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***The Industrial Revolution,
An Unintended Consequence of Self-Defence?***

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Abstract

This short paper examines Patrick O'Brien's bold reinterpretation of the British Industrial Revolution as a joint result of the expropriation of land by the landed aristocracy, abundant coal endowments, and the unintended consequences of self-defence, in the context of historical literature and contraposes it to evidence on long run growth and inequality and alternative narratives of British industrialisation. It concludes that, by neglecting the contribution of culture and institutions to incentivise investment and innovation, O'Brien lessens the role of the British Industrial Revolution for understanding modern economic growth.

Keywords: Industrial Revolution, Britain, Mercantilist state, Agriculture, Coal, Growth, Inequality

JEL Classification: N13, N43, N53, O14, O47

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I. Patrick O'Brien's Take on the Industrial Revolution

In his new and ambitious essay, 'Was the British Industrial Revolution a Conjuncture in Global Economic History?', Patrick O'Brien proposes a deeply revisionist interpretation of the Industrial Revolution. He examines three major ideas deeply rooted in the views of the Industrial Revolution: that it was a significant discontinuity in British economic history, that it represented a defining conjuncture in global economic history after which growth accelerated in a sustained fashion, and that it provided a paradigm of modern economic growth, namely, a sustained increase in output per head and per worker accompanied by population growth and structural transformation (Kuznets, 1966). For Patrick O'Brien, the industrialisation of a "small island located off the coast of western Eurasia" was neither a discontinuity nor a global conjuncture that deserve to be considered a paradigm model of "liberal and neo-liberal" economic development, but largely an unintended consequence of self-defence plus the predation of natural resources and sheer luck.

Let us examine firstly the notion of diffusion. The British industrialization was elevated to a paradigm for modern economic growth by authors who saw the diffusion of its best practice techniques of production and institutions as the yardstick for the assessment of the success or failure of subsequent national development (Landes, 1969), and of those who promoted the industrial Revolution as a model of take-off into self-sustained growth (Rostow, 1960).

O'Brien rejects the diffusion model categorically as unsuitable "for comprehending the industrialization of mainland Europe, the United States and East Asia, let alone as a basis for policy recommendations to countries still struggling to industrialize". This rejection is rooted in his seminal contribution *Economic Growth in Britain and France, 1780-1914: Two Paths to the Twentieth Century* (O'Brien and Keyder, 1978), which represented a departure from a long-standing tradition going back to post-World War II development economists and economic historians. O'Brien's core argument is that being the first to experience modern economic growth does not necessarily imply the achievement of the "best practice", and that no optimal path for growth can be identified with Britain's pioneering path and pattern of industrialization. Furthermore, he questions the idea of industrialized Britain's superiority above other

regions of Europe based on more efficient institutions, cultural values, and economic performance.

In fact, O'Brien strongly rejects what he labels the Whiggish view, which claims that modern economic growth took place in Britain due to its specific institutions and the set of incentives they provided. In his view, they were not that different from those of its European rivals. O'Brien (2010: 508) had already dismissed Joel Mokyr (2009) and Robert Allen's (2009a) interpretations of the origins of the Industrial Revolution for their "Anglo-centric perception" of the superior culture and institutions of an elite promoting technological innovation. On the contrary, argues O'Brien, the conditions under which the Industrial Revolution emerged were those of the Ancien Régime, with an "unenlightened system of governance" and "Europe's most egregiously inegalitarian system of property rights".

O'Brien acknowledges, though, that mid-nineteenth-century Britain's economic and geopolitical hegemony resulted from an "increase of real income per head and labour productivity due to structural changes ... linked to urbanization and technical progress". Nonetheless, and again at odds with Mokyr and Allen, O'Brien maintains that, rather than invention and innovation, British comparative advantage laid in the improvement and diffusion of new technologies.

What is, then, Patrick O'Brien's appraisal of the Industrial Revolution? This appraisal centres on the role of natural resources - ore and minerals and agriculture - and the state's investment in naval power and its consequences for technological change and trade expansion.

