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The Contributions of Warfare with Revolutionary and Napoleonic France to the Consolidation and Progress of the British Industrial Revolution

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“Great Britain is under weightier obligation to no mortal man than to this very villain. For whereby the occurrences whereof he is the author, her greatness prosperity, and wealth, have attained their present elevation.”

A Prussian General's reference to Napoleon at the Congress of Vienna, 1815¹

Abstract

This revised and reconfigured essay surveys a range of printed secondary sources going back to publications of the day (as well as includes research in primary sources) in order to revive a traditional and unresolved debate on economic connexions between the French and Industrial Revolutions. It argues that the costs flowing from the reallocation of labour, capital and technical knowledge to wage warfare from 1793-1815 have been overstated in relation to a range of benefits that accrued from: crowding out a potential invasion by Napoleon's armies; improvements to the skills and discipline of the workforce; the integration of Ireland into a national market; the accelerated diffusion of technologies associated with coal and iron; the circumvention of diminishing returns to agriculture and above all from a victory that provided the economy with a more efficient State, Navy and Merchant Marine that, for a century, retained most of the gains from trade and servicing the international economy obtained at the expense of rivals during these long wars with France.

My conclusion is that the costs and benefits (derived from participation in a global war from 1793 to 1815, that was integral to the era's geopolitical and mercantilist international economic order) cannot be measured. But in the context and history of that order it is difficult to represent their outcome as anything other than positive and significant for the consolidation and progress of Britain's famous transition to become Europe's First Industrial Nation.

Keywords: Industrial Revolution, French Revolution, Revolutionary and Napoleonic Wars, Warfare and Economic Growth, Fiscal States, Sovereign Debts, Balance of Payments, Naval Hegemony, Mercantilism

JEL classification codes: B, E, G, J, N, O, Y

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¹ A Prussian general's reference to Napoleon at the Congress of Vienna in 1815 cited by A.D. Harvey, *Collision of Empires. Britain in Three World Wars 1793-1815* (London, 1992), p. 111

1. Quantifying the Impact of Warfare upon Economic Growth

Between the Peace of Paris (1763) and the adoption of free trade (1846-49) the economy of the United Kingdom passed through an accelerated phase of industrialization and urbanization, referred to as the First Industrial Revolution. For more than a third of that time the British state was: extracting and mobilizing resources (labour, capital, raw materials, intermediate and consumption goods) for purposes of: preparing, waging and disengaging from warfare with enemies from the mainland of Europe, failing to repress rebellions by colonists in the Americas, and defeating Indian, Chinese and other armed forces in various parts of the world.²

The wars conducted between 1793 and 1815 in the middle of this famous conjuncture in British economic history should be comprehended historiographically (as they were by contemporaries) as part of an era of mercantilist competition accompanied by violent strife, going back to the First Anglo-Dutch war of 1651. The interludes from 1793-1815 will be represented here as the culmination of a connected sequence of wars that accompanied the rise of the realm to the position of geopolitical, commercial and economic hegemony that it occupied for something like a century after the Treaty of Vienna in 1815, when “Britain’s military and diplomatic prestige touched a pitch it has never reached before or since.”³

Connexions between around fourteen politically distinct conflicts and the long-run growth of the national economy preoccupied statesmen and their mercantilist advisers between 1651 and 1815.⁴ They conceived of clear and positive correlations between power and profit. As Charles Wilson observed: their “logic was the logic of violence in an age of

² D. Horn, *Great Britain and Europe in the Eighteenth Century* (Oxford, 1967) and D. McKay and H.M. Scott, *The Rise of the Great Powers 1648-1815* (London, 1983) and P. Marshall, (ed.), *The Oxford History of the British Empire*, vols. 1-3 (Oxford, 1998)

³ The quote is from Boyd Hilton, *A Mad, Bad and Dangerous People. England 1783-1846* (Oxford, 2006), p. 237; J.R. Jones, *Britain and the World, 1649-1815* (Brighton, 1980) and L. Stone (ed.), *An Imperial State at War from 1689-1815* (London, 1994). J. Black, *Trade, Empire and British Foreign Policy 1689-1815* (London, 2007).

⁴ L. Gomes, *Foreign Trade and the National Economy* (London, 1987) and T.W. Hutchinson, *Before Adam Smith The Emergence of Political Economy* (Oxford, 1988).

violence”.⁵ That logic has been derogated by the dominant tradition in English political economy running from Adam Smith to Maynard Keynes which has influenced generations of liberal economic historians to regard all wars as inimical for material progress and the welfare of British society.⁶

There is a literature, even a journal on the economics of war. Both economists and modern historians are explicably chary in entering debates that attempt to investigate the economic consequences of wars. Historians tend to concentrate upon their origins and political outcomes for states and, by extension, institution formation in early modern Europe.⁷ Economists prefer more manageable research into the costs of mobilizing resources for engagement in power politics.⁸

Clearly conjectures about outcomes from wars for the histories of national economies will be much more difficult to support with evidence hard enough to draw inferences about their benefits as well as their costs or to measure connexions between active involvement in armed conflicts with rival powers on the one hand, and long-term material progress on the other.⁹

⁵ C. Wilson, *England's Apprenticeship, 1603-1763* (New York, 1968), p. 67 and K Tribe, 'Mercantilism and the Economics of State Formation' in L. Magnusson (ed.), *Mercantilist Economics* (Northwell, 1993), pp. 175-86; E. and S. Reinert, 'Mercantilism and Economic Development: Schumpeterian Dynamics, Institution Building and International Benchmarking' in K. S. Jomo and E. Reinert (eds.), *Development Economics. How Schools of Economic Thought have Addressed Development* (London, 2005).

⁶ E. Silberner, *The Problem of War in Nineteenth Century Economic Thought* (Princeton, 1946) and J. Brauer and H. Van Tulyll, *How Economists Explains Military History* (Chicago, 2008).

⁷ F. Lane, *Profits from Power. Readings in Protection, Rent and Violence* (Albany, 1979); P.W. Schroeder, *The Transformation of European Politics* (Oxford, 1992) and S. Baxter, (ed.), *England's Rise to Greatness* (Berkeley, 1983).

⁸ V.W. Ruttan, *Is War Necessary for Economic Growth? Military Procurement and Technology Development* (Oxford, 2006). E.L. Bogart, *Direct and Indirect Costs of the Great War* (New York, 1920); A.O. Bowley, *Some Economic Consequences of the Great War* (London, 1930); G. Kennedy, *Defense Economics* (London, 1983); S.N. Broadberry, 'The Impact of World Wars on the Long Run Performance of the British Economy', *Oxford Review of Economic Policy*, 4 (1988), pp. 25-37; T. Sandler and K. Hartley, *The Economics of Defence* (Cambridge, 1995).

Engagements in war may have delayed, accelerated or arrested economic development. Counterfactuals are certainly implicit in any enquiry that poses the meta question about their economic consequences. Economists remain commendably explicit in the parsimonious methods they utilize to deal with that key question. Impatient with history, they cut through detailed investigations into the impact of armed conflicts upon the factors of production (labour, capital, natural endowments and technology) behind economic growth. They avoid difficulties involved in disaggregating the effects of mobilization upon the distinct sectors and industries that make up national economies. They make heroic assumptions that, in the absence of conflict, rates of growth for national incomes, industrial and agricultural outputs, labour productivities, consumption per capita and other macro-indicators of development would have continued on trends observed and measured for runs of pre-war years. Cliometricians posit that: without the interruptions and diversions associated with warfare these trends (as represented on several varieties of growth curves invented by statisticians) would have persisted; that deviations from them are imputable to the malign effects of reallocating resources from the civilian economy into purposes connected directly or indirectly to armed conflict. Estimated declines below trends represent the costs of war which cease to effect long run growth once national economies are back upon “normal” paths for growth.¹⁰

⁹ A. Milward, *The Economic Effects of Two World Wars on Britain* (London, 1984); R. Andreano (ed.), *The Economic Impact of the American Civil War* (Cambridge, Mass., 1967); H.G. Vatter, *The US Economy in World War II* (New York, 1985). For recent attempts to construct theories that draw connexions between warfare and state formation vide T. Besley and T. Persson, ‘Wars and State Capacity’, in *Journal of the European Economic Association*, 2 (2009), pp. 522-30.

¹⁰ S. Kuznets, *Postwar Economic Growth* (New Haven, 1954); C. Goldin and F. Lewis, ‘The Economic Cost of the American Civil War,’ in *Journal of Economic History*, 35 (1975), p. 299-327 and C. Goldin and F. Lewis, ‘The Postwar. Recovery of the South and the Cost of the Civil War,’ *Journal of Economic History*, 38 (1978), pp. 487-492.

These macro statistical exercises draw attention to familiar connexions. Firstly, that: war reduces a country's capacity for steady growth; secondly, that social deprivation - in terms of private consumption foregone - and investment diverted, measured as a reallocation of investible savings to support expenditures by the state - rises in wartime, but then steadily diminishes when recovery carries national economies forward again;. Some recognize that wars were followed by shifts in the relative geopolitical positions of countries and their potential for future growth within the global economy at large.¹¹

Most historians of early modern Europe will not be convinced that trends in production, investment or consumption could be defined ex post on the basis of accessible information for runs of so-called normal years, extrapolated forward through periods of war and recovery until an economy is back upon some kind of linear path for growth. They anticipate that more heuristic insights into the outcomes of early modern warfare might flow from investigations conducted war by war, factor by factor, sector by sector. They insist upon the separation of chronologies and perspectives so that distinctions can be made between immediate and short-term impacts and longer term structural effects of warfare upon the growth of Europe's competing national economies.¹²

¹¹ M. Harrison, 'Resource Mobilization for World War II: the USA, UK, USSR and Germany, 1938-15,' in *Economic History Review*, 41 (1988), pp. 171-93; S. Broadberry and M. Harrison (eds.), *The Economics of World War I* (Cambridge, 2005) ; K. O'Rourke, 'The Worldwide Economic Impact of the French Revolutionary and Napoleonic Wars, 1793-1815,' in *Journal of Global History*, 1 (2006), pp. 123-49; R. Findlay and K. O'Rourke, *Power and Plenty. Trade, War and the World Economy in the Second Millennium* (Princeton, 2007).

¹² P.K. O'Brien, 'Global Warfare and Long Term Economic Development, 1789-1939,' in *War in History*, 3 (1996) pp. 437-50.

2. Mercantilism, Warfare and the Rise of the British Economy

Partly to avoid the almost insurmountable theoretical and empirical difficulties involved as well as a liberal antipathy to the very notion that the celebrated and precocious industrialization of the offshore island can be plausibly represented as Europe's paradigm case of effective mercantilism, British economic history is not replete with a significant volume of historical research and debate into the costs and benefits of the states largely successful engagement in a sequence of wars and numerous minor conflicts with other European and Asian powers between 1651-1846.¹³

As John Brewer, Lawrence Stone, Huw Bowen, Stephen Conway and others discovered when they published recent surveys of what is after all a major theme in British history, the anticipated programme of research, publication and discourse (concerned to synthesize connexions between warfare and the long run growth of the British or any other national economy) for an era of mercantilism is not out there in anything like the volume and depth the topic warrants.¹⁴

Long ago Ashton published an acute analysis of the influences of warfare on economic fluctuations during the 18th century and rejected John's suggestions that expenditures by the army and navy on weapons, ships and equipment promoted any kind of significant stimulus for industrial production and technological innovation before 1760.¹⁵ Jones, Conway and Crouzet have all published excellent books and articles, tracing the impact of wars on sectors of the British economy (particularly

¹³ Recently published textbooks devote very few pages to the analysis of connexions between warfare and British industrialization despite the fact that they proceeded in tandem. Vide P. Hudson, *The Industrial Revolution* (London, 1992); M. Daunton, *Progress and Poverty. An Economic and Social History of Britain, 1700-1850* (Oxford, 1995); R. Floud and P. Johnson (eds.), *The Cambridge Economic History of Modern Britain*, vol. 1 Industrialization 1700-1860 (Cambridge, 2004) and R.C. Allen, *The British Industrial Revolution in Global Perspective* (Cambridge, 2009); J. Mokyr, *The Enlightened Economy. An Economic History of Britain* (London, 2009).

¹⁴ J. Brewer, *The Sinews of Power, War, Money and the English State 1683-1783* (London, 1989); L. Stone (ed.), *An Imperial State at War* (London, 1994); H. Bowen, *War and British Society, 1688-1815* (Cambridge, 1998); S. Conway, *The British Isles and the War of American Independence* (Oxford, 2000).

trade and shipping) during the course of three major periods of warfare: 1689-1713, 1776-83 and 1803-15.¹⁶ Anglo-Dutch rivalry and mercantile conflicts has attracted scholarship of the highest quality from Israel, Ormrod, and De Vries and Van der Woude.¹⁷ Very little has been published on economic outcomes imputable to the War of Austrian Succession, 1739-48, the watershed Seven Years War of 1756-63 or those relatively minor conflicts with Sweden and Spain in the 1720s, 1770s and 1780s.¹⁸

Although the bibliography in international history includes substantial volumes of evidence and some pertinent insights into economic outcomes the concerns of most historians are basically with the immediate problems and shorter term effects flowing from: the mobilization of resources; from victories, defeats, taxes, loans and monetary policies that operated while conflicts were in progress; supplemented by ad hoc assessments of the territorial losses incurred or gains that accrued from peace treaties concluded at the end of wars.¹⁹

Economic historians have adopted more structuralist and comparative approaches by exploring multiple examples of mobilization for warfare by several European polities and their connexions to the formation of organizations – primarily to service their geopolitical policies, but which over time contributed to the establishment of comparative advantages including the formation of more centralized and efficient states, evolving to protect and sustain institutions that promoted the development of national interests. This recent wave of research has recognized the inseparable connexions between warfare, state formation, competitive advantages and the construction of favourable and/or restrictive institutions for long term growth.²⁰

¹⁵ T.S. Ashton *Economic Fluctuations in England, 1700-1800* (Oxford, 1959) and A. John, 'War and the English Economy, 1700-1763,' in *Economic History Review*, 7 (1955), pp. 329-44.

¹⁶ D.W. Jones, *War and Economy in the Age of William III and Marlborough* (Oxford, 1989); Conway, *The British Isles and the American War of Independence*; S. Conway, *War, State and Society in mid-Eighteenth Century Britain and Ireland* (Oxford, 2006); F. Crouzet, *L'Economie Britannique et Le Blocus Continental* (2nd ed., Paris, 1987)

¹⁷ J. Israel, *Dutch Primacy in World Trade, 1585-1740* (Oxford, 1989); J. De Vries and A. Van Der Woude, *The First Modern Economy. Success, Failure and Perseverance of the Dutch Economy 1500-1815* (Cambridge, 1997); D. Ormrod, *The Rise of Commercial Empires. England and the Netherlands in the Age of Mercantilism, 1650-1770* (Cambridge, 2003); P. K. O'Brien, 'Mercantilism and Imperialism and the Rise and Decline of the Dutch and British Economies', in *De Economist*, 148 (2000), pp. 148-501.

¹⁸ Bowen, *War and British Society*; D. Baugh, *The Global Seven Years War, 1756-1763*, (London, 2011).

For example, several of the institutions established for defence and internal order by England's republican regime during and in the wake of the Civil War (including an enlarged standing navy, the taxation of domestic production by way of excise duties and a reformulated strategy for the implementation of navigation acts) embodied long term spinoffs and externalities for private capital formation and innovation in domestic agriculture and industry, as well as the Island's trade, shipping, commercial services and colonization overseas. The political consensus and organizational capacities that sustained Britain's well-funded fiscal naval state emerged during an interregnum of republican rule and continued during the restoration of monarchy. Thereafter it evolved over time to supply several public goods of real significance for businessmen operating in the home economy and protected their investment and enterprise overseas. By increasing control over a unifying kingdom, the state provided firms with: external security against invasion, internal stability, the rigorous enforcement of private property rights, a bellicose foreign policy linked to an ideology of xenophobia, supporting cultures of deference to hierarchy and, above all, compliance with the taxation allocated by an ancien regime for naval (and military) protection and for imperial expansion overseas.²¹

As the level, scope and stability of tax revenues accruing to the restored monarchical regime increased, Britain's ruling aristocratic elite became more confident that their state could fund (basically through the medium of debt accumulation), more aggressive geopolitical and mercantilist policies against the country's economic rivals including: the Netherlands, Spain, Scandinavia and Russia and above all France, for

¹⁹ Typified by the scholarship displayed in the writings and volumes edited by Philippe Contamine and Jeremy Black. Vide J. Black, (ed.), *European Warfare, 1453-1815* (Basingstoke, 1999), and P. Contamine (ed.), *War and Competition Between States* (Oxford, 2000). For economic history the tradition, represented in seminal books by R. Davis, *The Rise of the English Shipping Industry* (London, 1962) and C. Wilson, *England's Apprenticeship*, has not attracted much new research in recent years. But vide: A. Page, *Britain and the Seventy Years War, 1740-1815* (Basingstoke, 2014).

²⁰ Surveyed and fully referenced in three recent volumes: L. Prados de la Escosura (ed.), *Exceptionalism and Industrialization. Britain and its European Rivals, 1688-1815* (Cambridge, 2004); R. Torres Sanchez, *War, State and Development. Fiscal Military States in the Eighteenth Century* (Pamplona, 2007) and the bibliography cited in his book by M. Dincecco, *Political Transformation and Public Finances in Europe* (Cambridge, 2011).

²¹ P.K. O'Brien, 'State Formation and the Construction of Institutions for the First Industrial Nation,' in H.J. Chang (ed.), *Institutional Change and Economic Development* (New York, 2007), pp. 177-98.

the gains from trade and colonization over an era of European imperialism and expansion of world commerce. By the close of the Seven Years War, 1756-63, the realm's aristocratic and plutocratic elites had consolidated a political consensus, behind Britain's fiscal and financial systems, invested heavily in naval power to defend the realm, commanded a military apparatus to deter challenges to property and could rely upon a culture of nationalism and deference to hierarchy to sustain drives for expansion overseas and ambitions to become Europe's hegemonic power.²²

Although the American tax rebellion, which developed into open conflict with other European powers, can be represented as an avoidable and expensive setback for the British state and its mercantilist strategy for growth, after the Peace of Paris (1783) slow recovery occurred. The king and Parliament simply gave up on their pretensions to tax and regulate the economic affairs of "subjects" living and working 3000 miles from London.²³

Commerce with the Americas then resumed.²⁴ Pitt the Younger and his able advisers began to reform and reorganize the Island state's fiscal and financial system in order to regain the realm's geopolitical and commercial lead over rivals from the mainland.²⁵ The economy appears to have been back on track when Britain's unreformed system of parliamentary government and the kingdom's propertied elites were confronted by the most sustained and expensive challenge to the political security, stability and economic prosperity of the Isles since attacks by Spanish Armadas in the late 16th century.²⁶

²² P.K. O'Brien, 'The Nature and Historical Evolution of an Exceptional Fiscal State and its Possible Significance for the Precocious Commercialization and Industrialization of the British Economy from Cromwell to Nelson in *Economic History Review*, 64 (2011), pp.427-48.

²³ S. Conway, *The War of American Independence, 1775-83* (London, 1995).

²⁴ R.C. Nash, 'The Organization of Trade and Finance in the British Atlantic Economy,' in P.A. Coclonis (ed.), *The Atlantic Economy during the Seventeenth and Eighteenth Centuries* (Columbia, South Carolina, 2005), pp. 95-152; N.F. Koehn, *The Power of Commerce, Economy and Governance in the First British Empire* (Ithaca, 1994); P.K. Liss, *Atlantic Empires: the Networks of Trade and Revolution, 1713-1826* (Princeton, 1983).

²⁵ J. Ehrman, *The Younger Pitt. The Years of Acclaim* (London, 1969) and R. Rayment, 'The Income and Expenditure of Great Britain of the last Seven Years,' (London, 1791: *Goldsmiths' Collection*, University of London Library).

²⁶ H.D. Dickinson (ed.), *Britain and the French Revolution* (London, 1989) and Harvey, *Collision of Empires*.

3. Fiscal and Financial Costs of the Revolutionary and Napoleonic Wars 1793-1815

The appropriation of revenues (taxes with loans) to fund the real resources (manpower, equipment, weapons, horses, foodstuffs, buildings, ships, fortifications, organizational systems etc. etc. utilized for the wars of 1793-1815 replicated the range of governmental tasks involved in the mobilization of armed force for previous conflicts going back to that other protracted period of warfare against Louis XIV and his allies from 1689-1713. Nevertheless, the length, scale and scope of the effort required to raise sufficient funds to acquire the volume of resources allocated to defeat Revolutionary and Napoleonic France exceeded by a long way anything undertaken by the state since its takeover by William of Orange in 1688. For example, between 1788-92, immediately before the Revolutionary War, George III and his ministers allocated about £7 million per annum to provide for the defence of the realm and civil administration (excluding transfer payments for debt servicing). At the close of the Napoleonic war (1803-15), expenditures on military and naval forces for an expanded empire and an inflated wartime administration had multiplied five times in real terms and had gone up from around 6% to above 22% of Britain's national income.

As Table 1 shows the tax "burdens" per head of the population had multiplied about seven times compared to amounts appropriated by William III to fund his newly acquired kingdom's re-engagement with European power politics during the War of the League of Augsburg (1689-97) and by a far larger multiplier if comparisons are made with those years of peace under the last Stuart monarch, James II. In short, by any historical, international (including Dutch) standards, the taxation carried by British society and the economy to service debt and mobilize resources to defeat the ambitions of Revolutionary and Napoleonic France looks extraordinary.²⁷

²⁷ The data sources for taxation used here are fully referenced in previous publications. P.K. O'Brien, 'The Political Economy of British Taxation 1660-1815,' in *Economic History Review*, 41 (1988) pp. 1-32 and in P.K. O'Brien and P. Hunt, 'England,' in R. Bonney (ed.), *The Rise of the Fiscal State in Europe c. 1200-1815* (Oxford, 1999). The reference to Dutch levels is to comparisons made by W. Fritschy, 'Taxation in Britain, France and the Netherlands,' in *Economic and Social History of the Netherlands*, 2 (1990) pp. 57-99.

