian Britain. On the whole, a monarchical and aristocratic state met their concerns and when lobbied redefined legal rights for new forms of wealth by promulgating statutes for the realm which superseded custom and common laws that could counterfactually have been used to provide protection for the welfare of the majority of the nation’s workforce without assets, status and power, but threatened by market forces associated with industrialization.<sup>59</sup>

For example, the institutions of the Elizabethan poor law for dealing with poverty, unemployment, vagrancy and labour migration maintained a repressive system of control over the labour of juveniles, females and unskilled men. For less vulnerable artisans and industrial workers and especially for courageous groups who formed “combinations” to challenge what they perceived to be adverse changes to a traditional and more moral economy, the punishments prescribed by Parliament for: the formation of unions; for riots against high prices of basic necessities; for

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<sup>57</sup> P. O’Brien, “The State and the Economy 1688-1815”, in R. Floud and D. McCloskey, eds., *The Economic History of Britain since 1700, vol. 1* (Cambridge: Cambridge University Press, 1994), 205-41.

<sup>58</sup> L.Cullen, *An Economic History of Ireland since 1660* (London: Batsford, 1987).

<sup>59</sup> J. Rule, *Albion’s People. English Society 1714-1815* (London: New York: Longman, 1992)



resistance to enclosures and turnpikes; to attacks upon mills, barns, factories and labour saving machinery; for insubordinate and disorderly conduct as well as every kind of theft became discernibly harsher and, under an ever extending bloody code of law, increasingly subject to capital punishment.<sup>60</sup>

Parliament's antipathies to large standing armies in times of peace looks like Whig rhetoric because the actual numbers of troops, embodied militiamen and patriotic volunteers on station in Britain and Ireland year after year (and particularly in wartime) were more than adequate to repress disturbances to the peace. For purposes of political stability, maintaining internal order, the protection of property and upholding hierarchies of all kinds, it is not at all obvious that on a per capita basis, the political and legal authorities of constitutional Britain commanded a smaller or less coercive force of troops than so called "despotisms" on the mainland of Europe, who deployed armies (not capital intensive navies) to defend their more vulnerable frontiers. Indeed in 1808 the numbers of soldiers mobilized to combat Luddites in the Midlands and North of England exceeded troops under Wellington's command in the Peninsular.<sup>61</sup>

#### **4. The Discovery, Take up and Diffusion of “English” Technology**

For several reasons, the invention and diffusion of a familiar list of machines, energy converters and industrial processes, long represented as “English” and regarded as prime movers behind the national economy’s precocious transition, seems to have been relegated from a traditionally clear position of prominence into contexts where their importance has been historicized. That has occurred not only by way of significance testing by cliometricians but because the Industrial Revolution is no longer Anglocentrically or Eurocentrically conceived as a short sharp discontinuity based upon fundamental breakthroughs in industrial technologies emanating from and developing within a singularly progressive set of Anglo-Saxon institutions and cultures.<sup>62</sup>

Several inventions certainly emerged and matured in Britain after the Seven Years War, but their effects were probably confined to particular sectors of industry (cotton textiles, metallurgy, shipbuilding, transportation and the generation of energy from steam).<sup>63</sup> Furthermore, technologies that became first the wonders and eventually the marks of a modern economy (machines, steam power, processes for making and shaping metals, chemicals, factories, etc.) appeared early but matured rather slowly over that century of “revolutionary transition” after 1756. Tabulations purporting to account in quantitative terms for the sources of British economic growth (derived from exercises that “fit” production functions to extant but imperfect data for national output and inputs of land, labour and capital) expose the persistence of an entirely traditional and extensive form of aggregated economic growth, emanating mainly

from somewhat higher rates of capital accumulation and upswings in the size and hours worked by the workforce rather than innovations or even new sources of energy *per se*.<sup>64</sup>

These essentially taxonomic exercises have provided some kind of nationwide perspective derivable from cliometric models designed to measure *proximate* sources behind the growth of British national output (gdp). Nevertheless the contribution of technological change and organisational complexity (which had proceeded slowly over the centuries in many regions of a connected but not integrated Afro-Asian Oikumene) is more heuristically measured and defined by two widely recognized hallmarks of modern economic growth, namely accelerated and sustained rates of growth in output per worker and incomes per capita.<sup>65</sup> For the British case and after protracted debate over the models and the statistics, cliometricians now take into account the tentative quality of the data at their disposal and reciprocal interactions between profitable opportunities provided by the appearance of new process and product innovations on the one hand and higher rates of investment on the other. In terms of the parameters and taxonomies specified by growth models, technological progress turns out to have evolved over time to reach a

British economy would never have been designated as the locus of The First Industrial Revolution.<sup>66</sup>

Nevertheless, the role for new technology coming on stream in Britain at that time can be relegated to a chapter of a longer and more complex historical narrative, which recognizes its confined scale, scope for transformation and potential across all sectors, not only of the national economy, but of manufacturing itself. Economic histories of a range of industries (other than that paradigm case of revolutionary change), cotton textiles, have made us aware of the decades taken and costs incurred to move from a blueprint, through several stages of development and protracted periods of learning by using until original and promising designs became marketable prototype machines, processes or artefacts.<sup>67</sup> We now realize that the forward planning and investment are required to embody a backlog of known product and process innovations in firms that were connected to markets for commodities, labour and capital also took decades to mature. Furthermore such firms had to be networked to suppliers of raw materials and to transportation and distribution services so that entrepreneurs exploiting new knowledge could realize external economies of scale and agglomeration by locating in industrial towns and maritime cities. The costs of system-wide investments to develop, embody and relocate production in factories and towns turned out to be large multipliers of the original outlays borne by private individuals and their networks for the research and development required to come up with the potentially useful and commercially viable knowledge in the first place.<sup>68</sup>

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<sup>66</sup> N. Crafts, "The First Industrial Revolution: Resolving the Slow Growth/Rapid Industrialization Paradox?" *Jnl. of European Ec.Assocn.* 3 (2005), 525-34.

