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ABSTRACT

India and Britain were much bigger players in the 18th century world market for textiles than was Egypt, the Levant and the core of the Ottoman Empire, but these eastern Mediterranean regions did export carpets, silks and other textiles to Europe and the East. By the middle of the 19th century, they had lost most of their export market and much of their domestic market to globalization forces and rapid productivity growth in European manufacturing. Other local industries also suffered decline, and these regions underwent de-industrialization as a consequence. How different was Ottoman experience from the rest of the poor periphery? Was de-industrialization more or less pronounced? Was the terms of trade shock bigger or smaller? How much of Ottoman de-industrialization was due to falling world trade barriers -- ocean transport revolutions and European liberal trade policy, how much due to factory-based productivity advance in Europe, how much to declining Ottoman competitiveness in manufacturing, how much to Ottoman railroads penetrating the interior, and how much to Ottoman policy? The paper uses a price-dual approach to seek the answers. It documents trends in export and import prices, relative to each other and to non-tradables, as well as to the unskilled wage. The impact of globalization, European productivity advance, Ottoman wage costs and policy are assessed by using a simple neo-Ricardian three sector model, and by comparison with what was taking place in the rest of the poor periphery.

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1. The Issues

What do we mean by the term de-industrialization? To simplify, define our country as producing only two commodities – agricultural goods which are exported and manufacturing goods which are imported, with three factors of production – labor which is mobile between the two sectors, land which is used only in agriculture, and capital which is used only in manufacturing. Assume further that our country satisfies what trade economists call the "small country" assumption, and thus that it takes its terms of trade as exogenous, dictated by world markets. De-industrialization can be defined under those simplifying assumptions most easily as the movement of labor out of manufacturing and in to agriculture.

If a country de-industrializes because its comparative advantage in agriculture has been strengthened either by productivity advance on the land (or more land), or by increasing openness in the world economy, or both, then GDP increases in the short-run. In the case of more land or more productive land, and if the country is still assumed to be "small" – a condition we think applies to the Ottoman Empire -- then the country faces no change in its terms of trade.[1] In the case of increasing openness, the country enjoys an unambiguous terms of trade improvement as declining world trade barriers raise export prices and lower import prices in the home market. Whether real wages in towns and living standards in villages also increase depends on the direction of the terms of trade change, whether the export commodities include foodstuffs, and whether foodstuffs dominate the budgets of poor families. That is, it depends on whether the export commodities are wheat, barley and tobacco (a big share of the worker's budget) or silk and opium (a small share). Whether GDP growth rates rise in the long run depends on whether industry generates accumulation and productivity externalities that agriculture does not. If

[1] Alternatively, if the country is "large" and has an influence on world prices, then it will suffer a terms of trade deterioration, in that it has to share part of the labor productivity gains in the agricultural export sector with its trading partners. The "large" country conditions probably began to apply to Egypt and its cotton exports after the 1860s, but Egypt is not included in our Ottoman Empire definition. We define the Empire to exclude Egypt since it had different endowments, commodity specialization and significant autonomy in the 19th century. The Empire includes present day Turkey, greater Syria, Iraq and the Balkans. The following Balkan regions were under Ottoman rule during some part of the 19th century: Macedonia 1800-1913; Albania 1800-1912; Bosnia and Herzegovina 1800-1878; and Romania-Walachia, Romania-Moldavia and Serbia 1800-1829. See Brown (1996).

industrialization is a carrier of growth – as most growth theories imply (e.g. Matsuyama 1992; Helpman 2004), then de-industrialization could lead to a growth slowdown and a low-income equilibrium that gives the notion of de-industrialization its power in the historical literature.

This paper documents Ottoman experience with its terms of trade over the century 1800-1913, explores the connection between de-industrialization and those external price shocks, and then compares this experience with that of the rest of the eastern Mediterranean, as well as with Asia, Latin America and the European periphery. The next section sets the stage by reviewing Ottoman experience with trade policy, world transport costs, Ottoman railroads, and thus with world market integration. Section 3 reviews the de-industrialization debate as it applies to the Ottoman Empire and the rest of the eastern Mediterranean while section 4 assesses the de-industrialization evidence. Section 5 reports the external terms of trade estimates for the Ottoman Turkish and Balkan core, for Levant in the Empire's eastern wing, and for more autonomous Egypt. Section 6 presents a neo-Ricardian model of de-industrialization, and Section 7 uses the model to answer the following questions: How much of Ottoman de-industrialization was due to falling world trade barriers – transport revolutions and European liberal trade policy, how much due to factory-based productivity advance in Europe, how much to changing Ottoman competitiveness in manufacturing, and how much to Ottoman policy?

