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WHEN DID GLOBALIZATION BEGIN?

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ABSTRACT

Some world historians attach globalization “big bang” significance to 1492 (Christopher Columbus stumbles on the Americas in search of spices) and 1498 (Vasco da Gama makes an end run around Africa and snatches monopoly rents away from the Arab and Venetian spice traders). Such scholars are on the side of Adam Smith who believed that these were the two most important events in recorded history. Other world historians insist that globalization stretches back even earlier. There is a third view which argues that the world economy was fragmented and completely de-globalized before the 19th century. None of these three competing views has explicitly shown the difference between trade expansion driven by booming demand and supply within the trading economies (e.g., the underlying fundamental, population growth), and trade expansion driven by the integration of markets between trading economies (e.g., the central manifestation of globalization, commodity price convergence). This paper makes that distinction, and then offers two novel empirical tests which allow us to discriminate between these three competing views. Both tests show: there is no evidence supporting the view that the world economy was globally integrated prior to 1492 and/or 1498; there is also no evidence supporting the view that these two dates had the economic impact on the global economy that world historians assign to them; but there is abundant evidence supporting the view that the 19th century contained a very big globalization bang. These tests involve a close look at the connections between factor prices, commodity prices and endowments world wide.

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“The year 1500 marks an important turning point in world history ... The European discoveries made the oceans of the earth into highways for their commerce ...” William H. McNeill 1999, p. 295.

“[T]here was a single global world economy with a worldwide division of labor and multilateral trade from 1500 onward.” Andre Gunder Frank 1998, p. 52.

I. Globalization and World History

Globalization was a defining term of the 1990s. Optimists argued that trade with the third world would keep American inflation low, despite ten years of high U.S growth rates, a belief that helped underpin the great bull market of the Clinton Presidency. Pessimists argued that globalization was boxing the world into a ‘global trap’, increasing inequality and undermining the ability of the state to deal with pressing social problems (Martin and Schumann 1997). While they might have disagreed about everything else, optimists and pessimists seemed to think that modern globalization was unprecedented.

Economic historians know better. Few of us would disagree with the statement that the world economy was in 1913 extremely well-integrated even by late 20th century standards (O’Rourke and Williamson 1999a). World historians have gone much further. They argue that globalization is a phenomenon which stretches back several centuries, or even several millennia. According to Andre Gunder Frank, “there was a single global world economy with a worldwide division of labour and multilateral trade from 1500 onward” (Frank 1998, p. 52), while Jerry Bentley argues that even before 1500, “trade networks reached almost all regions of Eurasia and sub-Saharan Africa and large volumes of commerce encouraged specialization of agricultural and industrial production” (Bentley 1999, p. 7). Some attach globalization “big bang” significance to the dates 1492 (Christopher Columbus stumbles on the Americas in search of spices) and 1498 (Vasco da Gama makes an end run around Africa and snatches monopoly rents away from the Arab and Venetian spice traders), viewing the period after 1500 as inaugurating “a genuinely global epoch of world history” (Bentley 1996, pp.

768-9). Such scholars are on the side of Adam Smith who believed that these were “the two most important events in recorded history” (Tracy 1990, p. 3).

Not all world historians agree. One well-known scholar of the early modern world, James Tracy, expressed his skepticism with the 1490s big bang theory this way: “What remains ... in doubt is the *contemporary impact or significance* of these new configurations of long-distance trade,” and “it is far less clear what meaning the new connections had for those who lived in the sixteenth or even the seventeenth century” (Tracy 1990, pp. 2-3, emphasis added). Many economic historians now “argue that long-distance trade has been overemphasized by students of the early modern period[, that] the international economy was poorly integrated before 1800, [and] that if there was a transport revolution ... it happened ... in the nineteenth century” (Menard 1991, pp. 228 and 272). While Immanuel Wallerstein believes that “(i)t was in the sixteenth century that there came to be a European world-economy based upon the capitalist mode of production” (Wallerstein 1974, p. 67), he also believes that several parts of the world (India, Russia, the Ottoman Empire and West Africa) only became incorporated into this world economy some time between 1750 and 1850, as the trade in luxury goods which had linked these regions to the core was replaced by trade in bulk goods (Wallerstein 1989, Chapter 3).

Others think that globalization was a significant phenomenon long before 1500, including Frank himself (1998, pp. 328-9). Janet Abu-Lughod (1989, p. 8) describes “an international trade economy ... that stretched all the way from northwestern Europe to China” in the century between 1250 and 1350, based on the *pax Mongolica* which transformed Central Asia into “a ‘frictionless medium’ through which trade and exchange moved relatively freely” (Abu-Lughod 1993, p. 286). Frank and Barry Gills go further, arguing that “the existence of the same world system in which we live stretches back at least 5,000 years” (Frank and Gills 1993, p. 3).

So, is globalization 20, 200 or 2000 years old?

II. How to Measure Globalization

This paper looks at just one dimension of globalization, international commodity trade, although it is certainly one which obsesses world historians. The paper brings some empirical evidence to bear on what thus far has been largely a qualitative discussion. Before we do so, we need to define terms: we take globalization to mean the integration of international commodity markets. Figure 1 presents a stylized view of trade between some home country and the rest of the world (the latter denoted by an asterisk). MM is the home import demand function (that is, domestic demand minus domestic supply), with import demand declining as the home market price (p) increases. SS is the foreign export supply function (foreign supply minus foreign demand), with export supply rising as the price abroad (p^*) increases. In the absence of transport costs and trade barriers, international commodity markets would be perfectly integrated: prices would be the same at home and abroad, determined by the intersection of the two schedules. Transport costs and protection drive a wedge (t) between export and import prices: higher tariffs or transport costs increase the wedge while lower tariffs and transport costs reduce it. Commodity market integration, or globalization as we define it here, is represented by a decline in the wedge: falling transport costs or trade barriers lead to falling import prices, rising export prices, commodity price convergence, and an increase in trade volumes.

The fact that trade should rise as transportation costs or trade barriers fall is, of course, the rationale behind using trade volumes or the share of trade (exports, or exports plus imports) in GDP as a proxy for globalization and international commodity market integration. Several authors (e.g. Chase-Dunn, Kawano and Brewer 1999; Hirst and Thompson 1996) have used Angus Maddison's data (e.g. Maddison 1991, 1995) to trace out long-run trends in commodity market integration since the early 19th century. However, Figure 1 makes it clear that globalization is not the only reason why the volume of trade, or trade's share in GDP, may change over time. Outward shifts in either import demand (MM) or export supply (SS) can also lead to trade expansion, and such shifts could occur as a result of population growth, the colonization of empty lands, capital accumulation, technological

change, and a variety of other factors. Alternatively, globalization could coincide with falling trade volumes if MM or SS were shifting inwards over time. Thus, *the only irrefutable evidence that globalization is taking place, on our definition, is a decline in the international dispersion of commodity prices or what we will call commodity price convergence.*

Although it is commodity price convergence that matters, historians rarely look for evidence of such convergence or its absence.¹ They look instead at shipping technologies, port histories, the evolution of trading monopolies, the rise and fall of trade routes, trade volumes and so on. Such evidence may or may not correlate with commodity price convergence, but if growing imports are simply due to population growth, say, then trade is merely responding passively to some internal demographic shock, and there were certainly plenty of demographic shocks driving the pre-industrial economies in Europe, Asia and elsewhere. For globalization to have an independent influence on an economy, two conditions must be fulfilled. First, trade-creating forces must change domestic commodity prices before anything else can happen. Second, the changes in domestic commodity prices must induce a reshuffling of resources between economic activities in order for trade to influence the things that really matter, like the scale of output, the distribution of income (e.g., land rents relative to wages), absolute living standards or the quality of life. This inference follows regardless of how colourful are the tales of explorers, discoverers, sea battles, plunder, pirates, flows of gold, flows of silver, the size of spice trade profits, financial bubbles and financial busts that fill our history books. These are tales about *rent-seeking*, not about the integration of global commodity (or factor) markets. After all, the rise in long distance trade over the three centuries following 1492 could have been driven solely by population growth amongst the trading partners, in which case pro-globalization forces would have had absolutely nothing to do with it.²

¹ One revealing indicator is to look for entries under “prices” in the subject index of well-known world history texts. Here are some partial results: Prakesh (1998), none; McNeill (1999), one to “price revolution”; Curtin (1984), two, one on “administered prices” and another to “price fixing”; and Chaudhuri (1982), none. The examples could be multiplied.

² Population rose by two and a half times in England between 1450 and 1750 (Wrigley 1969, p. 78); it rose in China by 4.6 times between 1400 and 1820 (Maddison 1991, p. 10); and it rose by

Long distance trade between continents developed as transport costs, monopoly, mercantilist intervention, and international conflicts declined. Initially, only goods with very high value to bulk ratios were shipped, like silk, exotic spices and precious metals. The range of goods traded extended over time, but it was not a gradual evolution, but rather a history punctuated by abruptly changing trade regimes. In fact, the six centuries from 1400 to the present trace out three very distinct eras of commodity exchange and specialization. Long distance trade in the pre-18th century period was strictly limited to what might be called non-competing goods: Europe imported spices, silk, sugar and gold, which were not found there at all, or were in very scarce supply; Asia imported silver, linens and woolens, which were not found there at all (with the important exception of Japanese silver before 1668). Dutch exports of precious metals to Asia accounted for between a half and two-thirds of the value of Asian products imported into Europe by the Dutch East India Company (hereafter, VOC: Vereenigde Oostindische Compagnie, established 1602),³ while VOC imports into Europe were dominated by spices, tea, coffee, drugs, perfumes, dye-stuffs, sugar and saltpetre. Indeed these were 84 percent of the VOC import total in 1619/1621, 73 percent in 1698/1700, and still a hefty 64 percent as late as 1778-1780 (Prakesh 1998, Table 4.1, p. 115). Imports into Lisbon from Asia were almost all spices in 1518 (Prakesh 1998, Table 2.2, p. 35). Textiles came to take a larger share of that total, but spices were still 88 percent of Asian imports into Lisbon by 1610 (Prakesh 1998, Table 2.3, p. 36). Even the English East India Company, famous for their gamble to focus on the textile trade from India, had imports heavily weighted by spices and other luxuries: the figure is 43.4 percent in 1668-1670 and 46.5 percent in 1758-1760 (Prakesh 1998, Table 4.2, p. 120). By definition, these non-competing goods were very expensive luxuries in importing markets, and thus could bear the very high cost of transportation from their (cheap) sources. Also by definition, their presence or absence in Europe had no impact on domestic production since they were non-competing. Again by definition, their presence or absence in Europe had an impact only on the living standards of the very

about 33 percent in India between 1600 and 1800 (Habib 1982, p. 167).

³ Findlay (1996, pp. 53-4).

rich who could afford these expensive luxuries: their influence did not trickle down much to the vast majority.⁴

The second era starts in the early 19th century with the rise of trade in “basic” competing goods such as wheat and textiles, preceded by an 18th century transitional phase sprinkled with trade in furs, tobacco and cotton. The 19th century is the classic Heckscher-Ohlin era of spectacular transport cost decline. It is a period of commodity price convergence, when price gaps between trading partners almost evaporated. It is also a century in which these globalization forces had a big income distribution impact on long distance trading partners.

The reference to Eli Heckscher and Bertil Ohlin is, of course, a salute to their famous contribution to international economics for which one of them got a Nobel Prize. These Swedish economists, one a historian and one a theorist, were motivated by late 19th century intercontinental trade, when the regions of recent settlement (as the League of Nations would later call them) shipped ever-increasing quantities of food and raw materials to the capital-abundant and labour-abundant but land-scarce European continent. The key insights of Heckscher and Ohlin were that factor endowment differences were the basis for trade, and that trade could lead to factor price convergence between trading partners (or, Heckscher argued, even factor price equalization). We have argued in previous work that Heckscher and Ohlin were right insofar as the late 19th century was concerned since commodity price convergence did induce some factor price convergence (O’Rourke and Williamson 1994; O’Rourke, Taylor and Williamson 1996; O’Rourke and Williamson 1999a, Chapter 4).

The third era contains the present, decades which have seen trade in both basic and highly differentiated manufactured commodities. The power of the simple trade model is more difficult to identify in this period, characterized as it is by the rising dominance of skills and new technologies, than it is in the previous era of less complicated and more stable technologies during which

⁴ At least, these are our prior expectations, ones which we share with Wallerstein (1989), and which we will make a first stab at testing in Section V.

endowments of land, labour and capital mattered most.⁵ Curiously enough, the period is also one for which relatively little work has been done on trends in international transport costs and commodity price differentials.

