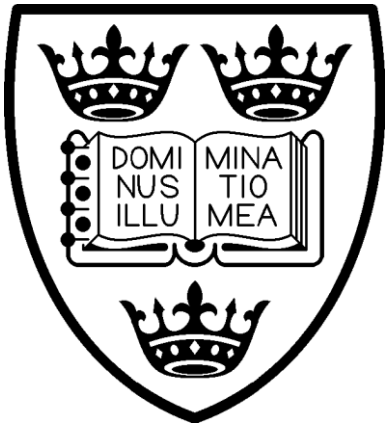

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SLAVERY, THE BRITISH ATLANTIC ECONOMY AND THE INDUSTRIAL REVOLUTION

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Abstract

Modern economic growth first emerged in Britain about the time of the Industrial Revolution, with its cotton textile factories, urban industrialization and export orientated industrialization. A period of economic growth, industrial diversification and export orientation preceded the Industrial Revolution. This export orientation revolved around an Americanization of British trade for which the slave colonies of the Caribbean were central. The Eric Williams' explored the extent to which this export economy based on West Indian slavery contributed to the coming of the Industrial Revolution. His claim that profits from the slave trade were crucial to the Industrial Revolution has not stood up to critical evaluation. Nonetheless, modern speculations regarding endogenous growth plausibly postulate that manufacturing, urbanization, and a powerful merchant class all have a favourable impact for growth. These hypotheses need careful consideration.

What set the British colonial empire aside from its rivals was not the quality of its sugar colonies but the involvement of the temperate colonies on the North American mainland. Unlike the slave colonies created to exploit staple exports, English emigrants to the northern mainland sought to establish independent settlement. These colonies lacked staple products and residents financed imports by exploited opportunities the empire provided providing for shipping and merchandising and compensating for the lack European market for the timber or temperate agricultural products by exporting to the sugar colonies which, in turn, concentrated on the export staple. The British Empire was unique and its development provided an important and growing diversified and relatively wealthy market for British manufactured goods that all other empires lacked. Although the mainland colonies financed their imports of British manufactured goods by intergrading into the slave-based British Atlantic, it seems likely that in the absence of opportunities in the slave colonies the mainland colonies would have imported similar amounts of British manufactured goods.

Slavery, the British Atlantic Economy and the Industrial Revolution

Modern economic growth first emerged in Britain at about the time of the cotton textile factories of Industrial Revolution. Urban industrialization and increasingly export-orientated industrialization occurred. Previously the British economy had already experienced economic growth, industrial diversification and export orientation. Trade with the Americas was central to this development and the slave colonies of the West Indies were key to Britain's American trade. Eric Williams' *Capitalism and Slavery* (1944) emphasized the central role that slavery played in developments leading up to the Industrial Revolution.

Americanization transformed Britain’s trade in the eighteenth century. In 1700 Britain overwhelmingly exported woollen textiles to Europe. By the eve of the American Revolution (and the Industrial Revolution) the Americas surpassed Europe as a destination for manufactured exports. Probably even more important, exports to Europe remained overwhelmingly woollen textiles while those to the Americas were overwhelmingly other manufactured products. This diversification seems an important feature of eighteenth century growth leading to the Industrial Revolution.

The diversification of the British exports and consequently its economy rested heavily on the Atlantic economy which depended on the slave-based sugar colonies of the Caribbean. However, it is impossible to attribute Britain's success as the first European economy to experience modern economic growth to a unique position in the

sugar colonies. Britain's colonies were less productive than those of its rivals. In fact, prosperity of the British Caribbean depended on mercantile protection that prevented the sale of cheaper French sugar in British markets. In effect, British consumers subsidized British slave plantations, hardly a recipe for differential advancement. Nonetheless, Atlantic trade had differential impact on Britain. What set the British colonial empire apart from those of its rivals was the involvement of the temperate colonies on the North American mainland. The slave colonies had come into being because they presented opportunities of exceptional profits to those who could mobilize labour and capital to exploit their staple exports. In contrast, the northern colonies were settled by English emigrants whose primary objective was to establish independent settlement. The resulting colonies of in New England and on the middle Atlantic coast did not posses staple products that could be sold at profit in Europe. Instead, their residents exploited the opportunities the eighteenth century British Atlantic Empire as a whole provided. They became important providers of maritime services in the form of shipping and merchandising. In addition, while there was no significant European market for the timber or temperate agricultural products of the region because transportation costs were too high, the profitability of sugar in the West Indies provided incentives to concentrate resources there on the production of the export staple. The northern mainland colonies' economies evolved in such a way that the residents' purchases of European products were financed by the sale of services, timber and foodstuffs to the West Indies. In this regard, the British Empire was unique and its development provided a growing diversified and relatively wealthy market for British manufactured goods that other empires lacked.

The question that Williams' work emphasized was to what extent did the British export economy based on West Indian slavery contribute to the coming of the Industrial Revolution? Williams' own answer that the profits from the slave trade were crucial to the Industrial Revolution has not stood up to critical evaluation. Nonetheless, modern speculations regarding endogenous growth frequently plausibly postulate that manufacturing, urbanization, and a powerful merchant class all have favourable impact for growth and have found statistical support for these propositions. The British Atlantic economy of the eighteenth century enhanced manufacturing, urbanization and the mercantile class.

Globalization, the Americas and slavery

The Industrial Revolution capped economic change in the eighteenth century. Prior to the last decades of the century, however, expanding international trade led Britain's economic dynamics. Expansion of trade, in turn, was firmly situated in a world of mercantilism and colonial rivalry. The rivalry among European states arose from early modern state-building and took many forms. Importantly, the state-building process occurred in a time of globalization and marked the early stage of a two century-long European political and economic dominance of world affairs. As Eric Williams pointed out as a young scholar, incorporation of the Americas into the dominant Eurasian economy was central to the process. From a Eurasian perspective the Americas that Columbus's voyages brought into contact with the old world were regions of land abundance and labour scarcity (reinforced, of course, by the catastrophic demographic

consequences of contact on indigenous American populations). It is now commonplace to point out that if an elite is going to extract a surplus from land abundance slavery rather than free labour is almost certainly involved.