2. Falling and Rising Trade Barriers in the Eastern Mediterranean: Setting the Stage

In response to the influx of cheaper manufactured goods from Britain and the rest of western Europe, de-industrialization was the norm for most periphery countries during the 19th century. The great Middle East scholar Charles Issawi placed the Ottoman case in this general context:

> "The Revolutionary and Napoleonic wars gave the region a respite, but in the 1820's and 30's it was hit by the full blast of European competition. Factories were pouring out cheap goods, and peace and increased security in the Mediterranean and improvement in shipping made it possible

to land them at low costs. To this should be added the effects of the various commercial treaties, which froze import duties at low levels and opened up the region's markets" (Issawi 1982: 151). Thus, the 1838 Treaty is one of the most widely discussed events pertaining to the "collapse" of Ottoman industry in the 19th century, although liberal Ottoman reforms began to appear earlier in 1826. Most European industrial countries were still protectionist before they went liberal in the 1860s (Bairoch 1989; O'Rourke and Williamson 1999), so Britain's agenda was to sign free trade agreements with as many periphery countries as possible in order to gain foreign markets for their manufactures.[2] The 1838 Anglo-Turkish Commercial Convention was one such commercial agreement. The original treaty was signed in Balta Liman in August of 1838 and went into effect in March of 1839. The "Anglo-Turkish convention eventually became the basis of practically all foreign trade in Turkey" (Puryear 1969: 83) as the Ottoman Empire signed similar treaties with several other European countries in the following three years. This Convention was viewed as the next step in the Empire's transition to economic liberalism after the sultan eliminated the Janissary corps in 1826, urban guildsman on the military payroll that were the strongest advocates of protectionism (Quataert 1994: 764).

The 1838 Treaty eliminated all local monopolies, allowed British merchants to buy goods anywhere in the Empire, and exempted foreign (but not domestic) merchants from an 8 percent internal customs duty that had been levied previously on goods transported within the empire.[3] Export duties were raised from 3 to 12 percent and import duties from 3 to 5 percent (Issawi 1966: 38).[4] One of the present authors had argued previously that the importance of these treaties has been overstated (Pamuk 1987: 20) since they did not represent a drastic revision from the liberal course already set in 1826. It appears that Donald Quataert agrees: "Commerce between [Britain and the Ottoman Empire] already was increasing dramatically: British exports to the empire had doubled in value during the late 1820's and doubled again before 1837" (Quataert 1994: 825). However, by locking the government into fixed import duties these

[2] In Asia, gunboats were often used as a powerful arm of that policy, by Britain and the United States.
[3] This must have placed local industry at a significant disadvantage relative to foreign products. Yet, the literature offers no explicit assessment of its impact, nor of the political economy which produced it.

treaties did prevent the Ottomans from providing any subsequent protection to domestic industry. Indeed, between 1865 and 1905, average tariff rates were fairly stable at 7.5 percent in the Empire. These low 'revenue-producing' tariffs were consistent with free trade policy, and they were equivalent to those prevailing in Asia. In contrast, average tariff rates in protectionist Latin America and the United States were about 30 percent in the middle of the period,[5] or *four times* that of the Ottoman Empire (Williamson 2006a, 2006b).

It may seem odd that the literature never mentions political pressure exerted by export interest groups who, after all, stood to gain significantly from the treaties, and how they came to overwhelm import-competing interest groups, when the opposite was true of Latin America and the United States. This can be attributed to two factors. First, the export oriented agricultural producers were not well organized. Second, the Ottoman government signed the Free Trade Treaties in order to obtain the political support of Britain against the threats from Russia and Mohammed Ali of Egypt, not because of pressure from export interests. The elimination of monopolies also had a powerful short run impact on de-industrialization, as we shall see below.

The move to free trade and the dramatic decline in transportation costs (Harlaftis and Kardasis 2000) contributed to a boom in Ottoman trade during the 19th century, especially with western Europe. Imports increased from £5.2 million in 1840 to £39.4 million in 1913, at about 3.3 percent per annum, and since "the prices of the traded commodities were considerably lower on the eve of World War I than in 1840, the increases in trade volumes were actually greater" (Pamuk 1987: 23). Between 1840 and 1873, trade grew even faster with the volume doubling every 11 to 13 years (Pamuk 1987: 30). Placed in a comparative framework with other periphery countries, the

> "Ottoman-center trade grew faster than the periphery-center trade (from the 1820s) until the early 1870's, but the rate of growth of Ottoman exports lagged behind the rate of growth of total exports from the periphery after the 1870's … for the period 1840-1913 as a whole, per capita

[4] Export duties are a tax on trade and thus offer partial relief to import-competing industries. It appears that the literature has failed to appreciate this fact, since it offers no explicit assessment of its impact.

exports from the Ottoman Empire expanded at rates close to but lower than those of per capita world trade and per capita center-periphery trade" (Pamuk 1987: 37).