When did globalization become sufficiently advanced that it started influencing overall living standards and income distribution, by changing domestic commodity prices and inducing the widespread reallocation of resources within national economies? This paper offers what we think is powerful evidence that these two conditions were not satisfied during the three centuries following 1492 and 1498, but that they did start being satisfied about two centuries ago. We see no evidence documenting significant pre-19th century global price convergence for the (competing) commodities that really mattered to the economic lives of the vast majority. Nor do we see any evidence of significant commodity price convergence even for those (non-competing) commodities that mattered little to the vast majority. The implications for world history are, we think, revisionist and profound.

Sections III and IV review the price evidence which we think establishes the superiority of our dating of global history over that of Andre Gunder Frank and most other world historians. Section V offers the key test of our central proposition: that globalization was sufficiently advanced by the early 19th century to influence domestic factor prices and living standards, but not before. Here we explore almost four centuries of English experience with relative factor prices, commodity prices and factor endowments. We expect to find the terms of trade between agriculture and industry (relative commodity prices) and the wage-rental ratio (relative factor prices) closely tied to the land-labour ratio (relative endowments) prior to the 19th century, while we expect to find far more independence between them after the French Wars and the dismantling of the Corn Laws. If we are right, then the date for big bang theories of global economic history should be the 1820s, not the 1490s. Section VI offers some concluding remarks.

⁵ Crafts and Thomas (1986); Estevadeordal (1997).

III. The First Era: Non-Competing Goods and the Absence of Commodity Price Convergence

North Atlantic Transport Revolutions and Commodity Price Convergence Before 1800?

The best summary we have seen dealing with the evolution of transport costs in the North Atlantic prior to the early 19th century is by Russell Menard (1991). Much of Menard's evidence was taken from James Shepherd and Gary Walton (1972), but these scholars did not deflate their nominal indices as did Menard. In any case, Menard found very little evidence favouring a transport revolution. Of course, our interest is in commodity price convergence, and thus we care less about its sources. Menard's interest was limited to freight costs and the role of productivity advances in transportation in reducing them. Still, Menard's freight cost indices offer very mixed evidence with no unambiguous support either for a pre-18th century transport revolution or for commodity price convergence.

We start with the most negative evidence for the world historians' view, the sugar trade of Barbados and Jamaica, and the rice trade of Charleston, both with England. Menard (1991, Table 6.6, p. 264) documents stability in the peacetime real freight charges on sugar between the 1650s and the 1760s, deflating the nominal charges by the Brown-Hopkins (1981) consumer price index. But if sugar prices in Barbados and Jamaica fell by more than did the CPI in England, the rise in Menard's real freight rate index would be understated and its fall overstated. Apparently sugar prices did fall by more (Mechner 1999, Figure 2.2, p. 58a; McCusker and Menard 1991, Figure 7.1, p. 158). In short, "the sugar trade offers little support for the notion of a ... transport revolution" (Menard 1991, p. 267) in the North Atlantic prior to the 19th century. The North Atlantic rice trade also shows no fall in real freight rates between the 1690s and the 1760s, although it did undergo an impressive decline thereafter (Menard 1991, Table 6.8, pp. 268-9). Once again, if rice prices in Charleston fell by more than did the CPI in England, then this late 18th century decline in freight rates is overstated, an offset that would have been greatly reinforced by rising insurance charges in the more hostile world of the French Wars.

Menard also offers a freight rate index for the wine trade between Bordeaux and London, from the 1290s to the 1660s (Menard 1991, Table 6.1, pp. 241-2). His index rises up to the 1490s, and it remains relatively high and unchanged until the 1550s. No progressive transport revolution here, but rather a transport regression. During the next century, however, the index drops sharply. Yet that big drop is not caused by a fall in nominal freight charges, since they did not fall: nominal freight charges ranged from 20.3 to 40.2 between the 1530s and the 1550s, and from 24 to 37.5 between the 1620s and 1660s. It is the huge surge in the Brown-Hopkins consumer price index between 1550-54 and 1616 that drives down Menard's real freight rate. Here again, why deflate by the English CPI? Since our interest is solely in commodity price convergence, we should deflate the freight rate by the price of wine. Did the price of wine rise less than the CPI, an index that excludes wines entirely and is dominated by grains (Brown and Hopkins 1981, pp. 32-59)? Unfortunately, we have not been able to find wine prices for the early modern period, so we cannot pursue this issue for the crucial half-century 1550-54 to 1616. However, we note that there was absolutely no fall in the real freight index on the wine trade connecting Malaga and London between the 1590s and the 1680s (Menard, 1991, Table 6.10, p. 273), a period when, as we have seen, the wine trade between Bordeaux and London recorded a big fall in transport charges. Which of the nominal freight rate trends on the London wine trade routes should we believe: the fall in the Bordeaux rate or the stability in the Malaga rate?

The best case for a North Atlantic pre-19th century transport revolution lies with the tobacco trade. Between 1618 and 1775, freight charges on tobacco shipments from the Chesapeake to London fell consistently, and by a lot. Adjusted by the Brown-Hopkins CPI, real freight rates fell by 1.6 percent per annum over the entire colonial period (Menard 1991, p. 255). Menard is unimpressed by this fall since it had nothing to do with transport revolutions: almost all of the gains were due to the introduction of standard containers and the more efficient use of cargo space.

We have searched for evidence of transport revolutions affecting the lucrative Newfoundland cod fisheries, but to date have been unable to locate evidence on freight rates or trans-Atlantic commodity price gaps. What we do have is Earl Hamilton's data on dried codfish prices in Andalusia

(1505-49 and 1606-50) and Valencia (1555-1646). Is it the case that real codfish prices were falling in Spain over this period, as might be expected if transport costs connecting New World cod fisheries with European markets were plummeting? Deflating the regional codfish prices by regional price deflators suggests no trend in Andalusia in the first half of the 16th century (Figure 2, from Hamilton (1934), p. 189; Appendix 3); a decline in real Valencian cod prices in the subsequent 50 years (Figure 3, from Hamilton (1934), p. 198; Appendix 4); and a rise in real cod prices in both provinces in the first half of the 17th century (Figure 4, from Hamilton (1934), p. 215; Appendix 5). To obtain consistent series for the entire period (1505-1650) it is necessary to use an average national deflator, and to convert regional prices into silver prices. The resulting evidence in Figure 5 suggests, if anything, an upward trend in Andalusian cod prices over the period. If the first three Valencian observations are excluded in Figure 5, there is no trend in that province between 1555 and 1650.⁶

These data are suggestive but not conclusive. After all, Iberian fishermen dried their fish at home, and so the dried codfish prices collected by Hamilton incorporated a Spanish drying component (Michell 1977, p. 157). Furthermore, the failure of dried cod prices in Europe to fall during the first century and a half following the voyages of Columbus and Cabot could be made consistent with international commodity market integration if import demand was rising relative to export supply.⁷ Nonetheless, the cod price facts are consistent with the failure of trans-Atlantic freight rates to fall significantly during this period.

It seems that the tobacco freight data, with all of the qualifications attached to them, offer the only evidence of trans-Atlantic transport revolutions and commodity price convergence prior to the 19th century.

⁶ Andalusian prices are converted into silver prices using the silver premiums (in terms of vellon) given in Hamilton (1934) on pp. 93, 96; Valencian prices are converted using the premiums on Castilian silver in terms of Valencian silver given on p. 131. The average silver price index is given in his Appendix VIII.

⁷ Indeed, Michell's judgement is that "the total yield of the European fisheries did not expand as fast as the average European rate of population expansion" (Michell 1977, p. 135) during this period.

Transport Revolutions Along Asian Trade Routes Before 1800?

In Joseph Schumpeter's grand vision, major innovations are followed by long periods of minor tinkering, so that costs fall, very fast at first, approaching asymptotically stable levels later. If 1492 and 1498 saw the beginning of a truly global world economy, then we should see plenty of evidence of transport cost declines, commodity price convergence and trade booms along Euro-Asian trade routes in the three centuries that followed. As far as trade booms are concerned, Ralph Davis (1962, p. 17) points out that even by 1663 -- almost two centuries after the alleged big bang of the 1490s -- only a tiny 6 percent of the total tonnage of ships engaged in English external trade was involved with East Asia. Furthermore, there is not much evidence documenting what happened to transport costs along Euro-Asian routes. Nor is there even an active scholarly tradition of seeking that evidence. One impressive exception, however, is a paper by Niels Steensgaard (1965) on Dutch and English freight costs on southeast Asian trade routes between 1601 and 1657.

At the beginning of the 17th century, freight costs on the East India round-trip voyage from Europe were £30-32 per ton, whether carried in a Dutch or an English vessel (Steensgaard 1965, p. 148). By the 1650s, the freight costs on English chartered ships had fallen to £16-23 (Steensgaard 1965, Table 1, p. 152). Surely Steensgaard's evidence points to a big fall in transport costs? After all, it amounts to a 23-50 percent decline over the half century, for an average fall of about 1 percent per annum. It looks as though the 17th century underwent a transport revolution almost as spectacular as the 19th century (a 1.5 percent per annum decline). Looks, however, can be deceiving. The source of the decline "was undoubtedly the reduction in the time that ships were away [and] after 1640 it was appreciably shorter -- not only for chartered ships but for the Company's own ships as well" (Steensgaard 1965, p. 154). Steensgaard is not talking about the duration of the voyage out and the voyage back, both of which remained unchanged, but rather the turnaround time in Southeast Asia. Prior to 1640, these ships were also required to perform protective duties in Asian waters -- to put down local revolts, build forts, show the flag, negotiate agreements and so on. After 1640, chartered ships did not perform these functions, but rather a permanent Asian fleet of smaller VOC ships did.

The cost per ton per trip does not include the cost of the permanent fleet, borne by the East India Company as before, but not directly included as part of the charter cost per ton. When these costs are added back in, our guess is that most of the decline in transport costs over the half century would evaporate.⁸

Ralph Davis (1962, pp. 262-4) and Bal Krishna (1924, pp. 321-3) extend the freight cost evidence from the 1650s to the 1730s. They find that freight costs “were higher in the 1720s and 1730s than they had been in the 1660s and 1670s and they took another step upward in the 1760s, when they return to the levels prevailing in the early seventeenth century” (Menard 1991, p. 250). Figure 6 plots Davis’ data on freight rates for ‘fine’ goods, such as textiles, from 1702-1760. These freight rates, from the Malabar Coast and Bay of Bengal on the one hand, and Bombay and Surat on the other, are deflated by the average prices paid for Bengali and Bombay textiles respectively (Davis 1962, p. 263; Chaudhuri 1978, Tables C.20, C.22). Despite the large-scale trade in textiles between India and Europe during this period, the figures show no sign that textile freight rates were declining during the 18th century.

As far as we can tell, there is absolutely no evidence of any transport revolution along Euro-Asian trade routes during the Age of Commerce.

Commodity Price Convergence in Spices and Textiles Before 1800?

While we have very little evidence documenting the presence or absence of commodity price convergence for basic or competitive commodities prior to 1800, we do have that kind of evidence for three non-competitive commodities -- cloves, coffee and pepper, important evidence when we remember that spices and pepper combined were 68 percent of Dutch homeward cargoes in the mid-17th century (Reid 1993, pp. 288-9). We have enough evidence to compute clove price gaps between

⁸ We say “most” but do not assert “all.” Presumably, the VOC saved on costs by switching to a permanent Asian fleet. In Steengaard’s words, “The extra expense involved in setting up this permanent Asian trading fleet must have been slight compared with the saving achieved by employing the big return ships solely for the purpose for which they were intended” (Steengaard 1965, p. 156).

Amsterdam and Maluku (relative to Maluku in the Southeast Asian archipelago, east of Borneo and Sulawesi, north of Timor); the pepper price gap between Amsterdam and Southeast Asia (in and around Sumatra); and the coffee price gap between Amsterdam and Java or Sumatra (Bulbeck, Reid, Tan and Wu 1998). Figure 7 plots markups for the three commodities, where markups are defined as the ratio of the European to the Asian price. There is plenty of evidence of price convergence for cloves from the 1590s to the 1640s, but it was short-lived, since the spread soared to a 350-year high in the 1660s, maintaining that high level during the VOC monopoly and up to the 1770s. The clove price spread fell steeply at the end of the French Wars, and by the 1820s was one-fourteenth of the 1730s level. This low spread was maintained across the 19th century. Between the 1620s and the 1730s, the pepper price spread showed no trend, after which, however, it soared to a 250-year high in the 1790s. By the 1820s, the pepper price spread of the early 17th century was recovered, and price convergence continued up to the 1880s, when the series ends. While there is some evidence of price convergence for coffee during the half century between the 1730s and the 1780s, everything gained was lost during the French Wars. At the war's end, price convergence resumed, so that the coffee price spread in the 1850s was one-sixth of what it had been in the 1750s, and in the 1930s it was one-thirteenth of what it had been in the 1730s.