Eric Williams' documentation of this process in the West Indies highlighted key relationships among staple extraction, the slave trade from Africa and British eighteenth century prosperity. Relationships between the British sugar colonies in the West Indies and the Industrial Revolution in Britain were central Williams' work but in considering Williams' seminal book, I think it is misleading to overemphasize the famous phrase in the forward that his book "is strictly an economic study of the role of Negro slavery and the slave trade in providing the capital which financed the Industrial Revolution in England" (the basis of the literature on the 'Williams' thesis'). The book is more about the political economy of the relationship between British economic policy and the interests of West Indian planters and traders (including slave traders) and how the relationship changed over time. It is worth quoting the rest of the famous sentence partially quoted above: "and of mature capitalism in destroying the slave system."

By the mid-seventeenth century northern European perception of the gains that could be extracted from the New World had come to focus on the profits of sugar cultivation in the West Indies. To be sure, the great early source of American gain, the silver (and to a lesser extent gold) deposits, remained important but they were firmly in the hands of the Spanish and to a lesser extent the Portuguese and new deposits elsewhere did not appear to be forthcoming. In the seventeenth century, the Portuguese transferred

sugar cultivation from their Atlantic island possessions to the New World. The potential for sugar seemed nearly unlimited in Brazil and the Caribbean but its exploitation required labour and capital. Capital and capitalists (the elite) were able to dominate sugar production not only because they received imperial support but more fundamentally because successful exploitation of the sugar's potential required partial refining of the cane immediately it was cut. Initial refining required fixed capital and there were significant economies of scale in processing. As Williams emphasized, the cheapest (but not only) labour supply came from the African slave trade (already tapped by the Portuguese in the Atlantic Islands). Thus the infamous triangular trade emerged. European powers engaged in intense political rivalry over control and exploitation of the sugar islands. In addition to military confrontation, mercantile legislation attempted to channel surpluses from the expansion of sugar production to the home country. Thus the colonies were required to export and import solely from the home imperial power. The imperial power controlled the slave trade, the sale of the staple and monopolized profits from the sale of European goods in the colonies.

As Williams emphasized, the British sugar plantations, first in Barbados and then in the other islands (Davis, 1973, Chapter 15) created vested interests in Britain. Some planters became very wealthy from the trade, particularly in the era of expansion in the late seventeenth century. Shipping interests in London, Bristol and eventually Liverpool invested heavily in trading links to Africa and the middle passage that transported slaves to the West Indies. In addition, sugar refiners and suppliers of export goods benefited from the trade. In the late seventeenth century the British islands led sugar development.

They not only supplied the rapidly growing British market for sugar but also provided the basis of a substantial re-export trade to the rest of Europe. That changed, however, in the early eighteenth century after the French gained control of Saint Dominique (today's Haiti). By the end of the 1720s Britain's re-export trade in sugar had disappeared (Davis, 1962, p. 294). High differential tariffs on sugar preserved the large British market (Davis, 1973, p.255 notes that the British consumed a third of all the sugar imported into Europe in the eighteenth century).

As the English islands lost their comparative advantage in sugar production to the larger islands, the prosperity of the vested West Indian interest, resting as it did on protective tariffs that kept British sugar prices substantially higher that prices elsewhere in Europe depended on its political position. The extent of the sugar interests, reaching from the planters to the ports and into the manufacturing districts, combined with wealthy planters' ability to purchase seats in the unreformed House of Commons, preserved the interests and supported slavery in the islands through the eighteenth century.

Williams argued that this protected West Indian vested-interest found its position becoming unsustainable as the eighteenth century ended. The loss of the mainland American colonies created problems of supply to the islands. The extent of subsidy that British consumers were providing to support a special interest became increasingly obvious. The climate of public opinion was moving away from mercantile policy and the support of special interests. The 'old corruption' that supported the political position of the West Indian interest was increasingly under attack. As the Industrial Revolution

proceeded, the main focus of economic attention shifted to the new industries created by Britain's technological prominence. These industries looked not for protection but for an opening of export markets. As the political economy shifted, the West Indian interest became vulnerable to their opponents. The slave trade was abolished in 1807 and slavery eventually abolished in 1833. In Williams' narrative the key to these changes was not the moral case against slavery and slave produced products – the British were still happy to purchase slave produced cotton from the American South – but the West Indian interest's loss of economic and political influence.

Historical importance of slavery

None of the preceding narrative should be taken, however, to negate the importance of slavery and the slave trade in the evolution of the British economy in the eighteenth century. Over the century Britain became more industrial and exports made major contributions to that industrialization. Exports to America played a particularly important role, not only in the growth of trade but in the development of export trades in manufactured goods. Some basic statistics, presented in Figure 1 and Table 1, illustrate the process.

Figure 1 about here

At the Restoration, England's exports went almost entirely to Europe. They were overwhelmingly manufactured goods but also almost exclusively woollen goods. By the eve of the American Revolution (and the Industrial Revolution) the nature of trade had changed. Exports remained overwhelmingly manufactured goods but woollen goods had

fallen to less than half of the total. Trade to Europe, however, had changed little. The change in trading patterns emerged from the development of a trade with the American colonies. By the 1770s trade with the Americas rivalled that with Europe and Britain exported a wide range of manufactured goods other than woollen cloth to these American markets. The American trade had assumed major prominence in British life and the demand of the colonies provided major markets for diversified manufactured goods. Expansion of the slave economies drove the transformation but there was another important dimension. The mainland colonies of America played a major role. The trade of the mainland colonies, however, was hardly independent since it depended on the colonists' own triangular trade with the staple colonies.

Table 1 about here

The sugar colonies and the southern mainland colonies with exports of tobacco and rice were classical staple colonies. They had grown to exploit previously unknown opportunities of staple production for sale in Europe in conditions of land abundance and labour shortage. Sales in Europe financed the purchase of African slaves and European consumption goods. The northern mainland colonies, however, differed. They financed imports from Europe by providing intermediate goods (food, timber, etc) and international transactions services (shipping, etc) to the staple colonies. Nonetheless, their economies were linked to the slave-based staple trades. Their trade was as dependent on the success of the staples as was the trade of the staple producers. There were, however, important differences.