We note, therefore, that trade grew faster before 1870 than after.

Steamships and railroads constitute the two major transport innovations that contributed to the booming Ottoman trade during the period. Steamships could be built much larger than their sail counterparts and their rise to dominance lowered freight costs and stimulated trade for the region. Steamers were introduced into the eastern Mediterranean in the late 1820s, and they became a real presence after the 1840s. Indeed, all sea-going countries established "steamship companies between the 1830s and the 1850s, which competed for cargo … transportation in the Mediterranean" (Harlaftis and Kardasis 2000: 246). More to the point, the freight factor on wheat fell by nearly 80 percent on London imports from the Black Sea and the Mediterranean (Harlaftis and Kostelenos 2007). The decline in freight rates between 1870 and 1914 was just as dramatic on routes involving Black Sea and Egyptian ports as it was in the Atlantic, perhaps even more so (Harlaftis and Kardasis 2000; Shah Mohammed and Williamson 2004). Shipping and trade boomed in the Mediterranean. For example, shipping tonnage entering Beirut went from 40,000 in 1830, to 600,000 in 1890, and to 1,700,000 in 1913. Other cities in the eastern Mediterranean show similar shipping tonnage increases (Issawi 1982: 48).

Over the 19th century as a whole, the Ottoman Empire was more active in world trade than either Asia or Africa, but less so than Latin America. Why? Did the Ottoman Empire enjoy more favorable terms of trade shocks than Asia and Africa, but less favorable than Latin America? Thus, did it undergo greater de-industrialization shocks than Asia and Africa, but less than Latin America?

3. The De-Industrialization Debate for the Eastern Mediterranean

De-industrialization is defined as curbing production and factor employment in manufacturing, either in factories or in cottage industry. In the simple two-sector model set out in the introduction, de-

[5] The figure is for *average* tariff rates, but they were even higher on imported manufactures.

industrialization can be gauged as the movement of labor out of manufacturing and in to agriculture, either measured as a fall in the total employment share, or as a fall in absolute numbers. Either measure could, in theory, also be constructed for value added, but such evidence is almost impossible to find for the 19th century periphery. Alternatively, absolute de-industrialization can be supported by information on the capital stock in manufacturing, like the number of spindles and handlooms. In any case, de-industrialization is easy enough to define. It is debate over the *magnitude* of de-industrialization, its *causes*, and its *impact* on living standards and GDP growth that is more important and contentious.[6]

The literature dealing with Ottoman and Middle Eastern 19th century de-industrialization exhibits an amazing solidarity. Charles Issawi, Roger Owen, Donald Quataert, Socrates Petmezas, Michael Palairet and others all promote similar, or at least reconcilable, views. Yet, the de-industrialization narrative is usually supported only by qualitative accounts, anecdotal evidence or spotty time series, making long period quantitative analysis difficult. As if to provoke more and better work, twenty-five years ago Orhan Kurmuş (1983: 411-12) commented that anecdotal evidence was being "accepted as constituting some part of the historical truth" which would serve "to substitute antiquarianism for scientific work." The Kurmuş challenge produced a response by one of the current authors whose previous book *The Ottoman Empire and European Capitalism, 1820-1913* will be used extensively in this survey (Pamuk 1987). Still, Issawi and Pamuk appear to be the only Ottoman economic historians that base their claims on hard evidence. Even in those exceptions, previous debate has rarely been engaged in comparative terms. How did the Ottomans do relative to the rest of the 19th century periphery? Where the performance was different, why was it different?