Let us first examine the role of natural resources. From a macro perspective, the role of natural resources emerges as a crucial actor in British industrialization. In a context of technological innovation restricted to a few modern sectors in industry and services, a favourable endowment of land, coal, and waterways facilitated the transition to urban industrial economy. The rise of agricultural labour productivity, resulting from the landed aristocracy's accumulation of land (often through expropriation of common land) and the urban pull from rural labour, facilitated rapid urbanisation and the creation of an urban labour force. Moreover, O'Brien stresses the combination of ruthless predation by the landed aristocracy with the exogenous natural reserves of coal. Agricultural productivity was enhanced by the intense

exploitation of coal deposits. In the absence of coal, O'Brien argues, *pace* Wrigley, land would have been required to produce fuel and Malthusian pressures would have hindered the transition to an industrial economy. O'Brien notes that other countries in Europe and Asia also had coal, but attributes its minor contribution to their economic growth to its quality and location: "their coal may not have been of the same variety and quality, nor as cheap to transport to coastal cities".

The leading role of the mercantilist state in promoting technological innovation and overseas expansion as an unintended consequence of building naval power to secure Britain and its possessions is the most innovative aspect in Patrick O'Brien's interpretation of the Industrial Revolution. A long term defensive strategy, initiated after the Hundred Years' War and gaining momentum from the 1660s, created, in O'Brien's words, "a public-cum-private maritime sector in the British economy".

The overseas expansion made a significant contribution to British industrialization by providing resource-intensive goods that served to relax the natural resource constraint in Britain suffered by Asian polities. It is also worth noting that O'Brien sees the role of trade in the rise of Britain through the prism of Adam Smith's 'vent for surplus', namely, that trade provided employment opportunities for otherwise idle resources (Engerman and O'Brien, 1991) This is at odds with the Ricardian view that gains from trade only derived from improving resource allocation, as the economy enjoyed full employment (McCloskey and Thomas, 1981; Harley, 1994).

The economic effort to prevent foreign invasion of the British isles and internal security required a very effective fiscal and financial system. Its success in raising tax revenues allowed the mercantilist state to defeat rival powers and create a world empire to the benefit of its trade and industry. A crucial aspect of O'Brien's argument implies the rejection of the view that tax generates market distortions and crowding out effects of public debt. His main point is that less interventionist policies would have not been feasible in a mercantilist context and, furthermore, net economic gains would have derived from the mercantilist state's combination of war finance and economic development. O'Brien admits the possibility that the financial war effort over 1652-1802 might have 'crowded out' private investment. But government expenditure on security, domestic and overseas stimulated investment whose

economic returns more than offset any ‘crowding out’ resulting from public debt issues. The powerful economic role of the state during the path to the Industrial Revolution, so O’Brien argues, minimised the contribution of private businessmen and investors, a narrative that contradicts *Cliometric* literature. In fact, O’Brien rejects the entrepreneurial attitude of the British industrial business community who, he claims, lacked “templates” and “systemic and scientific knowledge” which resulted in “one of the slowest ... transitions to an industrial economy in global history”.

II. O’Brien’s View of the Industrial Revolution and Britain’s long-run Growth

British long-run economic growth has been lately investigated with the help of time-series analysis, a statistical technique which allows for examining breaks in the trend rate of growth over time. Nicholas Crafts and Terry Mills (2017) found zero trend growth prior to 1660, which was then followed by accelerations before and after the Industrial Revolution. Leandro Prados de la Escosura and Vladimir Rodríguez-Caballero (2020) have extended the investigation to a sample of European countries and show that, unlike most European countries, trend growth in per capita income occurred in Britain since the early 1600s. In fact, Britain did not suffer growth reversals (that is, phases of negative trend growth), since at least the Black Death, even though zero trend growth is found between 1527 and 1628. This means that a positive trend growth emerged from 1270.² Trend growth accelerated from the first third of the 17th century, making Britain a precocious case in Europe. Britain’s trend growth rate over 1629-1708 more than doubled any previous growth during any expansion phase in early Western Europe. This represents an early success, at odds with the narrative that associates modern economic growth with the impact of the institutional changes wrought by the Glorious Revolution (North and Weingast, 1989) and implies instead that the institutional reforms under republican rule (1640-83) had a significant economic impact, as Patrick O’Brien (2018) had suggested.