Table 1: Burdens of Tax Revenues in Wartime

War Period (5-year average)	Taxation per Head in Constant Prices	Taxes collected as Shares of National Income of GDP
1693-97	100	6.7%
1703-12	158	9.1%
1743-47	189	8.7%
1758-62	236	11.5%
1778-82	277	11.7%
1812-15	679	18.2%

My aim is to say something potentially viable, or at least worth contesting about the impact of this particular war upon the long-run growth of the economy. Since “loops of inter-connexions” ran both ways, let me begin by degrading the hypothesis (prevalent in history textbooks) that the structural changes and rapid growth of the economy during the years 1793-1815 provided the state with some “substantial” share of the extra taxes and ergo the means for servicing debt and funding the resources allocated to the navy and to British and foreign armies.

Agreed: the rise of new industries, the concentration of production in factories, its agglomeration in towns and the increased pressures to comply with intensified and more effectively monitored demands for taxes in a war against a revolutionary foe, allocated for the defence of property and English “freedom” all helped the kingdom’s developed fiscal and financial systems to appropriate revenue and borrow money more efficiently than ever before. Nevertheless, several quantified objections undermine any simplistic view that economic growth and structural change provided the state with any significant proportion of the extra taxation allocated to service loans and to fund the resources required to defeat France.

For example, less than 10% of the incremental taxation allocated to wage this war emanated from *additions to the volumes* of goods, services and incomes taxed before its outbreak in 1793. 55% came from raising rates of taxation levied on goods, services, wealth and incomes already taxed between 1788-92. Taxes introduced in wartime, especially the income tax (imposed in 1799), provided the state with the residual 35% of

the additional taxation required to defeat the bid by France for hegemony over Europe. Most of these “new taxes” did not, moreover, fall either *directly* or severely upon industries and sectors of the economy undergoing the kind of rapid growth, structural change and urban agglomeration associated with the First Industrial Revolution. For example, cotton textiles, the iron and metallurgical industries, coal, internal transportation by canals, shipbuilding and shipping as well as exports of manufactured goods continued to enjoy roughly the same kind of favourable fiscal treatment long advocated by mercantilists for new industries as well as foreign trade and shipping - by then receiving heavier protection from the Royal Navy to cope with intensified dangers at sea.²⁸

Finally, the view that economic growth and structural change proceeding more slowly between 1793-1815 could have supplied anything more than a fraction of the resources required for warfare looks highly implausible because it implies inconceivable rates of expansion for the national income and its component fiscal base. Over these years of warfare expenditures by the state increased at an annual average rate of nearly 5% at a time when the estimated growth rate for gross domestic product decelerated to 1.5% per annum.²⁹

Unless the elasticity of tax revenues with respect to changes in national income was more than an inconceivable coefficient of 3.3 *prima facie* the data in Table 1 supports the orthodox inference that wars against France imposed steep and rising burdens associated with taxation and state borrowing on the domestic economy and British society both during the conflict and for several decades after final victories at Trafalgar and Waterloo.³⁰

²⁸ P.K. O'Brien, 'Taxation for the Wars against Revolutionary and Napoleonic France, 1793-1915,' in C. Storrs (ed.), *The Fiscal Military State in Eighteenth Century Europe* (Farnham, 2009), pp. 167-201.

²⁹ N.F.R. Crafts and K. Harley, 'Output Growth and the British Industrial Revolution: A Restatement of the Crafts-Harley View,' in *Economic History Review*, 45 (1992) pp. 703-30 and K. Harley, 'Reassessing the Industrial Revolution: a Macro View in J. Mokyr (ed.), *The British Industrial Revolution* (Boulder, 1993) pp. 160-205. The debate about resources to carry on with the war against France was a dominant discourse of the times. See J.E. Cookson, 'Political Arithmetic and War in Britain,' in *War and Society* (1983) pp. 37-60.

³⁰ J.E. Cookson, 'British Society and the French Wars, 1793-1815,' in *Australian Journal of Politics and History*, 31 (1985) pp. 74-88 and C. Emsley, *British Society and the French Wars* (Ottawa, 1984). The aftermath of the wars has been well covered by historians referenced in footnote 31.

Nevertheless, the numbers also suggest that the First Industrial Revolution continued (vide the indices calibrated by Deane, Cole, Crafts, Cuenca-Esteban and others) on an established trajectory. The rate and pattern of industrialization never transformed the national economy or extended its fiscal base at a pace anywhere near fast enough to carry more than a small share of the costs of this most expensive of conflicts. Given that invasion and defeat by the armies of Napoleon could conceivably have set back the Industrial Revolution for decades, the search for connexions is best conducted by specifying and, if possible, marshalling evidence to answer two counterfactual questions that cannot be dismissed as anachronistic exercises in theoretical speculation?

Firstly, why did this “re/misallocation” of resources to support 22 years of warfare fail to depress the growth and structural change of the economy even further below levels that might well have been anticipated if trends in investment, structural change and of technological innovation (discernible during the decade of peace that followed the Treaty of Paris in 1783) had continued into the 19th century? In other words, why was the momentum already transforming the economy from the 1760s onwards not held in check for far longer and more seriously by this costly war?³¹

Secondly (and this is a key argument for reviving an old discussion) what, if anything, could be claimed for positive legacies and spin-offs from mobilization for war that contributed to recovery and placed the economy back onto a course that led to the long Victorian boom and to Britain’s interlude of hegemony as the commercial hub and industrial workshop of the world?³²

³¹ This is virtually the way the question has been posed by England’s most distinguished historian of this period. Vide: Boyd Hilton, *A Mad, Bad and Dangerous People. England 1783-1846* (New Oxford History of England, Oxford, 2006). Hilton provides an excellent survey of the social and political problems of the post war period attributable to twenty-two years of engagement in warfare.

³² As celebrated in recent books by Allen, *The British Industrial Revolution*; Mokyr, *Industrial Enlightenment* and by P. Vries, *State, Economy and the Great Divergence. Great Britain and China, 1680s-1850s* (Leiden, 2015).

Fiscal and financial accounts provide the most accessible and frequently used bodies of data for historians who attempt to analyse and elaborate upon economic costs inflicted by warfare. But they bias investigations towards the measurable, neglect real or opportunity costs and divert attention away from any serious consideration of material benefits that flowed from money efficiently spent by states. Furthermore, budgetary accounts are reported in current prices for a period when extraordinary fluctuations from year to year renders deflation to real terms highly problematical.³³ In short, while official accounts promote quantification, historical scholarship could now move on from liberal antipathies to unavoidable wars and concentrate upon the nature, significance, transformations and potential benefits as well as the opportunity costs of the resources mobilized by Britain and other early modern states for warfare.

The resources, reallocated from civilian production, included manpower, capital, natural endowments and the skills and funds diverted from research and development for more efficient technologies and their diffusion across the private sector in order to produce weapons and other inputs utilized primarily for warfare. Apart from the long term benefits imputable to victory rather than defeat, engagements in warfare carried in train positive outcomes for the accumulation of human and social as well as physical capital, for the diffusion of technologies for the enhancement of a nation's competitive advantages for trade and commerce overseas and, perhaps first and foremost, for the formation of more modern and efficient systems for central governance and administration and by extension, institutions promoting development.³⁴

³³ J.T. Salerno, 'War and the Money Machine: Concealing the Costs of War Beneath the Veil of Inflation,' in *Journal des Economists*, 1 (1995), pp. 153-73. For the French wars see the classic paper by J. Mokyr and N. Savin, 'Stagnation in Historical Perspective: the Napoleon Wars Revisited,' in P. Uselding (ed.), *Research in Economic History*, 1 (1976), pp. 198-259. Modern economists who properly prefer to deal with real or constant prices should remain aware that indices to measure anything other than grain prices were not available to contemporaries at the time. Vide A. Young, *An Inquiry into the Increases in Prices in Europe during the Past Twenty-five Years* (Goldsmiths Collection, London, 1815) and T. Tooke, *Thoughts and Details on Prices* (Goldsmiths Collection, London 1824).

³⁴ In this and other respects the article by G. Hueckel, 'War and the British Economy, 1793-1815: a General Equilibrium Analysis,' in *Explorations in Economic History*, 10 (1973) pp. 365-96 promises more than it delivers. For recent analyses, see W. He, *Paths Toward the Modern Fiscal State. England, Japan and China* (Cambridge, Mass, 2013).

4. Labour

The most significant of the factors of production reallocated from employment in the private economy either to serve in or, indirectly to provide goods and services for the forces of the Crown was manpower. According to annual budgetary estimates published for the period 1793-1815, a modal 60% of the revenues voted by Parliament for the support of the armed forces (army, navy, militias, volunteers and ordnance) was classified as “pay and provisions”. By the latter years of the Napoleonic war, Parliament agreed to pay and feed military, naval and ordnance forces in excess of half a million men compared to some 75,000 in 1792.³⁵ The force under arms, funded by the State, included Irishmen, foreigners, volunteers, yeomanry and militias (embodied for only part of a year), as well as Indians paid for by the East India Company. Parliamentary “votes” can be transformed into “conjectures” that “outerbound estimates for incremental shares of “the British” workforce recruited to serve in the forces of the crown during the French wars were at most 6% of the country’s labour force and some 11% of males in their prime years.³⁶ My calculations make no allowance for troops and sailors recruited from Ireland who (according to Fortescue, Glover and Chart) constituted “significant” proportions of the British Army and Navy.³⁷ Furthermore, no estimates were constructed at the time for the increased numbers of workers engaged in maintaining, servicing and building ships, producing food, commodities, weapons, equipment, munitions, transportation, buildings, shelter etc and the commercial services purchased for the

³⁵ To classify the numbers of men mobilized for full and part-time service in the forces of the crown and the sums spent by the state on their pay and food would require years of research among several bodies of disparate records for audited public expenditures. The imperfect data cited here refer to: budgetary estimates produced for parliament (including “extraordinary” expenditures sanctioned after they had been incurred). They were published annually in appendices to Journals of the House of Commons and Supply Ledgers of the Treasury (Public Record Office Series T/35). They are printed in consolidated form in the British Parliamentary Papers 1868-69 (35) and 1858 (17). The categories of manpower recruited and paid for military service to the state are discussed in C.M. Clode, *Military Forces of the Crown* (London, 2 vols.1869).

³⁶ I made a calculation for the census year 1801 designed to provide a quantified upper bound notion of the possible shares of the British male workforce reallocated from normal civilian employment into production for the navy, army, ordnance, militia, volunteers, fencibles etc. After making due allowance for the scale of the pre-war armed services and for part-time soldiers and foreign mercenaries, I concluded that the extra numbers involved could not have been more than 60% of the totals referenced in estimates put before Parliament for budgetary support – a total that calibrates into 11% of male workers in their prime years: and around 6% of the entire male workforce.

army and navy. Thus we might plausibly assume that *additional* demands by the state for “civilian” labour generated by engagement in warfare could have been proportional to the shares of the *incremental* expenditures required to enlarge the armies and navies in the pay of the Crown between 1793 -1815. On this premise my tentative estimate suggests that some 18% of all male British workers in their prime (aged 15-40) became either directly or indirectly employed in the workforce involved with warfare. Conceivably that ratio may overstate the opportunity costs incurred for the redeployment of labour because Parliament did not pay market wage rates for the kingdom’s soldiers and sailors. That parsimony, combined with the operation of selective and coercive systems for conscription (Quota Acts and impressment) encouraged more affluent (“skilled”) men to bribe and purchase their way out of military service.³⁸ Several histories of mobilization for the armed forces are marked by a consensus that both the Army and the Navy (which relied in some, but no small degree, upon coercion to bring ships crews and regiments up to strength) recruited, conscripted and impressed manpower mainly from the lower ends of pay and skill categories.³⁹

Thus, apart from the merchant marine and shipbuilding industry, the civilian economy may not have been seriously deprived of scarce labour. Given that some 60% recruits cited labourer as their occupation, the army

³⁷ J.W. Fortescue, *A History of the British Army* (London, 1910), pp. 94-96; R. Glover, *Britain at Bay* (London, 1973), p. 131 and R. Glover, *Peninsular Preparation. The Reform of the British Army, 1795-1809* (Cambridge, 1963) p. 225, and D.A. Chart, ‘Irish Levies’, in *English Historical Review*, 26 (1911) pp. 102-32. R. Morriss, *The Foundations of British Maritime Ascendancy, Logistics and the State* (Cambridge, 2011); R. Knight, *Britain Against Napoleon in the Organization of Victory, 1793-1815* (London, 2013) and S. Ward, *Wellington’s Headquarters. Administrative Problems in the Peninsular War* (Oxford, 1957).

³⁸ J.E. Cookson, *The British Armed Nation, 1793-1815* (Oxford, 1997).

³⁹ The range of measures passed by Parliament during the war to recruit, incentivize, cajole and coerce young males to serve in the forces of the crown (army, navy, volunteers, militias, fencibles) have been elaborated in detail in books in fns 37 and 38 Cookson, *British and Armed in Nation*; C. Emsley, *British Society and the French Wars*, and J. Western, *The English Militia in the Eighteenth Century* (London, 1965), as well as in classical studies by J.W. Fortescue, *History of the British Army*; Fortescue, *The County Lieutenancies and the Army, 1803-14* (London, 1909); Clode, *Military Forces of the Crown*. Naval recruitment and impressment is covered in books by M. Lewis, *A Social History of the Navy* (London, 1960); C. Lloyd, *The British Seaman 1200-1860* (London, 1968) and N. Rodger, *Command of the Ocean. A Naval History of Britain, 1649-1815*, vol. 2 (London, 2004).

could, as Wellington, Malthus and Ricardo suggested, enlisted a significant percentage of the nation's potentially under or unemployed workers.⁴⁰ While the coincidence of the wars with upswings in population growth and expenditures on poor relief are consistent with suggestions that some kind of "military Keynesianism" may have operated over these years. Until the closing years wage rates for a majority of workers lagged behind prices.⁴¹ Although pay differentials between skilled and unskilled workers narrowed a little in wartime, the evidence for constraints on growth associated with inelastic supplies of labour seems neither compelling nor consistent with conditions in the labour market for years after the war.⁴² On the contrary, and in so far as Britain entered and remained at war with an elastic supply of potentially underemployed labour, remunerated its troops and sailors at low rates of pay, and the state maintained repressive controls over all forms of collective bargaining by workers, then overall the opportunity costs of labour mobilized for warfare might be plausibly depicted as relatively insignificant.⁴³

⁴⁰ Public Record Office, War Office Papers, volumes 25 and 69 give trades and place of birth of recruits to the army; C. Emsley, 'North Riding Naval Recruits,' in North Yorkshire County Record Office, 18 (1978), pp. 8-13; T.H. McGuffie, 'Recruiting for the Ranks of the Regular British Army,' in *Journal of the Society for Army Historical Research*, 34 (1956) pp. 56, 126 and 138.

⁴¹ W.A. Armstrong, 'The Influence of Demographic Factors on the Position of Agricultural Labour in England and Wales, c. 1750-1914,' in *Agricultural History Review*, 29 (1981), pp. 68-81; Mokyr and Savin, 'Stagflation in Historical Perspective', reject the full employment assumptions made in two papers by G. Hueckel, 'The Napoleonic Wars and their Impact on Factor Returns and Output Growth in England, 1793-1815,' in *Economic History Review*, 33 (1973) and 'War and the British Economy.'

⁴² The improbable full employment assumption is also the subject of dispute between G. Hueckel (cited in fn 41) and J. Anderson, 'Aspects of the Effect on the British Economy of the Wars Against France,' in *Australian Economic History Review*, 12 (1972), pp. 1-18 and 'A Measure of the Effect of British Public Finance, 1793-1815,' in *Economic History Review*, 27 (1974), pp. 610-19. Feinstein's indices for real "earnings index adjusted for unemployment" and for full employment show no tendency to rise between 1788-92 and 1813-17 – C. Feinstein, 'Pessimism Perpetuated: Real wages and the standard of living in Britain during and after the Industrial Revolution,' in *Journal of Economic History*, 58 (1998), pp. 648-653. In current prices expenditures on the poor in England and Wales rose from just over £2 million per annum in 1783-85 to £6.3 million in 1814. Data from Parliamentary (Parliamentary Papers 1818 (41) app. 2). The numbers are listed as being in receipt of "occasional" and "permanent" poor relief are neither concise nor reliable, but they do suggest totals in excess of those on payrolls for the armed forces – see K. Williams, *From Pauperism to Poverty* (London, 1981).

Furthermore, the evidence also suggests that the casualties suffered by the unfortunate victims of armed conflict cannot be represented as a serious depletion of the stock of human capital available for the post-war development of the British economy. Estimates for their economic effects are almost impossible to construct because proper allowance must be made for normal (civilian) rates for death and injury.⁴⁴ While conjectures for “offsets” and externalities including intangible gains derived from the inculcation of skills, attitudes to disciplined work and bodily health that supposedly came from service aboard naval ships and in the colours look plausible. Finally most political and social historians with expertise on the period recognize that the response to French aggression by an aristocratic officer class and the upsurge in loyalism among the population at large contributed to the stability of Britain’s ancien regime as well as to the orderly and deferential behaviour of its working class during the difficult years of post-war transition to an industrial society.⁴⁵

⁴³ This view is congruent with the views of economists of the day including Ricardo and Malthus. And see G. Chalmers, *Historical View of the Domestic Economy of Britain and Ireland* (Goldsmiths Collection, London 1812); J. Lowe, *The Present State of England* (Goldsmiths Collection, London, 1822) and T. Tooke, *Thoughts and Details on Prices*; Cookson, *The British Armed Nation 1793-1815*.

⁴⁴ On the health of troops, vide E. Charters, *Disease, War and the Imperial State* (Chicago, 2004); G. Hodge, ‘On the Mortality Arising from Naval Operations,’ in *Journal of the Statistical Society*, 18 (1855) pp. 208-12 and ‘On the Mortality Arising from Military Operations,’ in *Journal of the Statistical Society*, 19 (1856) pp. 264-66; L.G. White, *The Story of Army Education* (London, 1963).

⁴⁵ L. Greenfield, *The Spirit of Capitalism. Nationalism and Economic Growth* (London, 2001); R. Price, *British Society 1680-1880* (Cambridge, 1999), pp. 30-35; Cookson, *British Armed Nation*; A. Gee, *The British Volunteer Movement, 1794-1814* (Oxford, 2003); H. T. Dickinson, ‘Popular Conservatism and Military Loyalism, 1785-1815,’ in H.T. Dickinson (ed.), *Britain and the French Revolution* (Basingstoke, 1989) and G. Russell, *The Theatres of War. Performance, Politics and Society* (Oxford, 1995).; C. Elmsley, *British State and the French Wars – 1792-1815* (London, 1979).

To guess at some ratio that might represent net depletion and depreciation of the nation's stock of human and social capital imputable to 22 years of warfare would be a spurious, not to say a crass form of quantification. Given the numbers and credentials of most of the men conscripted or reallocated for early modern conflicts, both the short term impact of mobilization and longer term economic significance of casualties from these final wars against France were probably a lot smaller than they were during the world wars of the 20th century.⁴⁶ There is, moreover, nothing in histories of post-war conditions in the labour market to suggest: that the economy suffered from inelastic labour supplies between 1793 and 1815 or that the conflict had seriously depleted on Britain's stock of human capital for the protected engagement in warfare had done anything other than strengthen a political and social culture favourable to an established order of patriotism and deference to authority.⁴⁷ That outcome was not obtained in France, Spain and other belligerent rivals and competitors on the mainland. They suffered far more from casualties than the United Kingdom.⁴⁸

5. Connexions of War to the Formation, Depreciation, Destruction, Appropriation and Augmentation of the Stock of National Capital

Feinstein estimated that stocks of fixed and circulating capital available for private production may have increased by 27% (around 1.0% per annum) between 1792 and 1816.^{48a} How rapidly that stock might have accumulated in the absence of war remains virtually impossible to measure.

⁴⁶ J. Greenwood, 'British Loss of Life in the Wars, 1793-1815 and 1914-18,' in *Journal of the Royal Statistical Society*, 105 (1942), pp. 4-7; S. Broadberry and P. Howlett, 'Economic Mobilization for World War II: The United Kingdom' (unpublished paper, September 1995); S. Broadberry and M. Harrison (eds.), *The Economics of World War I* (Cambridge, 1995). According to Emsley, "French casualties" were much higher. See fn 45, p. 59.

⁴⁷ A.W. Acworth, *Financial Reconstruction in England, 1815-22* (London, 1925); B. Gordon, *Political Economy in Parliament, 1819-23*, (New York, 1976); B. Gordon, *Economic Doctrine and Tory Liberalism, 1824-30* (London, 1979); B. Hilton, *Corn, Cash and Commerce* (Oxford, 1977) and A. Gambles, *The Boundaries of Political Economy. Tory Economic Arguments, 1809-47* (London, 1996); J. Clapham, 'Europe after the Great Wars 1815 and 1920,' in *Economic Journal*, 30 (1920), pp. 423-35.

⁴⁸ C. Emsley and J. Walvin (eds.), *Artisans, Peasant and Proletarians, 1760-1860* (London, 1985); F. Tallet, *War and Society in Early Modern Europe* (London, 1992); L. James, 'Warrior Race,' in *History of the British at War* (London, 2001); A. Burns and J. Innes (eds.), *Rethinking the Age of Reform* (Oxford, 2003).

^{48a} C. Feinstein, 'Capital Accumulation in the Industrial Revolution,' in R. Floud and D. McCloskey (eds.), *The Economic History of Britain Since 1700*, vol.1 (Cambridge, 1981) pp. 128-42.