As is true with the de-industrialization literature in other parts of the 19th century periphery, Ottoman industry has too often been considered solely as capital-intensive, large scale, urban, factory

[6] Quataert cites the Indian de-industrialization literature in pointing out terminological problems: "Some India scholars suggest that the term [de-industrialization] be abandoned altogether because its meaning is not clear. They argue that there are too many holes in the data to support the level of generalization that use of the term implies" (Quataert 1994: 898). We disagree. Labels are useful for narratives, but theory and measurement are the keys to understanding the de-industrialization experience, regardless of descriptive labels.

production since those were the modes of production in Britain and the rest of Europe by mid-century. This is a mistake when analyzing the Ottoman Empire and the rest of the periphery during the 19th century (or even Britain before 1780), where most manufacturing was labor-intensive, small scale, household based and rural. Indeed, "Mechanized factory output was and remained relatively insignificant in the 19th century when compared with domestic and handicraft production" (Quataert 1994: 898). Since cotton spinning and hand weaving were performed part-time by family members using extremely simple technology, it may seem implausible to argue that the demise of local textile production destroyed a 19th century Ottoman platform for modern industrialization. Yet, economic historians assign the same importance to home-based cotton spinning and weaving in Britain: "proto-industrial" cottage industries are said to have supplied the platform for the factory-based British industrial revolution that followed in the late 18th century (Mendels 1972; Mokyr 1993: chps. 1-3; Weisdorf 2006; and see Petmezas 1990). Furthermore, employment of women and children was central to the process then too (de Vries 1994). Hence, this paper will consider both cottage and factory industry in the Ottoman Empire, even though the data are often sparse for the former.

4. Measuring De-Industrialization

The traditional view of Ottoman manufacturing is that it steadily collapsed in the wake of the influx of European manufactured goods. The Napoleonic Wars had disrupted international trade and shielded the eastern Mediterranean from the impact of the Industrial Revolution. However, local textiles began to retreat soon after the wars ended in 1815. Western provinces of the Empire, the Balkans and western Anatolia were first to face the impact of imports. It is clear, for example, that the strong manufacturing activity in the mountainous region of Thessaly in central-northern Greece reached its peak in the 1810s (Petmezas 1990). Consular and traveler's reports are riddled with anecdotal accounts relating the demise of industry (Quataert 1994: 888). Certainly de-industrialization did occur between about 1815 and 1860, and in response to three forces. First, the end of the Napoleonic Wars opened up the gates for

British exports of manufactures. Britain had already accumulated productivity advantages in manufacturing, and peacetime conditions made it possible for the leading European economy to exploit them in world markets. Second, additional rapid productivity advance in British manufacturing increased its competitive edge in foreign markets still further. Third, the move to liberal policies in the Ottoman Empire between the 1830s and the 1850s deepened the de-industrialization shock still further. After all, the terms of trade soared between 1815 and the late 1850s (Figure 1), and it more than doubled over the two decades after the late 1830s. It increased by 2.6 times between 1800 and 1860 (Table 2).

The Ottoman Empire was completely self-sufficient in cotton textiles until about 1820, but the deluge of cheap European industrial goods changed all of that. Pamuk reconstructs the decline of Ottoman cotton textiles by using an identity to estimate the domestic consumption and production of textiles for the areas within the 1911 borders of the empire -- Macedonia, present day Turkey, greater Syria and Iraq.[7] He identifies the period from the 1820s to the mid 1870s as the crucial one for the decline of cotton handicrafts, a result consistent with the fact that the biggest terms of trade improvement took place in this period, as we shall see below. Weavers suffered, but domestic spinning also declined dramatically in the face of import competition: spinning output "fell from 11,550 tons per year in 1820-2, to 8,250 tons in 1840-2, to 3,000 tons in 1870-2" (Pamuk 1987: 118). Note that the biggest collapse in local spinning output was between 1840/2 and 1870/2 – 74 percent, not between 1820/2 and 1840/2 – 29 percent, an observation consistent with the fact that the external price shock was *much* bigger after the 1830s (Figure 1).[8] In Syria, in the eastern wing of the Empire, de-industrialization forces hit hard too (Issawi 1988: 374). Aleppo was estimated to have had 40,000 handlooms in the 18th century, while the numbers were down to 25,000 in the 1820s – a 37 or 38 percent fall from the 18th century highs, and averaged 5,125 between 1838 and 1850 – for an 80 percent fall from the 1820s. Damascus was estimated to have had 34,000 handlooms in the 18th century, while the numbers were down to 12,000 in the 1820s – a 65 percent fall

[7] Pamuk (1987: 121, and Appendix V for the details of the reconstruction).
[8] Even if we follow Quataert's (1994) suggestion and raise the local spinning estimates for 1870-72, the decline in overall production is clear and the half century before the 1870s remains by far the most important period of declining Ottoman manufacturing activity.

from the 18th century highs, and averaged 2,355 between 1838 and 1850 – an 80 percent fall from the 1820s. One wonders how much of the decline between "the 18th century" and the 1820s can be attributed to competition from modern British factories after 1815 and the peace, and how much of it can be attributed to the late 18th century when Britain, before the factories, began to take over the Atlantic and European market from India, the Middle East and other competitors (Clingingsmith and Williamson 2008). In any case, we note again that de-industrialization was dramatic up to about 1860, and so too was the terms of trade boom.