These long time series are certainly instructive, but they are limited to Dutch trade in Asia. What about English trade in Asia? Figure 8 reproduces Chaudhuri's mark-up figures for the East India Company's trade in pepper, saltpetre, tea, raw silk, coffee, and indigo, between about 1660 and 1710. With the possible exception of saltpetre, it would be very hard to establish a convincing case that mark-ups were declining during this fifty-year period.

The moral is this: there is no evidence of commodity price convergence for these non-competing goods prior to the 19th century. Of course, the price spread on pepper, cloves, coffee, tea and other non-competing goods was not driven solely, or even mainly, by the costs of shipping, but

rather, and most importantly, by monopoly,⁹ international conflict, and government tariff and non-tariff restrictions. But we are indifferent about the sources of commodity price convergence: anything that impedes price convergence suppresses globalization, and there is no evidence of significant globalization before the 1820s.

Is there any reason to expect the price spread on competing goods between Europe and Asia to have behaved differently? We think it unlikely, especially if the Indian cloth trade is representative. Figure 9 plots the average prices received by the East India Company on its Asian textile sales in Europe, divided by the average prices it paid for those textiles in Asia. Again, there is no sign of declining mark-ups (where mark-ups include all trade costs, as well as any East India Company monopoly profits) over the century between 1664 and 1769.¹⁰ This textile trade was extremely large and it was on the rise. Yet, the evidence on freight rates offered in the previous section and the mark-ups shown in Figure 9 suggest that growing trade volumes in the late 17th century were almost certainly driven by the outward expansion of import demand (probably due to population growth) rather than by world commodity market integration *per se*. If it was globalization at work, we would see evidence of commodity price convergence and thus a long term fall in the mark-ups plotted in Figure 9. Such evidence is completely absent from the figure.

There is plenty of evidence of a trade boom during the Age of Commerce. There is hardly any evidence of globalization. Trade volumes alone tell us little about globalization. World historians who have leapt to the inference that a post-1492 or post-1498 trade boom must imply that globalization was at work seem to have missed this fundamental point entirely. We suspect that a far

⁹ A reading of Douglas Irwin (1991, esp. p. 1297) suggests that pretty much all of the intercontinental trade at this time was by state-chartered monopolies. Like most monopolies, they raised prices paid by consumers (in Europe), lowered prices paid by suppliers (in Asia), restricted output and limited trade. These are hardly ingredients that make globalization flourish!

¹⁰ All import price data come from Chaudhuri's (1978) Table C.24, which also provides data on sales prices and mark-ups from 1664 to 1704. From 1710 to 1759, the sales prices used are those given in Chaudhuri's Table A.13 (p. 302); like the earlier data in Table C.24, these are average prices, but since they are listed in a separate table, we cannot be sure that they are strictly comparable with those earlier figures.

more likely explanation for the trade boom was a growing import demand fuelled by population growth after 1400 or 1450.

IV. The Second Era: 19th Century Transport Revolutions and Commodity Price Convergence

The Amazing 19th Century World-Wide Decline in International Transport Costs¹¹

In the 19th century, international freight rates collapsed, as steamships and the Suez Canal linked continents, and railroads penetrated their interiors. It is important to stress that this 19th century transport revolution was not limited to the Atlantic economy. Certainly the Black Sea and the eastern Mediterranean were part of it: Gelina Harlaftis and Vassilis Kardasis (1999) have shown that the declines in freight rates between 1870 and 1914 were just as dramatic on routes involving Black Sea and Egyptian ports as on those involving Atlantic ports, and perhaps even more so. Asia was a part of it too: the tramp charter rate for shipping rice from Rangoon to Europe, for example, fell from 73.8 to 18.1 percent of the Rangoon price between 1882 and 1914.¹² China and Japan were also involved in this Asian transport revolution. The freight rate on coal (relative to its export price) between Nagasaki and Shanghai fell by 76 percent between 1880 and 1910, and total factor productivity on Japan's tramp freighter routes serving Asia advanced at 2.5 percent per annum in the thirty years between 1879 and 1909 (Yasuba 1978, Tables 1 and 5).

Perhaps the greatest 19th century “globalization shock” in Asia did not involve transport revolutions at all. Under the persuasion of Commodore Perry’s American gun ships, Japan switched from virtual autarky to free trade in 1858. It is hard to imagine a more dramatic switch from closed to open trade policy, even by the standards of the recent Asian miracle. In the fifteen years following 1858, Japan's foreign trade rose from nil to 7 percent of national income (Huber 1971). The prices of

¹¹ This and the next sub-section draw on Chapter 3 of our recent book (O’Rourke and Williamson 1999a, pp. 33-54).

¹² The Asian material that follows draws on Williamson (1999a, 1999c).

(labour-intensive) exportables soared, rising towards world market levels; the prices of (land- and machine-intensive) importables slumped, falling towards world market levels. One researcher estimates that Japan's terms of trade rose by a factor of 3.5 between 1858 and the early 1870s (Huber 1971); another thinks it rose even more, by a factor of 4.9 (Yasuba 1996, p. 548). This combination of declining transport costs and the dramatic switch to free trade unleashed powerful globalization forces in Japan. Other Asian nations – China, Siam, Korea, India and Indonesia -- followed this liberal path, most forced to do so by colonial dominance or gunboat diplomacy. This shift had largely taken place from the 1860s; from then on, commodity price convergence was driven entirely by sharply declining transport costs in Asia without much change in tariffs one way or the other. Asia's commitment to globalization, forced or not, started more than a century ago.

Figure 10 offers a summary of the impact of these productivity improvements on transport costs in the Atlantic economy. What is labelled the North index (North 1958) accelerates its fall after the 1830s, and what is labelled the British index (Harley 1988) is fairly stable up to mid-century before undergoing the same, big fall. The North freight rate index dropped by more than 41 percent, in real terms, between 1870 and 1910, while the British index fell by about 70 percent between 1840 and 1910. These two indices imply a steady decline in Atlantic economy transport costs of about 1.5 percent per annum, for a total of 45 percentage points up to 1913, a big number indeed. There is another way to get a comparative feel for the magnitude of this decline. The World Bank reports that tariffs on manufactures entering developed country markets fell from 40 percent in the late 1940s to 7 percent in the late 1970s, a 33 percentage point decline over thirty years (Wood 1994, p. 173). This spectacular postwar reclamation of “free trade” from interwar autarky was still smaller than the 45 percentage point fall in pre-1914 trade barriers due to transport improvements.

Figure 10 makes another point: the 19th century transport revolution was a spectacular regime switch, occurring some time between 1820 and 1850. At the end of this section, we shall try to place the 19th century big bang in a 20th century perspective, but the evidence presented thus far will suffice to make the following point: if world historians are looking for a globalization big bang, they should

switch their gaze from the 1490s to the 1820s.

19th Century World-Wide Commodity Price Convergence

What was the impact of these transport innovations on the cost of moving goods between markets? The cost has two parts, that due to transport and that due to trade barriers (such as tariffs). The price spread between markets is driven by changes in these costs, and they need not move in the same direction. It turns out that tariffs in the Atlantic economy did not fall from the 1870s to World War I; the globalization which took place in the late 19th century cannot be assigned to more liberal trade policy. Instead, it was falling transport costs which provoked globalization. Indeed, rising tariffs were mainly a defensive response to the competitive winds of market integration as transport costs declined (O'Rourke 1997). As we have seen, the opposite was true of Asia, and, furthermore, there were no offsetting tariff hikes in the eastern Mediterranean either. But we have gotten ahead of the story. What about commodity price convergence?

Trend estimates based on Knick Harley's (1980) annual data show that Liverpool wheat prices exceeded Chicago prices by 57.6 percent in 1870, by 17.8 percent in 1895, and by 15.6 percent in 1912. Both the Liverpool-New York and New York-Chicago price gaps declined steeply (Figure 11), which is consistent with the evidence on freight rates offered earlier. Moreover, these estimates understate the size of the price convergence because they ignore the collapse in price gaps between Midwestern farm-gates and Chicago markets (as well as between Liverpool and inland British consumers). This price convergence experience in Anglo-American wheat markets was repeated for other foodstuffs. The second biggest tradable foodstuff consisted of meat and animal fats such as beef, pork, mutton and butter. While there was no convergence in London-Cincinnati price differentials for bacon across the 1870s, there was convergence after 1879-80. Indeed, the price convergence after 1895 was even more dramatic for meat than it was for wheat: price gaps were 92.5 percent in 1870, over 100 in 1880, 92.3 in 1895, and 17.9 in 1913. The delay in price convergence for meat, butter and cheese has an easy explanation: it required the advances in refrigeration made

towards the end of the century.

Anglo-American price data are also available for many other non-agricultural commodities (O'Rourke and Williamson 1994). The Boston-Manchester cotton textile price gap fell from 13.7 percent in 1870 to about zero in 1913; the Philadelphia-London iron bar price gap fell from 75 to 20.6 percent, while the pig iron price gap fell from 85.2 to 19.3 percent, and the copper price gap fell from 32.7 to almost zero; the Boston-London hides price gap fell from 27.7 to 8.7 percent, while the wool price gap fell from 59.1 to 27.9 percent. Commodity price convergence can also be documented for coal, tin and coffee. Furthermore, similar trends can be documented for price gaps between London and Buenos Aires, Montevideo and Rio de Janeiro (Williamson 1999b).

Transport cost declines from interior to port and from port to Europe also ensured that Asian economies became more integrated into world markets. Price gaps between Britain and Asia were driven down by the completion of the Suez Canal in November 1869, by the switch from sail to steam, and by other productivity advances on long distance sea lanes. The cotton price spread between Liverpool and Bombay fell from 57 percent in 1873 to 20 percent in 1913, and the jute price spread between London and Calcutta fell from 35 to 4 percent (Collins 1996, Table 4). The same events were taking place even farther east, involving Burma and the rest of Southeast Asia. Indeed, the rice price spread between London and Rangoon fell from 93 to 26 percent in the four decades prior to 1913 (Collins 1996, Table 4). These events had a profound impact on the creation of an Asian market for wheat and rice, and, even more, on the creation of a truly global market for grains (Latham and Neal 1983; Brandt 1985; Kang and Cha 1996). Finally, the impact of transport revolutions on commodity price convergence involving the eastern Mediterranean was just as powerful. The price spread on Egyptian cotton in Liverpool and Alexandria markets plunged off a high plateau after the 1860s. The average percentage by which Liverpool exceeded Alexandria price quotes was: 1824-1832 42.1; 1837-1846 63.2; 1863-1867 40.8; 1882-1889 14.7 and 1890-1899 5.3 (Issawi 1966, pp. 447-8).

Much of the evidence on commodity price convergence just reviewed covered the decades

from 1870 to the Great War. What about the half century before? The data are not as abundant, but if they were, they would surely also support commodity price convergence. After all, 1846 dates a major victory for liberalism, the year of Corn Law Repeal in the United Kingdom. It has also been well-established that this move to more liberal trade swept the rest of Europe shortly thereafter (at least up to the 1870s). Although rarely by choice, Asia went through the same liberal wave: Japan emerged from autarchy in 1858; China opened up to trade in 1842 after centuries of isolation; Korea emerged from isolation about the same time; and Siam adopted a 3 percent tariff limit in 1855 (Williamson 1999a). Furthermore, the British Repeal was preceded by two decades of quota and embargo removal and tariff reduction. One estimate has it that the *ad valorem* tariff equivalent on grain in Britain fell from about 73 percent in 1815/27, to about 59 percent in 1828/41, and to about 24 percent in 1842/45, a spectacular move to freer trade even before Repeal (Williamson 1990, p. 128). In short, it seems very clear that the dramatic commodity price convergence in the half century after 1870 had its source in the half century before.

Has the Late 20th Century Globalization Big Bang Been Different?

Table 1 summarizes the 19th century experience with commodity price convergence, but it also adds a crude attempt to quantify the magnitude of the transport revolution over the century or so between 1870 and 1990. Note that there are four Addenda inserted, each offering an estimate of the impact of declining transport costs – restricted to seaborne freight – on the price gap between sending and receiving regions. The “representative” commodity is grain, and the estimated decline in the freight rate index is applied to the initial production cost of grain at the beginning of each period to get an estimate of the percentage points per decade by which the ratio of freight costs to production costs declined. There are many assumptions lurking behind the estimates,¹³ but they confirm the

¹³ One obvious assumption is that the weights are fixed: that is, we take grains like wheat and rice as the representative commodities throughout. Yet grain has declined as a share of total world trade, while manufactures have risen. Manufactures have always had far lower freight cost/

premise that the spectacular pre-World War I decline in transport costs between Europe and the rest of the world slowed down a bit during the 20th century interwar decades, and that transport costs have declined only modestly since 1950. We include this evidence to place 19th century globalization in sharper perspective. During the second great globalization boom between 1950 and 2000, the decline in transport costs has been far more modest than was true of the 19th century. Indeed, in the most careful study of the subject to date, David Hummels (1999) concludes that, while air freight rates have declined rapidly during the late 20th century, ocean freight rates have actually increased.