Yet this potentially major, connexion between the Industrial Revolution and the wars against Revolutionary and Napoleonic France has stimulated an interesting debate among economic historians, inspired by theoretical propositions designed by neo-classical economic theorists, to demonstrate that borrowing by states to fund expenditures on their armed forces tends (under rigorously specified conditions) to “crowd out” private borrowing and investment undertaken for ostensibly more productive purposes.⁴⁹ Thus loans to the state which funded warfare against Revolutionary and Napoleonic France could have left the kingdom’s economy at the end of hostilities with a stock of physical capital depleted and depreciated some way below the level that it could counterfactually have been in a position to utilize if the state had not borrowed savings to sustain much larger armies in the field and navies at sea. Although the model looks plausible enough, it remains as a proposition of contention among competing theories that span a range of possibilities from crowding out to crowding in.⁵⁰ Thus, the empirical question of where the stock of British capital and prospects for its future accumulation might have stood in 1815 (after some twenty-two years of wartime conditions) continues to be complex for historians of British and European economic history to specify, let alone measure.⁵¹

⁴⁹ M. Boskin et al (eds.), *Private Saving and Public Debt* (Oxford, 1987).

⁵⁰ B. Friedman, ‘The Effects of Large Government Deficits on Interest Rates and Equity Returns,’ in *Oxford Review of Economic Policy*, 1 (1984), pp. 58-71; M. Edelstein, ‘What Price Cold War? Military Spending and Private Investment in the US, 1946-1979,’ in *Cambridge Journal of Economics*, 14 (1990), pp. 421-37; R. Barro, ‘Government Spending, Interest Rates, Prices and Budget Deficits in the United Kingdom, 1701-1918,’ in *Journal of Monetary Economics*, 20 (1987), pp. 221-49. J. Ventura and H-J. Voth, ‘Debt with Growth. How Sovereign Debt Accelerated the First Industrial Revolution’ in *National Bureau of Economic Research Working Paper*, 21280 (2015), pp. 1-29.

⁵¹ I rely on data reconstructions by C. Feinstein, ‘Capital Formation in Great Britain,’ in P. Mathias and M. Postan (eds.), *The Cambridge Economic History of Europe*, vol. VII (Cambridge, 1978), p. 66. Feinstein’s data can be converted to mid-decennial estimates for gross national expenditures on capital formations in current prices. They are: £10.3 million for 1785, £13.4million for 1790, £16.4million for 1795, £16.9million for 1800, £18.9million for 1805, £27.9million for 1810, £37.9million for 1815 and £40.7million for 1820. Feinstein’s original data was constructed in constant prices of 1857-60.

Not least because after four years of heavy borrowing (1793-1797) Pitt the Younger and his successors at the Treasury departed from the kingdom's traditional strategy by funding very high proportions of the resources mobilized to continue the struggle against France with taxes instead of loans. Thereafter and by the end of this protracted interval of wartime finance 58% of the money raised to secure victory had emanated from taxation compared to around 21% for four previous wars.⁵² Even so, the nominal value of the sums borrowed by selling perpetual annuities and other public securities on the London capital market do prima facie look like an enormous diversion of the nation's savings away from investments for more productive purposes. This impression often arises, however, from citations of official figures which refer to the face values of the national debt serviced by the state which rose from a nominal total of £292 million (1788-92) to £862 million in 1817.⁵³ Apart from impressions conveyed by nominal values even when expressed as ratios of national income (another modern number unknown to contemporaries) the whole problem of "crowding out" could be dismissed as anachronistic and malposed because ultimately the funds borrowed by the state were allocated to "crowd out" plans for invasion by French armies. A far more serious check to economic transformation could have followed from the occupation of the United Kingdom by Napoleon's army. Nevertheless, a counterfactual exercise for a First Industrial Revolution, proceeding within an improbably peaceable geopolitical international economic order, could be heuristic to contemplate with reference to capital formation because some degree of avoidable crowding almost certainly occurred, particularly in the short run. There are, however, no valid reasons to toy with hypotheses that the elasticity of substitution between borrowing by the government and investment by the private sector could have been close to unity? It is not plausible to suggest that anything close to every million pounds subscribed by domestic savers to loans of various maturities for the state or extended by suppliers to the army, navy,

⁵² O'Brien, 'Taxation for the Wars Against Revolutionary and Napoleonic France'

⁵³ P.K. O'Brien, 'Mercantilist Institutions for the Pursuit of Power with Profit. The Management of Britain's National Debt, 1756-1815,' in F.P. Caselli (ed.), *Government, Debts and Financial Markets in Europe* (London, 2008), pp. 179-208. Even though market prices were and are quoted for the range of paper assets representing government debt, it is not clear what meaning could be attached to a market value for the entire stock of any national debt? For even higher estimates see J. McDonald's *A Free Nation Deep in Debt* (New York, 2003).

ordnance and other departments as credit would, *ceteris paribus*, have been invested in assets contributing to the growth and structural transformation of Britain's civilian economy?⁵⁴

Alas, the data required for a contextualized discussion of probabilities based upon macro statistical evidence lacks a secure annual series for private investment expenditures upon fixed and circulating capital in current prices to compare with the net annual amounts of loans and credits extended to the state before, during and in the immediate aftermath of warfare from 1793-1815. Feinstein constructed national "best guess" totals for such expenditures which are cited in table 2 for purposes of comparison with estimates for net inflows of funds (also in current prices) obtained by the state from a complex of recorded transactions with domestic and foreign capital markets involving the issue, redemption and repayment of perpetual, long and short term loans and credits as well as transfers for debt servicing. Feinstein warned us, however, that the margins of error in his estimates range from 10% to 25%.

⁵⁴ J.G. Williamson, 'Why was British Growth so Slow during the Industrial Revolution?' in *Journal of Economic History* 44 (1987), pp. 687-712 and the subsequent debate in C. Heim and P. Mirowski, 'Interest Rates and Crowding Out during Britain's Industrial Revolution,' in *Journal of Economic History*, 47 (1987), pp. 117-39 and J.G. Williamson, 'Debating the British Industrial Revolution,' in *Explorations in Economic History*, 3 (1987), pp. 269-92. His thesis has now been reformulated by P. Temin and H-J. Voth, *Prometheus Reshackled. Goldsmith Banks and England's Financial Revolution after 1700* (Oxford, 2012) in ways that both support and undermine the crowding out hypothesis.

Table 2 : Estimates for Borrowing by the State and Conjectures for Private Expenditures on Capital Formation 1781-1820 (in current prices)

Annual Averages £m	Net Private Investment £m	Net State Borrowing £m	Nominal Yield on Consols %	Interest Payments on Government Debt (£m)
1781-90	10.7	Negligible	4.5	8.8
1791-1800	22.4	20.2	4.7	10.9
1801-1810	25.5	13.4	4.8	20.2
1811-1820	36.7	12.5	4.6	28.3

Notes and Sources: Net private investment expenditures are from C. Feinstein, 'Capital accumulation and the industrial revolution', in R. Floud and D. McCloskey (eds.) *The Economic History of Britain since 1700* (Cambridge, 1981) p. 131. His figures have been reflat to current prices using price indices constructed by Rostow Gayer and Schwartz in B. Mitchell (ed.) *Abstract of Historical Statistics* (Cambridge, 1962), pp. 470-71 and by P.K. O'Brien, 'Agriculture and the home market for British industry 1660-1820', in *English Historical Review*, 100 (1985), pp. 773-79. The figures for net inflows of money borrowed by the state are taken from P.K. O'Brien's unpublished D.Phil thesis, *Government Revenue 1793-1815* (Oxford, 1967). Table 4 p. 10. Recalculated interest charges on the loans are listed on p. 17 of that thesis. Nominal yield on consols is from C. Heim and P. Mirowski, 'Interest Rates and Crowding out during Britain's Industrial Revolution', in *Journal of Economic History*, vol. XLVI (1987), p. 120.

Figures for net annual government borrowing have not been reconstructed from the public accounts for the 1780s, but after the American war ended in 1782-83, the net average annual amounts borrowed for this particular inter-war period were probably negligible. Subsequently net borrowing by the state fluctuated over time and peaked in the closing years of the Napoleonic war 1813-15 but then ceased. Figures for 1811-20 refer to the years 1811-15 and are an outer-bound estimate for a decade when the operations of the sinking fund and demobilization from armed conflict led to a switch from net annual borrowing to repayments of public debt from 1816-20.

Although the table is a mere conjecture for the annual flows of savings, private investment, government loans and debt servicing operations for the period, it provides some kind of macro- statistical basis for addressing the possible significance of crowding out. That hypothesis (even if it could be tested econometrically) could not, however, support hyperbolic claims that wars could ever be “factored out of the industrial revolution”.⁵⁵ The theory required to address such an unreal separation of the kingdom’s industrialization from its engagement in a sequence of mercantilist conflicts from 1651 onwards could only be infinitely more unreal than an underspecified model for growth that concentrates on capital formation alone for the sub-period 1793-1815.⁵⁶

Yet warfare and its potential for “crowding out” does not *prima facie* look trivial. The sums borrowed by the state represented substantial, and in the early stages of the war, high ratios relative to total net investment in privately owned stocks of fixed and circulating capital. Nevertheless, other data particularly quotations for interest rates (both nominal and real) undermine the impression that the annual average sums borrowed by government to wage war could be interpreted as a really serious diversion

⁵⁵ Even if the model is reformulated to include rational expectations about movements in bond prices and interest rates – vide R. Black and C. Gilmore, ‘Crowding Out during Britain’s Industrial revolution,’ in *Journal of Economic History*, 50 (1990), pp. 109-3.

⁵⁶ For the opposite view that this and presumably other wars could with help from econometrics be “factored out” see the articles cited in this paper by G. Hueckel and by J.G. Williamson, ‘New Views on the Impact of the French Wars on Accumulation of Britain,’ in *Harvard Institute of Economic Research Discussion Paper 1480* (1990), pp. 1-25. Other cliometricians are not convinced that the supply curve for investible funds had been a key constraint on British economic growth or that it remained inelastic to changes in the relative price levels, interest rates and to the institutional and political changes surrounding the domestic and international markets for capital during the French wars. Vide. N.F.C. Crafts, ‘British Economic Growth, 1700-1850. Some Difficulties of Interpretation,’ in *Explorations in Economic History*, 24 (1987), pp. 245-68 and J. Mokyr, ‘Has the Industrial Revolution been Crowded Out? Some Reflections on Crafts and Williamson,’ in *Explorations in Economic History*, 24 (1989), pp. 293-319. The connexions between warfare and industrialization are analysed in P.K. O’Brien, ‘State Formation and the Construction of Institutions for the First Industrial Revolution.’

of investible funds available for from capital formation by the private sector. Rates of interest referenced above as the nominal yield on consols rise by too small a percentage to support such a strong hypothesis. Furthermore, these average yields on consols fall into line with rates of interest the Treasury had to offer contractors, in order to sell perpetual annuities to financial intermediaries operating on the London capital market between March 1793 (when the annual interest bill for a loan of £4.3 million amounted to 4.29%) and June 1815, when net receipts on the final loan of £35 million (to fund armies for the Battle of Waterloo) incurred annual interest payments at a rate of 5.79%. In between the modal rate fluctuated between 4.75% and 5.75% with peak rates of just over 6% during months of crisis between April 1797 and April 1798.⁵⁷ This data, together with a reading of day-to-day records of governmental transactions with the money market could not rule out some degree of crowding out or dismiss theoretically plausible connexions between public and private operations, that occurred in the context of an integrating but hardly an integrated national market for capital.⁵⁸ But they do suggest that the more interesting question for historians to address is, as usual, the issue debated by contemporaries at the time; namely why flows of funds made available for purposes of warfare as well as the continued formation of capital in agriculture, industry, commerce and the infrastructure, remained relatively elastic during a quarter of a century of discernibly elevated levels of demand for loans and credits by

⁵⁷ P.K. O'Brien, *Government revenue*, p. 17. These rates are ratios in current prices for the amounts received at the Exchequer and annual interest payments incurred to raise loans. The late John Wright of Trinity College, Oxford, clarified the meanings that could be attached to total returns on the range of government stocks traded on the London capital market in an unpublished paper, 'Government Borrowing and the Interest Rate 1750-1815' (unpublished paper, Oxford, July, 1996).

⁵⁸ J.L. Buchinsky and B. Polak, 'The Emergence of a National Capital Market in England,' in *Journal of Economic History*, 53 (1993), pp. 1-24, and Temin and Voth, *Prometheus Reshackled*.

the British and also by other European states engaged in warfare?⁵⁹ This question also bears upon the wider problem of the relative significance of constraints arising from propensities and capacities to save compared to propensities and opportunities to invest during the Industrial Revolution.⁶⁰

Although the majority of the physical indicators for investment for the years immediately before and during the war testify to something like a semblance of continuity in capital formation between 1793 and 1815, the financial flow charts required to deal with the problem of domestic savings supplemented by inflows of foreign funds and expenditures on capital formation between 1793 and 1815 might never be constructed.⁶¹

Several more or less plausible reasons can be offered to account for the wartime paradox. For example, the spread and persistence of warfare across the mainland of Europe widened and deepened the transnational pool of investible funds (credits and loans) that became

⁵⁹ In real terms the net amounts borrowed fell from around £18 million per annum, 1793-97 to £8 million, 1808-12, but were jacked up to £14 million for the final years of the Napoleonic War 1813-15 (see O'Brien, *Government Revenue*, tables 18-22). The contemporary debate is surveyed by Cookson, 'Political Arithmetic and War in Britain,' and vide P. Colquhoun, 'Treatise on the Wealth, Power and Resources of the British Empire,' (Goldsmiths Collection, University of London Library) and G. Chalmers, 'An Estimate of the Comparative Strength of Great Britain, 1804,' (Goldsmiths Collection, University of London Library) for views by contemporary economists that the economy could sustain warfare and growth at the same time.

⁶⁰ A question that has preoccupied Crafts (Crafts, 'British Economic Growth, 1700-1850) and R.C. Allen, 'Engels Pause. Technological Change. Capital Accumulation, Technological Change and the Distribution of Income during the Industrial Revolution,' in *Explorations in Economic History*, 46 (2009), pp. 418-35.

⁶¹ Physical and surrogate indicators for capital formation in print refer to: the production of bricks, white glass, pig iron, steam engines, ships, copper, tin, iron; factories erected for woollens and paper, imports of timber, bills passed for enclosures of land, river improvements, canal and road construction, houses charged to the window tax, numbers of banks, cotton spindles in operation, patents registered etc are tabulated in O'Brien, *Government Revenue*, table 36; A. Gayer et al, *Growth and Fluctuations in the British Economy*, 2 vols (Oxford, 1953) and S. Pollard and J.P. Higgins (eds.), *Aspects of Capital Investment in Britain* (London, 1971).

accessible to the British government.⁶² In contrast to all other European states - and except perhaps momentarily in 1797 and 1805 – neither domestic nor foreign investors in the securities of the Island state could have rationally contemplated that the realm might be successfully invaded from the sea; or that the government's debt (with its traditionally secure and untaxed payments of interest) might be repudiated either as an outcome of conquest or as the result of any unmanageable fiscal and financial crisis of the state. Over 22 years of prolonged and widespread revolutionary warfare (when the external security and internal stability of almost all other European empires, realms and republics either experienced or anticipated threats from French aggression and when property rights of all kinds became extremely difficult for states to protect) the safest haven for mobile capital was located offshore.

References to the flight of liquid capital (along with people with commercial expertise) to Britain are not difficult to cite.⁶³ Bonds and bills issued as securities by the Government, or firms, in London surely continued to provide European investors with marketable and less risky assets for their portfolios than anything available elsewhere.

⁶² G.J. Ellis, *The Napoleonic Empire* (London 1991); R.J. Black, 'Revolutionary and Napoleonic Warfare,' in R. J. Black (ed.), *European Warfare, 1453-1815* (Basingstoke, 1999); K.J. Holsti, *Peace and War: Armed Conflicts and the International Order* (Cambridge, 1991). E. Aerts and F. Crouzet (eds.), *Economic Effects of the French Revolutionary and Napoleonic Wars*. (Proceedings of the Tenth International Economic History Congress, Leuven, 1990).

⁶³ This view has been developed by Neal in a seminal book on the international capital market and a series of articles on capital movements during the French war. His views align with the perceptions of contemporary observers. Vide: L. Neal, *The Rise of Financial capitalism* (Cambridge, 1990); L. Neal, 'A Tale of Two Revolutions, International Capital Flows, 1789-1819.' In *Bulletin of Economic Research*, 43 (1991), pp. 307-37. Neal's views are shared by Acworth, *Financial Reconstruction in England*. While Lord Grenville told Auckland : "the proposal of confiscating foreign property in the funds I hold in abhorrence", *Dropmore Papers 1892-1915*, vol. 8, letter dated 2 December 1806. On the migration of European merchants into London, vide S. Chapman, *Merchant Enterprise in Britain from the Industrial Revolution to World War 1* (Cambridge, 1992) and P. Gauci, *Expansion of the World. The Merchants of London, 1660-1800* (Oxford, 2006).

Alas, data for flows of capital emanating not only from the mainland but from the United States; from Britain's expanding empire and conquests in the Caribbean, India, South East Asia and the collapsing empires of Portugal and Spain in South America cannot be aggregated into an unambiguous and incontestable table of annual estimates of transfers of foreign and imperial funds into and out of London during the wars. Cuenca's recently and constructed balance of payments accounts, Feinstein's estimates and Wright's research into overseas holdings in the national debt add up to an impression of potentially significant *net* inflows of savings from overseas.⁶⁴

Given that international markets for mobile capital had been integrating for several decades before the outbreak of revolution in France and the strong historical evidence that during these wars London became Europe's most secure haven for capital and skills, the presumption that capital flight from the mainland helped (in some and perhaps significant measure) at least mitigated the more adverse effects from crowding out remains plausible. After all, the French Revolution, particularly in its initial phases, represented a serious attack upon aristocratic and other forms of *ancien regime*, wealth and property rights.⁶⁵ Revolutionary and Napoleonic armies threatened and/or actively disrupted the operations of capital markets in Amsterdam, Antwerp, Venice, Hamburg, Frankfurt and other European cities that before the Revolution had rivalled London as centres for dealings in financial assets.⁶⁶

⁶⁴ Cuenca-Esterban's research which has superseded the controversial estimates from Brezis is cited at fn.152. Feinstein's data is in P. Mathias and M. Postan (eds.), *Cambridge Economic History of Europe*, vol. 7, p. 66 and Wright's unpublished research is cited in fn. 57 and by J. Wright, 'The Contribution of Overseas Savings to the Funded National Debt of Great Britain,' in *Economic History Review*, 50 (1999) pp. 657-74.

⁶⁵ F. Crouzet, *Britain Ascendant: Comparative Studies in Franco-British History* (Cambridge, 1990) and D. Bell, *The First Total War. Napoleon's Europe and the Birth of Modern Warfare* (London, 2007).

⁶⁶ Aerts and Crouzet (eds.), *Economic Effects of the French Revolutionary and Napoleonic Wars*; P.K. O'Brien, 'The Hanoverian State and the Defeat of the Continental System,' in R. Findlay et al (eds.), Eli Heckscher, *International Trade and Economic History* (Cambridge, Mass., 2006), pp. 373-406; A. Milward and S.B. Saul, *The Economic Development of Continental Europe, 1780-1870* (London, 1973), pp. 248-70; S. Schama, 'The Exigencies of War and Politics of taxation in the Netherlands,' in J.M. Winter (ed.), *War and Economic Development* (Cambridge, 1975), pp. 103-38; Harvey, *Collision of Empires*; C. Esdaile, *Napoleon's Wars 1803-15. An International History* (London, 2007).

At the same time positive if unintended offsets flowed from Pitt's famous decision of 1797 to release the country's monetary system from all constraints of convertibility associated with an 18th century version of the gold standard.⁶⁷ Assisted by the greater flexibility introduced into the supply of paper money and credit, the kingdom's financial intermediaries (merchants, metropolitan banks, insurance firms, mortgage companies, a reformed stock exchange and literally hundreds of newly founded provincial banks) extended their services and accessibility to include a range of hitherto riskier customers and securities for credits and loans as well as a wider array of assets which were, moreover, cushioned at the safer end of their portfolios by the bonds and bills of the Government bearing rates of interest some 30%-40% above normal pre-war levels and predicted to appreciate in value once victory was secured.⁶⁸

⁶⁷The 18th century monetary system is described in classic texts by J. Clapham, *History of the Bank of England*, vol.1 (Cambridge, 1948); T.S. Ashton and R. Sayers (eds.), *Papers in English Monetary History* (Oxford, 1953) and L.S. Pressnell, *Country Banking in the Industrial Revolution* (Oxford, 1956). M. Collins, *Money and Banking in the United Kingdom* updates those texts. The classic article on monetary regulation is by M.C. Lovell, 'The Role of the Bank of England as a Lender of Last Resort in the Crises of the Eighteenth Century', in *Explorations in Economic History*, 10 (1957), pp. 8-21.

⁶⁸ The operations of the financial and monetary system under a regime of inconvertible paper, 1797-1819 has been covered by a prolonged and voluminous contemporary debate surveyed by E. Wood, *Theories of Central Bank Control* (Cambridge, Mass., 1939); J. Viner, *Studies in the Theory of International Trade* (London, 1955) and F.W. Fetter, *The Development of British Monetary Orthodoxy* (Cambridge, Mass., 1965). There is also an extensive modern literature in British monetary history the most recent publications with bibliographies are M. Bordo and F. Capie (eds.), *Monetary Regime in Transition* (Cambridge, 1994), and my working paper, P.O'Brien and N. Palma, 'Danger to the Old Lady of Threadneedle Street. The Bank Restriction Act and the Regime Shift to Paper Money,' in EHES Working Papers, *Economic History*, 100 (2016).