Basic staple approach

It is useful to conceptualize the staple colonies and the northern mainland colonies in the old British Empire. John McCusker and Russell Menard in their masterful 1985 *Economy of British America, 1607-1789* introduce their first chapter (p. 18) by noting that historians of the economies of colonial America have tended to adopt one of two approaches. One is the 'staples or vent for surplus theory' while the other is Malthusian. The staples approach emphasizes the expansion of a land-abundant region driven by potential rents from the cultivation of a staple for sale in the metropolitan economy. The expansion draws capital and labour to the New World. The Malthusian (so termed because it is driven by population growth although in the absence of diminishing agricultural returns), in McCusker and Menard's words "locates the central dynamics of American history in internal demographic processes that account for the principal characteristics of the colonial economy: the rapid and extensive growth of population, of settled area and of aggregate output combined with the absence of major structural change." Although both the slave colonies and the northern mainland economies became major trading economies it is enlightening to think of the trade of the slave economies in the context of the staple approach and that of the northern mainland economies in the Malthusian context.

For the slave economies it is useful to follow Findlay and O'Rourke's (2007 p. 339) advice and think of the Atlantic economy in the framework of a three region general equilibrium model. Findlay (1990) laid out a useful and simple model of this type that I

wish to use, with a few modifications, to characterize the slave colonies and their trade. The model explores relationships in an economy comprised of a metropolitan manufacturing sector that uses colonial raw materials which in turn depends on slave labour. The equilibrium of the model simultaneously determines the size of the slave labour force (and given an exogenous slave mortality, the size of the slave trade), the output of manufactured goods and the trade in raw materials as well as the relative price raw materials and of slaves.

Figure 2 presents a slightly modified version of the model of the raw-material-staple-slave economy graphically. In Findlay's version of the model a unit of manufacturing output required a specific amount of raw materials and all raw materials produced by colonial slave production. That specification tied manufacturing very closely to the slave economy but can hardly be fully accepted as a reasonable representation of historical reality. After about 1800 the British cotton textile industry depended on slave-produced cotton, but until that time colonial products were heavily dominated by sugar and tobacco, with rice and fish as other exports. None of these were industrial raw materials. Nor was British industry very dependent on imported raw materials. For this reason, and to provide a framework to discuss the initial expansion of the staple colonies I have modified Findlay's diagram (1990, p. 9) as indicated by the heavy dashed lines, to allow a non-colonial source of raw materials. The steady state equilibrium (say approximately the situation in the mid eighteenth century) with colonies is qualitatively identical to Findlay's and indicated by the broken lines. Equilibrium levels of manufacturing output (M*), raw material inputs (R*), slaves (S*) and the relative price of

raw materials (p*) and Findlay's comparative statics also carry through without change.

Figure 2 about here

- This model provides a good framework to emphasize the earlier history of the staple colonies. Prior to Columbus, the European economy was constrained by its internal raw material supply. Thus the equilibrium was at R^0, M^0 and P^0 in Figure 3. The high price of raw materials in this economy relative to supply opportunities in the colonies generated colonial profits and induced slave imports. The ensuing fall in raw material prices induced expansion of manufacturing. Eventually, the economy attained its post-Columbus equilibrium at R*, M*, S* and P*.

Figure 3 about here

Trade and the Malthusian northern mainland colonies of British America

The history of the northern mainland colonies did not share the staple-driven dynamic where potential profits from exploitation of staples drew labour – through the slave trade – and capital from the Old World. Instead New England and the middle colonies evolved from the migration and subsequent demographic growth of groups interested in creating an independent existence in the New World. These colonies involvement in Atlantic trade was thus different. Figure 4 provides a way of visualizing their trading experience. The colonist in these colonies had a potential demand for European commodities – their main source of manufactured goods and luxuries. The demand curve in the diagram slopes downward in terms of the price of imported goods relative to the price of domestic goods (and wages) in the colonies. The demand may have been quite inelastic given the difficulties of providing colonially produced substitutes for European goods and the relatively small part these goods played in

consumption of these intentionally self-sufficient colonies. The equilibrium colonial price (and wage) level and import quantity are determined by the intersection of this curve with a second curve representing foreign exchange earnings for the colonies at different real exchange rates (determined by colonial price levels). The curve has been drawn with two distinct segments – one nearly horizontal and one with a clear upward slope. The upward sloping segment represents the sale of colonial produce in Europe. Transportation costs precluded the sale of temperate agricultural products and timber which were abundant in the colonies except at very low prices in the colonies (in fact, transportation costs often exceeded European prices). There were some valuable American goods such as furs and fish but revenue from them was modest relative to the demands of the substantial colonial population.

However, the presence of the Atlantic economy presented a substantial demand for foodstuffs, timber etc. in the West Indies and for shipping services in the maritime economy more generally. At an appropriate level of colonial prices and wages, this demand was extremely elastic since the colonies were marginal suppliers in a much larger imperial market and could sell at the prices prevailing in the broader market. In the diagram this demand shows up as the near horizontal segment of the supply curve for foreign exchange. This horizontal demand determined the colonial price level and the volume of imports.

Figure 4 about here

Shepherd and Walton's (1972) estimate of the American balance of payments just before the Revolutionary War (Table 2) demonstrates the importance of the elastic

demand in the imperial economy to the northern colonies. Exports to Britain were small (less than 10% of estimated foreign exchange receipts). Exports of temperate staples to the West Indies were important, providing about a third of receipts. These exports supported the islands' specialization in staple production and without them the islands would have found these temperate commodities much more expensive. Importantly, nearly forty percent of the Northern mainland colonies' receipts came from shipping and mercantile services. These services characterized the Malthusian economies that expanded exports into a large market where, as a small supplier in a large market, they faced an almost infinitely elastic demand.