What made the late 20th century globalization shock different was that it was induced by the undoing of autarkic restrictions created after the Great War. What made the 19th century globalization experience even more impressive was that it saw the dismantling of mercantilism, the establishment of the *Pax Britannica*, and a more dramatic transport revolution.

V. Documenting the Globalization Big Bang Date: What Determined English Factor and Commodity Prices 1565-1936?

If the first great globalization shock hit the world economy in the early 19th century rather than in the late 15th century, then it follows that European commodity prices should have been determined primarily by domestic supply and demand prior to the early 19th century, while they should have been determined by global supply and demand afterwards. Moreover, the distributional implications of international trade should only have begun to manifest themselves some time between Waterloo and the Great War. Here we test this intuition for one economy, Great Britain, which was at the heart of the 19th century global economy and which was thus fully exposed to the effects of growing international trade. Previous work has shown that international commodity price convergence can explain a large proportion of British distributional trends between 1870 and 1914 (O'Rourke and Williamson 1994; O'Rourke, Taylor and Williamson 1996), and that British grain

production cost ratios, and thus the same changes in freight rates are likely to have had a smaller impact on overall commodity price gaps in the 1980s than in the 1880s.

markets were well integrated with those on the European Continent as early as the 1830s (Williamson 1990; O'Rourke 1994). Was this also true of earlier centuries?

To answer this question, we gathered data on British endowments, commodity prices, and factor prices from 1565 to 1936.¹⁴ For these four centuries, we were able to construct: the ratio of agricultural land to the economy-wide labour supply (LANDLAB); the ratio of agricultural prices to industrial prices (PAPM); and the ratio of wage rates to farm land rents (WR1 and WR2, corresponding to two alternative rent series).¹⁵ All variables are expressed in natural logarithms.

How should these variables be related in an economy closed to trade, and how should they be related in an economy open to trade? Imagine a world in which two commodities are produced, food and manufactured goods, and assume that food is produced with land and labour, while manufactures are produced with capital and labour. In a closed economy without trade, increases in land-labour ratios should lead to a decline in relative agricultural prices, as the relative supply of food increases, and to an increase in the wage-rental ratio: commodity prices and factor prices should both be determined by endowments (as well as technology and demand). Moreover, if Malthus was right then a technology-induced rise in the real wage should induce an increase in the labour force, and a reduction in the land-labour ratio. Thus, we might also observe factor and commodity prices having an impact on endowments in a closed economy. As commodity prices at home become increasingly dependent on foreign markets as an economy opens up to trade, factor prices, like the rents for farmland and the wages for labour, should be determined more and more by world commodity prices and less and less by domestic endowments, like land and labour. Rising land-labour ratios will still raise wage-rental ratios in an open economy,¹⁶ but increases in the relative price of food, which is

¹⁴ In future work, we plan to extend the English data back to 1500 and to explore French experience between 1450 and 1940.

¹⁵ We emphasize the results obtained with WR1 in the text. The results using WR2 were similar, and are reported in subsequent footnotes. It turns out that the debate over whose early modern rental series is closest to the truth is irrelevant to the empirical findings of this essay.

¹⁶ At least this will be true in the specific factors model, outlined above.

now an exogenous variable, will have an independent, depressing effect on the wage-rental ratio. Land-labour ratios might still depend on wages and prices through some sluggish Malthusian mechanism, or through more responsive international migration flows.

If we are correct in our assertion that sustained and significant globalization only began in the early 19th century, rather than in the 16th century or earlier as so many world historians believe, then the autarkic model should fit the pre-19th century facts, while the open economy model should fit the 19th and 20th century facts. That is, we should be able to see what economists call a regime switch somewhere around the 1820s. Furthermore, in order to justify the globalization big bang or watershed label, the econometric evidence should be absolutely unambiguous. If instead the world historian is right, then the open economy model should fit the pre-19th century facts too. To determine which prediction wins, we split the data into two parts: 1565-1828 and 1828-1936. We chose 1828 as the break point since that year saw a radical liberalization of British commercial policy, and Britain stuck to that liberal policy up to the 1846 Repeal and beyond. Prior to 1828, grain imports were prohibited if domestic prices fell below a certain ‘port-closing’ level, and during the early postwar years grain imports were effectively excluded much of the time. In 1828, the Duke of Wellington’s government replaced these import restrictions with tariffs which varied with the domestic price: this not only lowered British grain prices but increased the integration of British and Continental grain markets (Williamson 1990). Moreover, this adoption of the sliding scale tariff came at the end of a decade which had seen several other moves towards freer trade: a reform of the Navigation Acts in 1822; tariff reductions across the board; and the repeal of more than 1,100 tariff acts in 1825. Of course, prior to 1815, the French Wars effectively served to block commodity trade.

Figures 12A and 12B plot the raw data, and they show that the 1820s do indeed mark a watershed in British economic history. Prior to the 1820s, the relative price of agricultural commodities (PAPM) rose steadily, while the wage-rental ratio (WR) fell steadily. After the 1820s, the wage-rental ratio rose steadily, while from the 1840s onwards the relative price of agricultural goods stopped increasing and, eventually, started falling in response to cheap food imports from

Russia and the New World. The reversal in distributional trends is striking. It certainly does look as though a regime switch took place in which wage-rental ratios were first determined mostly by domestic endowments (and thus declined, as land-labour ratios fell at home) to one in which wage-rental ratios were determined mostly by booming trade with more land-abundant economies (and thus rose, despite the fact that land-labour ratios at home kept falling). But can we show with econometrics that the closed economy model fits the facts prior to the 1820s, but that the open economy model is the relevant one thereafter?

Table 2 reports correlation coefficients between our three variables in each of the two periods, and they are certainly consistent with our hypotheses. In the earlier period, the land-labour ratio was strongly and positively correlated with the wage-rental ratio (0.889), and strongly and negatively correlated with the relative price of agricultural goods (-0.956), precisely as closed economy theory suggests. In the later period, prices and endowments are uncorrelated, as they should be in an open economy; what is now a negative correlation between endowments and wage-rental ratios (-0.859) seems puzzling, a bit of unexpected over-kill in favour of our hypothesis, driven, we suppose, by omitted factors.¹⁷

In a background paper, we estimate VARs incorporating these three variables, as well as a time trend, for each of the two subperiods.¹⁸ The results were consistent with the closed economy prediction that endowments were driving commodity and factor prices prior to the early 19th century. In the later period, none of these variables were significantly related to each other, indicating that the earlier relationships had broken down. These VARs were then used to perform Granger-causality tests among the variables. The most important hypothesis tested concerned the impact of endowments

¹⁷ As we shall see, this result is driven primarily by time trends in the data, and by the increasing impact of capital-labour ratios on income distribution. Table 2 reports results using the WR1 wage-rental estimate. Its replacement by WR2, however, does not seem to matter to our results. In the earlier period, the correlation between WR2 and LANDLAB is 0.907, while in the later period it is -0.799. The correlation between PAPM and WR2 is -0.864 in the earlier period, and -0.361 in the later period.

¹⁸ O'Rourke and Williamson (1999b). All econometric exercises described below were performed using Eviews 3.

on prices, and it was confirmed: endowments Granger-caused prices in the earlier period, but not in the later, regardless of the number of lags used.

All variables appeared to be integrated of order one, and we next proceeded to see if there were cointegrating relationships linking them. We first estimated these relationships directly, using OLS methods. Table 3 reports the estimates which would obtain in a closed economy, in which both commodity and factor prices were driven by endowments. The results for the pre-1828 period indicate an elasticity of prices with respect to (hereafter w.r.t.) endowments of -0.882 [equation (1)], and an elasticity of wage-rental ratios w.r.t. endowments of 0.907 [equation (3)]. Unfortunately, when the residuals from these equations were inspected, the hypothesis that the series contained a unit root could not be rejected (albeit by a narrow margin). In the case of prices, this failure may have been due to the impact of the Napoleonic Wars; when the relationship was re-estimated for the sub-period 1565-1800, the elasticity of prices w.r.t. endowments was -0.866 [Table 3, equation (2)], and the Engle-Granger procedure shows PAPM and LANDLAB to have been cointegrated. For the 1828-1936 period, simple OLS regressions show no relationship at all between prices and endowments, consistent with our predictions [equation (4)], while wage-rental ratios are now negatively related to endowments [equation (5)]. Clearly, the structure of the economy was *very* different after 1828 than before: while the closed economy model fits the facts very well prior to 1828, it fits them very badly thereafter.

The wage-rental ratio should be a function of endowments, technology and prices in an open economy, with prices being exogenous. In the 16th, 17th and even 18th centuries, land and labour were the most important factors of production, but by the 19th century capital began to add its impact on economy-wide wages, eventually dominating land in importance. Any post-1828 equation expressing wage-rental ratios as a function of land-labour ratios and commodity prices without in addition including capital-labour ratios and technology would be mis-specified.¹⁹ Since capital-intensity and

¹⁹ O'Rourke, Taylor and Williamson (1996). Technology, as proxied by the Solow residual, was found in our 1996 paper to be positively related to the wage-rental ratio in Europe, suggesting that technological change was indeed labour-using, as economic historians had previously suggested.

total factor productivity were both trending up during the 19th and 20th centuries, we estimated the following equation (all variables are in logarithms):

$$WR = a_1 + a_2LANDLAB + a_3PAPM + a_4trend \quad (1)$$

where the trend term is a proxy for the combined impact of capital deepening and technological change. The results for both periods are given in Table 4. They show that the open economy model fits the post-1828 facts extremely well, but that it fits the pre-1828 facts extremely poorly (prices have the wrong sign in the regression). Table 4 also shows that there was a dramatic switch in the impact of capital-deepening and technical change on the wage-rental ratio after 1828. Moreover, when the residuals from the post-1828 regression were examined, the null hypothesis of a unit root in the series was rejected at the 1 percent confidence level, indicating that the estimated equation constituted a cointegrating relationship between the variables.²⁰

We conclude that there is very strong evidence for our contention that the closed economy model fits the facts before 1828 but not afterwards, while the open economy model fits the facts after 1828 but not before. If the world historian is looking for a globalization big bang, she will find it in the 1820s, not in the 1490s.

VI. Political Economy Evidence and Concluding Remarks

We do not deny the long-run importance of the Voyages of Discovery to world economic history. After all, it generated a transfer of technology, plants, animals and diseases on an enormous scale, never seen before or since. But the immediate impact of Columbus and da Gama on trade and globalization is another matter. For the economic implications of the Voyages of Discovery to be fully realized required the peopling of frontiers and the application of European capital to those frontiers. But, more importantly, it also required the breakdown of monopolies controlling long

²⁰ When WR2 is used, the coefficients are very similar to those in Table 4, equation (2); however, the residuals from this equation narrowly fail the Engle-Granger cointegration test.

distance trade, and a technological revolution making possible the movement of bulk commodities between continents so much more cheaply that domestic prices, and domestic resource allocation, were significantly affected by international trade. It is our contention that these fundamental conditions were not satisfied prior to the early 19th century. They were satisfied after the early 19th century.

Pre-industrial trade was sufficiently expensive that only luxury goods were traded in large amounts between continents. Although as economists we are using different language than Immanuel Wallerstein, we agree with his assertion that a region is not fully incorporated into some global economy if trade between it and the rest of the world is dominated by luxury goods (Wallerstein 1989, Chapter 3). Standard Heckscher-Ohlin trade theory, used so commonly by economists, suggests that if globalization does not affect wage/rental ratios, relative returns to sector-specific capital and other income distribution measures, then it cannot have a significant impact on the structure of production or on economic welfare. By this standard, the results in Section V suggest that the 19th century international economy was globalized in a way which the world economy of earlier centuries simply never was.

Our priors were that we would arrive at such results because pre-19th century trade was overwhelmingly in 'non-competing' goods. But the data presented in Section III suggest that there is a second reason for our results: even for non-competing goods, there is no convincing evidence of a widespread transport revolution before 1800, or of any inter-continental commodity price convergence. This poses an even more severe challenge for those who stress the continuity of the globalization process over the past 500 years: the price data suggest a dramatic discontinuity in the early decades of the 19th century, associated with steamships, railroads, the demise of mercantilism, the rise of trade liberalisation and the disappearance of trading monopolies. There was little or no price convergence beforehand, but there was spectacular price convergence afterwards.