Table 1 offers another de-industrialization indicator for the 19th century Ottoman Empire, where comparisons with the rest of the Third World are offered. For four Third World regions – Mexico, the Ottomans, India and Indonesia, we measure the loss of domestic textile manufactures markets to foreign imports. That is, the figures report the share of domestic consumption supplied by local and foreign sources. Take India first. It has been estimated (not in Table 1) that Bengal exported about 27 percent of domestic consumption in 1750 (21 percent of domestic production: Chaudhury 1999). That figure had fallen, at least for India more generally, to 6 or 7 percent by 1800. Thus, even before the onset of the factory-led industrial revolution in Britain, India had lost a big chunk of its export market. By 1833, India had lost *all* of its (net) export market *and* 5 percent of its domestic market. By 1877, the de-industrial damage was done, with domestic producers claiming only 35-42 percent of their own home market. Although the Ottoman Empire did not have a large foreign market to lose, it underwent a similar dramatic collapse in its home market share, domestic producers undergoing a fall in their share from 97 to 25-35 percent over the half century between the 1820s and the 1870s. It fell again after the 1870s, but at a much slower rate, from 25-35 to 20-26 percent. The decline in the Indonesian (or Dutch East Indian) textile industry was a little less spectacular than in the Ottoman Empire since the local producer share of the home market fell from 82 to 38 percent of the home market between 1822 and 1870. But in the Dutch East Indies case de-industrialization persisted much longer, with the local producer share falling still further to about 11 percent in 1913. Finally, Mexico seems to have resisted these de-industrialization forces more successfully since domestic producers could still claim 60 percent of its home market in

1879. In short, the Ottoman Empire had one of the more dramatic de-industrialization episodes (Dobado, Gómez Galvarriato and Williamson 2008).

The rapid growth in imports from Europe slowed down after 1880, and the volume of weaving doubled from 1880 to World War I. Although spinning continued to decline, urban weavers used cheaper imported yarn to expand their output of cotton and mixed cotton cloths to meet local demand.[9] Significant amounts were shipped to long distance markets in Anatolia, Syria and as far as Egypt. This slowdown if not reversal of de-industrialization is consistent, as we shall see, with the gradual *fall* in the terms of trade during the second half of the century. Hence, we would expect the de-industrialization forces to have been powerful up to the 1860s and weak thereafter. Indeed, the handloom numbers in both Aleppo and Damascus show no trend at all between 1860 and World War I (Issawi 1988: 374), after a long secular decline.

Not all industries were damaged by foreign competition. Due to an increased world demand, carpet making, copper work, earthenware, inlaid woodworking, lace making, silk reeling, and embroidery were able to thrive despite foreign competition and trade liberalism (Issawi 1982: 153; Quataert 1994: 890). Indeed, some of the above industries, and even the textile industry itself, persisted until the First World War and after.

Some have argued that Pamuk may have overstated the extent to which handicrafts suffered. Quataert thinks he understated hand-spun yarn production, and thus that his estimates of domestic production and consumption of cotton textiles must be in error. Hence, Quataert suggests that handspinning "remained an important source for Ottoman textile producers and accounted for a considerable proportion of all cotton yarn being used in the empire, at least 25 percent in c.1900" (Quataert 1993: 14). While he also claims that Pamuk's reconstruction of the cotton textiles decline does not account for the fact that imported yarn and cloth may have created new domestic jobs, Quataert fails to offer any explicit revision of Pamuk's reconstruction. Nor is Quataert explicit about the size of the *demise* of local textile production in the face of foreign competition. Thus, we will stick to Pamuk's

estimates and the overall decline they suggest with the exception of an upwards revision in the volume of local spinning.

Still, although the domestic import-competing industry suffered, why was it able to survive the foreign competition? There are a number of hypotheses suggested by the literature. First, perhaps foreign goods were not able to penetrate into regions distant from major trade routes or ports, especially before the railway boom late in the century. Ottoman geography offered some protection to local industry, just as it did in the Latin American interior (Coatsworth and Williamson 2004; Bértola and Williamson 2004; Williamson 2006c). Support for this hypothesis can also be inferred from the price convergence between Upper and Lower Egypt (Yousef 2000: 354). These results are especially relevant because they speak to the impact of the transport breakthroughs that occurred in one part of the Middle East very late in the century. Denser rail networks and more navigable waters and roads lowered transportation costs, and these created price convergence and internal trade (Yousef 2000: 356). Thus, since European imports couldn't be brought cheaply into the more remote areas of the Empire during most of the century, domestic manufactures could still supply local demand in those parts of the interior.