Table 2 about here

Implications for British growth

There is no question that the growth of British trade and industrialization was heavily intertwined with the British Atlantic Economy of the old Imperial System and its mercantile basis. The trade of the Americas rested on the slave-produced staples of the West Indies and to a lesser extent the Southern mainland colonies. The northern mainland colonies participated by utilizing the opportunities that the growing staple trades presented to trade temperate foodstuffs and raw materials to the staple colonies and to exploit niches in the shipping and mercantile activities that were vital to its success. From Britain's domestic point of view, the American colonies within the protected mercantile empire became important markets. This was particularly true for manufacturing industries. The Americas were almost solely responsible for the

diversification of Britain's exports to the point where other manufactured exports exceeded the value of woollen exports. Even though this was clearly the actual historic case, we still do not really know to what extent the slave-based empire contributed to the coming of the Industrial Revolution in Britain. We can approach this in various ways.

One starting point is to ask did Britain benefit from slave-based empire more than its European rivals. Here scepticism seems appropriate. To be sure the English sugar colonies enjoyed a period of impressive expansion and prosperity in the late seventeenth century, but the eighteenth century picture was much more mixed. Britain's staple colonies were not particularly dominant (Inikori, 2002, p. 181). As I said in my survey of British trade (Harley 2003)

> "The eighteenth century British Empire was not exceptionally large or prosperous. The Spanish, French and English sugar islands in the West Indies all had about the same population (300,000 to 350,000 around 1750). The British islands were high cost producers, unable to compete with the rapidly growing output of French Saint Dominique without protection. During the eighteenth century, French trade to the West Indies grew more rapidly than British and merchants in the French Atlantic ports dominated the re-export Europe of sugar and coffee to Northern (Crouzet 1996). Even in 1750, Spanish America's 10.5 million provided a much larger market than the British America's 1.5 million. Portugal's colony in Brazil had population equal to that of all of British America. The British Empire's size or trading contribution can hardly have made the decisive contribution to Britain's lead

the emergence of modern economic growth."

If colonial trade make a crucial contribution, it probably did so by expanding the market for British manufactures, transforming the environment in which eighteenth century British inventors and entrepreneurs made decisions in ways that stimulated innovation. Here Britain differed from her European rivals but it is important to be aware that the difference arose not from the staple-economies but from the 'Malthusian' economies of northern mainland America. The principal growing markets for diversified manufactured exports from Britain were not the slave-based staple colonies but rather the northern mainland. These colonies' population growth was almost entirely internal (New England received no immigration between the Great Migration prior to the English Civil War and the Irish Famine in the 1840s and was a centre of emigration within America). The demand for manufactured goods was generated by this growing population that remained relatively prosperous in the absence of a binding land constraint. They did, to be sure, satisfy their import demands by trading within the slave-staple dominated British Atlantic trading network. Nonetheless, it was not the staple economies but the presence of these rapidly growing Malthusian colonies that distinguished the British Empire from its rivals.

As Findlay and O'Rourke comment (2007, p. 339) questions like how important were the slave-staple economies in the growth and diversification of British exports invite counter-factual thought experiments. To what extent would the growth of manufactured imports into the northern mainland colonies been curtailed without the slave colonies? Of

course such questions cannot be fully answered but they need to be considered if we are to understand the dynamics of economic change. In this context it is perhaps useful to consider Figure 4 above again. Certainly we can be confident that an absence of the slave colonies would have constrained the supply of foreign exchange to the northern colonies (shifted the curve to the left). It is possible, however, that it would have had no effect on the equilibrium. Table 2 above indicates the importance of the horizontal portion of the supply curve of foreign exchange consisted of the shipping and mercantile services the colonist sold in a wider British market in which they were relatively small. This suggests that these sales might have expanded at very little cost to the colonies or to British exporters. This conclusion, of course, is undoubtedly too optimistic. Much of the services that the northern colonies sold were connected with the West Indian trade and would have been affected by these colonies' absence. If the supply of foreign exchange were sifted left (say to the broken line in the diagram), the price of imports in terms of American goods and labour would have risen. How much would that have affected British exports to the colonies? It seems unlikely that it would have had important impact on the underlying growth in the land-abundant continent. There might well have been some expansion of colonial manufacturing production if imports were now more expensive, but my own conjecture (and it is no more than that) is that the northern colonists' demand for European manufactured goods was price inelastic and the absence of the West Indies would have had little effect on British exports there.

It is also the case that simple consideration of the static impact of trade on the British economy does not support the contention that slave-dependent trade generated by

the West Indies made a crucial contribution to the British economy. Finlay and O'Rourke in their spirited argument for the importance of the trade (2007, p. 337) take me to task for "play[ing] the old trick of multiplying two fractions by each other to obtain an even smaller fraction" and concluding that trade had a minor impact on the British economy. In response, I would contend that this is no trick but arithmetic and, in fact, is a good place to begin even if any satisfactory analysis needs to go farther. Theoretical speculations demonstrate logical possibilities but historical explanation needs to connect to evidence we have that can provide indications of relevant importance.

Crafts calculates (1985, p. 127) that Britain's exports were about 16 percent of national income in 1801. Since most were manufactured goods, exports were a much higher portion of manufacturing output. He calculates net exports were about 45 percent of the output of manufacturing, mining and building. About fifty-five percent of that went to Africa and the Americas. However, nearly sixty percent of that went to the United States and British North America (Davis 1979, p. 89). But, as I have just conjectured much of that, although connected with the slave economies, did not depend on them. If exports to the Americas disappeared and the resources used in their manufacture were left idle the reduction of British income would be on the order of eight percent of national income and close to a quarter of manufacturing output. Of course this overstates the static impact after the economy adjusted to the removal of American trade since the British resources no longer employed in the trade would have found some alternative gainful employment. If these alternatives were, say, 25 percent less productive than the export industries, the loss of national income would have been only two percent of British

income. To be sure these calculations have limitation but they provide the order of magnitude from which discussion should begin. I cannot resist here quoting Samuel Johnson on the value of simple calculations: "That, Sir, is the good of counting. It brings everything to a certainty, which before floated in the mind indefinitely." (quoted in McCloskey, 1981, p. 105).

Findlay and O'Rourke quite properly comment on the limitations of similar calculations: (p 337)

> "However, comparative static trade models cannot, by definition, say anything about the impact of trade on growth, and to show that the British economy as it stood in 1860, with the Industrial Revolution already firmly entrenched, would have suffered a small welfare loss had it not been able to trade at all is not only unconvincing on its own terms [whatever this means] but evidently raised the question of what forces were required to bring the economy to that state in the first place."