There is important qualitative evidence coming from another source which supports our view that it was only after the early 19th century that globalization really took off. If globalization is strong

enough to have a potent effect on income distribution, then we should see intensive political battles over trade policy. As is well known, trade had a large impact on domestic politics in the 19th century, and the divisions to which it gave rise can largely be understood by Heckscher-Ohlin thinking, as Ronald Rogowski (1989) and others have shown so convincingly. Thus, free-trading slave and land owners in the cotton South opposed capitalists in the industrial North in the ante-bellum United States, free-trading labour and capital opposed protectionist landowners in mid-century Britain, and protectionist coalitions of land and capital opposed labour in Germany after 1879. The fact that trade policy frequently gave rise to major political debates, and that those debates seemed to evolve along class lines, is in itself powerful evidence of significant 19th century globalization. The Heckscher-Ohlin model suggests that trade produces losers as well as winners, and by the end of the 19th century many of those losers were able to gain protection from accommodating legislators. History shows that globalization backlash could sometimes be quite significant.²¹

The politics of trade were very different before 1800 when conflicts were far more likely to erupt between nations rather than within nations. Again, this is consistent with the hypothesis of a globalization big bang occurring only in the early 19th century. If trade had no large distributional effects within domestic economies, then the various classes in society had no great incentive to lobby for protection or free trade. If trade was still largely characterized by monopoly rents, then the key political question for (mercantilist) statesmen was who would get those rents, their own monopolists, or those of other nations.²² Thus, to take the best known example, the 16th and 17th centuries saw violent conflict over who would control the South East Asian spice trade. But a world in which monopoly rents, mercantilist intervention, and better warships played such an important part in inter-continental trade was not a world whose economy would be considered globalized by today's

²¹ See, for example, O'Rourke (1997) on European grain tariffs and Williamson (1997) on New World manufacturing protection and immigration restrictions. What remains to be written is a comparative history of the political economy of globalization backlash in Latin America, the Mediterranean and Asia, an agenda that might be called "dealing with de-industrialization."

²² This topic -- mercantilism -- was, of course, explored at length by Heckscher (1931). More recently, its monopolistic and rent-seeking attributes have been explored by Douglas Irwin (1991).

standards.

Globalization did not begin 5000 years ago, or even 500 years ago. It began in the early 19th century. In that sense, it is a very modern phenomenon.

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Table 1
Global Transport Cost Changes
and Commodity Price Convergence Indicators 1870-1990

1. The Big Bang Era Before World War I

The Greater Atlantic Economy

A. Transport Declines

American export routes, deflated freight cost	1869/71-1908/10	100 to 55
American east coast routes, deflated freight cost	1869-71-1911/13	100 to 55
<u>Addendum: freight cost/wheat price</u>		<u>41 to 22.6% or 4.6% pts per decade</u>
British tramp, deflated freight cost	1869/71-1911/13	100 to 78

B. Commodity Price Convergence

Liverpool vs Chicago, wheat price gap	1870-1912	58 to 16%
London vs Cincinnati, bacon price gap	1870-1913	93 to 18%
Philadelphia vs London, pig iron price gap	1870-1913	85 to 19%
London vs Boston, wool price gap	1870-1913	59 to 28%
London vs Buenos Aires, hides price gap	1870-1913	28 to 9%

The Third World

A. Transport Declines

Rangoon to Europe, freight costs/rice price	1882-1914	74 to 18%
<u>Addendum: freight cost/rice price</u>		<u>74 to 18% or 18.7% pts per decade</u>
Java to Amsterdam, freight costs on sugar	1870-1914	100 to 40 or 50
Nagasaki to Shanghai, freight costs on coal	1880-1910	100 to 24

B. Commodity Price Convergence

Liverpool vs Odessa, wheat price gap	1870-1906	40 to 2%
Liverpool vs Bombay, cotton price gap	1873-1913	57 to 20%
London vs Calcutta, jute price gap	1873-1913	35 to 4%
London vs Rangoon, rice price gap	1873-1913	93 to 26%
Liverpool vs Alexandria, cotton price gap	1837/46-1890/99	63 to 5%

2. The Slow Down to Steady State Era 1920-1990

A. Transport Costs

World Bank deflated ocean freight cost index	1920-1940	100 to 68
<u>Addendum: freight costs/wheat price</u>		<u>27.5 to 18.7% or 4.4% pts per decade</u>
World Bank deflated ocean freight cost index	1950-1990	100 to 76
<u>Addendum: freight costs/wheat price</u>		<u>18.7 to 14.2% or 1.1% pts per decade</u>

Notes: In the addenda, the freight cost/wheat price bases, to which the changing freight cost index is applied. See Williamson (1999c, Table 1).

Table 2. Correlation Coefficients, 1565-1936

Panel A. 1565-1828			
	PAPM	WR	LANDLAB
PAPM	1.000	-0.829	-0.956
WR	-0.829	1.000	0.889
LANDLAB	-0.956	0.889	1.000

Panel B. 1828-1936			
	PAPM	WR	LANDLAB
PAPM	1	-0.34	0.058
WR	-0.34	1	-0.859
LANDLAB	0.058	-0.859	1

Source: see text.

**Table 3. Closed-Economy Theory:
The Determinants of Commodity and Factor Prices, 1565-1936**

	(1)	(2)	(3)	(4)	(5)
L.H.S. variable	PAPM	PAPM	WR1	PAPM	WR1
Time period	1565-1828	1565-1800	1565-1828	1828-1936	1828-1936
C	9.152 (85.722)	9.048 (59.158)	-1.153 (-6.234)	4.545 (33.606)	9.148 (33.857)
LANDLAB	-0.882 (-52.921)	-0.866 (-36.680)	0.907 (31.422)	0.017 (0.598)	-0.973 (-17.390)
R-squared	0.914	0.852	0.790	0.003	0.739
Adjusted R-squared	0.914	0.851	0.789	-0.006	0.736
S.E. of regression	0.081	0.076	0.140	0.111	0.222
Sum squared resid	1.708	1.335	5.128	1.327	5.295
Log likelihood	290.753	275.775	145.631	85.615	10.172
Durbin-Watson stat	0.268	0.022	0.116	0.267	0.103
Mean dependent var	3.508	3.441	4.653	4.625	4.464
S.D. dependent var	0.276	0.196	0.305	0.111	0.433
Akaike info criterion	-2.188	-2.320	-1.088	-1.534	-0.150
Schwarz criterion	-2.160	-2.291	-1.061	-1.485	-0.101
F-statistic	2800.645	1345.412	987.336	0.358	302.421
Prob(F-statistic)	0.000	0.000	0.000	0.551	0.000
Included observations	264	236	264	109	109

Source: see text.

**Table 4. Open-Economy Theory:
The Determinants of the Wage-Rental Ratio, 1565-1936**

	(1)	(2)
Time period	1565-1828	1828-1936
C	0.053 (0.047)	-4.500 (-1.691)
LANDLAB	0.666 (5.481)	1.013 (3.706)
PAPM	0.158 (1.560)	-0.770 (-5.496)
@TREND(1565)	-0.002 (-6.092)	0.024 (7.268)
R-squared	0.821	0.882
Adjusted R-squared	0.819	0.879
S.E. of regression	0.130	0.151
Sum squared resid	4.372	2.384
Log likelihood	166.686	53.659
Durbin-Watson stat	0.134	0.321
Mean dependent var	4.653	4.464
S.D. dependent var	0.305	0.433
Akaike info criterion	-1.232	-0.911
Schwarz criterion	-1.178	-0.812
F-statistic	398.067	262.437
Prob(F-statistic)	0.000	0.000
Included observations	264	109

Source: see text.