Second, domestic tastes afforded Ottoman handicrafts some staying power. Although British companies attempted to imitate Ottoman styles, often they could not do so satisfactorily, and thus there was still demand for domestic cloth, including cotton cloth (Pamuk 1987: 124). Their knowledge of local preferences helped domestic manufactures survive in the short run, and the import of foreign techniques and foreign managers increased their efficiency and competitiveness in the longer run. For example, local textile makers eventually became more familiar with synthetic dyestuffs which allowed them to import plain cloth and take advantage of lower priced Ottoman labor to dye it (Quataert 1994: 889). Third, Issawi argues that "weavers were able to cut their costs greatly by using imported yarn; thus the Industrial Revolution, which had wiped out the spinners, gave the weavers a precarious reprieve" (Issawi 1982: 152). We are skeptical of this argument since this advantage was given just as freely to weavers abroad who were competing with local weavers. A fourth potential explanation seems more promising. Namely,

[9] Quataert (1994) documents this rise in urban weaving but has less to say about what happened in the rural areas.

the late 19th century resistance of Ottoman handicrafts can be explained by the "Great Depression" of 1873-1896 when the terms of trade moved *against* the Ottomans. This relative price event may have afforded import-competing sectors, like local handicrafts, some relief. For all of these reasons, domestic handicrafts and industry, although badly hurt by foreign competition in the first half of the 19th century, resisted and adapted in the second half of the 19th century and in the early 20th century.

Large capital-intensive factories were not common in the Ottoman Empire, nor would they have made much economic sense given the factor endowments of the region (Allen 2007). There were, however, two waves of Ottoman factory building during this period. The first wave occurred before the treaties, consisting of state-owned factories like Mohamed Ali's prototype establishments in Egypt, and to a lesser extent, like those of Mahmoud II around Istanbul**.** While they were protected by monopolies from the beginning, these factories "suffered from great inefficiencies, including lack of fuel and metallic raw materials and the total absence of skilled labor" (Issawi 1982: 154; Clark 1974). They were also poorly managed with military elite serving as supervisors, rather than young men that had been technically trained in Europe. In addition, these factories had dilapidated machinery and inadequate power sources, both of which would have been very expensive to remedy (Owen 1993: 72 and 76). The liberal treaties assured these factories a short life, but Owen believes that they would have been forced to shut down even in the absence of free trade. The second wave ensued after the 1870's and consisted of factories funded and operated by private interests, and which received little or no financial support from the state. Although Quataert states that these factories expanded rapidly in number, both Issawi and Pamuk argue that this second wave was also modest (Quataert 1994: 901; Issawi 1982: 155-58; Pamuk 1987: 127) and that their production was still very small compared to handicrafts. Perhaps, but that second wave certainly looks like a supply response to a much more favorable world price environment. And while Turkish (no longer Ottoman) industrialization really took hold only in the 1930s (Issawi 1982: 159), it might be relevant to point out that while tariffs and quotas on imports increased sharply after 1929, the terms of trade also took a nose dive during that decade, that is, the relative price of manufactures rose.

Quataert (1992: 6-10) proposes three additional reasons for the lack of capital-intensive industrialization in the Ottoman Empire -- population density, religion, and wars. Population density may have fostered industry by creating local demand: the Balkans had the greatest population density in the Empire and the most pervasive industry, while the Arab provinces were very thinly populated and had the least industry. Parenthetically, one wonders why this local demand could not be satisfied as well by foreign manufacturers. Religion may have inhibited technology transfer to the extent that Muslims, who constituted the majority of the population, may have been reluctant to adopt the ideas of Christians and Jews, who understood the technology. Wars waged by the Ottomans may also have delayed potential technology transfer at a time when such assimilation would have been crucial. No hard evidence is offered in support of these three propositions. In its absence, we will explore more mundane but promising explanations – factor endowments and the external terms of trade.