Furthermore, when compared to the performance of other Western European countries, a growing gap in terms of income per head and structural change emerged between the North Sea Area (including Flanders, Holland, England, Wales, and

² However, the possibility of a growth reversal had demographic shocks as those of the late 18th century taken place a century earlier, does not seem far-fetched. See Crafts and Mills (2020).

Scotland), and the rest of Europe after the Black Death, the so-called *Little Divergence*, which became a generalised phenomenon from the seventeenth century onwards.

Although Patrick O'Brien dismisses growth accounting exercises because, as he says, they "tend to ignore the historical contexts and conditions leading to the discovery and diffusion of technologies", a glance at the proximate sources of British economic growth shows the extent to which new research in quantitative economic history lends support to his view of the Industrial Revolution. Stephen Broadberry and Alexandra de Pleijt (2021) find that, between the 1400s and 1640s, GDP growth was exclusively based on larger endowments of capital and labour. However, over 1640s-1690s, efficiency gains or total factor productivity (TFP) - that is, better use of the available capital and labour - drove faster GDP growth (0.84% per cent per year), contributing four-fifths of it but having a much less significant contribution between 1700 and 1830 (about one-fourth) when GDP accelerated to 1.08%. If we now look at the more relevant contribution of TFP to GDP per worker growth, it represents three-fourths of it, both during the phase of acceleration, 1640s-1690s, when labour productivity grew at 0.88%, and during its slowdown, 1690s-1830s, when it fell to 0.34%. It can be confirmed, then, that both the structural breaks in GDP per head, which heralded growth acceleration, and the increase in efficiency gains started in the 1640s, not after the Glorious Revolution (1688), match the periodisation suggested in O'Brien's work.

Inequality is also highlighted by O'Brien as the downside of the process of growth that led to the Industrial Revolution. Classical economists considered that the shares of GDP accruing to the owners of the production factors, land, labour, and capital - the functional distribution of income - provide a measure of personal income distribution. This is because the dispersion within the incomes accruing to each factor of production, labour in particular, was much less important, since they earned subsistence wages. So, the evolution of the share of labour in national income provides information about inequality trends. The pathbreaking work by Jane Humphries and Jacob Weisdorf (2019), who have computed annual labour incomes, shows the evolution of the labour share from the late 13th to the mid-19th century. A declining trend (bar a phase of recovery in the early 17th century) is observed from the peak in the late 15th century to the early 18th century, which represents a trough in the series.

However, inequality initiated a reduction in labour incomes in the following century. Thus, the results confirm the uneven distribution of the fruits of the growth prior to the Industrial Revolution, as O'Brien claims, but also suggest an improvement from the mid-18th century onwards. This is clearly at odds with the conventional literature (Allen, 2009b).

III. O'Brien's narrative and the recent economic history literature

On the role of agriculture, Robert Allen (2009) confirms O'Brien's view that the basic impetus to change in this sector came from the extension of proto-industrial and urban economies, rather than a peculiar set of "capitalist" institutions. Key to British early success were the artisans and merchants who made the new draperies - a crucial sector in the 'industrious revolution' - and the yeomen farmers who actively responded to shifts in demand by increasing yields. Also, Allen's interpretation (1992) of the enclosures as redistribution of wealth toward the great landowners militates in favour of O'Brien's expropriation view.

Coal had both land and labour-saving effects, substituting for wood and agricultural land (Wrigley, 1988). Moreover, overcoming the constraints of an organic economy was a pre-requisite for the occurrence of the First Industrial Revolution (Wrigley, 1994: 28). The relative shortage of wood and building timber and the abundance of coal triggered an early transition to coal-burning technologies, while iron replaced timber in construction. Alan Fernihough and Kevin O'Rourke (2021) find a relationship between proximity to coalfields and urban growth after 1750, but not before. The crucial issue is whether coal is exogenous or endogenous to the process of British industrialisation. The exogeneity of coal deposits defended by O'Brien has been supported by Christine MacLeod (2004), who argues that coal abundance was fortuitous, and by Kenneth Pomeranz (2000) who points to coal as a felicitous ingredient of British supremacy. It is true that other world regions (including India, China, and Eastern Europe) also possessed regular coal deposits, but only the British exploited the new source of energy intensively and systematically. As in the United States in the nineteenth century mineral resources (David and Wright, 1997), the exploitation of natural endowments on a large scale appears as endogenous, resulting from Britain's own economic progress.