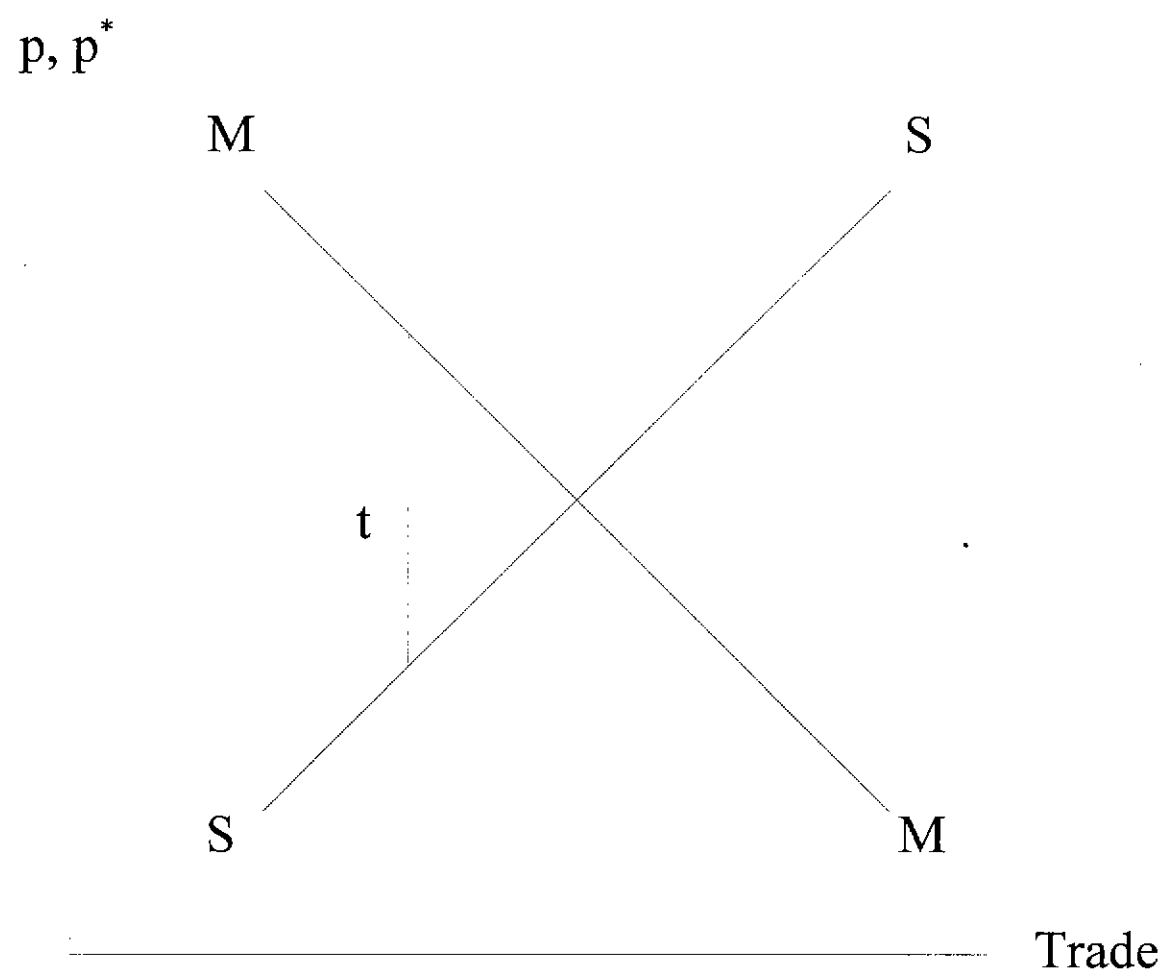


Figure 1

Figure 2. Real dried cod prices
Andalusia, 1505-1549

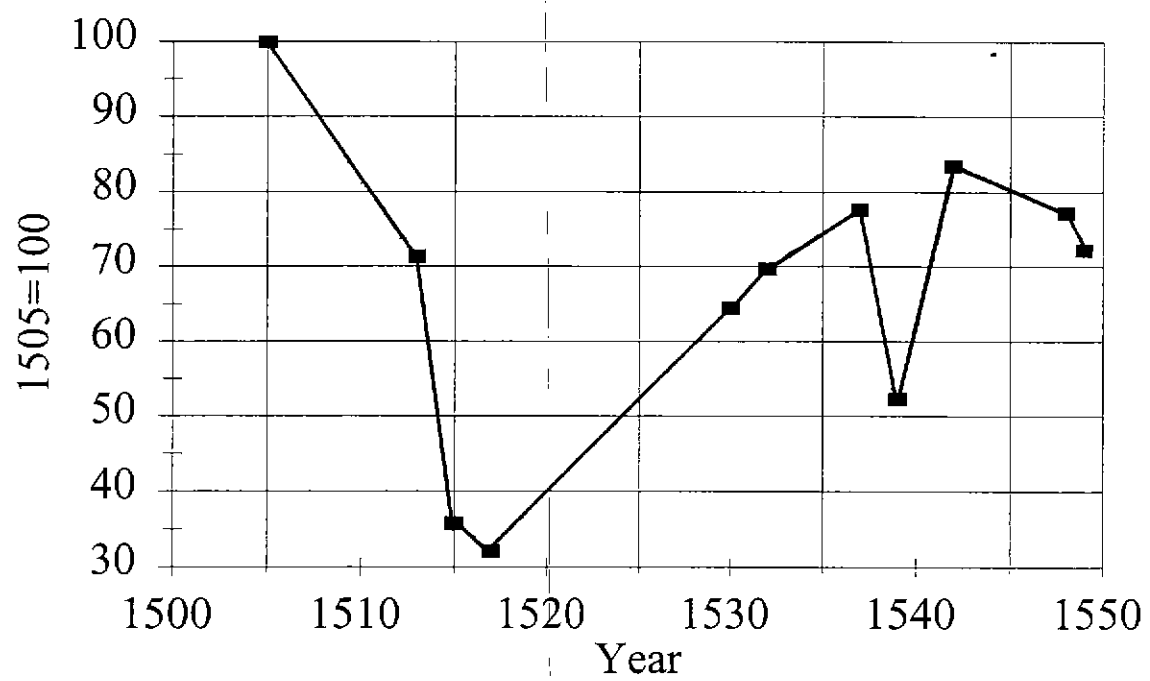


Figure 3. Real dried cod prices
Valencia, 1555-1598

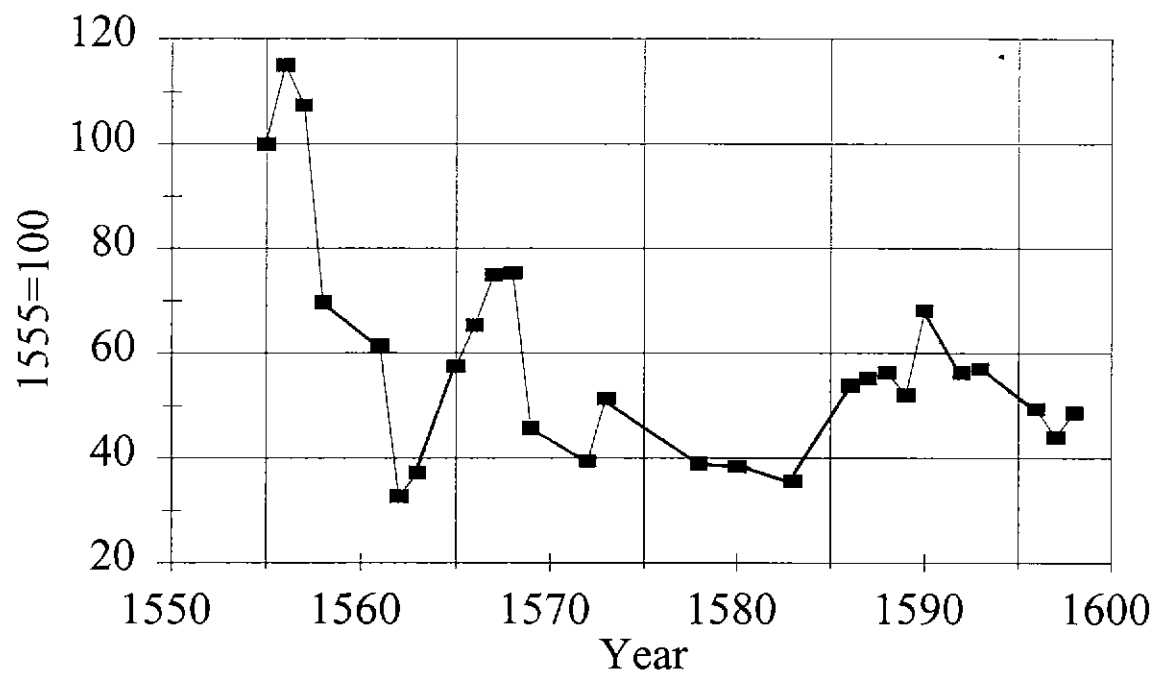


Figure 4. Real dried cod prices
Spain, 1601-1650

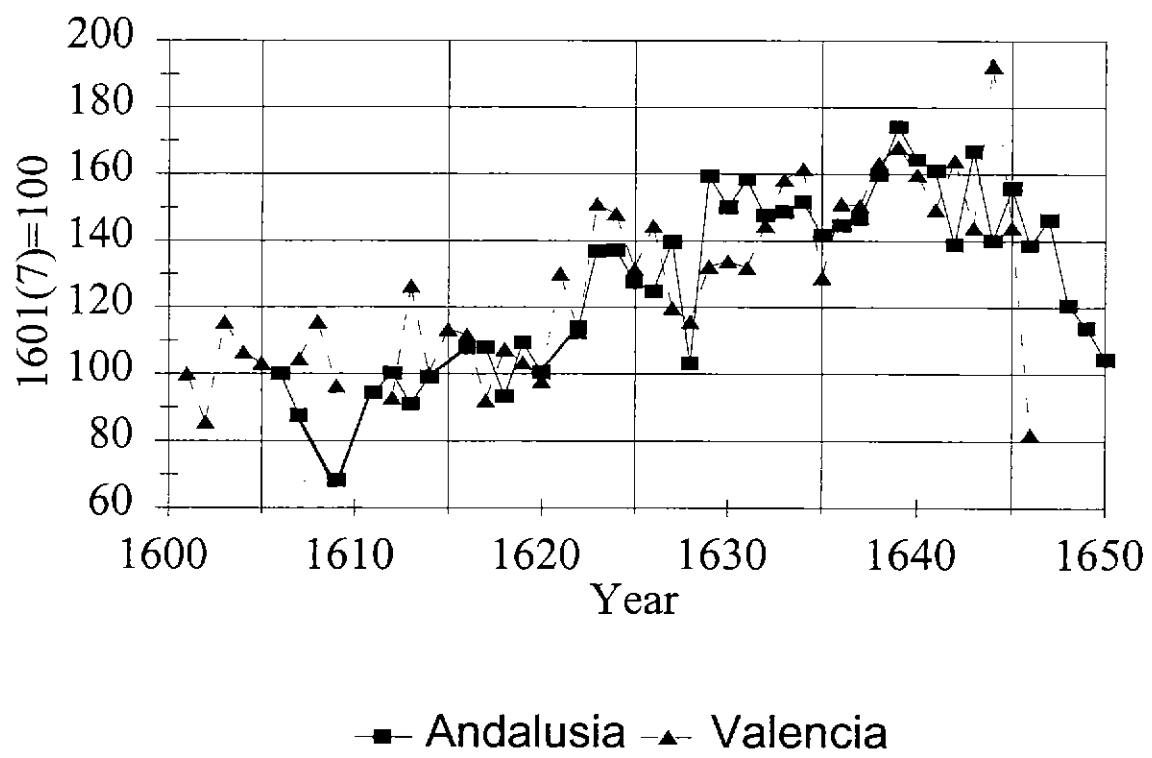


Figure 5. Real dried cod prices
Spain, 1505-1650

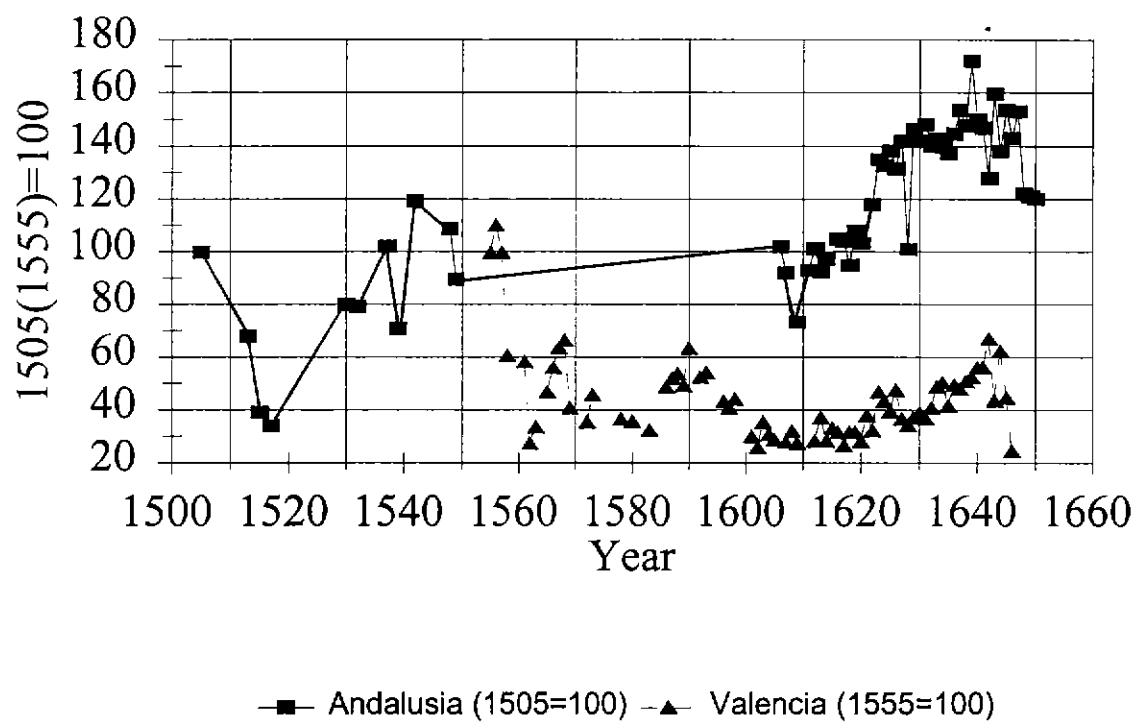
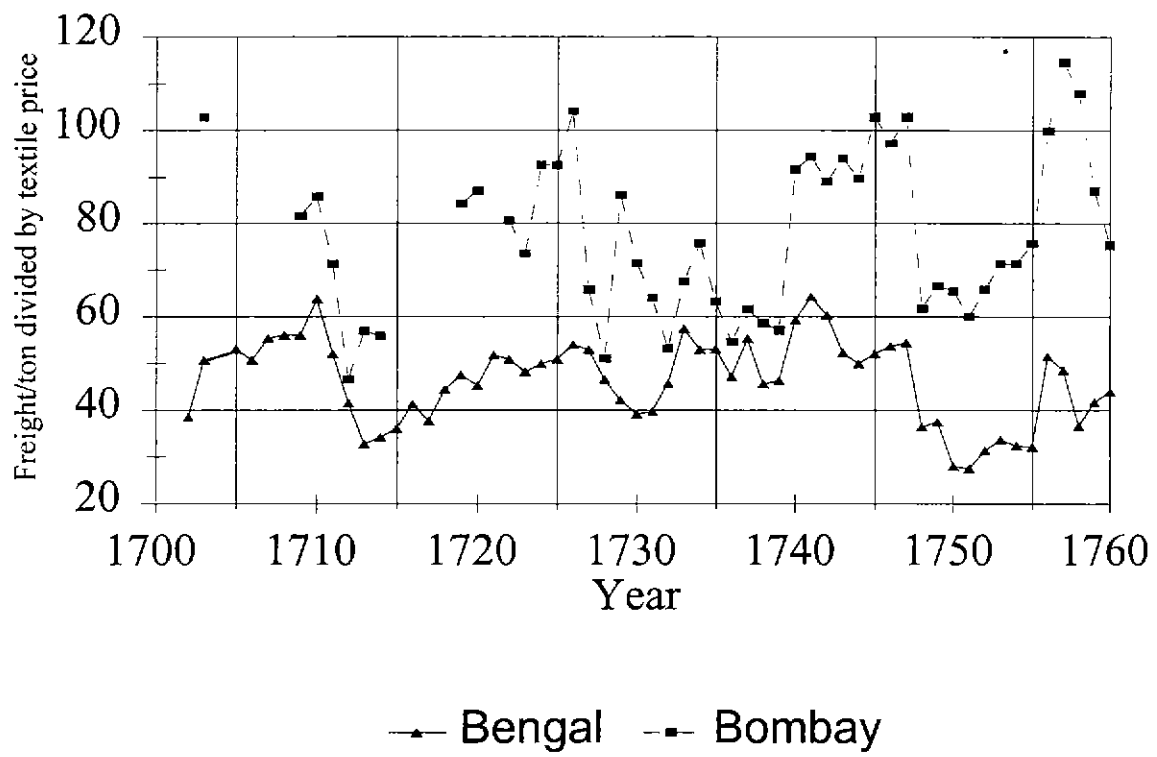