We all agree that the dynamic questions are the ones in which we are interested. Unfortunately, we lack clear understanding of the dynamics of economic growth even in current economies much less in the transition to modern economic growth. We are trying to tease it from the historical record. In that task, it is important to try to "bring...to a certainty, which before floated in the mind indefinitely."

Rather strangely, Findlay and O'Rourke commend (two pages on) the general equilibrium model in Findlay (1990) as a tool to construct counter-factual thought

experiments consider the dynamic issues of trade and British growth. The Findlay model is a useful device to conceptualize the relationships in the British Atlantic economy in the period of old imperialism and I have already used if for that purpose. However, it can hardly be taken seriously as providing reliable orders of magnitude of various influences. The model is quite straight forward. There are three sectors. Britain (or Europe) produces manufactured goods with domestic labour, mobile capital and requires a fixed amount of raw materials per unit of output. America produces raw materials using slaves and land. Africa produces slaves at an increasing marginal cost. Capital can be used to produce manufactured goods or to own slaves. An equality of the return on capital in various uses is part of the equilibrium of the system. Now in this system, manufacturing depends on the supply of slaves. No manufacturing output is possible without raw materials and raw materials are only produced in America and require slaves (in terms of the use I made of the model earlier, before the discovery the Americas everything would be at the origin except the price of raw materials). Useful as this model is in conceptualizing the relationships involved in the Atlantic economy, at least in a comparative static way, it is unconvincing as a guide to assessing the contributions of various factors to British growth over all or the growth of British manufacturing. In passing, I should note that it is a comparative static model and suffers from the limitations already discussed regarding explaining growth.

Of course, Findlay and O'Rourke are correct that comparative statics exercises have very limited leverage when it comes to explaining long-run economic growth. Unfortunately, however, we lack any convincing models of the process of economic

growth but there are a range of ideas that provide background for such a model. One aspect of exploring these ideas is the construction of endogenous growth models. A second is careful examination of the historical record (see Harley, 2003). There is general agreement that technological change lies behind historical economic growth and that the creation of knowledge and technology much be seen as a part of the economy, i.e. endogenous. Furthermore, knowledge is a 'good' in which market failure is pervasive because it is characterized by externalities and non-exclusivity. This suggests that we should attempt to identify the historical workings of purposeful knowledge creation and the externalities that it involves. Such ideas suggest that the process of technological change is path dependent.

My colleague, Bob Allen (2011) has recently argued that the classical Industrial Revolution in Britain at the end of the eighteenth century arose from a process of industrial research and development that was directed by high wages and cheap energy (compared to other economies) that prevailed in Britain in the eighteenth century. This gave British entrepreneurs and capitalists incentives to search for manufacturing techniques that substituted fuel and capital for labour and their efforts were eventually fruitful. This search in turn created knowledge externalities that further enhanced the process of technological change.

This view of the Industrial Revolution has the somewhat uncomfortable feature of suggesting that Britain got rich because it was already rich, thus pushing the basic question farther into history. Allen's view, however, is consistent with other work on the

emergence of modern economic growth (e.g. Crafts and Harley (1994), van Zanden (2010), Leigh Shaw Taylor et al (2011)) that suggests that understanding of the process needs to extend far earlier than the classical Industrial Revolution. Allen has investigated data on long-run growth in Europe (Allen, 2003) and concluded that Britain's growth emerged from commerce and the urbanization that it generated from the early sixteenth century. Urbanization created incentives and externalities that led to productivity growth. In his view, urbanization played a key role in stimulating technological change both the agricultural and the non-agricultural sectors of the economy. This technological advance created the high-wage, coal-using economy that lay behind the Industrial Revolution. The expansions of trade to the Americas fits into this schema in a general sense although Allen concludes that it occurred too late to have been the trigger that initiated the process of divergence. On the impact of empire he concludes (p. 431):

> [T]he empire established in the seventeenth and eighteenth centuries also contributed to growth. The greatest impact was on city size. Over half of England's urban expansion is attributed to empire in these simulations."

The view that urbanization and industrialization provided both incentives and externalities that contributed crucially to Britain's economic growth is extremely attractive even if Allen's simulations – based on quite simple regression – are not powerful enough evidence to be conclusive. As I have discussed above, there is no question that the slave-based British Atlantic Empire contributed strongly to both the rise of Britain's port cities and to the expansion of industrial activity. However, by the late seventeenth century the bulk of the trade-based stimulus to industrialization came not

from the slave economies but from the northern Malthusian economies.

Of course, the Industrial Revolution was crucially about cotton (Findlay and O'Rourke, p. 320 comment: "Rostow's original characterization of cotton textiles as the leading sector of the British Industrial Revolution appears to have been well-founded"). Cotton, of course, depended on a slave-produced raw material. As such it seems to be the stimulus for Findlay's model that I have already discussed more than once. There are, however, several problems in building an argument on the importance of slavery for the emergence of modern economic growth on the British cotton textile industry.

The first, and most obvious, is that the cotton industry emerged too late. A cotton industry existed in Britain from at least the late seventeenth century. However, it was a small industry, initially at least, dependent on protection from competition from imports from India. As is well-known, that protection was incidental to protection of England's woollen industry but it helped the cotton industry become established. This early cotton industry had only limited connections to the slave-based Atlantic. Its raw material came from Ottoman territories in the Levant, although the West Indies became a significant source of supply after the middle of the eighteenth century. Cotton textiles were a part of the cargoes sent to the west coast of Africa to finance slave purchases. These were, however, principally Indian cottons re-exported from Europe, although Inikori has shown (2002, p. 444) that by the second half of the seventeenth century, British 'cottons' (cloth of linen weft and cotton warp often, if inaccurately, referred to in the literature as 'fustians') had become significant.