As for the role of the mercantilist state in the journey towards industrialisation, the historical literature tends to support the view that the long-term economic effects of higher taxes and increasing national debt were positively associated with Britain's imperial expansion and the rise of overseas trade and commerce. A crucial issue here concerns how the British government managed to raise the stock of national debt with each successive war and, then, to raise sufficient taxes to service the public debt between the mid-seventeenth century and the Napoleonic Wars. Larry Neal (2004) has argued that it was the result of the increasing value of public debt as an insurance against the risks incurred in other markets. Widening opportunities for risk sharing thus contributed to British success.

But why were the tax increases approved by a Parliament dominated by landowners? Peter Mathias and O'Brien (1976) suggested long ago that the state relied increasingly upon indirect taxes, and O'Brien (1988) observed that excises (which is to say, indirect taxes on domestic consumption goods) were levied on price inelastic and income elastic goods, and paid mostly by the middle-income social groups, while the upper classes, well represented in Parliament, diversified their portfolios into public debt. Excise taxes were required to service that long-term debt, without which the British government could not have raised funds for the finance of the wars (Brewer, 1989). Forrest Capie (2004) added that the tax collection was facilitated by the extensive circulation of cash and credit in Britain, in contrast to France's persistent shortage of money. So, British fiscal and financial strategies reinforced each other over the eighteenth century; increased expenditure in times of war was financed by growing debt funded by future taxes, rather than inflation..

Less consensus exists about the impact of public debt expansion. The ratio of national debt to gross domestic product rose with each successive war while the economy continued to expand (O'Brien, 1988). But how much larger might private investment have been without these budget deficits? Growing defence expenditures in Britain led to higher taxes and promoted protectionism during the eighteenth century (Crafts, 1996). Jeffrey Williamson (1985) and Nicholas Crafts (1996) have associated Government borrowing with the crowding out of private investment during the Revolutionary and Napoleonic Wars, 1793-1815. Against this view, O'Brien (1989) and

Knick Harley (1992) pointed that the substantial increase in the ratio of stock of national debt to domestic product did not have a negative impact on the investment/GDP ratio. It seems that public deficit, or negative government saving, in war time was offset by a rise in private saving and by foreign capital inflows so that domestic capital formation was little effected (Brezis, 1995; Neal, 1990). The debate is still ongoing, but a British state and economy delinked from mercantilist and imperial warfare over 1650-1815 does not seem a plausible counterfactual scenario.

IV. Concluding remarks

What can be concluded from this juxtaposition of the views of Patrick O'Brien and those found in the historical literature? It can be accepted that the mercantilist military state succeeded in developing stable fiscal, financial and monetary institutions and, thus, contributed to the Industrial Revolution. But, as Stanley Engerman (2004) has written, free private initiative backed by a strong government, which enforced property rights and resorted to naval and military power to protect foreign trade and shipping, led to the British victory in the mercantilist struggle for world economy and geopolitical hegemony. Furthermore, several polemical issues remain unsettled. In the case of invention and innovation, O'Brien seems to neglect the fact that the British were responsible for major improvements on previous innovations and leveraged them on a much larger scale and more efficiently. That points to their endogenous nature (Allen, 2009a). Moreover, no attention is given to the role of the so called "upper tail" human capital as a driver of modern economic growth (Mokyr, 2018) and to "the powerful complementarity between people who knew things and those who could make things, between savants and artisans, that opened the floodgates of progress" (Kelly, Ó Gráda, and Mokyr, 2020).

Thus, we may conclude that, in Patrick O'Brien's narrative, the Industrial Revolution was the combined result of the unintended consequences of self-defence, together with the expropriation of land by the landed aristocracy and the availability of abundant coal endowments. This reveals agnosticism about the role of culture and institutions, and the incentives they provided in the achievements of the Industrial Revolution. In so doing, the British example is diminished as a role model for understanding and facilitating modern economic growth.

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