Figure 6. Real textile freight rates
India, 1702-1760



**Figure 7. Spice and coffee markups:
Amsterdam vs. Southeast Asia 1580-1939**

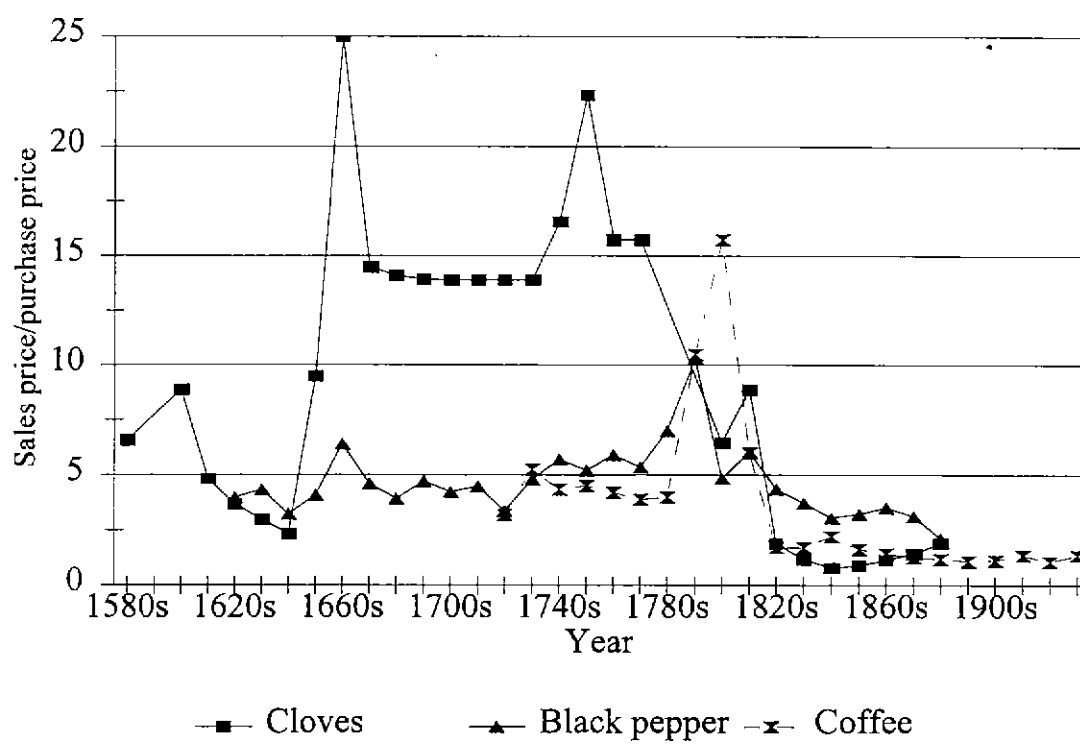
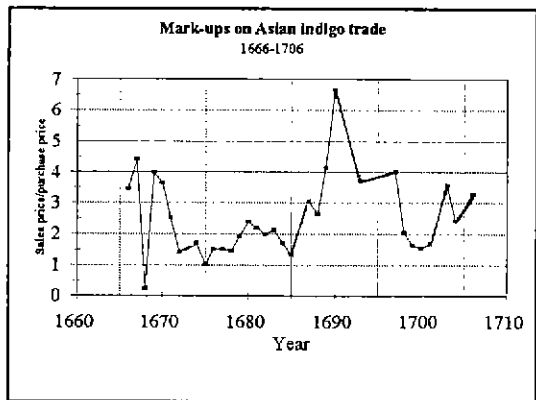
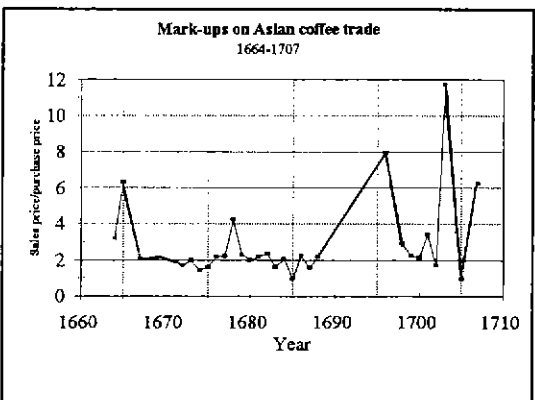
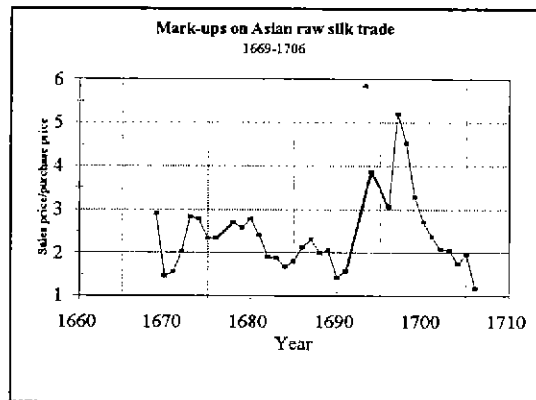
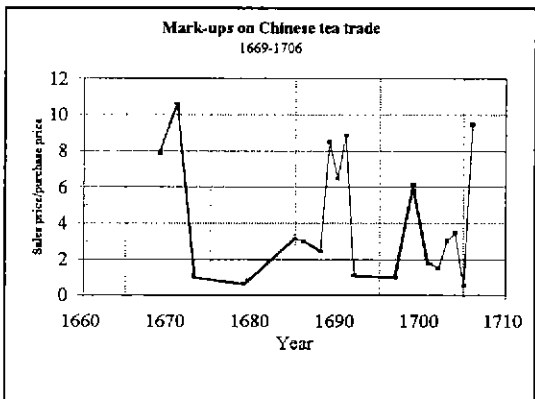
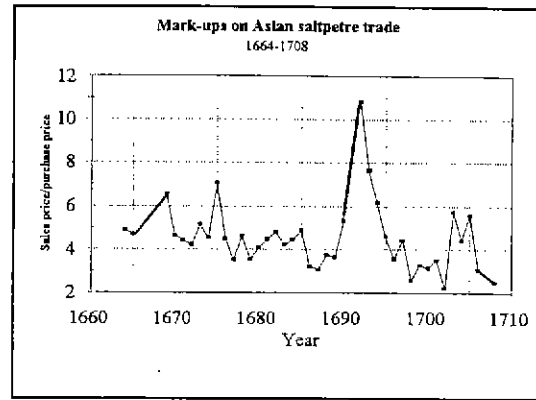
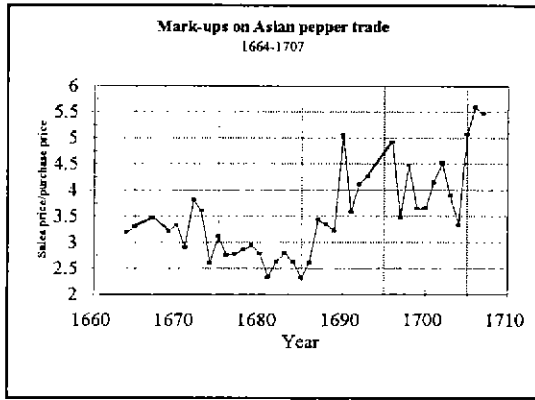


Figure 8. British-Asian Markups on 6 Non-Competing Goods



Source: Chaudhuri (1978).

Figure 9. Asian textile trade markups
1664-1759

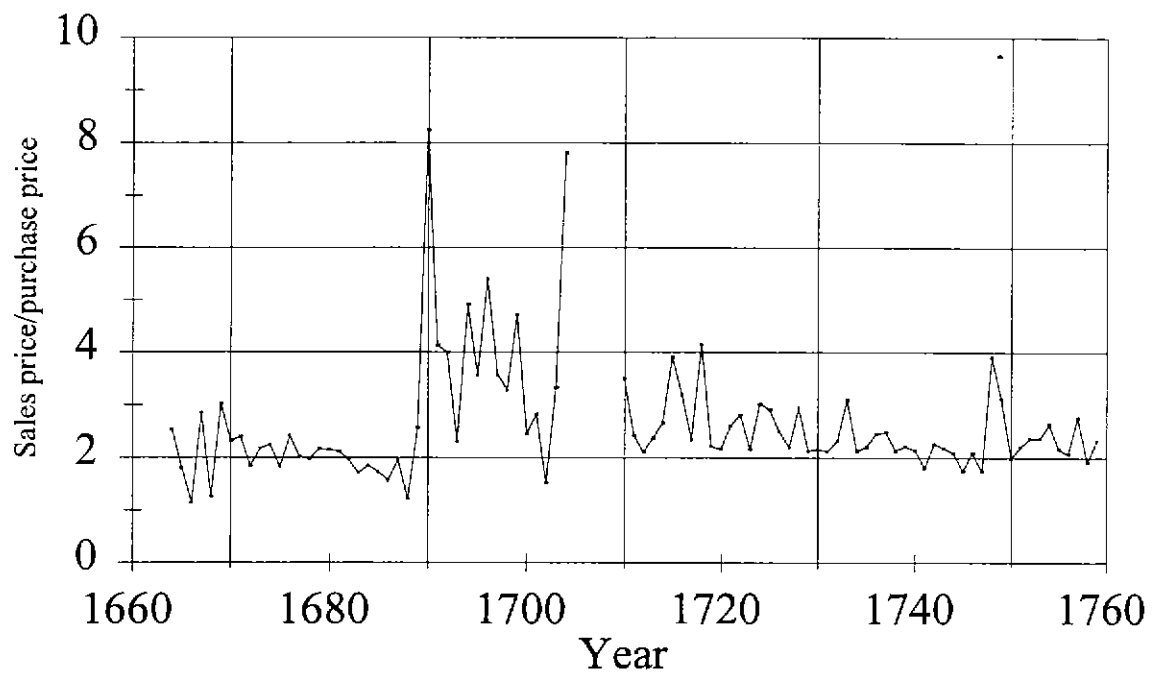
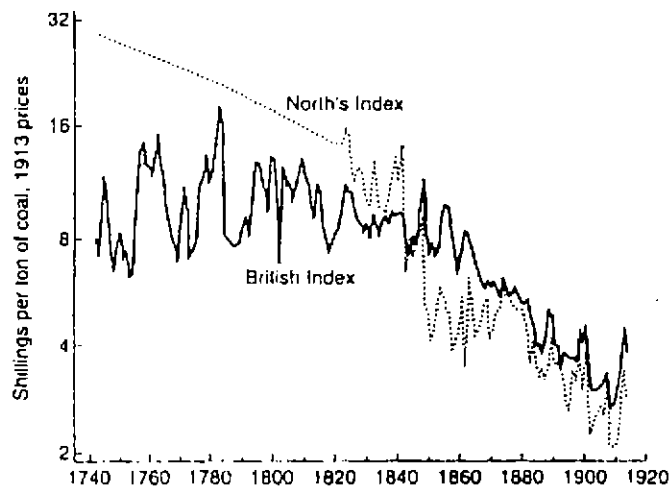
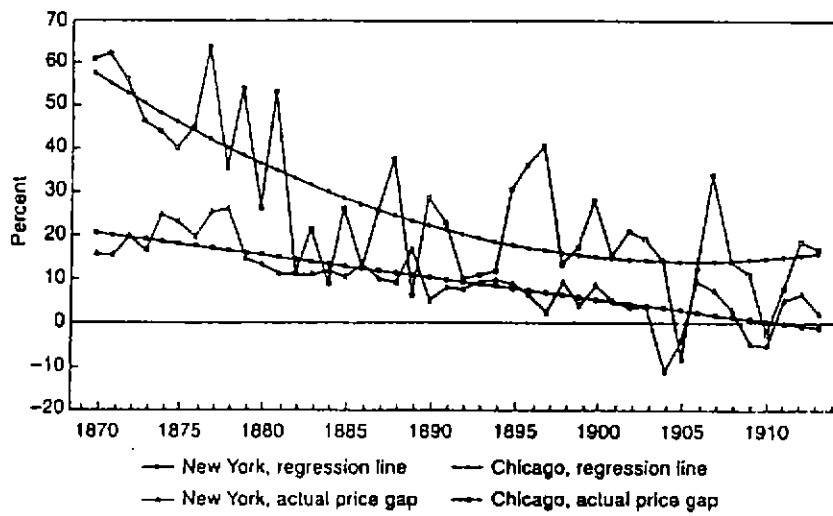


Figure 10
Real Freight Rate Indexes 1741-1913



Source: Harley (1988, Figure 1), nominal rates deflated by UK GNP deflator. ..

Figure 11
Wheat Price Differentials: Britain-United States 1870-1914
(as percent of US)



Source: O'Rourke and Williamson (1999), Figure 3.4.