The great expansion of cotton only occurred after Arkwright's innovations at the end of the 1760s. The industry grew spectacularly from the mid 1770s but remained fairly small until near the end of the century. The United States did not become an important supplier of cotton until Eli Whitney's cotton gin came into widespread use in the 1790s. The expansion of cotton growing in the United States may have influenced a surge in slave imports in the final years of legal slave imports into the United States from 1800 to 1807. Nonetheless, as far a cotton production in the United States is concerned, its expansion occurred with a native-born, although un-free, labour force.

How do slavery and cotton fit into endogenous growth models of the emergence of modern economic growth? Not very well. Allen uses Arkwright and the cotton textile innovations as an example of the importance of research and development in the emergence of nineteenth century technology (Allen, 2009). The story is persuasive, but the benefits of market size and prospects for market penetration do not really play a role. Although cotton textiles became British factory industry par excellence in the nineteenth century, it was small until after Arkwright's innovations. The incentives were not there to concentrate on cotton. Wool would have appeared to have a much higher payoff. Cotton fibre, however, proved easier to manipulate by machine.

Counter-factual: no slavery

Findlay and O'Rourke invited us to consider counter-factuals (p. 339). They

particularly ask "what would have happened to the Lancashire cotton industry if there had not been any British colonies or slavery in the New World." They imply that the effect would have been devastating. Any attempt to answer such a question is inevitably largely speculation but I am sceptical that the absence of slavery would have had a devastating impact on the cotton industry of the Industrial Revolution. Slavery and sugar were very close connected. Sugar technology required large units and concomitant capital resources. An alternative of free white labour would probably have been achievable only at considerably higher cost. We should recall, however, that seventeenth century Barbados initially attracted white indentured servants. For the Lancashire cotton industry, the labour force on the North American mainland was relevant. Slavery there was used for tobacco cultivation in the Chesapeake and for the rice plantations of the lower south. In 1780 there were about 300,000 blacks in the Chesapeake and 200,000 in the lower south (McCusker and Menard, p. 136 and 172). The labour force in tobacco had become predominantly slave during the eighteenth century but there were few economies of scale in tobacco production. The Chesapeake had been an attractive destination for indentured servants through most of its history and it seems likely that the development of the region would have been only slightly retarded in the absence of slavery. The lower south was much less attractive to whites. Here the workforce would undoubtedly have been smaller in the absence of slavery. The population of the cotton producing states of the United States in the nineteenth century arose mainly from natural growth of the population already in place when the United States became independent. A somewhat smaller labour force in 1780 would have generated a smaller subsequent labour force. This would have generated higher cotton prices. This, however, would have increased the attractiveness of

the region to yeomen farmers and labour would have moved to the region. In the absence of slavery, presumably Southern society would have been more attractive to outside labour and migration would have occurred.

Cotton was produced in the antebellum American south on both plantations and on yeomen farms. Plantations appear to have had a cost advantage arising largely from the ability of plantation operators to extract harder labour in unattractive circumstances than free men would have tolerated. Even if the labour force had reached the same level that actually prevailed, cotton output presumably would have been lower since the cost of production would have been higher. What would have been the impact on Lancashire? Modestly smaller output. On British growth? Negligible.

The more interesting but much harder counter-factual question to speculate on relates to the impact of the sugar slave-economy on the underlying dynamics of growth. The rise of commerce and industry that were stimulated in England by the Atlantic economy may have been important in creating the underlying dynamics of technological change that drove modern economic growth. Unfortunately, we have no way to really estimate the magnitude of possible dynamic forces. It is easier to speculate on the effects on trade of the absence of slavery. Certainly the sugar economy would have been smaller but it would hardly have disappeared.

I have already argued that if there was a decisive impact of American trade in differentiating the growth of the British economy from that of her European rivals it lay

in the trade with the mainland colonies. It was the mainland colonies that provided the overseas demand for manufactured goods. I have just speculated that the absence of slavery would probably not have decisively slowed the development of the tobacco colonies. The northern colonies were a key market for British exports. These colonies financed their imports primarily though the sale of goods and services to the sugar colonies. How much different would their development have been in the absence of these slave colonies? Here thinking about there colony's trade in the 'Malthusian' framework that I have already introduced is helpful. If we look at Figure 4 two features seem relevant.

To what extent would the horizontal portion of the foreign exchange supply curve have been affected? It seems almost certain that there would have been an effect if the sugar trade disappeared completely since in historical fact most of the temperate agricultural goods and the maritime services that this horizontal curve represents were sold to the West Indies or in West Indian trade. However, after independence, American shippers were excluded from the British West Indies by the Navigation Acts. They found new trades including the Far East.

The second key element in thinking about the impact of the absence of slavery on British trade is the elasticity of the American demand curve and the extent to which it moved over time. First, the growth of population in the Northern colonies was largely independent of trading opportunities. Between 1700 and 1780 the population of New England increased from just over 90 thousands to over 700 thousand and that of the

middle colonies from just over 50 thousand to over 700 thousand (McCusker and Menard, p. 103 and 203). It seems unlikely that these numbers would have been much different in the face of reduced export markets. New England's population grew exclusively on its natural increase and even lost population to migration to other colonies. The attraction of the middle colonies consisted of good agricultural lands at very low prices. Imports made up only a small part of the colonies' yeoman farmers' consumption. It is likely also that the demand for European goods was relatively price inelastic. If this were true, British sales to the mainland colonies of North America would have been only modestly decreased if the sugar colonies had never existed.

Conclusion: Slavery, the British Atlantic and the Industrial Revolution

Eric Williams was certainly right to bring interaction between industrializing Britain, slavery and the Atlantic economy into the centre of discussion of British change in the eighteenth century. The Atlantic economy provided the focus of expanding and diversifying trade and trade contributed greatly to the expansion of manufacturing. The sugar colonies of the West Indies provided the focus of the Atlantic economy and were fuelled by the trade in African slaves. However, if we believe as Williams did that the Atlantic economy made a central contribution to the subsequent Industrial Revolution; it seems likely that the route through which this contribution came was the trade to the colonies of the northern mainland. Here the story becomes rather more complex. These colonies were not created on the basis of slave-based sugar plantations but primarily as refuges in the New World. They grew rapidly because they had abundant agricultural

land into which the settlers could expand rapidly. This rapidly growing population demanded industrial goods that were imported from Britain. The northern colonies, in turn, financed their imports by sales of agricultural and forest commodities, and crucially, shipping and mercantile services to the West Indies. In this way the entire American trade rested on the slave colonies. However, this statement almost certainly overemphasizes the role of the slave colonies. In the absence of slavery, the northern settlements would have found alternative goods to sell into the Atlantic economy and their growth, and their demand for British manufactures, seems unlikely to have been stifled.