5. The External Terms of Trade

Figure 1 plots the net barter terms of trade for the Ottoman Empire (the ratio of the price of exports P_X to the price of imports P_M) covering the century 1800 to 1913. The series has two parts. Pamuk (1987) has already estimated the terms of trade following 1854, so what follows stresses the extension backwards to 1800 recently constructed by the other present author (Williamson 2008a), and further revised in Table 2.[10] As it turns out, the first half of the century was the most crucial half. For comparison, Figure 1 also plots Egypt 1796-1913, the Levant 1839-1913 (present day Iraq, Israel, Lebanon, Palestine, Jordan, Syria), and the Middle East region as a whole.

Like most of the periphery, the Ottoman Empire specialized in the export of primary products, while importing manufactures, so between 1800 and 1854 P_X refers to an unweighted average of wheat, wool, raisins plus figs, tobacco, opium and raw silk. As Appendix 1 indicates, prices for the first four are

taken from United States markets, the price of raw silk is from British markets, and the price of opium is from the (infamous) Calcutta market. To derive P_X, these six prices are taken as an unweighted average since the share of each commodity export in total exports is not available until 1879, and those weights changed dramatically over the decades before the late 1870s. P_M refers to what was primarily manufactured goods and intermediate inputs, and it is proxied by the British export price index.

Between 1800 and the late 1860's, the price of British manufactured exports fell far faster than did the price of British imported primary products, swinging the terms of trade against Britain and in favor of the periphery. If P_M for the Ottoman Empire moved anything like P_X for Britain, then the Ottoman Empire certainly received a massive positive price shock over the half century before the Crimean War (Pamuk 1987: 48; based on Imlah 1958). The magnitudes were enormous: over the four decades between 1815-1819 and 1855-1859, the Ottoman terms of trade rose almost 2.6 times, for an annual rate of 2.4 percent; even over the longer 1800 to 1860 period, which includes two decades of Napoleonic conflict and suppressed trade, it still rose by a huge annual rate of 1.6 percent per annum. While no actual Ottoman P_M time series data has been tabulated prior to 1854 to confirm these otherwise plausible P_X/P_M trends, qualitative evidence appears to be consistent with the implied terms of trade surge. Hence, domestic resources were pulled in to agriculture and other primary product sectors, while the glut of cheap, foreign manufactures flowed into the Empire, pushing domestic resources out of import-competing industry and perhaps even out of some non-tradable activities.

Ottoman terms of trade data are of far better quality for the period 1854-1913. Between 1855-1859 and 1875-1879, the terms of trade fell by 27 percent, while it did not fall across the so-called "Great Depression," between 1875-1879 and 1893-1898.[11] Indeed, the surprising fact is how stable was the terms of trade over the four decades between 1875-1879 and 1909-1913 when it drifted up at a modest annual

[10] P_X/P_M in Table 2 and Figure 1 are exactly the same for 1860-1913. However, Table 2 explores the extent to which c.i.f. and other adjustments to P_M make a difference in trends. They do, documenting an even bigger P_X/P_M boom up to 1860. See below.

[11] That is, all of the fall took place in a few years before 1875 (Figure 1).

rate of 0.4 percent. Furthermore, all of the pre-WWI rise took place after 1896 when the Ottomans enjoyed a 14 percent increase in their terms of trade.

To summarize, if one is looking for evidence of a big de-industrialization impact on the Ottoman Empire, we should see plenty of it in the half century before the late 1850s. We should see little or no evidence of de-industrialization between the late 1850s and the mid-1890s, assuming that the pre-1860 price shock had had enough time to shake out import-competing industries. Finally, we should see only very modest evidence of de-industrialization in the two decades before World War I.

Were these terms of trade trends common to all parts of the Empire? Issawi claims that the terms of trade moved in favor of the Ottomans in both Syria and Iraq between 1836 and 1913. He bases his claims concerning Syria on the prices of raw silk and cocoons prevailing in Beirut from 1836 to 1913 and on prices for some other commodities exported from Aleppo between 1891 and 1913. His claims for Iraq are based on an unweighted five-commodity index covering the period from 1864 to 1913. Issawi extrapolates both the Syrian and Iraqi terms of trade backwards, concluding that the terms of trade improved there from 1800 to 1913 (Issawi 1988: 147-51). These estimates are consistent with the de-industrialization experience in that part of the Empire: "it destroyed a large part of the handicrafts both directly through competition and indirectly by turning consumers' taste to western-type goods," without causing technology spillovers or import substitution (Issawi 1988: 151).