From 1797 to 1819 the flexibility afforded by the suspension of specie payments to transact with paper money, bank deposits and bills of

exchange, as well as with the government's own bills, promoted the extension and integration of the market for money, stimulated financial intermediaries to take greater risks and encouraged those with liquid savings to invest, not only in government paper, but to participate in what moralists, conservatives and monetarists of the day condemned as "speculation".⁶⁹ Of course, the dangers of a monetary system freed from regulations of any kind, reliant upon the discretion of ministers of the crown, the caution of governors of the Bank of England and the prudence of bankers free to issue their own paper notes and credit were cogently articulated at the time.⁷⁰ During the famous bullion controversy of 1810-11, Ricardo and his supporters castigated ministers (trying to run a war to British exports). In their view they had allowed a fragile paper pound to depreciate against gold and other hard currencies to the tune of 10%-15%.⁷¹ By that stage of the war, with inflation running at 3%, inconvertible paper money had indeed begun to display familiar dangers in the form of higher interest rates charged for loans and credits extended to the state and shortages of funds for fixed investments in houses, buildings, social overhead capital and mortgages for agricultural improvements.⁷² Nevertheless, the hopes of Napoleon and his advisers for a collapse of the British fiscal and financial system and the dire predictions of English bullionists never came to pass.⁷³ At the height of French domination over

⁶⁹ P.K. O'Brien, 'Merchants and Bankers as Patriots or Speculators. Foreign Commerce and Monetary Policy in Wartime, 1793-1815,' in J. McCusker and K. Morgan (eds.), *The Early Atlantic Economy* (Cambridge, 2000); R. Cameron et al (ed.), *Banking in the Early Stages of Industrialization* (Oxford, 1967), chapters 1-3; L. Brunt, 'Country banks as venture capitalists,' in *Journal of Economic History*, 1 (2001), pp. 74-102.

⁷⁰ E. Cannan (ed.), *The Paper Pound 1797-1821* (London, 1925) and F.W. Fetter, 'The Politics of the Bullion report,' in *Economica*, 26 (1959), pp. 99-120.

⁷¹ J. Silberling, 'Financial and Monetary Policy in the Wars Against France,' in *Quarterly Journal of Economics*, 38 (1924), pp. 214-33.

⁷² Mokyr and Savin, 'Stagflation in Historical Perspective.'

⁷³ F. Crouzet, *L'Economie britannique et le blocus continental*, Harvey, *Collision of Empires* and D. Bell, *The First Total War. Napoleon's Europe and the Birth of Modern Warfare* (London, 2007); J. Gent, 'The Sustainability of Britain's Public Debt in the Period 1765-1850,' (unpublished Master's thesis, Department of Economic History, LSE, 2015-16).

Europe, despite inflation, a depreciated rate of exchange, and Napoleon's serious attempt to blockade European markets, the Hanoverian state continued to borrow at rates of interest below 5%. By then (1812-15) wages were probably beginning to catch up with prices. For most of the war that involuntary transfer of income from labour to capital operated to stimulate savings and to cheapen construction and all other labour intensive forms of capital formation.⁷⁴

In theory a floating pound detached from gold might have checked the flight of capital from Napoleon's extensive empire into London. But sterling was by no means the only currency to fluctuate in value when French armies rampaged across Europe.⁷⁵ Meanwhile fluctuating rates probably encouraged foreign investors to retain sterling assets until the pound stabilized and the government kept to its repeated promise to continue to run a sinking fund and to return the monetary system to full convertibility at the traditional parity with gold.⁷⁶

Thirdly, over the years of conflict interest payments to service the mounting burden of debt (see Table 2) rose from about half the annual net amounts borrowed by the state to prosecute war against Revolutionary France (1793-1802) to reach about double the sums raised as loans in order to vanquish the Napoleonic empire between 1803-15. This "regressive" political mechanism for transferring income from taxpayers to creditors (or from social groups with lower capacities to save and invest to those with higher propensities) had evolved steadily, war by war, since the Dutch coup d'état of 1688.⁷⁷ It augmented a trend towards increased inequality and contributed to social distress and internal disorder for some

⁷⁴ Runs of bad harvests, inflation and swings relative prices renders the task of constructing a representative trend for rates of change in real wages during a period of war very difficult. Vide N. Von Tunzelman, 'Trends in Real Wages Revisited. 1750-1850,' in *Economic History Review*, 32 (1979), pp. 33-49. Feinstein's widely accepted indices in 'Pessimism Reunited,' suggests that real earnings adjusted for unemployment did not regain 1788-92 levels before 1818-22. Crouzet surveys the data and plumps for a disaggregated representation. Vide F. Crouzet, 'Guerre et Salaires de L'Angleterre 1793,' in F. Crouzet (ed.), *Melange d'histoire economique offerts au Professeur Anne Marie Kinz* (Geneve, 1989), pp. 71-85.

⁷⁵ Young, *An Inquiry into the Increase in Prices in Europe*; Neal's point 'Tale of Two Revolutions,' that a potentially large share of European capital flowing into London went into shipping and commercial, services allied to trade and enjoyed protection from the Royal Navy, is supported by histories of London merchants. Vide the bibliography in K. Morgan, *Slavery, Atlantic Trade and the British Economy* (Cambridge, 2000); Chapman, *Merchant Enterprise*; Liss, *Atlantic Empires* and Gauci, *London Merchants*.

⁷⁶ O. Brien, 'Mercantilist Institutions for the Pursuit of Power with Profit,' and Gent, 'The Sustainability of Britain's Public Debt in the Period, 1765-1850,' *Department of Economic History Masters Thesis in 2011 (L.S.E.)*.

⁷⁷ O'Brien, 'The Political Economy of British Taxation' and MacDonald, *A Free Nation Deep in Debt*.

three decades in the wake of the final victory at Waterloo.⁷⁸ While the wars against France continued the reinvestment mechanism built into the Hanoverian states fiscal and financial system and maintained an elastic supply of loans and credits for a state engaged in warfare to protect the political privileges and rights of property, including the assets of bondholders - who could confidently anticipate a significant uplift in the value of their securities once the end of any war terminated the need to run budgetary deficits and when the operations of Pitt's constitutionally safeguarded sinking fund would resume operations designed to redeem the entire public debt.⁷⁹

To sum up: some crowding out inevitably occurred during this most protracted and costly of mercantilist wars, but several factors operated to weaken its potentially serious obstruction to Britain's trajectory towards an industrial economy. Firstly, Pitt's suspension of convertibility created conditions of flexibility for an unusual increase in the money supply that allowed for the widening, deepening and integration of financial intermediation without running into any really serious danger of fiscal and financial collapse while promoting a lag of wages behind rising prices. Secondly, the nature and extent of warfare on the mainland, initiated and sustained by France, together with the loot from extensions to the formal

⁷⁸ P. Hoffman, et al, 'Real Inequality in Western Europe since 1500,' in *Journal of Economic History*, 62 (2002), pp. 322-55. N. Gash, 'After Waterloo: British Society and the Legacy of the Napoleonic Wars,' in *Transactions of the Royal Historical Society*, 28 (1978), pp. 145-57; M. C. Buer, 'Trade Depression Following the Napoleonic Wars,' in *Economica*, 2 (1921), pp. 159-79 and Hilton, *Corn, Cash and Commerce* and other books cited in fn 47.

⁷⁹ O'Brien, 'Mercantilist Institutions for the Pursuit of Power and Profit'; Wright, 'Government Borrowing and Interest Rate'. J.G. Williamson, *Did British Capitalism Breed Inequality?* (London, 1985). Ch. 4 surveys and calibrates the rather restricted evidence available from tax data and contemporary estimates to address this issue; Pitt funded the massive deficit for 1797 with what he termed a "loyalty loan" and published the names of patriots who contributed. On the fear of Revolution in England, vide: Dickinson, *Britain and the French revolution*; Gee, *The British Volunteer Movement*, and Hilton, *A Bad and Dangerous People*; Harvey, *Britain in the Early Nineteenth Century*.

and informal British empire overseas and the collapse of Iberian empires, promoted movements of foreign capital into London. Thirdly, the bias already built into the states' fiscal and financial system (together with inconvertible paper money) intensified tendencies towards inequality in the distribution of income that promoted propensities to save and invest among a propertied and patriotic elite, whose political and economic stake in the kingdom was under threat from the armies of Revolutionary France.⁸⁰

Finally, and to complete a specimen balance sheet on capital account, it will be necessary to analyse and quantify not merely the incalculable costs of averting invasion, but an offsetting list of long term gains derived from some 22 years of higher expenditures by the state on warfare that augmented the stock of public and social capital available to contribute to the recovery and longer run growth of the British economy after 1815.⁸¹

Thus, some of the surplus capital owned by the forces of the crown in 1815 (including ships, buildings, wagons, horses, stores etc) was resold at bargain prices for civilian use at the end of the conflict. For several decades after final victory at Waterloo the state commanded a range of warships, weapons and skills held in reserve for the defence of the realm and its extended empire, to support the kingdom's foreign, strategic and commercial policies and an enlarged army of troops with equipment and barracks for the maintenance of internal order.⁸² Lord

⁸⁰ This argument was elaborated by a long list of political arithmeticians whose writings and numbers on post-war wealth, power and resources of Britain and its extended empire can be consulted in the Goldsmiths Collection at the Library of the University of London. Under the names of G. Chalmers, P. Colquhoun, J. Lowe, J. Marshall, C. Moreau, T. Vaux. These writings neglected by economic historians in thrall to classical economics have been surveyed and contextualized by historians including: Acworth, *Financial Reconstruction*; Hilton, *Corn, Cash and Commerce*; Gambles, *The Boundaries of Political Economy*; Hilton, *England 1783-1860*.

⁸¹ Stocks of military and naval capital are reviewed in the House of Commons Journal (1806), pp. 781-86 and Parliamentary Paper 1817 (4). For the navy see J. Coad, *The Royal Dockyards, 1690-1850* (Aldershot, 1989); R. Morriss, *The Foundations of British Maritime Supremacy. Resources, Logistics and the State, 1755-1815* (Cambridge, 2011).

⁸² Acworth, *Financial Reconstruction*; Hilton, *Corn, Cash and Commerce*; S. Pollard and D.W. Crossley, *The Wealth of Britain*, ch. 6; S. Checkland, *The Rise of Industrial Society in England, 1815-1885* (New York, 1964).

Liverpool's and subsequent administrations controlled an intimidating fleet of battleships; a trained supply of skilled seamen and soldiers; reserves of cannon, muskets, pistols, swords, bayonets, modernized royal dockyards, new barracks, hospitals, coastal fortifications, military roads, organizational systems, etc. In short the realm's military and naval infrastructure had been significantly increased by wartime expenditures, by expropriations (principally ships and a small indemnity) from France) and by some technological innovations. Twenty-two years of investment in the manpower, equipment, capital and ideology required for warfare, allowed Britain's victorious and hegemonic state not merely to demobilize most of its armed forces, but to radically reduce future expenditures on the means required by the army and navy to defend the realm as well as its extended commerce and empire overseas while maintaining order over several difficult decades of industrialization and urbanization after the treaty of Vienna had stabilized the balance of power in Europe.⁸³

Factoring in the benefits as well as the costs of that unavoidable investment is difficult enough to specify and model. Meanwhile, prospects for striking anything other than a conjectural balance sheet or factoring armed conflicts out of analytical narratives, or the industrial revolution are too remote to contemplate.

⁸³ F. Crouzet, *A History of the European Economy* (London, 2001); F. Crouzet, 'The Second Hundred Years War: Some Reflections,' in *French History*, 10 (1996) pp. 432-50 and Schroeder, *The Transformation of European Politics*; Ruttan, *Is War Necessary for Economic Growth?*; V. Hanson, *Why the West has War, Carnage and Culture* (London, 2002); L. James, *Warrior Race. A History of the British at War* (London, 2001); C. Hall, *British Strategy in the Napoleonic Wars* (Manchester, 1992); R. Morriss, *The Foundation of British Maritime Supremacy*.

6. Warfare and the Intensified Exploitation of the Island's Cultivable Land, Minerals, Industries and Technologies

Once at war British statesmen sought to augment and exploit the potential of the Island's natural resources and national system of production to the full.⁸⁴ As mercantilists appreciated the need to minimize the inefficiencies associated with taxation, to contain wasteful expenditures on the army and navy, to minimize the crowding out of private investment and to reduce dependence on imports, and thereby reserve hard currency for such strategic priorities as payments to allied, mercenary and British troops committed to conflict on the mainland of Europe and for payments to provision, refit and repair naval warships docked in ports overseas.⁸⁵

Not surprisingly warfare depressed the kingdom's rate of growth and pushed its economy off a course of recovery it had been on during the decade between the end of the war with the United States and its allies (1783) and the opening of the long conflict with Revolutionary France some ten years later. Unfortunately the macro-economic data for the analysis of trends and fluctuations from 1783-1821 (when the monetary system returned to full convertibility and taxation reverted to peace time levels) is neither extensive in range, adequate in quality nor sufficiently complete in chronological coverage to provide acceptable records to analyse and quantify the overall performance of agriculture, industry and foreign trade for a period of somewhere close to three decades when the kingdom's economy operated under conditions of warfare, and its aftermath.

⁸⁴ The political economy of power and warfare is analysed by the predecessors (not the precursors) of Adam Smith, vide: T.W. Hutchinson, *The Emergence of Political Economy* (Oxford, 1988). Mercantilist views on the strategic necessities for conserving bullion as a "war chest" are covered in Magnusson (ed.), *Mercantilist Economics*; C. Perrota, 'Is the Mercantilist Theory of the Favourable Balance of Trade Really Erroneous?' in *History of Political Economy*, 23 (1991), pp. 302-55 and R.C. Blitz, 'Mercantilist Policies and the Pattern of World Trade,' in *Journal of Economic History*, 27 (1967) pp. 39-55.

⁸⁵ They are articulated in all the statesman's papers for the period deposited in the British Libraries Collection of Additional Manuscripts. See the papers of Auckland, Herries, Liverpool, Rose, Vansittart and Wellington, as well as the Pitt Papers at the Public Record Office and debates in Parliament. M. Sherwig's *Guineas and Gunpowder. British Foreign Aid in the Wars with France, 1793-1815* (Cambridge, Mass., 1969) elaborates on the role of wartime transfers of bullion to allies and mercenaries. Policies and reforms to contain the waste and corruption associated with expenditures of the Army and Navy are analysed by the scholarship of R. Morriss, *The Foundations of British Maritime Ascendancy*; and R. Knight, *Britain Against Napoleon. The Organization of Victory*; C. Wilkinson, *The British Navy and the State in the Eighteenth Century* (London, 2004).

Several indices used to measure the long term growth of the national product, agricultural and industrial outputs, average wages and prices remain in dispute. More serious, for attempts to quantify the immediate impact of war are published figures based upon interpolations between benchmark years which are too widely separated in time to expose fluctuation in outputs, incomes and prices imputable to both negative and positive influences from engagement in this conflict. For purposes of this survey, I will consider both quantitative and qualitative sources (published and unpublished) for agriculture, industry and international commerce in an attempt to offer some plausible conjectures about the significance of a protracted interlude of warfare for the growth of an economy passing through a First Industrial Revolution.⁸⁶

Between 1793 and 1815 the expansion of domestic (including Irish) agriculture already underway accelerated into a long cycle of structural change that continued down to mid-century.⁸⁷ The kingdom's agrarian sector played an important role in mobilizing provisions and organic raw materials for the forces of the crown. Along with previous conflicts the French wars remained labour and food intensive. Budgetary estimates indicate that very high proportions of the revenues allocated by Parliament for the Army and Navy were for the pay and provisions of British soldiers and sailors.⁸⁸ It is, however, impossible to measure the

⁸⁶ Clark offers a comprehensive range of indices. G. Clark, 'The Macro-Economic Aggregates for England 1209-2008' in *Research in Economic History*, 27 (2010), pp. 96-136. The most recently published set of annual data is S. Broadberry et al., *British Economic Growth 1270-1870* (Cambridge, 2015). Their data remains under review.

⁸⁷ A range of growth rates for agriculture are reported by R.C. Allen, 'Tracking the Agricultural Revolution in England,' in *Economic History review*, 52 (1990), pp. 209-35 and his contribution, R.C. Allen, 'Agriculture during the Industrial Revolution,' to R.F. Floud and P. Johnson eds.), *Cambridge Economic History of Modern Britain, 1700-60* (Cambridge, 2004), pp. 96-116. The standard text on the agricultural revolution is M. Overton, *Agricultural Revolution in England. The Transformation of the Agrarian Economy, 1500-1800* (Cambridge, 1996). A good thesis on the stimulus imparted by the war to Irish agriculture is by A.J. Fitzpatrick, *The Economic Effects of Revolutionary and Napoleonic Wars on Ireland* (Manchester PhD, 1973).

⁸⁸ The allocation of funds raised to prosecute warfare across sectors of the economy are recorded in multiple ways by the several departments of state (the Admiralty and Navy Board, the War Office and Board of Transport, the Transport Office, the Board for Barracks etc and at Regimental levels). These records make it virtually impossible for modern historians to aggregate data that would provide valid tabulations of wartime expenditures for purposes of economic analysis. Commissions and Committees of Enquiry established for purposes of auditing military and naval expenditure also found the tasks of post hoc audit too complex to comprehend and control. (Vide the Reports of Committees and Commissioners appointed to "Examine, Take and State the Public Accounts of the Kingdom", 1780-91 volumes II and 12 and 13, Journals of the House

net effect on agriculture because fiscal data suggests that the incidence of the incremental taxes imposed to fund the wars of 1793-1815 may have fallen with particular severity (both directly and indirectly) upon the production of foodstuffs and raw materials and upon the incomes and wealth of farmers and landowners.⁸⁹

Fortuitously but fortunately ministers (seeking to secure compliance with their increasing demands for taxation and requests for loans from the United Kingdom's affluent groups of aristocratic landowners and tenant farmers the agricultural sector contained both a sufficient area of under-utilized but cultivable land and growing supplies of under-employed labour available to respond elastically to rapidly rising demands for food and organic raw materials. These demands emanated basically from the acceleration in population growth and internal migration to towns, but were supplemented by "incremental purchases" by the state for provisions, fibres, horses, leather, timber and building materials to support the mobilization of young men for service in the army, navy, ordnance, and militia.⁹⁰

Contemporary reports from the Farmers and Monthly Magazines and Arthur Young's Annals of Agriculture as well as the testimonies of numerous farmers, landowners, agents and others with professional knowledge - who appeared before Parliamentary committees investigating the state of the agrarian economy as it adjusted to post war deflation, demobilization and the persistence of high taxation - have left a very considerable body of evidence that testifies to the incidence of warfare on the kingdom's agricultural sector. This library of localized description and ad hoc statistics surveyed and analysed by generations of agrarian historians describes how effectively British and Irish landowners and farmers responded to incentives to profit from the circumstances

of Commons, volumes 38-42 and Parliamentary Papers 1790-91 (92). Parliament continued to attempt to take control of expenditures of the armed forces during and after the wars with France. Vide: reports from Commissioners of Naval and Military Inquiry in Parliamentary Papers, Parliamentary Papers 1805 (2), 1810 (2), 1810-11 (4), 1812 (4), 1817 (4) and Committees on Finance in Journals of the House of Commons, volumes 41, 42. Reporting and auditing problems have been studied by J.E.D. Binney, *British Public Finance and Administration* (Oxford, 1958). I attempt to reclassify a sample of budgetary estimates laid before Parliament during war. They "suggest" that something like 70-75% of expenditures on the armed forces were allocated to foodstuffs and organic raw materials produced by the kingdom's agricultural sector. Vide estimates published annually in the Journals of the House of Commons, fn. 35.

⁸⁹ O'Brien, 'Triumph and Denouement of the British Fiscal State,' pp. 86-200.

⁹⁰ R. Morriss, *The Foundations of British Maritime Supremacy; Knight, Britain Against Napoleon*; R. Knight and M. Wilcox, *Sustaining the Fleet, 1793-1815* (London, 2010).

and conditions created by wars with Revolutionary France. Thereafter the sector confronted the challenges of the immediate post-war decades that required adjustment to: falling prices for primary products and the resumption of imports from the mainland, along with intensified competition from the integration of Ireland into the British economy as well as the persistence of higher taxes to service a Government debt that had reached the extraordinary level of some 2.5 times the national income, for an enlarged and extended military and naval establishment and elevated levels for welfare expenditures on the rural poor.⁹¹

Attempts in recent years to quantify this tradition of dense narrative histories of agrarian development that accompanied and sustained the kingdom's transition to an urban industrial economy with the theoretically required range of statistical indicators are still underway and remain as another area of dispute about "facts".⁹² The indices currently in print for

⁹¹ The best known observers of the realm's agrarian economy as it developed from 1783-1846 are Arthur Young and John Sinclair. An enormous range of contemporary comment (with data) is contained in the publications of the Goldsmiths Collection of Economic Literature at the University of London Library. Year by year reports on the state of agriculture, county by county, are reported in the Monthly, Gentlemen's and Farmers magazines and the Annals of Agriculture. The testimonies and data of landowners, farmers and managers of estates who appeared before Parliamentary Committees can be read in reports from Committees of the House of Commons, volumes 9 (1798), 1800-1801, and in Parliamentary Papers 1806-07 (2), 1808 (2), 1809 (2), 1813-14 (4), 1813-14 (5), 1819 (3), 1821 (9), 1836 (8). The last three Parliamentary Papers contain reports with minutes of evidence related to agricultural distress in the wake of war.