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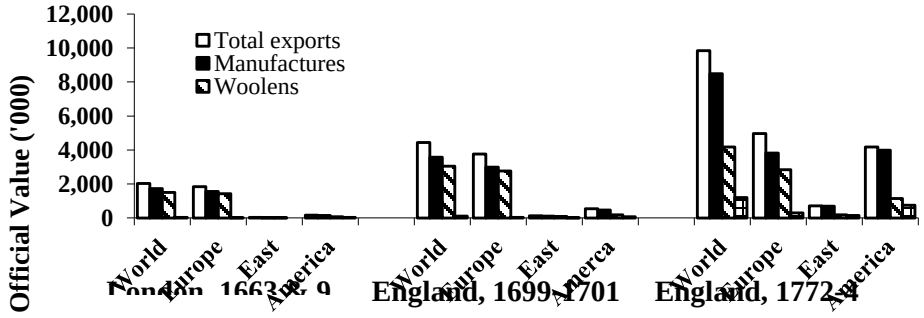
Figure 1: English Exports, 1660s to 1770s



Source: Table 1

Figure 2: Atlantic Economy, Finlay Model

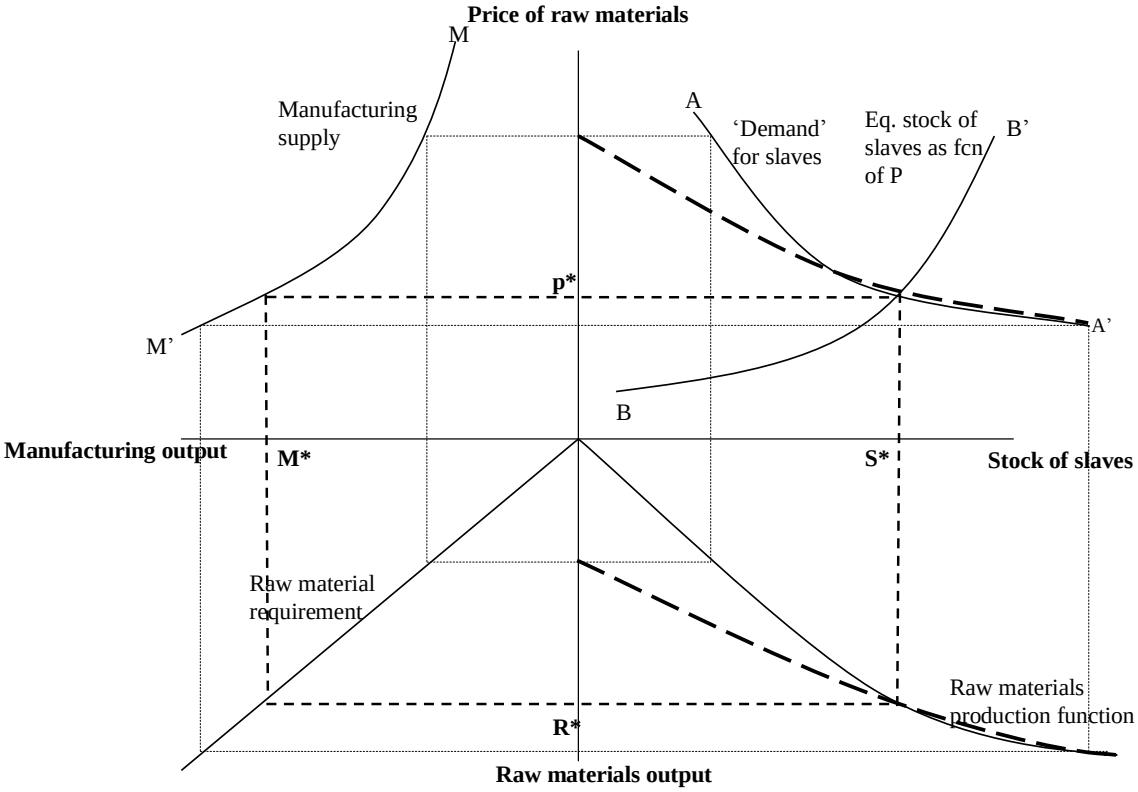


Figure 3: Discovery disequilibrium

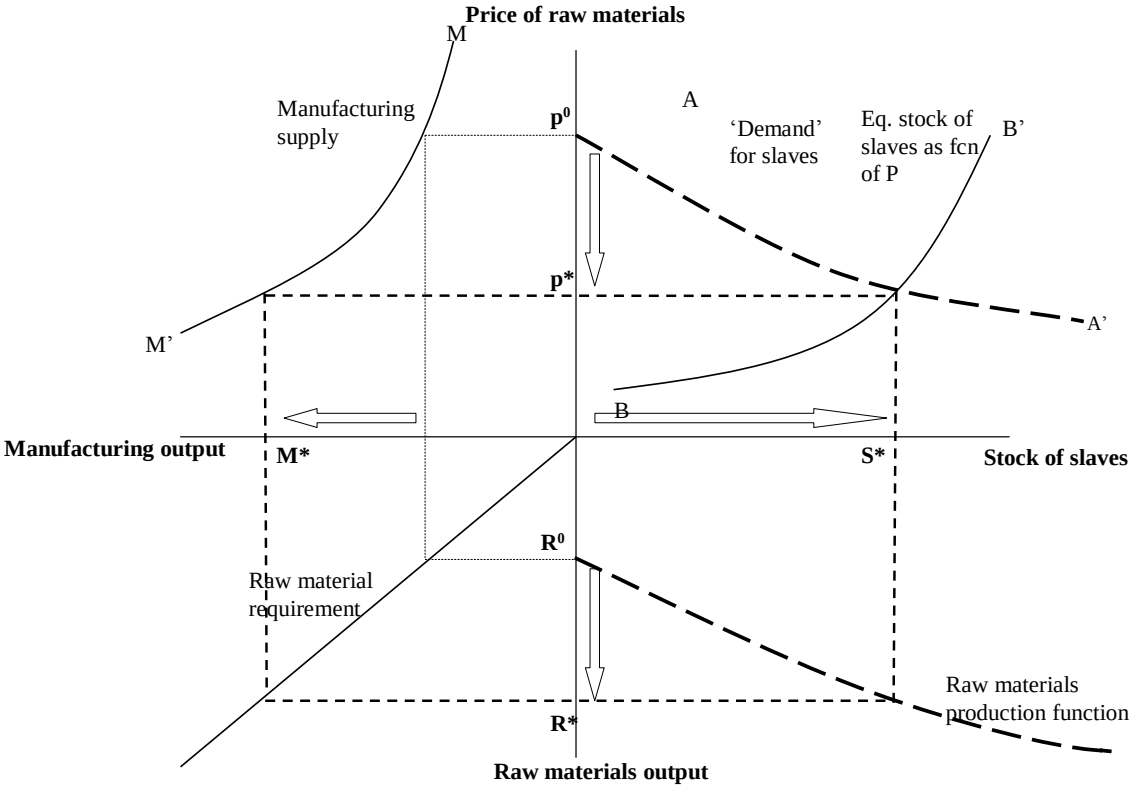


Figure 4: Malthusian colonies' trade

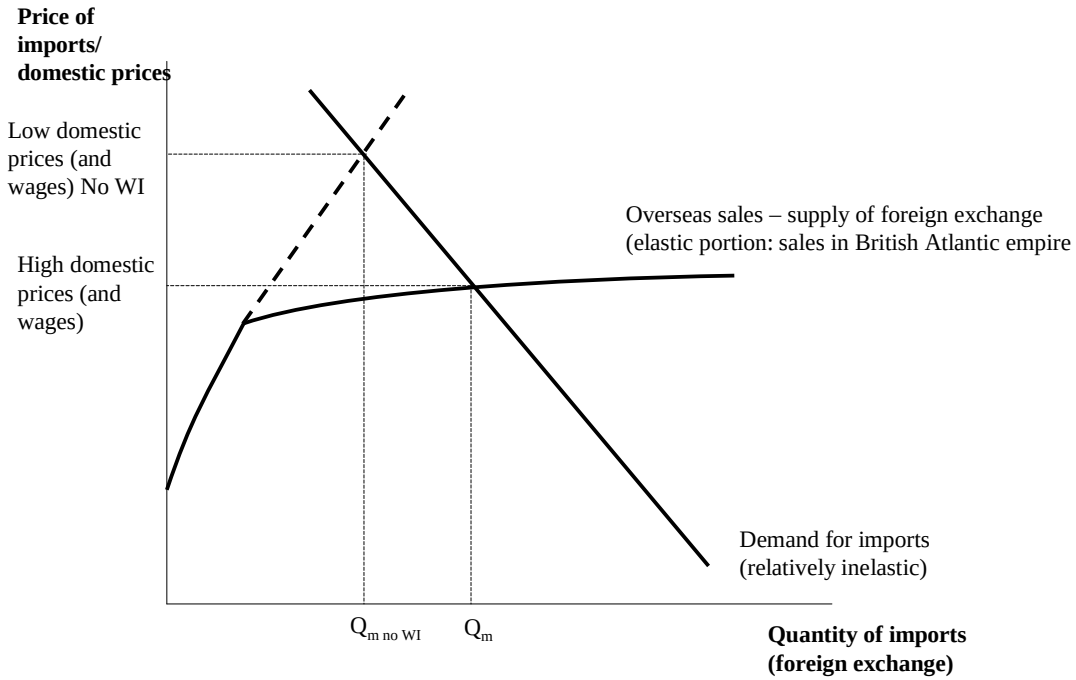


Table 1: English Trade, 1660s to 1770s (£'000)

	1663 & 9 (London only)				1699-1701				1772-4			
	World	**Europe**	**East**	**Americas**	**World**	**Europe**	**East**	**Americas**	**World**	**Europe**	**East**	**Americas**
Exports	**2039**	**1846**	**30**	**163**	**4433**	**3772**	**122**	**539**	**9853**	**4960**	**717**	**4176**
Manufactures	1734	1562	19	153	3583	2997	111	475	8487	3816	690	3981
woolens	1512	1423	19	70	3045	2771	89	185	4186	2849	189	1148
metal	44	15		29	114	31	10	73	1198	295	148	755
Imports	**3495**	**2665**	**409**	**421**	**5849**	**3986**	**756**	**1107**	**12735**	**8122**	**1929**	**2684**
Manufactures	1292	1077	215		1844	1292	552		2157	1364	792	1
Pepper	80		80		103		103		33		33	