Figure 12A
Trends in Land-Labor Ratios, Wage-Rental Ratios and Relative Prices of Agricultural Goods:
England 1565-1828

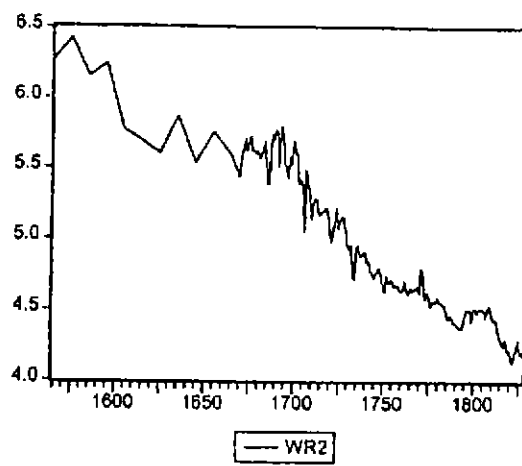
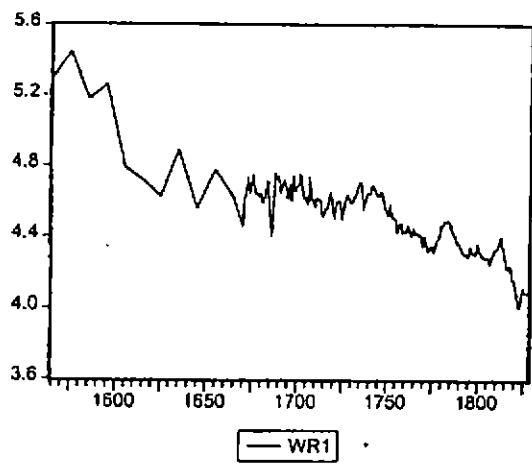
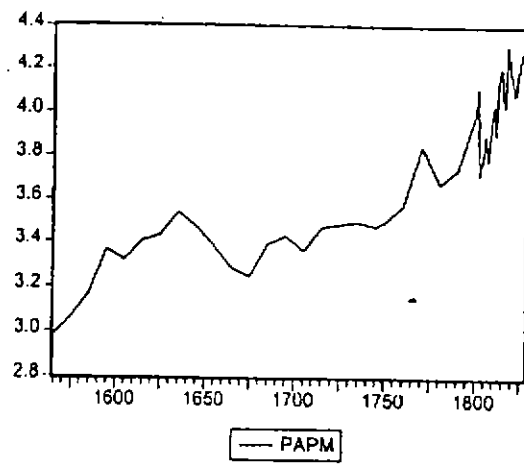
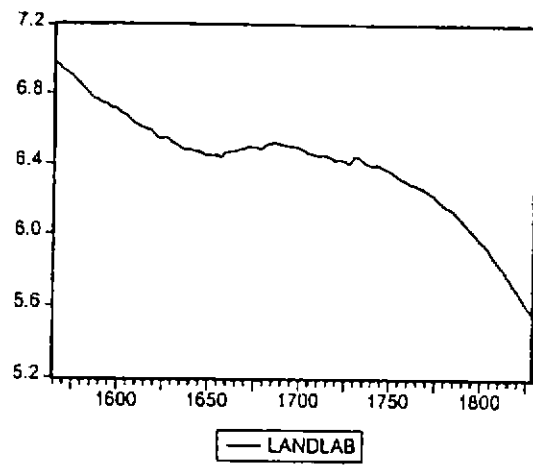
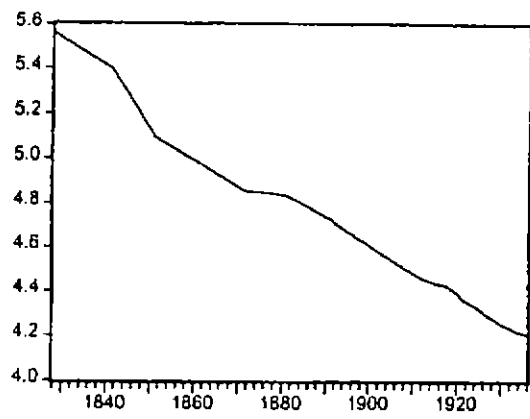
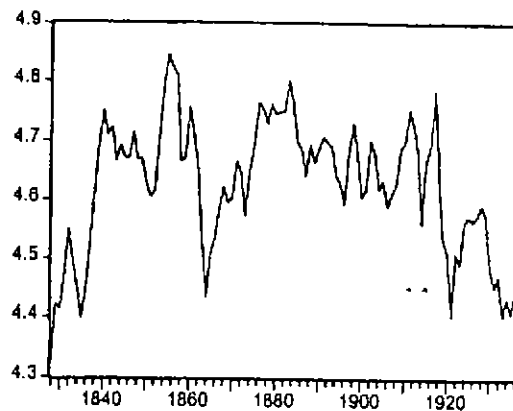


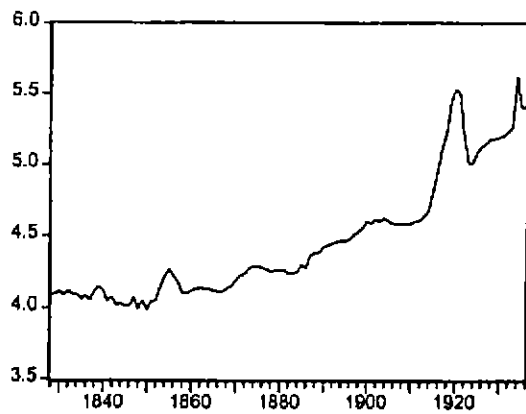
Figure 12B
 Trends in Land-Labor Ratios, Wage-Rental Ratios and Relative Prices of Agricultural Goods:
 England 1828-1936



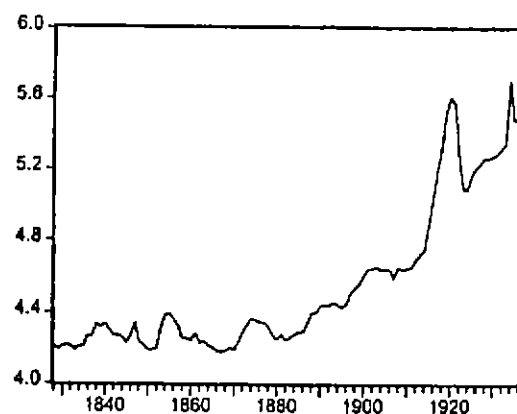
— LANDLAB



— PAPM



— WR1



— WR2

Appendix

Data Sources for the Analysis of English Wage/Rental Ratios and the Inter-Sectoral Terms of Trade, 1565-1936

Nominal Wages 1280-1940 (1900=100)

1280-1850: male daily wages in agriculture; reported decadal, interpolated geometrically to get annual; from G. Clark, "Nominal and Real Male Agricultural Wages 1250-1850, and English Economic Growth," Agricultural History Center Working Paper 96, University of California, Davis (n.d.), Tables 6 and 7, pp. 38-9 and Appendix, pp. 47-8.

1850-1914: annual; **1850-1880** from A. L. Bowley, "The Statistics of Wages in the United Kingdom during the last Hundred Years (Part IV)," Journal of the Royal Statistical Society, LXII (September 1899), pp. 562-4, col. Ad/52 for England and Wales, col. Bd/52 for Scotland; UK a weighted average of the two series, where the weights are male population from B. R. Mitchell and P. Deane, Abstract of British Historical Statistics (Cambridge: Cambridge University Press, 1962), p. 6; **1881-1914** from A. L. Bowley, Wages and Income Since 1860 (Cambridge: 1937), Table II, p. 8 for the UK.

1914-1940: annual; from a revised data base for nominal wages underlying J. G. Williamson, "The Evolution of Global Labor Markets Since 1830: Background Evidence and Hypotheses," Explorations in Economic History, vol. 32, no. 2 (April 1995), pp. 141-96.

Nominal Farm Land Rents 1565-1936 (1900=100)

Index A:

1560-1830: reported decadal, interpolated geometrically to get annual; from G. Clark, "Land Hunger: Land as a Commodity and as a Status Good, England, 1300-1910," Agricultural History Center WP 86, University of California, Davis (February 1997), data underlying Figure 4, p. 26 (personal correspondence from Clark to Williamson).

1831-1870: annual; from J. Thompson, "An Inquiry into the Rent of Agricultural Land in England and Wales during the Nineteenth Century," Journal of the Royal Statistical Society, LXX (December 1907), Appendix, Table A, p. 612.

1871-1900: annual; an unweighted average of Thompson (1907) and H. A. Rhee, The Rent of Agricultural Land in England and Wales (London: Central Landowners Association, 1949), Appendix Table 2, pp. 44-5.

1900-1936: annual; Rhee (1949).

Index B:

Alternative index 1690-1914: annual; linked forwards and backwards to the rest of Index A above: M. E. Turner, J. V. Beckett, and B. Afton, Agricultural Rent in England 1690-1914 (Cambridge: Cambridge University Press, 1997), Appendix Table A2.2, pp. 314-8.

Inter-Sectoral Terms of Trade, Pa/Pm (1900=100): Pa 1316-1938

1316-1450: Exeter wheat; annual; from Mitchell and Deane (1962), pp. 484-6.

1450-1649: "average - all agricultural products," including grains, other arable crops, livestock and animal products; reported decadal, interpolated geometrically to get annual; from Joan Thirsk (ed.), The Agrarian History of England and Wales, Volume IV: 1500-1640 (Cambridge: Cambridge University Press, 1967), Table XIII, p. 862.

1640-1749: "average - all agricultural products," including grains, other field crops, livestock and animal products; reported decadal, interpolated geometrically to get annual; from Thirsk (ed.), The Agrarian History of England and Wales, Volume V: 1640-1750 (Cambridge: Cambridge University Press, 1985), Table XII, p. 856.

1749-1805: wheat; reported decadal, interpolated geometrically to get annual; from P. Deane and W.

A. Cole, British Economic Growth 1688-1959, 2nd ed. (Cambridge: Cambridge University Press, 1962), Table 23, p. 91.

1805-1913: total agricultural products; annual; from Mitchell and Deane (1962), pp. 471-3.

1913-1938: total food; annual; from Mitchell and Deane (1962), p. 475.

Inter-Sectoral Terms of Trade, Pa/Pm (1900=100): Pm 1450-1938

1450-1649: “industrial products”; reported decadal, interpolated geometrically to get annual; from Thirsk (1967), Table XIII, p. 862.

1640-1749: “industrial products”; reported decadal, interpolated geometrically to get annual; from Thirsk (1985), Table XII, p. 856.

1740-1796: “other prices” (equals unweighted average of Schumpeter’s producer goods); annual; from Deane and Cole (1962), Table 23, p. 91.

1796-1938: price indices of merchandise exports (equals Imlah and Board of Trade, linked on 1913); from Mitchell and Deane (1982), pp. 331-2.

Land/Labor Ratios (1900=100): Male Farm Labor Force 1541-1940

Post-1840:

1841-1951: males employed in agriculture, horticulture and forestry, Great Britain; reported for census dates, interpolated geometrically to get annual: from Mitchell and Deane (1962), pp. 60-1.

Pre-1841:

These early years are poorly documented, so we apply crude agricultural employment share benchmarks (SH) to population totals (P) to infer trends in the total agricultural labor force ($SH \times P = La$), linked to the 1841 male farm labor force estimate (La) above.

Population 1541-1841: England; annual; from E. A. Wrigley and R. S. Schofield, The Population History of England 1541-1871 (Cambridge, Mass.: Harvard University Press, 1981), Table A3.3, pp. 531-4.

Total agricultural employment shares 1801-1841: census benchmarks; from Deane and Cole (1962), Table 30, p. 142.

Total agricultural employment shares 1688 and 1759: two benchmarks; from N. F. R. Crafts, British Economic Growth during the Industrial Revolution (Oxford: Clarendon Press, 1985), p. 14, 1688=55.6% and 1759=48%. We assumed the pre-1688 SH stayed at the 1688 level and filled in 1688-1759 and 1759-1801 by geometric interpolation.

Land/Labor Ratios (1900=100): Total Economy-Wide Labor Force 1541-1940

Post-1840:

1841-1951: “total occupied”, males and females; reported for census dates, interpolated geometrically to get annual (including the missing years 1932-1936); from Mitchell and Deane (1962), pp. 60-1.

Pre-1841 period:

Labor force or population age distribution estimates do not exist for the period prior to the late 18th century. Thus, we simply link the population totals up to 1841 with the economy-wide labor force totals 1841-1936 (e.g., we assume the 1841 labor participation rate was constant between 1560 and 1840, and at the 1841 rate).

Population 1541-1841: England; annual; from Wrigley and Schofield (1981), Table A3.3, pp. 531-4.

Land/Labor Ratios (1900=100): Land in Agriculture 1541-1940

Post-1866:

1867-1939: acreage in crops; Great Britain; annual: from Mitchell and Deane (1962), pp. 78-9 and we assume 1940=1939.

Pre-1867:

In his seminal piece on population in pre-industrial England, Ronald D. Lee (“Population in Preindustrial England: An Econometric Analysis,” Quarterly Journal of Economics 87, 4, November 1973: 581-607) quotes Postan to justify his assumption of a constant farm land endowment: “By 1066 the occupation of England by the English had gone far enough to have brought into cultivation ... most of the area known to have been occupied in later centuries of English history.” (M. M. Postan, “Medieval Agrarian Society in Its Prime,” in H. J. Habakkuk and M. M. Postan (eds.), Cambridge Economic History of Europe, Volume I (2nd ed.) , Chapter VII, Part 7, pp. 567-8. We make the same assumption.