⁹² The modern bibliography is extensive and referenced in texts by Overton, *Agricultural Revolution*; E.L. Jones, *Agriculture and the Industrial Revolution* (Oxford, 1974) and includes several seminal articles focussed on agriculture during and in the aftermath of war by: M.C. Burr, 'Trade Depression Following the Napoleonic War,' in *Economica*, 2 (1921), pp. 159-79; N. Gash, 'Rural Unemployment, 1815-34,' in *Economic History Review*, 6 (1935), pp. 90-93 and 'After Waterloo: British Society and the Legacy of the Napoleonic Wars,' in *Transactions of the Royal Historical Society*, 28 (1978) pp. 145-57; E.L. Jones, 'The Agricultural Labour Market in England, 1793-1872,' in *Economic History Review*, 17 (1964), pp. 322-38; A.H. John, 'Farming in Wartime, 1793-1815,' pp. 28-47; G. Hueckel, 'The Napoleonic Wars, Output Growth in England, 1793-1815,' in *Journal of Economic History*, 33 (1973), pp. 309-29, and 'English Farming, Profits during the Napoleonic Wars, 1793-1815,' and 'Relative Prices and Supply Response in English Agriculture during the Napoleonic Wars,' in *Economic History Review*, 29 (1976) pp. 401-14; S. McDonald, 'Agricultural Response to a Changing Market during the Napoleonic Wars,' in *Economic History Review*, 33 (1980), pp. 59-71; A.R. Wilkes, 'Readjustments in Arable Farming after the Napoleonic Wars,' in *Agricultural History Review*, 28 (1982), pp. 96-103.

long term annual rates of growth for agricultural output, investment, profits, rents, wages and for trends in yields, labour and total factor productivities are not founded upon any standardized and accepted body of official data. Statistics for total production have not been constructed on the same basis and are not tabulated to refer to comparable chronologies. In short, contention over the statistics available for histories of the kingdom's agriculture 1763-1846 have not been resolved.⁹³ Nevertheless, when clustered the statistical evidence in print supports some general impressions: namely, that for long stretches of the eighteenth century the overall performance of agriculture as measured in terms of rates of change in output or productivity could be represented as "sluggish" and "unimpressive."⁹⁴

Dates and years for turning points and discontinuities vary. Nevertheless, most extant exercises in data reconstruction suggest that an acceleration in the kingdom's agricultural output, investment and perhaps in factor productivities either began but certainly persisted during the war with Revolutionary France. It probably came discernibly

⁹³ The modern wave of cliometric research began with classic studies by P. Deane and W.A. Cole, *British Economic Growth, 1688-1959: Trends and Structures* (Cambridge, 1969) and revisions by N.F.R. Crafts, *British Economic Growth During the Industrial Revolution* (Oxford, 1985) followed by extensive and ongoing debate over the numbers summarized by N.F.R. Crafts, 'The First Industrial Revolution: Resolving the Slow Growth/Rapid Industrialization Paradox,' in *Journal of the European Economic Association*, 3 (2005), pp. 525-35. A range of estimates for the rate of growth of output tabulated by Allen, 'Agriculture during the Industrial Revolution,' was published before recent ingenious attempts were made by Clark and Broadberry, et al., (vide fn. 86) to bring consistency to the range of estimates in print for the growth of per capita incomes including incomes from agriculture.

⁹⁴ Allen, 'Agriculture during the Industrial Revolution,'; Crafts, 'British Economic Growth. Some Difficulties of Interpretation, p. 49 estimated that only 6% of the rentals from agricultural land was reinvested in agriculture in the 1760s. The ratio had risen to 16% in 1801-10; G. Clark, 'Yields per acre in English agriculture, 1250-1860: Evidence from Labour Inputs,' in *Economic History Review*, 44 (1991), pp. 445-60; R.C. Allen, *Enclosure and the Yeoman. The Agricultural Development of the South Midlands, 1450-1850* (Oxford, 1992); R.V. Jackson, 'Growth and Deceleration in English Agriculture,' in *Economic History Review*, 38C (1985) pp. 333-57. A recent contribution to the debate is by D. Meredith and D. Oxley, 'Food and Fodder: Feeding Britain, 1700-1900,' in *Past and Present*, 222 (2014). Overton's, *Agricultural Revolution* provides a more optimistic interpretation.

on stream after 1800, continued during the so-called decades of agricultural depression and distress in the aftermath of the war down to Caird's *Golden Age of Agriculture 1846-73*.⁹⁵

Modern exercises in “conjectural quantification” are not inconsistent with a historiography of agricultural development during the Industrial Revolution that includes upswings in rates of growth, investment and productivity growth proceeding over two long cycles of rising and then falling prices of primary products between the outbreak of the French wars in 1793 and the repeal of the Corn Laws in 1846.⁹⁶ Contemporary and well-referenced perceptions in agrarian history as well as statistical guesstimates all suggest that the owners and managers of the resources contained within the kingdom's traditional, dominant and relatively unprogressive sector for primary production responded to wartime incentives of rising prices, favourable shifts in the inter-sectoral terms of trade, flexible access to loans and credit and the lagging wages of their quasi-feudal workforce by raising rates of investment and diffusing known techniques for cultivation to feed the realm's growing and urbanizing

⁹⁵ Allen, *The British Revolution*; Allen, 'Agriculture in the Industrial Revolution,'; G. Clark, 'Farm Wages and Living Standards in the Industrial Revolution: England, 1670-1869,' in *Economic History Review*, 54 (2001), pp. 477-505 and G. Hueckel's articles cited in fn. 91; E.L. Jones, *Agriculture and the Industrial Revolution* (Oxford, 1974); L.P. Adams, *Agricultural Depression and Farm Relief in England, 1815-22* (London, 1972); B. Hilton, *Corn, Cash and Commerce* (Oxford, 1977).

⁹⁶ Investment data, are from Feinstein, 'Capital Formation in Great Britain,' and 'Capital Accumulation and the Industrial Revolution.' The rise in numbers of acres enclosed by private acts of Parliament was particularly marked between 1800-15. Vide B. Holderness, 'Agriculture,' in C. Feinstein and S. Pollard (eds.), *Studies in Capital Formation in the United Kingdom* (Oxford, 1988), pp. 9-34. The years of distress are covered by Adams, *Agricultural Depression* (London, 1922); Gash, 'Rural Unemployment, 1815-34,' pp. 145-57 and Wilks, 'Readjustments in Arable Farming after the Napoleonic Wars.' The “golden age” is described in C. Abel et al, *History of Agriculture, 1846-1914* (Newton Abbot, 1964), chs. 1-3.

population, while at the same time supplying the state with extra taxes as well as the additional provisions, fibres, horses, fodder, timber and other organic materials required to wage warfare.⁹⁷ Contemporary observations support the view that during war the kingdom's agricultural output grew at more impressive rates basically by taking waste, scrub and unenclosed land into cultivation. Landowners, farmers and their elastic supplies of cheaper labour pushed the extensive margin for cultivation outwards, consolidated estates into managerial units with larger scale farms, drained, marled and limed the soils and supplemented the reclamation of under-cultivated land by speeding up the diffusion of familiar and proven techniques for the growth of crops and rearing of farm animals.⁹⁸

After 1815 when prices of primary products declined sharply and the real burdens from higher levels of taxation, poor relief and elevated rents (previously veiled by inflation) became exposed, representatives of the agricultural sector in Parliament sought relief by reducing and shifting its tax burdens onto the urban economy.⁹⁹ Landlords diversified their portfolios of wealth into minerals, transportation and urban property.¹⁰⁰ In summary, several forces including the upswing in agricultural prices (associated with flexible money supplies, a pronounced shift in the inter-sectoral terms of trade, intensified demands from the armed forces and enhanced protection from high freight rates by ship) all operated to pull

⁹⁷ G. Clark, 'The Long March of History. Farm wages, population and economic growth, England, 1209-1869,' in *Economic History Review*, 60 (2007), p. 97-135 and A.H. John, 'Farming in Wartime' and the articles by Hueckel cited in fn. 91.

⁹⁸ G. Clark, 'Land rental values and the agrarian economy: England and Wales,' in *European Review of Economic History*, 6 (2002), pp. 281-308; R. Wordie, 'Rent Movements and the English Tenant Farmer, 1700-1839,' in R. Uselding (ed.), *Research in Economic History*, 6 (1981), pp. 192-215; M. Turner, *Enclosures in Britain, 1750-1830* (London, 1984); H.G. Hunt, 'Landownership and Enclosures,' in *Economic History Review*, 10 (1957) pp. 36-48; Hueckel's articles cited in fn. 91; Hilton, *Corn, Cash and Commerce*; Gordon, *Political Economy in Parliament*; Gambles, *The Boundaries of Political Economy*. Data for the wage/rental ratio for this period is from Clark, 'Land, rental values etc.' pp. 281-308.

⁹⁹ J.V. Beckett, *The Aristocracy in England, 1660-1914* (Oxford, 1986); N. Gash, *Aristocracy and People, Britain 1815-1865* (London, 1979).

¹⁰⁰ J. Habakkuk, *Marriage, Debt and the Estates System. English Landownership, 1650-1950* (Oxford, 1994) Chs. 6 and 7; M. Turner (ed.), *Malthus and his Times* (London, 1986)

owners and managers of agrarian land and capital into a “cage”. From where and despite post war deflation - mitigated by the infamous protection from corn laws and repeal of the income tax – they maintained imperatives to invest, innovate and reduce costs. That option had become unavoidable for landed elites endeavouring to preserve their wealth, incomes, status and, above all, their political power.¹⁰¹

In short: the wartime inflation followed by post war deflation seems in outcome to have strengthened an ongoing longer run impetus to agricultural progress. After 1815 the growth of output continued. Agreed, this conjuncture slowed the pace of structural change towards an urbanized industrial economy. Nevertheless a price and rent cycle coinciding with warfare may be represented as a fortuitous interlude which helped circumvent the tendency of an otherwise less than progressive sector owned by a powerful ancien regime of landowners and managed by conservative tenant farmers to circumvent the tendencies of agriculture to run into diminishing returns and thereby to block long term progress towards an urban industrial economy?¹⁰² After the war agriculture continued to develop and to support industrialization. While the famous controversy over the corn laws never polarized British society into any prolonged politically destabilizing and unprofitable conflict between “agrarians and industrializers” of the kind that hindered development on the mainland.¹⁰³

Comparable geopolitical and macro-economic conditions surrounded Britain’s industrial sector as it proceeded along its famous transformation between 1763-1846. Annual growth rates (as constructed by Deane and Cole and revised in several publications by Crafts and Harley) reveal a decade of sharp acceleration to 1.8% per annum 1780-90, followed by an almost imperceptible decline in an annual rate of growth interpolated from 1790-1811, succeeded by further accelerations (2.8% and 3.6%) over the decades 1811-21 and 1821-31. The leading critic of these estimates continues to insist upon his own claims to have uncovered “more representative” evidence for prices and qualities for the heterogeneous array of cotton textiles produced in England could be used to

¹⁰¹ P.K. O’Brien, ‘Agriculture and the Home Market for English Industry, 1660-1820,’ in *English Historical Review* c. (1985), pp. 773-99; M. Turner, et al, *Agricultural Rent in England, 1660-1914* (Cambridge, 1997).

¹⁰² Allen, *British Industrial Revolution*, ch. 3; F. Crouzet, ‘The Impact of the French Wars on the British Economy,’ in H. Dickinson (ed.), *Britain and the French Revolution*, (London, 1989), pp. 189-210.

¹⁰³ B. Moore, *Social Origins of Dictatorship and Democracy. Lord and Peasant in the Making of the Modern World* (London, 1967).

construct more acceptably weighted estimates of aggregated value added for the kingdom's rapidly growing industrial sector. Cuenca-Esteban offers an alternative (perhaps equally plausible?) index for industrial production that displays even higher rates of growth over the period from 1770-1831. He recognized, however, that we have "long reached the stage of diminishing returns in analysing the same body of data over and over again."¹⁰⁴

For present purposes may we simply note that on none of three rival indices did the wars from 1793-1815 precipitate fundamental discontinuities (negative or positive) in the pace and pattern of industrialization. Indeed nobody at the time claimed they had. Most mercantilist literature published during and after the wars under titles extolling "the wealth, power and resources of the British empire" was basically concerned to reassure Britons that their state possessed access

¹⁰⁴ Growth rates for total industrial output which (unlike agriculture) can be constructed within contained margins of error from records for annual production covering "significant" shares of total industrial output but also remain controversial. The rates cited in the text were constructed and defended by Crafts and Harley against the views of their critics. Vide. N.F. Crafts and K. Harley, 'Output, Growth and the British Industrial Revolution: a restatement of the Crafts-Harley view,' in *Economic History Review*, 45 (1992), pp. 703-30. C.K. Harley and N.F.R. Crafts, 'Cotton textiles and industrial output growth during the Industrial Revolution,' in *Economic History Review*, critics of their index which in effect augments the rate of industrial production has been mounted by J. Cuenca-Esterban, 'British Textile Prices? 1770-1831: are British Growth Rates worth Revising once again?' in *Economic History Review*, 47 (1994), pp.66-105. It generated a further reply (embodying another set of cotton textile prices) was published by C.K. Harley, 'Cotton Textile Prices and the Industrial Revolution,' in *Economic History Review*, 5 (1998) pp. 49-83. In his attempt to mediate his way through the range of estimates now available to analyse rates of growth for gross domestic product, agriculture and industry, J. Mokyr, 'Accounting for the Industrial Revolution,' in C. Floud and Johnson (eds.), *Cambridge Economic History of Modern Britain*, pp, 1027 preferred to concentrated upon estimates based upon new research by G. Clark, 'The Secret History of the Industrial Revolution,'; U.C. Davis, Working Paper in *Economic History*. Clark's estimates in this and other papers cited above tend to show that discontinuities on nearly all indicators deployed to measure trends in economic growth occurred after and not before 1800. Is there any consensus in prospect?

to all the resources required to defend the realm and protect and extend its colonies and commerce overseas and support industrialization.¹⁰⁵

Turning to that most frequently explored connexion between warfare and industrial growth, namely technology, historians also observe that in contrast to the great wars of the past century, only a confined range of inventions with spin offs for the long run growth of the civilian economy (or indeed for the effectiveness of the armed forces) have been directly associated with demands generated by this widespread and protracted conflict.¹⁰⁶ For France the deployment of airborne balloons for observation, and interchangeable parts for the assembly of weapons are cited.¹⁰⁷ For Britain there are references to experiments with the preservation of food, metal tanks to hold water pumped by steam power onto warships, biscuit making machinery and Brunel's blocks and pulleys for the rigging of battleships and a boot making machine. Claims have been made that Britain became the arsenal for Europe during these wars.¹⁰⁸

¹⁰⁵ L. Magnusson, *Mercantilism: the Shaping of an Economic Language* (London 1994). There is a substantial bibliography of pamphlets and books written to refute the claims of radicals that the British economy had been severely damaged by the strains placed upon it by taxes and loans raised to mobilize resources for warfare. The counter and mainstream tradition of writing in mercantilist economics and political arithmetic continued for decades after the final victory at Waterloo and is well covered by the Goldsmiths Collection of Economics Literature at the University of London Library. Characteristic writers include: G. Chalmers, *Comparative Views* and J. Lowe, *The Present State of England*. It is summarized by: Cookson, 'Political Arithmetic' and E. McCleod, *Wars of Ideas. British Attitudes to Wars Against Revolutionary France* (Aldershot, 1998).

¹⁰⁶ Vide P. Hoffman's recent thesis, *Why Did Europe Conquer the World?* (Princeton, 2015); K.W. Chase, *Firearms – A Global History to 1700* (Cambridge, 2003); M. Roe-Smith, *Military Enterprise and Technical Change. Perspectives on American Experience* (Cambridge, Mass., 1985); W. McNeill, *The Pursuit of Power. Technology, Armed Force and Society since 1000* (Chicago, 1982); R. O'Connell, *Of Arms and Men. A History of War, Weapons and Aggression* (Oxford, 1989); M. Van Crefeld, *Technology and War from 2000BC to the Present* (London, 1989).

¹⁰⁷ K. Alder, *Engineering the Revolution: Arms and Enlightenment in France* (Princeton, 1999).

¹⁰⁸ Harvey, *Collision of Empires*, pp. 51-57; Emsley, *British Society and the French Wars* (London, 1979); C. Trebilock, 'Spinoff in British Economic History,' in *Economic History Review*, 22 (1969) pp. 74-90; C. Fox, *The Arts of Industry in the Age of Enlightenment* (New Haven, 2009); Mokyr found a few minor connexions – Mokyr, *Enlightened Economy*, p. 344.

Future research might uncover the appearance of other inventions associated with the capital goods, materials and modes of organization designed and developed by or for the armed forces. What has been documented is an elaboration upon sequences of developments and improvements which began after the American War associated with the production of armaments, with the spread of steam power and, above all, with the construction and maintenance of warships with potential spill-overs and externalities for post war shipbuilding, metallurgy and engineering. There were certainly connexions to the network of organizations and enterprises engaged with shipping and commerce overseas that experienced booms as well as slumps connected to warfare.¹⁰⁹

This raises the unanswerable question of whether upswings associated with the fortunes of mercantilist warfare engendered expectations that promoted research and development, investment and ultimately growth? Such connexions could be heuristically pursued by analysing how the fiscal, monetary and commercial policies implemented by the state to wage war may, on balance, have promoted benign outcomes for the longer term development of major industries.¹¹⁰ For example, the shift after 1797 into an inconvertible currency and a greater

¹⁰⁹ R. Morriss, *The Foundations of British Maritime Ascendancy* (Cambridge, 2011). Connexions to shipping and shipbuilding are elaborated in the final section. Few claims have been validated by historians for anything approximating to development of a military-industrial complex as part of the industrial revolution – vide P. Deane, 'War and Industrialization,' in J.M. Winter (ed.), *War and Economic Development* (Cambridge, 1975), pp. 91-102; John, 'War and the British Economy,' pp. 329-44 draws positive connexions but for earlier periods. No credence for this thesis can be traced in P. Hoffman's recent book, *Why Did Europe Conquer the World?* (Princeton, 2015), but vide a forthcoming book by P. Satia, *Empire of Guns* (Penguin, 2018) which deals with development of an armaments industry.

¹¹⁰ Connexion s between the macro-economic monetary and fiscal policies and the development of a sample of British industries have been elaborated in previously published papers by P.K. O'Brien, 'The Impact of the Revolutionary and Napoleonic Wars 1793-1815 in the Long Run Growth of the British Economy,' in *Review*, 12 (1989), pp. 335-96 and 'Taxation for British Mercantilism from the Treaty of Utrecht (1713) to the Peace of Paris (1783),' (in R. Sanchez-Torres (ed.)), *War, State and Development. Fiscal Military States in the Eighteenth Century* (Pamplona, 2008), pp. 295-356, 'Taxation for the Wars against France' and O'Brien, 'British Incomes and Property in the Early Nineteenth Century,' in *Economic History Review*, 12 (1959), pp. 255-67; O'Brien and Palma, 'The Old Lady of Threadneedle Street.'

reliance on taxation relaxed the terms and expanded conduits for access to loans and credits even for riskier ventures. Wartime policies reinforced established traditions of fiscal mercantilism that operated to promote exports; maintain lower rates of taxation upon raw materials and inputs utilized by industry. They also elevated protection against imports of manufactures up to virtually prohibitive levels and accorded relatively favourable fiscal treatment to technologically progressive manufactures (like cotton textiles) as well as such strategically significant industries (such as iron, coal and shipbuilding). By default the state condoned as administratively unavoidable the widespread evasion of liabilities for direct taxation by the owners and managers of industrial and commercial capital.¹¹¹

Monetary policy promoted inflationary conditions for several industries (coal, iron, copper ores, metal, building materials, leather, hosiery and candles) for which data for both wage rates and prices for outputs happen to be available. That data allows us to observe and measure a classic symptom of periods of inflation, namely a lag of wages behind prices and an unintended transfer of income from labour to capital, savings and investment.¹¹²

Nevertheless nearly all industries became afflicted and constrained in greater or lesser degrees by excise and customs duties levied on their inputs of raw materials and intermediate goods and upon their final outputs. These negative but variable effects from higher rates of taxation upon the growth in the volumes of output produced by a wide array of industries and services have been analysed elsewhere.

¹¹¹ O'Brien, 'Taxation for the Wars against France'; J.V. Beckett and M. Turner, 'Taxation and Economic Growth in Eighteenth Century England,' in *Economic History Review*, 43 (1990), pp. 377-403; Bowen, *War and British Society* and the bulk of pamphlets on fiscal policy contained in the Goldsmiths Collection of the University of London Library.

¹¹² This familiar lag and its implications for standards of living is discussed by G.N. Von Tunzelman, 'Trends in Real Wages, 1750-1850, pp. 33-49 and F. Crouzet, 'Guerre et Salaires. Le Cas De L'Angleterre.' His data displays a lag in real wages even for skilled workers pp. 71-85. The lag of agricultural wages behind rents has been exposed by Clark, 'Land Rental Values.

At the time fiscal policy generated the greatest attention from interest groups behind prolonged debates in Parliament and a voluminous bibliography of contemporary comment that contains contributions to political economy. Most of the authors of this polemical literature deplored the social incidence and adverse economic effects of higher taxation. Predictably they also neglected to counterbalance their condemnations of taxation not only against potential outcomes flowing from military defeat, but also against some unintended but not insignificant longer term effects that emanated from several fiscal and financial policies designed to mobilize resources for the forces of the crown.¹¹³

For example, transitions in scale and scope, already underway before 1793, in two major industries, coal and iron, (restored to positions of prominence in recent texts on the industrial revolution) were almost certainly accelerated by fiscal and commercial policies and shifts towards autarky promoted by the conflict at sea.¹¹⁴ Before the war something like 30% to 40% of the kingdom's annual consumption of timber and bar iron took the form of imports from Norway, Sweden, Russia, Prussia and other countries with access to ports along the Baltic Sea.¹¹⁵ Both raw materials particularly timber, which also provided sources of heat and energy and household fuel, had been subjected to complex but relatively low burdens of customs duties calibrated to favour imports in British ships.

¹¹³ W. Kennedy, *English Taxation, 1640-1799* (London, 1913) and T. Dome, *The Political Economy of Public Finance in Britain, 1767-1873* (London, 2004). The debates in Parliament are in W. Cobbett, *Parliamentary History, Cobbett's Parliamentary Debates*, vol.1, 1803-04 to vol. 22, 1812 and Hansards, *Parliamentary Debates*, 24-31 (1812-13 – 1815).