<sup>67</sup> R. Church and A. Wrigley, eds., *The Industrial Revolutions*, 11 volumes (Oxford: Blackwells, 1994), vols. 8-10.

<sup>68</sup> V. Ruttan, *Technology, Growth and Development: An Induced Innovation Perspective* (Oxford,: Oxford University Press, 2001), part 2.

As pioneer movers into unexplored realms and spaces for the exploitation of novel industrial products and technologies, British investors and entrepreneurs lacked examples of anything like the required range of prior experiments and experience from elsewhere as well as access to an extensive and reliable base of systemic scientific theories of how, where and why things work that later in the nineteenth century could be utilized to expose the problems, ramifications and potential of untried knowledge more rapidly and at lower cost.<sup>69</sup> In short latecomers and subsequent industrializers entered into their transitions with advantages unavailable to Britain.<sup>70</sup>

Nevertheless and although British investors lacked references to practice elsewhere and to science to inspire confidence to undertake risky investments in new technologies, their direct support for research and development and for a more rapid and extensive diffusion of the potentially useful knowledge already available early in the eighteenth century does not appear, with hindsight, to have been particularly “entrepreneurial”. Considered as a national group, British businessmen promoted and managed one of the slowest, and for the working classes, more miserable transitions to an industrial economy in world history.<sup>71</sup>

Subsequent faster and often more socially benign industrial revolutions are marked by higher rates of saving and investment and a more rapid take up of advanced tec

double from a rather low base point of around 6% in 1760.<sup>73</sup> In relation to countries that followed Britain into industrial revolut


markets) which raised both the elasticity of supply and improved the allocation of investible funds.<sup>76</sup>

Furthermore, and to return to t





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Industrial Revolution, (b) that gains from investment in the capital formation required for faster and more extensive industrialization, combined with urbanization were being steadily eroded by rises in real product wages that exceeded or even converged upon the observed increase in labour productivity, or (c) that warfare was anything other than part (rather than a costly diversion) from the whole historical process. On the contrary, macro economic trends (as currently measured for this century of revolution) all look favourable and promotional for higher rates of saving investment and innovation. For example (and after falling below the 10% mark during the recession in economic activity that surrounded crisis and war with England's Thirteen colonies in North America) average rates of return on all forms of capital other than agricultural land fluctuated cyclically, but had doubled before the mid-nineteenth century. By then even real rents from farmed land (the sector in relative decline) had risen by nearly 50%. Over the century that succeeded the seven years war, average real wages passed through three cycles or phases: slow improvement (c.1761-1800), virtual stasis (1800-20) and upswing (1820-51) and reached a point around mid-century which stood some 45% above their initial level.<sup>83</sup>

Meanwhile labour productivity had followed a different trajectory and a faster rate of increase to arrive at a level 87% above its base line average. Classical features of all industrial revolut5 Tm(average. Classirn0.0009 Tw 13.0

Yet the British case was marked by a

predicable transition in the long global history for the accumulation of useful and reliable knowledge.

Furthermore, very few economic historians now regard this famous conjuncture in British economic history as a paradigm for comparable changes that followed elsewhere, or believe that standards of living or labour productivities currently displayed by the world's industrial market economies would look very different, but for the transformation that occurred in Britain between 1750 and 1846.<sup>88</sup>

In so far as the discovery and development of new technologies for industry, transportation and agriculture that appeared during this period can be linked to an evolving base of systemic knowledge the scale, scope and utilitarian relevance of that kind of knowledge can moreover be realistically depicted as Eurasian rather than British in origin. Britain's advantages resided more in the development, improvement and diffusion of technology than in discovery itself.<sup>89</sup> Yet some historians (notably Margaret Jacobs and Ian Inkster) argue that in a European, but perhaps more plausibly in an Asian context, British "culture" became more receptive to an intermingling of science with business, with religion and with politics than was the case elsewhere across Eurasia.<sup>90</sup> Studies of several contexts for the advance and diffusion of useful and reliable knowledge in France, Italy and even Spain, has, however, mad420010o2m yreIR71@ 38s

new knowledge than their

the French Revolution and the long interlude of destructive warfare that arrested diffusion to the mainland, 1791-1815. Across Europe technological advances tended to appear, moreover, in branches of industrial production which had reached a certain scale and diversity in production. In some well known British cases (cotton and bar iron are examples) that occurred after processes of import substitution. Foreign products obtained and pioneered access to their home market and that tempted British businessmen to press for protection and to engage in a search for indigenous ways of satisfying first domestic, then imperial, and eventually, foreign demand. The process involved the creation, by a sympathetic mercantilist state, of helpful matrices of legislation and fiscal incentives surrounding commodity and labour markets for Britain and its imperial possessions.<sup>96</sup>

Technological progress depended, above all, on the prior accumulati

continents, countries, regions and towns can be discerned and explained.<sup>98</sup>

For Eurasia the relevant contexts for human capital formation were invariably urban. On the

with the wars against Revolutionary and Napoleonic France, carried the Island to the clear position of competitive advantage it enjoyed over the economies of Continental Europe and the rest of the world between 1846 and 1873.



growth. Geography ensured that the Isles were predestined to avoid the first. In the wake of an interregnum of civil war and republican rule, a

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**WORKING PAPERS OF THE GL**

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