Tea	0				8		8		848		848	
Sugar	292	36		256	630			630	2360			2360
Tobacco	70	1		69	249			249	519	1		518
Re-exports					**1986**	**1660**	**14**	**312**	**5818**	**4783**	**63**	**972**
Manufactures					746	491	3	252	1562	959	7	596
Sugar					287	287			429	428		1
Tobacco					422	421	1		904	884	1	19

Source: Davis 1954; 1962.

Table 2: Balance of payments of the New England and Middle Colonies Ave 1768-72

Imports (Table 7.1 p. 115)		
New England	1054	
Middle Colonies	1202	
Combined	2256	
Earnings		% of earnings
Commodity exports all destinations:		
New England	477	53
Middle Colonies	559	69
Combined	1036	60
[Of which to West Indies]		
New England	303	34
Middle Colonies	244	30
Combined	548	32
[Of which to Britain]		
New England	87	10
Middle Colonies	75	9
Combined	162	9
Shipping earnings (Table 7.6, p. 128)		
New England	327	36
Middle Colonies	177	22
Combined	504	29
Other invisibles (Table 7.7 p. 134)		
New England	100	11
Middle Colonies	74	9
Combined	174	10
Total Earnings		
New England	904	
Middle Colonies	810	
	1714	

Source: Shephard and Walton (1972) pp. 115, 128, 134.

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