¹¹⁴ A.E. Wrigley, *Continuity, Chance and Change* (Cambridge, 1988); Allen, *The British Industrial Revolution* and P. Mathias, 'Energy and the Industrial Revolution,' in *Revista de Storia Economica*, 19 (2003), pp. 109-133.

¹¹⁵ According to Patrick Colquhoun, more than a third of Britain's supplies of timber continued to be imported from the Baltic even in wartime. P. Colquhoun, *Treatise on the Wealth, Power and Resources of the British Empire* (London, 1812), p. 90. J.R. McCulloch estimated British iron production at 68,000 tons for 1788 compared to 50,000 tons imported from Sweden and Russia. J.R. McCulloch, *A Dictionary of Commerce* (London, 1839), p. 735 and *Public Record Office, Customs 10901 for imports*.

During the war, duties on Russian and Swedish bar iron doubled.¹¹⁶ On Baltic timber, tariffs rose in two steps from 6.5/- to 28.5/- a load. In 1809 when ministers under political and geopolitical pressure reduced the kingdom's dependence on that region they raised the duty to 58/- a load in order to favour production and trade in Imperial (Canadian) timber.¹¹⁷ That controversial decision was occasioned by the risks of predation from enemy privateers, embargoes by northern powers and domestic pressures for pressures for imperial preferences.¹¹⁸ It was above all sustained by the massive augmentation in the costs of shipping of heavy and bulky raw materials, such as timber and bar iron from the Baltic to British ports in wartime.¹¹⁹ Already by 1808-11 the average price (cif) of a load of Baltic timber had risen by four to five times above pre-war levels.¹²⁰ Thereafter and in competition with Canadian imports, the volume and average price declined sharply over the final stages of the war, but not enough to counteract the pressures from self-interested groups of merchants, shippers and owners of British woodlands for the continuation of imperial preferences when the high costs of freighting timber across the Atlantic were exposed after the war.¹²¹

¹¹⁶ Duties on bar iron from Public Record Office Customs 10901 and Report of the Custom Tariff of the United Kingdom, Parliamentary Paper 1898 (85).

¹¹⁷ Timber duties are set out in the 'Report of the Select Committee to Take into Consideration the Duties on Timber,' *Parliamentary Papers* 1835 (19), p. 384 and Accounts and Papers, *Parliamentary Paper* 1826-27 (18), p. 267.

¹¹⁸ Pressure group activity can be traced in Public Record Office Board of Trade Papers, BT5/10 and Report of the Select Committee Appointed to Consider the Means of Improving and Maintaining the Foreign Trade of the Country in *Parliamentary Papers*, 1821 (6).

¹¹⁹ Vide Reports in *Monthly Magazine*, January, March and July 1801, June 1803 and February 1809; R.G. Albion, *Forests and Sea Power* (Cambridge, Mass., 1926); F. Crouzet, *L'économie britannique et le blocus continental*, pp. 91-93, 337, 34-45, 398 and 420-22; *Journals of the House of Commons* annually 1793-1815 include appendices of data related to prices of imported timber.

¹²⁰ H. Bliss, *The Timber Trade* (Goldsmiths Collection, University of London Library, London, 1822) p. 70 and T. Cooke, *Thoughts and Details on High and Low Prices* (London, 1824), p. 417. S. Cook, *Observations on the Timber Trade* (London, Goldsmiths Collection, 1821); Bliss, *Timber Trade*; *Parliamentary Paper* 1821 (6); McCulloch, *Commercial Dictionary*, pp. 1150-54.

¹²¹ The tariffs are recorded in Customs 10901 and *Parliamentary Paper* 1898 (85). The wartime history of the timber trade is covered by Bliss, *Timber Trade*.

Bar iron of the highest quality continued to be purchased from Sweden and Russia for the manufacture weapons for the army and navy. Nevertheless the total volume imported decreased from around 50,000 tons in 1788-92 to about 20,000 tons and falling (1811-15).¹²²

Changes to tariffs and more significantly to the risks and costs of importing wood and bar iron from the Baltic (initiated and sustained by warfare and its aftermath) raised incentives to accelerate the already ongoing process of import substitution by Britain's coal and iron industries. Both industries successfully resisted attempts by ministers, desperately seeking tax revenues, to impose excises on their outputs. While iron, much more than coal, benefitted directly and indirectly from augmented demands from the navy, army and ordnance departments for their products. Both industries also gained from the high rates of investment maintained in wartime to extend, integrate and improve the country's system of internal transportation, canals, rivers and roads as well as the extra protection afforded by a greatly enlarged navy for transportation by sea around the coasts of the Isles.¹²³

Responding to incentives heightened by war to replace imported timber with domestically produced, coke smelted iron, puddled iron for Swedish and Russian imports of bar iron and wood fuel with domestic coal (mined and more easily and more cheaply transported along the canals, rivers and protected coastal waterways of the Isles) both these heavy industries experienced remarkable accelerations in their rates of growth that cannot be disconnected from stimulus afforded by the state's engagement in warfare. Domestic pig iron production probably multiplied by a factor of 3.5 between 1788-92 and 1811-15 – a period when the

¹²² Mitchell, *Abstract of British Historical Statistics*, p. 140; C. Evans et al, 'Baltic Iron and the British Iron Industry in the Eighteenth Century,' in *Economic History Review*, 55 (2002), pp. 642-55. Purchases for the armed forces are recorded in War Office Papers, Public Record Office WO281; Appendices to House of Commons Journals and reports from Commissioners of Military Inquiry in Parliamentary Papers 1806 (2), 1806 (5) and 1812 (4). Corts links to the Navy are explored in R. Mott and P. Singer, *Henry Cort, Creator of Puddled Iron* (London, 1983).

¹²³ Raw data for investment in internal transportation are available in the form of the numbers of bills and estimated costs submitted to Parliament for expenditures on the construction of turnpike roads, canals, improvements to rivers. They are cited in A. Gayer et al, *Growth and Fluctuations in the British Economy*, and calibrated and revised by C. Feinstein and S. Pollard (eds.), *Studies in Capital Formation in the United Kingdom, 1750-1920* (Oxford, 1988) and by Feinstein, in 'Capital Formation in the United Kingdom.'

price of bar iron declined in real terms and when imports fell from about 43% to 6% of total consumption.¹²⁴ By 1821 the industry's long transition from charcoal to coke smelting was completed and it had recovered from the excess capacity of the immediate post war years.¹²⁵

Although the coal industry may not have experienced anything impressive by way of total factor productivity growth during the industrial revolution the evidence for accelerated rates of expansion during wartime also remains unmistakable.¹²⁶ Total output of all mines may have doubled between 1790 and 1815 while real prices per ton at points of delivery outside London probably declined because tolls at other ports

¹²⁴ P. Riden, 'The Output of the British Iron Industry before 1879,' in *Economic History Review*, 30 (1977) pp. 442-59; C.K. Hyde, *The British Iron Industry* (Princeton, 1977); R. Church (ed.), *The Coal and Iron Industries* (Oxford, 1994). The development of both industries has been cogently analysed by Allen, *British Industrial Revolution*, chs 4 and 9.

¹²⁵ T.S. Ashton, *Iron and Steel in the Industrial Revolution* (Manchester, 1924) and H. Scrivenor, *A Comprehensive History of the Iron Industry* (London, 1841)

¹²⁶ The exercise by Clark and Jacks to measure total factor productivity for the coal mining is based on data from the Northumberland Durham coalfield and deliveries by coastal transportation into London, vide G. Clark and D. Jacks, 'Coal and the Industrial Revolution 1700-1869,' in *European Review of Economic History*, 11 (2007), pp. 39-73 is under-specified. By the late eighteenth century only 30% and declining of mined coal came from that coalfield and was delivered down the coast to London. Vide. J. Mundella's estimates and discussion in *Journal of the Royal Statistical Society*, 10 (1878) pp. 87-112 and McCulloch, *Commercial Dictionary*, pp. 290-93 and 433. Estimates for total output are offered by M. Flinn, *History of the British Coal Industry*, 2 vols (Oxford, 1984), table 1.2 which show totals of 3.0m tons for 1700, 5.2m tons for 1750, 8.9m for 1775, 15.0m for 1800, 22.3m for 1800 and 30.4m for 1830. Mundella's estimates, pp. 87-712 display a rise from 7.6m tons for 1790 to 15.6m in 1815.

remained lower than they were in the capital.¹²⁷ Even for consumers in London rather late in the day, the government began to regulate combinations of producers, shippers and distributors, selling coal to households and industries located in the capital.¹²⁸ At the same time taxes upon exports were jacked up by 70%. This presumably increased the elasticity of coal supply for domestic use and restricted the diffusion of cheap British fuel and energy for rival competitors (Holland and France) on the mainland.¹²⁹

Over the second half of the eighteenth century coal fields beyond the boundaries of north eastern England opened up and mines utilizing improved Newcomen and eventually Watt engines for drainage, haulage and winding and railed ways for carriage were providing cheaper access to the extending network of inland waterways. Whether the diffusion of these technologies led to some or any increase in total factor productivity is not germane to the argument elaborated here. That argument is concerned to draw attention to rising freight rates, higher export taxes, repeated interruptions to the timber trade – all associated with warfare – that operated to intensify the extension and deepening of coal mining in Britain. The more rapid the exploitation of coal and technologies associated with its diffusion as a cheap source of energy and fuel for such heat intensive industries (as iron, copper, glass, salt, brewing sugar) pulled owners and managers of the coal industry into another “cage” of fixed investments and commitments that promoted and maintained a trajectory for long term development for the heavy industries of the first industrial revolution both during the war and thereafter over the difficult decades of post war adjustment and deflation. Its contribution to England’s precocious industrialization in and to feeding the nation in wartime cannot (as Wrigley has demonstrated) be understated.¹³⁰

¹²⁷ Flinn, *History of the Coal Industry* and offers a price index for coal moving from 100 in 1775 to 123 in 1800 and 128 in 1830, well below the general rate of inflation. Coal used to smelt metals was tax free. Although average costs of shipping coal to London 1793-1815 was about double pre-war levels, W.J. Hausman, ‘The English Coastal Coal Trade, 1691-1910: How rapid was Productivity Growth?’ in *Economic History Review*, 40 (1987), pp. 588-96.

¹²⁸ Legislation designed to enforce competition in the production and distribution of coal sold in London are discussed by P. Sweezy, *Monopoly and Competition in the English Coal Trade, 1550-1850* (London, 1996) pp. 34, 39, 59 and 79; R. Smith, *Sea Coal for London* (London, 1961), pp. 144-51; R. Stevenson, *Observation on the Coal Trade in the Port of Newcastle* (London, 1789); T.S. Ashton and J. Sykes, *The Coal Industry of the Eighteenth Century* (Manchester, 1929), pp. 211-15.

¹²⁹ Customs 10901 and C. Beaumont, *Treatise on the Coal Trade* (London, 1789) pp. 34-35 and 211-12.

¹³⁰ E.A. Wrigley, *The Path to Sustained Growth. England’s Transition from an Organic Economy to an Industrial Revolution*, (Cambridge, 2016), and P. Malamina, ‘Energy Consumption in England and Italy,’ in *Economic History Review*, 69, 2016, pp. 78-103. The technologies used for the extraction of coal and their diffusion are discussed by R.L. Galloway, *Annals of Coal Mining* (London, 1893); Ashton and Sykes, *Coal Trade of the Eighteenth Century* and Flinn, *British Coal Industry*.

To sum up, after the war and as all indices show, British industry rebounded. Major industries such as iron, coal and shipbuilding improved upon their capacities for growth built up in the hothouse conditions of a wartime economy by cutting costs, diffusing materials and technologies with demonstrable potential for future improvement and above all by holding onto the advantages of entry and access to foreign and imperial markets and sources of raw materials and supplies overseas which had been secured and thereafter retained by the hegemonic power of the Royal Navy, conjoined to the competitive superiority of Britain's mercantile marine with its linkages to the Island's expanded and competitively superior shipbuilding industry. Is it not necessary for historians to investigate how warfare might have on balance promoted a transition from one trajectory for industrial growth to another and potentially superior set based on heavy industry that came on stream once peace returned?

7. The Revolutionary and Napoleonic War as the Last Great Mercantilist Conflict and the Culmination of Britain's Maritime Strategy for Security with Economic Growth

Metternich, Talleyrand and other European statesmen gathered at the Congress of Vienna, recognized that the Peace Treaty of 1815 marked a conjuncture in great power politics when the Royal Navy had secured indisputable command of the oceans.¹³¹ The kingdom possessed: the largest fleet of merchant vessels, workforce of skilled seamen and shipbuilding capacity in the world.¹³² During the war years London, Bristol, Glasgow, Liverpool, Hull, Newcastle and numerous other port cities had reconstructed their harbours and shipyards and extended their commercial, financial and mercantile networks in order to continue to reap extraordinary shares of future gains from the integration of a world

¹³¹ C. Wilkinson, *The British Navy and the State in the 18th Century* (London, 2004). C. Webster, *The Foreign Policy of Castlereagh*; A. Herman, *To Rule the Waves: How the British Navy Shaped the Modern World* (London, 2005).

¹³² R. Hope, *A New History of British Shipping* (London, 1990); G. Bayley, *Tables Showing the Progress of the Shipping Interest of the British Empire* (London, 1844)

economy as it moved along a trajectory of more peaceful expansion under the hegemony of the Royal Navy.¹³³ Henry Dundas (the Minister For War) had anticipated this outcome in his memorandum to Ministers as early as 1800 when he wrote: “It is obvious that the present strength and pre-eminence of this country is owing to the extent of its resources arising from its commerce and its naval power which are inseparably connected.”¹³⁴

Crowding out, misallocation and destruction of national resources certainly occurred as unavoidable costs of participation in twenty- two years of warfare. Nevertheless, when the Government returned the currency to the gold standard in 1819 the augmented values of the kingdom’s natural endowments (land, minerals and coal); stocks of private fixed, circulating and human capital, supplies of useful knowledge, state capital, (battleships, fortifications, naval infrastructure, barracks and stores of weapons for the defence of the realm and protection of its commerce and assets overseas) all became available to an economy on the move and well placed to take advantage of opportunities flowing from the rebound and expansion of the post war global economy.¹³⁵

Britain’s prolonged mobilization for successful warfare at sea, together with the disruption to rival port cities by French and other European armies fighting on the mainland had almost certainly left the maritime sector of the Island’s economy with expanded and more efficient capacities to take advantage of opportunities for servicing of overseas trade and commerce. A quarter of a century of complementary expenditures by the state and the private sector on: the construction of ships; for extensions and improvements to the Island’s maritime infrastructures: for the training of seamen; for the expansion and reorganization of the mercantile and financial networks available to coordinate, fund, insure and transport increasing volumes of merchandize and passengers by sea to every part of an integrating world economy had

¹³³ Estimates for infrastructural expenditures on ports and their facilities have been published in several publications by Feinstein. Vide: C.F. Feinstein and S. Pollards (eds.), *Studies in Capital Formation in the United Kingdom, 1750-1920* (Oxford, 1988). Structural improvements to the commercial organization surrounding trade has been analysed by Chapman, *Merchant Enterprise in Britain*; Nash, ‘The Organization of Trade and Finance in the British Atlantic Economy’, pp.95-152 and Gauci, *The Merchants of London*.

¹³⁴ The Dundas Memorandum is in Pitt Papers 30/8/207 dated 31.3.1800.

¹³⁵ R. Rodger, *The Command of the Ocean. A Naval History of Britain, 1649-1815*; R. Backhaus, *Navies and State Formation* (Berlin, 2012).J.B. Williams, *British Commercial Policy and Trade Expansion, 1750-1850* (London, 1972); A. Herman, *To Rule the Waves*.

all been raised as an outcome of warfare to levels and standards that could not have been anticipated before the outbreak of a Revolution in France.¹³⁶

With the exception of the conflict with the United States and its European allies, opportunities to displace and replace competitors for the gains from trade and servicing a world economy had been taken from the time of the first Anglo-Dutch War of 1651 onwards. The destruction, degradation and depreciation of the rival mercantile sectors of France, the Netherlands, Spain, Portugal, Scandinavia, Russia, India and, after 1808, the United States, competing for these gains occurred on an unprecedented degree during the war with Revolutionary and Napoleonic France.¹³⁷ Intensified predation by a virtual fleet of British privateers (supported by their all-powerful Royal Navy) inflicted relatively more serious losses on the enemy and neutral shipping, sailing along lanes connecting the economies of Europe and their seaborne trades with the Americas, Africa, Asia and Australasia. The conflict also witnessed a sequence of dislocations of port cities on the mainland, disruptions occasioned by Napoleon's intrusive but unsuccessful continental system; as well as the forcible opening of Iberian, Dutch, French, Ottoman and Mughal empires to British trade.¹³⁸

¹³⁶ C. Wright and C. Fayle, *A History of Lloyds* (London, 1928); P.K. O'Brien, 'The Hanoverian State and the Defeat of the Continental System,' in R. Findlay et al (eds.), *Eli Heckscher, International Trade and Economic History* (Cambridge, Mass, 2006) pp. 373-407; The contemporary commentator, C. Moreau documents and quantifies Britain's enhanced competitive position in the world economy over this period. Vide Moreau, *Chronological Records and State of the Trade of Great Britain* (London, 1822).

¹³⁷ P. Crowhurst, *The Defence of British Trade 1689-1815* (Folkestone, 1977). C. Wilson, *Profit and Power: A Study of England and the Dutch Wars* (Cambridge, 1957) and *England's Apprenticeship, 1603-1763* (London, 1965); L. Gomes, *Foreign Trade and the National Economy* (Basingstoke, 1987); K.E. Knorr, *British Colonial Theories* (Toronto, 1944); N. Koehn, *The Power of Commerce. Economics and Governance in the First British Empire* (Ithaca, 1994).

¹³⁸ D. Starkey, *British Privateering Enterprise in the Eighteenth Century* (Exeter, 1990); L. David and S. Engermann, *Naval Blockades in Peace and War* (Cambridge, 2006). J. Lynch, 'British Policy in Latin America, 1783-1808', in *Journal of Latin American Studies*, 1 (1969), pp. 1-30; H. R. C. Wright, 'The Anglo-Dutch Dispute in the East, 1814-24', in *Economic History Review*, 3 (1950), pp. 232-46; A. Frost, *The Global Reach of Empire. Britain's Maritime Expansion in the Indian and Pacific Oceans, 1764-1815* (Carlton, 2003); Jones, *Britain and the World*; P. K. O'Brien and A. Clesse (eds.), *Two Hegemonies: Britain 1846-1914 and the United States 1941-2001* (Aldershot, 2002), Knight, *Britain Against Napoleon*.

Looking back from that vantage point of the Congress of Vienna it must be anachronistic to ignore the averted threat of military invasion, to concentrate upon hypothetical opportunity costs and to construct narratives for British industrialization that fail to include the long term material advantages and potential that maritime sectors of the Island kingdom's economy derived from final victory over France and its allies. Command of the ocean not only consolidated and maintained external security conjoined to internal stability for a society undergoing rapid urbanization, but Britain's naval hegemony brought to a virtual close centuries of violence at sea and contained all prospects for a resurgence of European colonial warfare in the Americas, in South and East Asia and in Africa.¹³⁹ By 1815 geopolitical preconditions were in place for the formation of a liberal international economic order that allowed overseas trade to widen geographically; integrate more regions into global markets for commodity, trade and services, to promote the movements of capital and labour and stimulate the diffusion of technologies to a degree inconceivable during an *ancien* mercantilist economic order.¹⁴⁰

Britain emerged from the wars with revolutionary France in pole position in a new international economic order with an extended territorial empire, naval bases in every part of the world and an enlarged and more efficient maritime sector linked to export industries poised to sell higher high shares of their outputs overseas. Meanwhile the economies of France, Portugal, Spain, Holland, Denmark, Venice, Russia, even the United States and other rivals, slowly recovered many of the competitive advantages for trade that they were developing between the Peace of Paris (1763) and the outbreak of the French Revolution six years later. The relative decline of rivals provided space for the Island's maritime sector, which since the times of Cromwell, had played a major part in leading the economy to a plateau of opportunities from where a sustainable transition to an industrialized economy would not be

¹³⁹ Roger, *Command of the Oceans*. Findlay and O'Rourke, *Power and Plenty* and G. Modelski and W. Thompson, *Seapower in Global Politics* (Seattle, 1993). For contemporary views of the economic state and status of Britain and its empire within the global economy of the day read Colquhoun, *Treatise on the Wealth, Power and Resources of the British Empire*; Chalmers, *Estimates of the Comparative Strengths of Great Britain*; Lowe, *Present State of England*; Moreau, *Chronological Records of the British Royal and Commercial Navy* and numerous other booklets in the Goldsmiths Collection, University of London Library.

¹⁴⁰ M. Robson, *A History of the Royal Navy. The Napoleonic Wars* (London, 2014). J. Klaitz and M. Hatzel (eds.), *The Global Ramifications of the French Revolution* (Cambridge, 1994); C.A. Bayley, *The Imperial Meridian. The British Empire and the World, 1780-1830* (London, 1989); W.R. Thompson, *The Emergence of Global Political Economy* (London, 2000) and G. Arrighi, *The Long Twentieth Century* (London, 1994).

checked either by the relatively small size of the United Kingdom's home market or by the risks to specialization from potential shortages of food and raw materials which attended the urbanization of a growing share of a workforce, generating increasing returns as it agglomerated in towns and factories.¹⁴¹

These outcomes consolidated by victory in the Revolutionary and Napoleonic wars, together with the stimulus that they had imparted to agriculture and industry add up to a view of that conflict as a conjuncture in the kingdom's economic history that brought a long commitment to mercantilism to a successful conclusion and thereby offered particularly strong advantages and opportunities for the Island's industrializing economy. Such post hoc representations would not, moreover, have surprised mercantilists of the day who never hesitated to extol links between power with profit.¹⁴² Classical economists and their neo-liberal successors would, however, only accept the "realpolitic" embodied in a view that the unintended economic consequence flowing from mercantilism and warfare could, on balance, be positive for progress of the First Industrial Revolution with deep scepticism.¹⁴³ Their posture of antipathy to mercantilism seems, however, to be based upon a superficial reading of recent scholarship in the history of economic thought.¹⁴⁴ Perhaps this ideologically unwelcome take and emphasis on positive connexions between investment for warfare and Britain's economic progress might become nothing more than ideological if it becomes possible to validate mainstream perceptions of the day with reference to a fully articulated and acceptable set of balance of payments accounts going back to the mid-seventeenth century.

¹⁴¹ Schmoller emphasized the geopolitics behind economic growth more than a century ago. See G. Schmoller, *The Mercantile System and its Historical Significance* (New York, 1967). His views are echoed by: Findlay and O'Rourke in their recently published text, *Power and Plenty*; and by S.A. Reinert, *Translating Empire. Emulation and the Origins of Political Economy* (Cambridge, Mass., 2011) and P. Vries, *State Economy and the Great Divergence* (London, 2015).

¹⁴² L. Magnusson, *Mercantilist Economics* and Reinert, *Translating Empire*.

¹⁴³ Silbener, *Problem of War in Nineteenth Century Economic Thought*; Mokyr, *Enlightened Economy*; for a critique read S. Rashid, 'Economists, Economic Historians and Mercantilism,' in *Scandinavian Economic History Review*, 28 (1980) pp. 1-15 and R.K. Schaeffer, *The Entelechies of Mercantilism*, vol. 29 (1981) pp. 1-16.

¹⁴⁴ E. Reinhert, et al., *Handbook of Alternative Theories of Economic Development* (Cheltenham, 2016); C. Perrota, 'Is the Mercantilist Theory of the Balance of Trade really Erroneous?' in *History of Political Economy*, 23 (1991) pp. 301-35; 'The Preclassical Theory of Development: Increased Consumption Raises Productivity,' in *History of Political Economy*, 29 (1997) pp. 295-326; L. Magnusson, *Mercantilism. The Shaping of an Economic Language* (London, 1994).

Alas, prospects for quantifying the range of Britain's evolving economic relationships with the rest of the world (including its Irish colony) over a chronology (say from the passage of Cromwell's navigation act of 1651 to its repeal two centuries later) continue to look entirely remote. Indeed a line of distinguished scholars who have grappled with the sources consider for trade in services such accounts could not be constructed within acceptable margins of error.¹⁴⁵

Their scholarly caution has, moreover, been vindicated by the convincing critique made by Nash of a set of "controlled conjectures" by Brezis published in the *Economic History Review* for several items on the current account of the balance of payments for benchmark years going back to 1710. They include figures for net earnings from shipping and mercantile profits, together with a set of guesses for net outflows or inflows derived from servicing Britain's foreign debt.¹⁴⁶ Their compiler did not respond to a challenge to publish the procedures and data she utilized to construct one of the standard and key components for balance of payments accounts, namely commodity imports at current (cif) prices, or explain why her data for exports was not comprehensive. Yet this debate over numbers has confirmed that the construction of acceptable estimates for Britain's balance of payments in current prices as Ralph Davis and Imlah told us, may not be possible for the period before, say, the 1770s.¹⁴⁷

¹⁴⁵ L.A. Harper, *The English Navigation Laws* (New York, 1939); H.C. Hunter, *How England got Its Merchant Marine, 1066-1776* (New York, 1935); R. Davis, *The Rise of Atlantic Economies* (London, 1973) quantified what he could and historicized a plausible story. Deane and Cole, *British Economic Growth*; R. Davis, *Rise of English Shipping*; R. Davis, *The Industrial Revolution and British Overseas Trade* and W. Minchinton (ed.), *The Growth of English Overseas Trade in the Seventeenth and Eighteenth Centuries* (London, 1969).

¹⁴⁶ E. Brezis, 'Foreign Capital Flows in the Century of Britain's Industrial Revolution: New Estimates, controlled Conjectures,' in *Economic History Review*, 48 (1995); R. Nash, 'The Balance of Payments and Foreign Capital Flows in Eighteenth Century England: a Comment,' in *Economic History Review*, 50 (1997) pp. 110-125. E. Brezis, 'Did Foreign Capital Flows Finance the Industrial Revolution?' a reply in *Economic History Review*, 50 (1997), pp. 129-32. Her mimeo is cited but apparently not utilized in Cuenca-Esterban's reconstruction of the accounts for 1772-1820. Vide J. Cuenca-Esterban, 'The British Balance of Payments, 1772-1820: Indian Transfers and War Finance,' in *Economic History Review*, 54 (2001), pp. 58-86.

¹⁴⁷ Davis, *Industrial Revolution and British Overseas Trade*; Imlah, *Economic Elements*.

Nevertheless, these and other attempts to envisage stylized balance of payments accounts lend support to perceptions (already familiar to historians and most contemporary commentators) on long term trends in the *volumes of Britain's commodity trade with the rest of the world based upon official statistics which refer to exports and imports measured in constant prices*. This imperfect data has often been used to estimate trends in rates of growth for decades between two periods of peaceful trade, 1717-21 to 1787-91, when average annual rates of growth for volumes of retained imports (1.7%) and domestic exports (1.5%) were not far apart.¹⁴⁸ Unless the net barter terms of trade were shifting against domestic exports, smuggling was on the increase, or debt servicing obligations to the rest of the world were already at high levels early on in the eighteenth century the numbers suggests there is no statistical basis for suggestions that a surplus of commodity imports over several decades of that century could not have been funded by earnings from invisibles (shipping, insurance, mercantile profits etc) which had reached the magnitudes suggested by the lower bound estimates constructed by Nash for 1700 and 1770.

Thereafter (1772-75) and before to the outbreak of the wars with France (1788-92) when the rate of growth for the volume of retained imports just about doubled and commodity exports (growing at around 2% per annum) failed to keep up, deficits on the balance of trade could well have widened.¹⁴⁹ Furthermore, they began to diverge at a time when earnings from invisibles also came under intensified, geopolitical and competitive pressures from the navies and merchant marines of rival economies (France, Spain, the Netherlands and the United States). From the American declaration of independence in 1776 to the outbreak of war with Revolutionary France in February 1793, volumes of re-exports leaving British ports remained at levels some twenty to thirty percent

¹⁴⁸ This official set is the foundation for all attempts to construct estimates for exports, imports and re-exports in constant and current prices: vide: B. Mitchell, *Abstract of British Historical Statistics* (Cambridge, 1962) section XI. See F. Crouzet's classic article 'Towards an Export Economy: British Exports during the Industrial Revolution,' in *Explorations in Economic History*, 17 (1980), pp. 48-93. The growth rates cited are based upon official values which are taken from Mitchell's abstract.

¹⁴⁹ From 1772-1820 data on commodities imported, exported and re-exported are available from: Mitchell, *Abstract*; Davis, *The Industrial Revolution* and from *Reconstructions* published in several papers by Cuenca-Esterban listed in the bibliography to the book edited by L. Prados De La Escosura, *Exceptionalism and Industrialization. Britain and its European Rivals, 1688-1815* (Cambridge, 2004).

below those attained before that conflict disrupted Atlantic and intra-European trades. Since British earnings from services (and even commodity exports) sold overseas remained highly correlated to volumes of re-exports, official records for those trades (supported by Cuenca-Esteban's estimates in current prices) are congruent with the gloomy assessments of the time that the years surrounding the American rebellion, war for independence and its immediate aftermath can be interpreted as a discernible setback for British naval power and the realm's commerce overseas.¹⁵⁰

Perhaps no study could quantify the macro-economic costs incurred by the British economy from the failed attempt by the Hanoverian state to retain control over thirteen colonies in North America? Modern historiography concurs with views of the day which observed that the conflict had inflicted serious geopolitical and economic setbacks to the nation's ambition to rise to a position of political and economic hegemony in the world at large.¹⁵¹

A decade later Britain was at war again and although it may never be possible to construct balance of payments accounts that could bring a really long term perspective on the economic significance of the warfare with France, from 1793 to 1815, Cuenca-Esterban has

¹⁵⁰ Contemporary views (e.g. McPherson, *Annals of Commerce* vol. 4 (London, 1805) and post hoc assessments have been critically summarized and supported by S. Conway, *The British Isles and the American War of Independence*; P. Marshal, *The Making and Unmaking of Empires, Britain, India and America* (Oxford, 2005); Ehrman, *The Younger Pitt.*; A. Christie, *Wars and Revolutions 1760-1815* (London, 1982); M. Turner, *The Age of Unease, 1782-1832* (Stroud, 2000); Bowen, *War and British Society*; D. Syrett, *Shipping and the American War, 1775-83* (London, 1970); Nash, 'The Organization of Trade and Finance'; Koehn, *The Power of Commerce*; Page, *Britain and the Seventy Years War*.

¹⁵¹ J. Cuenca Esterban, 'Balance of Payments and India's Contribution to the British Balance of Payments, 1757-1812,' in *Explorations in Economic History*, 44 (2007), pp. 154-76; P. Marshal (ed.), *Oxford History of the British Empire*, vol. 2 and his essay, 'The Eighteenth Century Empire,' in J. Black (ed.), *British Politics and Society from Walpole to Pitt* (London, 1990) pp. 177-200; H.M.. Scott, *British Foreign Policy in the Age of the American Revolution* (Oxford, 1990), p. 342, recognized that Britain's "success ultimately depended on the existence of a strong and aggressive French State – a point documented convincingly by B . Simms, *Three Victories and a Defeat. The Rise and Fall of the First British Empire, 1714-1783* (London, 2007)

However tried to recalibrate official and other data for exports, imports and re-exports and published plausible estimates, in current prices, for net earnings derived from supplying shipping, banking, insurance, mercantile, military and the services of imperial governance to the world economy (including Ireland and India) for the period 1772 to 1820. He has also ventured to construct controlled conjectures for the costs of servicing Britain's balance of net indebtedness to foreigners.¹⁵² This truncated but hard-won set of plausible macro-economic estimates allows for a foreshortened perspective on the conjuncture from 1793-1815 that exposes the place of warfare and colonization in narratives seeking to explain the origins and evolution of the comparative advantages enjoyed by Britain in servicing a globalizing world economy from 1793 to 1914. Although increasing returns accruing from the realm's precocious industrialization continue to be analysed in depth and sophistication its connexions to prior developments in shipping, financial, commercial, governmental services and ship-building for the kingdom's seaborne trades and increasingly for world commerce at large has moved away from centre stage in the writing of British economic history in recent decades.¹⁵³

Yet there is a historiographical tradition favoured by previous generations of economic historians (led by Ralph Davis) who insisted on according strong significance to international trade and commerce.¹⁵⁴ Their emphases may have been qualified they have not been undermined. Cuenca-Esteban's new data should now be included in narratives of the Industrial Revolution to make the point that the maritime sector of the British economy not only recovered from the conflict with the American colonies and their European allies (when returns from exports, re-exports and commercial services faltered) but took a leap upward to an altogether higher plateau of possibilities and opportunities during the long conflict with Revolutionary France.¹⁵⁵

¹⁵² References to his impressive archival-based scholarship are listed in Prados De La Escosura (ed.), *Exceptionalism and Industrialization* which includes an essay by J. Cuenca Esterban, 'Comparative Patterns of colonial Trade: Britain and its Rivals,' pp. 35-66.

¹⁵³ Allen, *British Industrial Revolution* and Mokyr, *The Enlightened Economy. The Economic History of Britain* (London, 2009); M. Daunton, *Progress and Poverty. An Economic and Social History of Britain 1700-1850* (Oxford, 1995). But vide Vires, *State and Economy* (2015).

¹⁵⁴ R. Unger, (ed.), *Shipping and Economic Growth* (Leiden, 2011); R.Davis, *Rise of the English Shipping Industry, The Industrial Revolution and British Overseas Trade*; Cain and Hopkins, *British Imperialism*.

¹⁵⁵ S. Ville: *English Shipping during the Industrial Revolution, 1770-1830* (1987); Gauci, *Emporium of the World. The Merchants of London*; Harper, *English Navigation Laws and Hope, New History of British Shipping..*

For that sector's core activity, namely shipping, the index required to support the key hypothesis for any chapter of a mercantilist narrative is aspirational because ideally it should measure cycles and trends in Britain's share of total ton miles of the world's freight carried overseas in British owned and built ships from, say, 1651-1851. In print we now have Cuenca-Esterban's conjectures of earnings from shipping for the years 1772-1820. They fall into line with several sets of official statistics submitted to Parliament by the Registrar General of Shipping.¹⁵⁶ His reports published in Journals of the House of Commons Parliamentary Papers and books by commentators of the day recorded:

- (a) the numbers and tonnage of vessels registered as British, Irish and Imperial ships;
- (b) the overall size of the workforce of seamen (men and boys) employed to man these ships;
- (c) shares of the tons of freight clearing (entering and leaving) British and Irish ports in British, Irish and Imperial (ie non-foreign) ships.
- (d) The numbers and tonnage of vessels constructed within Britain and its empire and registered as British, Irish and Imperial ships.¹⁵⁷

The Registrar's reports and data indicate the share of freight carried into and out from the kingdom's ports usually declined in wartime when the regulations for navigation confining overseas trade to imperial shipping had to be relaxed to allow neutral vessels to replace imperial merchant ships and their crews who had been redeployed to serve in and for the Royal Navy. Between 1793 and 1815 that changed in three respects. First, tonnage of freight clearing imperial ports in "British ships" rose sharply. Secondly, the tonnage constructed and registered as "British built" also increased over this period. Thirdly, while the war for American independence seems to have been a serious setback for the upward progression of the kingdom's shipping and shipbuilding industries, the longer and more expensive conflict with Revolutionary and Napoleonic Wars witnessed a pronounced expansion in Britain's capacities to build ships and to transport domestic, imperial and foreign freight by sea to every

¹⁵⁶ These data are printed in appendices to Journals of the House of Commons, vols. 57-71.

¹⁵⁷ C. Moreau, *The State of trade of Great Britain with All Parts of the World* (London, 1822); Parkinson (ed.), *Trade Winds, 1793-1814*.

port throughout the world economy.¹⁵⁸ That capacity had certainly been augmented at the expense of enemies, rivals and competitors, as the outcome of warfare at sea (and to some extent on land) leading to a divergence from France and all other rivals for the gains from trade and commerce.

Alternative hypotheses that the rise of Britain's shipping and shipbuilding industries emanated basically through higher rates of total factor productivity growth compared to the industries of its rivals must also be considered. That notion is untested and looks improbable. Few contemporaries or historians made the claim and the state continued for decades after 1815, to subsidize and protect both these industries.¹⁵⁹

For shipbuilding there are almost no indications in print for productivity change for a multinational industry producing a heterogeneous range of ships designed for a range of specialized tasks, located around the coasts of Eurasia. The secondary literature suggests that the designs, technologies, techniques and skills utilized to construct ships for particular purposes were accessible to many firms in several European countries, the United States and India. Innovations could, moreover, be copied fairly easily from purchased or captured foreign boats, and from models and blueprints. Technologies and skilled workers migrated easily. Best practice and designs diffused readily from shipyard to shipyard. Economies derived from agglomeration, specialization, the accumulation of skills, superior management and organization must, however, have emerged from site to site and reduced costs of production below average in some countries before others.¹⁶⁰ Although the Royal Dockyards operated to train the industry's skilled labour, the limited range of secondary sources published on the construction of sailing ships for this period leaves us with nothing more secure better than general impressions. Dutch shipyards seem to

¹⁵⁸ J. Marshall, *A Digest of all the Accounts* (London, 1833); Bayley, *Tables showing the Progress of the Shipping Industry* (Goldsmith's Collection, London 1844).

¹⁵⁹ Davis in his magnum opus *Industrial Revolution and Overseas Trade* made no such claim and the state protection see Harper, *English Navigation Laws*; Admiralty Papers at the Public Record Office 106/1457, 106/1481, 106/2055, 49/94, 95/85 dealing with relations between the Navy Board and private yards complain about the lack of improvement in shipbuilding techniques. Commissioners for Naval Enquiry (Parliamentary Papers 1805 (2) and 1817 (4)) found no significant examples of technological change in shipbuilding for the Royal Navy from 1608 to 1805.

¹⁶⁰ G.P. Naish, 'Ships and Shipbuilding,' in C. Singer et al (eds.), *History of Technology*. Vol. 5 (Oxford, 1963), ch. 18. A more extensive literature on the construction of battleships suggests that technologies for the design and construction of sailing ships changed slowly and innovations diffused fairly rapidly. Naval historians do not make strong claims for national superiorities in the construction of battleships. See Rodger, *Command of the Oceans* and D.H. Roberts (ed.), *Eighteenth Century Shipbuilding. Remarks on the English-Dutch Navies* (Rotherfield, 1992); J. Glete, *Navies and Nations: Warships, Navies and State Building* (Stockholm, 1993); R. Morriss, *Foundations of British Maritime Supremacy*; B. Lavery, *Ships of the Line. The Development of the Battle Fleet*, 2 vols (London, 1983-84).

retained the competitive position they had built up over the centuries.¹⁶¹ Access to cheap sources of raw materials (timber, pitch, tar, hemp, copper and iron) required to build fully rigged and equipped ships ready to sail the world's seas and oceans were foundational for competitive advantages.¹⁶² Shipyards tended to move away from larger port cities, like London and Amsterdam, in search of far cheaper supplies of labour. For example, by the time of the American Revolution (1776) something like 40% of the tonnage of ships registered in Britain's imperial mercantile marine had been constructed in yards located along the coasts of colonies in North America (and to a minor extent in India) close to supplies of raw materials and labour, cheaper by far than inputs available to yards in or near the capital. Indeed, London's high wages also promoted the migration of shipbuilding to "out ports" up the coast and around the Isles towards pools of cheaper labour in the North, Scotland and Ireland.¹⁶³ Wars for American independence operated to expand the shipbuilding and shipping industries of the United States along with those of its allies - the Netherlands, France, Spain, Scandinavia and Russia - into more serious rivals for the gains from servicing international trade and commerce. Competition intensified after the Peace of Paris and shows up in the new estimates for earnings from freight (1772-92). Meanwhile the performance of British shipping and shipbuilding worried mercantilist statesmen for more than a decade before the outbreak of war with Revolutionary France in 1793.¹⁶⁴

¹⁶¹ J. Lucassen and R. Unger, 'Labour Productivity on Ocean Shipping, 1500-1850,' in *International Journal of Maritime History*, 12 (2000), pp. 127-42; R. Unger, *Dutch Shipbuilding before 1800* (Amsterdam, 1978); D. Ormrod, *The Rise of Commercial Empires. England and the Netherlands in the Age of Mercantilism 1650-1770* (Cambridge, 2003).

¹⁶² A. Kirkaldy, *British Shipping, its Organization and Importance* (London, 1944); Ville, *English Shipping*; Harper, *English Navigation Laws*.

¹⁶³ K. Morgan, *Bristol and the Atlantic Trade in the Eighteenth Century* (Cambridge, 1993); Harper, *England's Navigation Laws*; G. Walton, 'Sources of Productivity Change in American Colonial Shipping 1675-1775,' in *Economic History Review*, 20 (1967) pp. 67-78; Syrett, *Shipping*.

¹⁶⁴ C R. Morriss, *Naval Power and British Culture, 1760-1850. Public Trust and Government Ideology*, (Aldershot, 2004); Cuenca Esterban, 'Balance of Payments'; H.T. Dickinson (ed.), *Britain and the American Revolution*. D. Syrett, *Shipping and the American War, 1775-83* (New York, 1970). Vide the pamphlets published by Lord Sheffield on the theme of 'Strictures on the Necessity of Maintaining the Navigation and Colonial System of Great Britain' (1804 Goldsmiths Collection, University of London Library) and J. Ehrman *The British Government and Commercial Negotiations with Europe, 1783-1793* (London, 1962); J.E. Crowley, 'Neo-Mercantilism and the Wealth of Nations: British Commercial Policy after the American revolution,' in *Historical Journal*, 33 (1994), pp. 334-60.

Thereafter and for some twenty- two years international competition for seaborne freight took place in a geopolitical environment of warfare and disruptions to international commerce from which Britain's shipping, shipbuilding and allied industries eventually emerged in clear positions of primacy.

This outcome has been well documented by historians, trade by trade, and has been referenced in classic texts dealing with growth and cycles for the British economy as a whole from 1789 to 1819.¹⁶⁵ The triumphal re-emergence of these two major industries from doldrums that accompanied the global conflict for American independence and from the fluctuations in their fortunes due to the ups and downs of twenty-two years of mercantilist warfare at sea, as well as on land, can be validated with reference to official and familiar values (the proxy for volumes) of retained imports, domestic exports and re-exports for 1774-1821.¹⁶⁶

Latterly and thanks to the seminal research of Cuenca-Esterban who has reconstructed a comprehensive set of balance of payments accounts in current prices for the period 1772-1820, historians are now placed to offer plausible conjectures based upon acceptable data that reveals the evolution of major intera-relations between the British economy and the rest of the world over initial and critical stages of the First Industrial Revolution. His estimates enables us to survey those connexions before, during and after European warfare that accompanied the American War for Independence and to analyse outcomes imputable to wars on land and above all at sea with France and her allies from 1772-75 to 1816-20.

¹⁶⁵ Parkinson (ed.), *Trade Winds*. The secondary sources providing dense description trade by trade is surveyed by P.K. O'Brien, *Government Revenue 1793-1815* (D.Phil. thesis, Oxford, 1967) ch. 9. On growth and fluctuations at more macro levels in imports, exports and re-exports the classic studies are by Ashton, *Economic Fluctuations*; Gayer et al, *Growth and Fluctuations* and Crouzet, *Le blocus: W. Schlote, British Overseas Trade, 1700-1930* (London, 1952).

¹⁶⁶ Mitchell, Abstract, p. 281; appendices to Journals of the House of Commons, vols. 51-71. Parliamentary Papers, Accounts and Papers; Marshal, *Digest of all the Accounts*; Moreau, *State of Trade*; C. Moreau, *Chronological Records of the British Royal and Commercial Navies* (Goldsmiths Collection, London, 1827). The approach to Britain's foreign commerce exemplified by the works of Ashton, Gayer and Crouzet cited above may leave the impression that the war years generated not only instability but depressed the prospects for British trade. That was not the view of the day – vide. A.D. Harvey, *Britain in the Early Nineteenth Century*; Ehrman, *The Younger Pitt. The Consuming Struggle*; and G. Bayley, *Tables Showing the Progress of the Shipping Industry* and A. Bayley, *Tables Showing the Progress of the Shipping Industry of the British Empire* (London, 1844).

Cuenca-Esterban is generous in his references to the archival scholarship of others and appropriately cautious about data that he continues to refine and revise. I have recast his estimates in order to draw inferences that fall into line with contemporary views of Britain's international economic relations and standing vis à vis its competitors for this critical conjuncture in the Island's history.

Estimates of External Flows to and from Great Britain and the Rest of the World 1772-75 to 1816-20 in £ million in Current Prices

<u>Categories</u>	<u>1772-75</u>	<u>1176-83</u>	<u>1784-92</u>	<u>1793-1802</u>	<u>1803-07</u>	<u>1808-15</u>	<u>1816-20</u>
1. Domestic Exports (fob)	13.7	12.4	19.2	32.2	37.3	43.2	41.5
2. Re-exports (fob)	7.0	5.2	5.1	10.8	10.0	15.9	13.5
3. Imports (cif)							
includes a guess for illegal imports	22.3	21.2	27.5	45.5	52.6	62.0	59.9
4. Retained Imports (3-2)	15.3	16.0	22.4	34.7	42.6	46.1	46.4
5. Balance of Commodities Trade (Net Imports or Deficit (4-1))	-1.6	-3.6	-3.2	-2.5	-5.3	-2.9	-4.9
6. Balance on Services Account from Shipping, Insurance and Mercantile Profits	4.0	5.2	4.9	10.6	10.3	14.2	8.3
7. Balance of Commodities and Services (6-5)	2.4	1.6	1.7	8.1	5.0	11.3	3.4
8. Net Transfers To and From Rest of the World							
(a) Theatres of warfare	0.0	-0.6	0.0	-4.4	-2.3	-16.2	-0.6
(b) India	0.4	0.5	1.0	0.3	-0.1	-0.5	-0.1
(c) Migrants	<u>-0.1</u>	<u>-0.1</u>	<u>-0.1</u>	<u>-0.1</u>	<u>-0.1</u>	<u>-0.1</u>	<u>-0.2</u>
Total Transfers	0.3	0.2	0.9	-4.2	-2.5	-16.8	-0.9
(d) Debt Servicing Charges (-) or Receipts (+)	0.3	-0.6	-0.5	-0.1	1.8	2.1	2.3
9. Balance on Current Account	2.5	0.9	2.2	3.8	4.4	-2.4	4.9
10. Capital Account							
(a) Changes in Reserves	2.9	0.2	1.8	0.6	0.7	-0.3	1.6
(b) Inflows or Outflows of Capital	-0.4	0.7	0.4	3.2	3.8	-2.1	3.3
11. Net Accumulated Balance of Claims against Foreigners	-13.0	-7.8	-4.5	27.7	46.6	30.0	46.4

Sources: Data reconstructions by J. Cuenca Esteban in papers cited in Bibliography to L. Prados De La Escosura (ed.) *Exceptionalism and Industrialization. Britain and its European Rivals, 1688-1815* (Cambridge, 2004) and his article: 'The British Balance of Payments, Indian Transfers and War Finance,' in *Economic History Review*, 54 (2001), pp. 58-86.

Several points (not unfamiliar to historians of the period) have been clarified by Cuenca-Esterban's research. For example, he shows domestic exports first declined, then recovered slowly from the American War of Independence and despite periods of boom and crises associated with the conflict with Revolutionary France increased over time in volume at a much faster rate between 1789 -1819 than they had over the two decades preceding 1793. The wartime upswing was marked by shifts in their composition (heavily into cotton textiles) and a clear geographical diversification - away from Europe towards markets in India, China, Latin America and, above all, the United States.¹⁶⁷

Correlation is not causation but after a protracted and unresolved debate on linkages between exports and industrialization it has now been recognized that an overall view of that contested connexion could only be pursued towards a settled conclusion by locating and analysing case by case, cycle by cycle, commodity by commodity evidence for changes in the range of overseas markets for British commodities that became accessible during these wars.¹⁶⁸ Meanwhile theoretically inspired exercises based on British statistics and founded upon models designed to separate out and to quantify endogeneous compared to exogeneous forces behind an accelerated rate of growth in industrial output and the rapid but erratic expansion of exports from a base period before the war (1788-92, down to its immediate aftermath (1816-20) and upward thereafter through a period of settled peaceable international economic relations (in the 1820s and 1830s) look ontologically unreal.

¹⁶⁷ Cuenca-Esteban and vide a brilliant unpublished Cambridge thesis by Simon Smith – summarized in *Economic History Society Annual Conference*, Session 7 'The Impact of the Discovery of the Americas, 1492 on Europe (Leicester, 1992). Crafts' discussion of the problem in his classic text, *British Economic Growth*, pp. 124-36, which elaborates on the complexities involved in quantifying connexions with trade in a growth process. He insisted on the significance of exports.

¹⁶⁸ For recent surveys of the protracted debate on connexions between trade and Britain's precocious industrialization see K. Harley, 'Trade discovery mercantilism and technology,' in R. Floud and P. Johnson (eds.), *The Cambridge Economic History of Modern Britain* (Cambridge, 2004), p. 175-204 and J. Cuenca Esterban, 'The Rising Share of British Industrial Exports in Industrial Output 1700-1851.' In *Journal of Economic History*, 52 (1997) pp. 879-906 and 'Comparative Patterns of Colonial Trade and India's contribution to the British Balance of Payments; P. Maw, 'Yorkshire and Lancashire Ascendant: England's Textile Exports to New York and Philadelphia,' in *Economic History Review*, 62 (2009) pp. 1-35. The long-run significance of trade may have been settled by a seminal econometric exercise by G. Clark et al., 'The Growing Dependence of Britain on Trade during the Industrial Revolution,' in *Scandinavian Economic History Review*, 62 (2014), pp. 109-36.

Complex “loops of inter-connexions” between British industry and its imperial and foreign markets overseas will probably remain impossible to disentangle. Theories imported from an array of competing models available in economics journals in order to engage with a utopian aspiration of factoring out the manifold influences on the growth and fluctuations in industrial exports flowing overseas during some twenty- two years of warfare and its aftermath could be represented as conclusive and not been tested.¹⁶⁹

Yes, conflicts at sea augmented risks for merchants trading beyond the shores of the realm. But they also widened opportunities, opened up new markets, degraded foreign competition, augmented fiscal and monetary incentives and offered naval protection to an extended range of nouveau businessmen, shippers and bankers (who included asylum seekers from the mainland), described at the time by the mercantile establishment as socially inferior “speculators” who engaged recklessly with overseas trade and commerce in wartime.¹⁷⁰ According to Crafts, shares of industrial output despatched, funded and insured for sale overseas, jumped from 22% in 1780 to reach 53% by 1831. Cuenca-Esteban’s revision to Craft’s estimates suggest an even more pronounced leap from 14% to 46% over that same period.¹⁷¹ Export volumes certainly rose more rapidly than manufactured outputs during the wars which thereby compensated industry’s need for markets at a time when domestic demand was being depressed by ever higher rates of taxation. Some (and probably a “substantial”) part of the rising share of total domestic industrial output sold overseas over these years can surely be attributable to the relative advantages that the British economy derived from the power of its Navy at sea and because fiscal and financial policies pursued by the government operated to promote trade and commerce with places beyond the impact of taxation, which narrowed markets at home.¹⁷² During the wars from 1793 to 1815 Britain recovered, consolidated, and thereafter retained a hegemonic position as the world’s “emporium” for trans-

¹⁶⁹ J.G. Williamson, *New Views on the Impact of the French Wars on Accumulation in Britain* (Harvard University Discussion Paper 14890, 1990) for a defence of economic theories that purport to “factor out” wars.

¹⁷⁰ P.K. O’Brien, ‘Merchants and Bankers as Patriots or Speculators. Foreign Commerce and Monetary Policy in Wartime,’ in J. McCusker and K. Morgan (eds.), *The Early Atlantic Economy* (Cambridge, 2000). This book also includes chapters by Engerman and Crouzet concerned with trade. The classic article on commerce for this period is Crouzet, ‘Wars, Blockades and Economic Change in Europe’.

¹⁷¹ Cuenca-Esterban, ‘The Rising Share of Industrial Exports.’

¹⁷² J. Beckett and Turner, ‘Taxation and Economic Growth, pp. 377-403

continental trade and commerce.¹⁷³ That outcome can be read as the restoration of a trajectory in operation from 1651 down to the loss the American colonies in 1783. Its progression was interrupted between the years of 1772-75 and 1790-93 (years that preceded, accompanied and followed the war for American Independence) and the outbreak of the French Revolution – a period when volumes and values of re-exports distributed, financed, insured and shipped across continents by British commercial enterprises remained almost flat. Fortuitously, during the wars from 1793-1815 geopolitical conditions affecting the operations of international trade and commerce changed in ways that, on balance, redounded to the long-term advantage of the British economy.

Prices for shipping, insuring, financing and organizing the carriage of freight overseas all rose to very high levels. Under superior protection from the Royal Navy British mercantile firms responded to opportunities and “captured” extraordinary shares of the returns from the sale of the commercial services associated with the distribution of both domestically produced and foreign commodities to European, American and other world markets.¹⁷⁴

At the time contemporaries became well aware of the gains from the accelerated rise of London and other British ports to become far and away the leading entrepôts for world commerce through the rhetoric of politicians, who referred with pride to official data recording large increases in imports and re-exports. Ministers also recognized, debated and investigated the recurrent and cyclical problems of “gluts” of foreign produce (mercantile inventories) lying unsold in the realm’s warehouses when the French and American governments managed to block and disrupt normal channels for British shipping.¹⁷⁵

¹⁷³ C.N. Parkinson, *Britannia Rules. The Classic Age of Naval History, 1793-1815* (London, 1977); P. Gauci, *Emporium of the World* depicts the London emporium at work and Hancock and other historians have explained how, when and why Britain acquired such extraordinary shares of the gains from servicing world trade – Chapman, *Merchant Enterprise in Britain*; A. Olson, *Making the Empire Work: London and American Interest* (Cambridge, Mass. 1992); D. Hancock, ‘The British Atlantic World: Coordination, Complexity and the Emergence of an Atlantic Market Economy 1651-1815,’ in *Itinerario*, No. 23 (1999), pp.107-26.

¹⁷⁴ A. Robson, *A History of the Royal Navy. The Napoleonic Wars* (London, 2014). Parkinson (ed.), *Trade Winds*; Wright and Fayle, *Lloyds*; Moreau, *State of the Trade of Great Britain*; Bayley, *Tables showing the Progress of the Shipping Interest of the British Empire*; C. Shammas, ‘The Revolutionary Impact of European Demand for Tropical Goods,’ in McCusker and Morgan, *The Early Atlantic Economy*, pp. 163-86 discusses the inelastic nature of European demand for these exotic and luxury products.

¹⁷⁵ Harvey, *Britain in the Early Nineteenth Century*, chs 2 and 3. The official statistics were recorded in parliamentary papers and journals of the House of Commons. The inventory cycles of the period are analysed by Ashton, *Economic Fluctuations*, Gayer et al, *Growth and Fluctuations* and in Crouzet’s magnum opus, *Le blocus*. The most recent study of world trade in wartime is by K.O’Rourke, ‘The Worldwide Economic Impact of the French Revolutionary and Napoleonic Wars, 1793-1815,’ in *Journal of Global History*, 1 (2006), pp. 123-51. He also concluded that Britain gained relative to its rivals from the wartime disruption of an evolution towards the integration of global markets.

By value approximately three quarters of the returns from this commercial activity came from shipping tropical groceries (sugar, tea, coffee, spices, tobacco etc) and raw materials (cotton fibres, thrown silk, dyestuffs, hardwoods etc) from Asia, Africa and the Americas onto the mainland of Europe. Marine insurance also prospered in risky wartime conditions, but shipping retained its place as the most significant sub-sector supplying international services.¹⁷⁶

By the end of the war sales of commercial, financial, insurance and other services to continents and colonies beyond Europe and North America accounted for nearly 90% of Britain's invisible exports. While warfare and dangers to external security of the realm lasted the augmented revenues from these services to foreign and colonized economies alike turned out to be more than sufficient to cover the deficit on commodity trade. With help from plunder and extortion from India they became sufficient to fund deficits on commodity trade (equivalent to some 6% to 12% of retained imports) and to cover payments for naval and military operations overseas – restrained to fairly low levels before the commitment of a large army under Wellington to fight on the mainland of Europe from 1808-15.¹⁷⁷

Thus and as Cuenca-Esterban's constructed estimates for international flows become acceptable as controlled conjectures they will allow historians to represent the war years as marking a turning point when the British economy (with indispensable help from the Royal Navy) became transformed from a net debtor to a net creditor to the rest of the world.¹⁷⁸ Between 1816-20 the kingdom's assets located beyond its frontiers may have amounted to somewhere around £50 million (approximately 14% of the national income). By then Britons may have been receiving inflows of returns from their investments overseas sufficient to fund about 7% of the country's retained imports.¹⁷⁹

¹⁷⁶ Cuenca-Esterban, *Balance of Payments* and Ville, *English Shipowning During the Industrial Revolution* and W. Vaughan, *Tracts on Docks and Commerce, 1793-1800* (London, 1839); F. Crouzet, 'Opportunity and Risk in Atlantic Trade in the French Revolution,' in C.L. Holfreirich (ed.), *Interactions in the World Economy* (London, 1990), p. 137.

¹⁷⁷ Cuenca-Esterban, 'British Balance of Payments' and 'India's Contribution. '; C. Hall, *British Strategy in the Napoleonic War, 1803-15* (Manchester, 1992); C. Hall, *British Strategy in the Napoleonic War, 1803-15*.

¹⁷⁸ Jones, *Britain and the World 1649-1815*; Harvey, *Collision of Empires*, pp. 58-61; O'Brien and Clesse, *Two Hegemonies*.

¹⁷⁹ Imlah, *Economic Elements in the Pax Britannia*.

Once the conflict was over and the advantages of naval protection and predation upon foreign (and neutral shipping) and other extortions associated with mercantilist warfare came to an end, European and American competitors recovered some of the international commerce they had lost in wartime from financing and transshipping commodities by sea around the world. Nevertheless Britain's top position had been secured. A liberal international economic order gradually emerged under the benign hegemony of the Royal Navy, the Island economy retained and built upon the extraordinary shares of the profits "seized" during an age of mercantilism from supplying: shipping, marine insurance, commercial and entrepôt services for the rest of the world economy (including its own extended empire overseas).¹⁸⁰

From 1815 to 1914 (the century of Pax Britannica) the economic significance of international services closely connected to the world's leading shipbuilding industry (both jacked up along with the Royal Navy to positions of almost unassailable primacy during the wars with France) has been mapped statistically by Imlah's classical study of 1958. As early as 1806 the foreign secretary had recommended: "The sea is ours and we must maintain the doctrine that no nation, no fleet, no cock-boat shall sail upon it without our permission."¹⁸¹

Geopolitical conjunctures in history when the long run growth of national economies might well have been thrown off course in developing comparative advantages that depended upon the maintenance of external security and the retention of naval supremacy over rival powers competing for gains from trade and specialization (linked to technological change) are complex to model.¹⁸² Early modern international history has never been an ontologically convenient arena for economic theories, however, rigorously designed to test connexions between trade and growth, except by resorting to unreal counterfactuals of peace with free

¹⁸⁰ O'Brien, 'State Formation and the Construction of Institutions for the First Industrial Nation'.

¹⁸¹ Harvey, *Collision of Empires*, pp 80-82; K.J. Holsti, *Peace and War. Conflicts and the International Order, 1648-1989* (Cambridge, 1991); C. Gray and R. Barnett (eds.), *Seapower and Strategy* (Annapolis, 1989).

¹⁸² Jones, *Britain and the World 1649-1815*; Harvey, *Collision of Empires*, pp. 58-61; O'Brien and Clesse, *Two Hegemonies*.

trade derived from Adam Smith's premature advocacy of a more enlightened international economic order. If, however, we reread Imlah's book and take account of the insights of "Gentlemanly Capitalism", we will then reflect upon the shares of imports retained, consumed and utilized by the economy of the United Kingdom from 1815-20 to 1911-13 that were funded by net receipts from the sale of services to the empire and the rest of the world, supplemented over time in ever increasing proportion over time from inflows of dividends and interest from investments overseas. Historians cannot avoid the question of how, when and why that pattern of specialization (with externalities) connected to long run growth of the economy came to pass and was sustained for more than a century.¹⁸³ From a post hoc perspective it seems anachronistic to underestimate the kingdom's pursuit of a mercantilist strategy for development or to ignore the massive expenditures incurred to defeat Revolutionary and Napoleonic France? After all, national versions of mercantilism were supported by the mainstream of European economic thought between 1651 and 1846 and accepted as a sensible foundation for geopolitical policy by all British Parliaments and governments of the day.¹⁸⁴ Smithian views continued to be as deviant and premature as universal suffrage, religious toleration, rights for women, sexual freedom and other demands for "enlightenment" until well into the nineteenth century. An Industrial Enlightenment succeeded rather than preceded Britain's precocious transition to a modern industrial market economy.¹⁸⁵

After Trafalgar and Waterloo the economic ramifications and significance of Britain's victory over Revolutionary and Napoleonic France were widely recognized by European statesmen intellectuals and historians as a conjuncture in European and global history that marked the beginning of the end of that malign international economic order.¹⁸⁶

¹⁸³ Black, *Trade, Empire and British Foreign Policy*, J. Clark (ed.), *A World by Itself* and S. Broadberry and K. O'Rourke (eds.), *Cambridge Economic History of Modern Europe* (Cambridge, 2010); P. Cain and A. Hopkins, *British Imperialism, Innovation and Expansion, 1688-1914* (London, 1993).

¹⁸⁴ I. Hont, *The Jealousy of Trade and the Nation State in Historical Perspective* (Cambridge, 2005); Harvey, *Collision of Empires*, pp 80-82; K.J. Holsti, *Peace and War. Conflicts and the International Order, 1648-1989*.

¹⁸⁵ J. Israel, *Enlightenment Contested: Philosophy, Modernity and the Emancipation of Man 1670-1750* (Oxford 2010); J. Mokyr, *The Enlightened Economy* (London, 2009) and *A Culture of Growth* (Princeton, 2017).

¹⁸⁶ L.S. Magnusson, *Nation, State and the Industrial Revolution* (London, 2009). Ch 1. Crouzet, *Britain Ascendant: Comparative Studies in Franco-British Economic History* (Cambridge, 1990).

Mercantilism may continue to retain its status as an irrational system of thought among economists who continue to read centuries of European writing in political economy teleologically as economic theory in retrospect.¹⁸⁷ Historians don't read it that way and will insist on representing the policies pursued by statesmen and the texts of their economic advisers in the context of an unavoidable geopolitical order in the context. Historically, as Crouzet told us years ago, the Revolutionary and Napoleonic wars find their genesis in a sequence of conflicts between Britain and France going back for more than a century.¹⁸⁸

Meanwhile to claim superiority for the insights derivable from attempts based on a modern economic theory and to factor wars or the history of mercantilism from an otherwise peaceful, but utopian, process of long run economic growth and transformation) are anachronistic exercises in theoretical speculation. Wars and the economic ideology which accompanied them were anything but enlightened, but they were part and parcel of that whole process and era. At its culmination it was important to win in order to consolidate the gains from trade, commerce and colonization culminating since 1651 to promote the kingdom's transition to become the world's first industrial market economy.¹⁸⁹

My rhetorical and debateable perception is that in significant respects the First Industrial Revolution can be plausibly represented as the paradigm example of successful mercantilism and that the unintended consequences of the Revolution in France contributed positively and perhaps "substantially" to its ultimate consolidation and progression.¹⁹⁰

¹⁸⁷ A perusal of Lane, *Profits from Power*, might be more heuristic and vide N. Hampson, *The Perfidy of Albion: French Perceptions of England during the French revolution* (London, 1998). The essays on Heckscher's studies of 'Mercantilism and the Continental System' by Magnusson, Irwin, Mokyr, Lal, Crouzet, Davis and Engerman and O'Brien in parts IV and V of R. Findlay et al (eds.) *Heckscher, International, Trade and Economic History* and J. Nye *War, Wine and Taxes* (Princeton, 2007) also debate the issue.

¹⁸⁸F. Crouzet, 'The Second Hundred Years War' and throughout his books, *Britain Ascendant: Studies in Franco-British History* (Cambridge, 1990), and including his last book, *La guerre économique Franco-anglaise au XVIII^e siècle* (Paris, 2008); J. Black, *Natural and Necessary Enemies. Anglo-French Relations in the Eighteenth Century* (London, 1986).

¹⁸⁹ D.A. Baugh, 'Great Britain's Blue Water Policy, 1689-1815,' in *International History Review*, X (1988) pp. 33-58; Stone (ed.), *An Imperial State at War*; Crouzet, *La guerre économique*. J. Black, *Great Powers and the Quest for Hegemony: the World Order Since 1500* (New York, 2007); A. Zatt, *War in Human Civilization* (Oxford, 2008).

¹⁹⁰ J. Horn et al (eds.) *Reconceptualizing the Industrial Revolution* (Cambridge, Mass, 2010); P. O'Brien, 'The Hanoverian State and the Defeat of the Continental System,' in R. Findlay et al., *The Hanoverian State and the Defeat of the Continental System* and P. Vries, *State Economy and the Great Divergence*.