According to cotton export price series, Egypt's terms of trade must also have risen across the 19th century. Issawi estimated that Egypt's terms of trade (1880=100) rose from 52 in 1820-1822 to 71 in 1850-1852, a rate of 1 percent per annum over the three decades, much smaller than what we have found for the rest of the Empire (2.4 percent per annum up to 1855-1859). It rises again to 107 in 1870-1872, reflecting world cotton scarcity induced by the US civil war. Issawi's index falls to 100 in 1890-1892 and then rises modestly to 136 in 1908-1912.

In Figure 1, we offer our own index of the terms of trade for Egypt 1796-1913, the Ottoman Empire 1800-1913, and Levant 1839-1913. The spectacular rise in the Egyptian terms of trade between 1820-1824 and 1856-1860, 2.7 percent per annum, is even bigger than that of the Ottoman Empire over

the same period, 2.3 percent per annum. Since P_M is the same in both cases, it is clear that cotton prices rose even more in world markets than did the Ottoman export mix of wheat, wool, fruits, silk, tobacco and opium. In any case, these terms of trade figures imply even bigger de-industrialization impact on Egypt than on the rest of the Middle East, spelling especially bad luck for Ali's early experiments with Egyptian industrialization. Between 1855-1859 and 1875-1879, the Egyptian terms of trade fell by almost 11 percent, less than half the fall experienced by the Empire, 27 percent, and thus, presumably, less stimulation to import-competing industry. Finally, between 1875-1879 and 1909-1913, the Egyptian terms of trade drifted upwards at roughly the same modest rate as elsewhere in the Middle East (0.5 versus 0.4 percent per annum).

6. A Neo-Ricardian Three-Sector Model of Ottoman De-Industrialization

We know that a booming terms of trade contributed to Ottoman de-industrialization in the 19th century, and especially up to the late 1850s. That is, as export prices rose, labor and other resources were pulled out of industry (and non-tradable sectors) and in to the export sector so as to augment its capacity. The size of these "Dutch Disease" effects were, of course, intensified by the pro-global policies introduced between 1826 and 1838, but we think there were other domestic supply-side forces that might have diminished Ottoman competitiveness with foreign manufactures up to mid-century. We also think these forces might have reversed when the terms of trade ceased to rise after the late 1850s.

During the century before the 1850s, most foodstuffs eaten by village peasants and the urban working class (like barley, rye, lentils, chick peas, beans, olive oil, cheap raisins and figs) were not traded internationally. True, skilled artisans and better off peasants ate wheat bread made from traded wheat, but most ate cheaper bread made from coarser grains that were not traded. Also, foodstuffs were a very large share of family budgets, somewhere between 75 and 80 percent in the urban areas and even higher in the rural areas where 75 percent of the population lived (Pamuk 2001: 28). Under those conditions, labor productivity in the non-traded part of food production must have influenced manufacturing

competitiveness, as Alexander Gerschenkron (1965) and W. Arthur Lewis (1978), and even Adam Smith argued long ago. Their reasoning went like this: In a pre-industrial economy with relatively stable subsistence wages (Lewis 1954), any decline in Ottoman food productivity would have put upward pressure on food prices and thus on the nominal wage in every non-food sector, eroding competitiveness with foreign producers. Any rise in Ottoman food productivity or increase in arable land in the interior would have had the opposite effect.

But there was another force at work too. As the Ottoman Empire became more integrated into world commodity markets, increased specialization took the form not only of rising exports of wool, silk and opium, but also of consumer goods like wheat, figs, raisins, olive oil, tobacco and even barley. Any rise in the price of traded consumer goods would have put more upward pressure on the prices of local consumer goods and thus on the nominal wage, eroding competitiveness with foreign producers in import-competing sectors. This would have been manifested by rising food prices relative to other products, by falling profitability in manufacturing, and by a decline in industrial output.

Which of these domestic supply-side forces dominated the Ottoman Empire, especially before the 1860s? Did the global trade boom raise the price of exportable food stuffs at home, augmenting nominal wages and reducing competitiveness in import-competing textiles and other manufacturing activities? Or, was this force offset by the increase in arable land in the interior, thus lowering the price of foodstuffs, at least in the interior, and especially in a pre-railroad era? Did increasing commercial crop land-use compete with non-tradable foodstuffs, raising their price? What was the net effect of all these complex forces on the relative price of food and other key consumer goods?

Concern with the price of foodstuffs was used by Lewis (1978) to help explain de-industrialization in the tropical periphery. But he did not offer an explicit model or supply comprehensive empirical support for his thesis. Recently, an explicit and testable Lewis-like model was applied elsewhere in the poor periphery: the thesis worked well in helping account for the spectacular demise of Indian manufacturing in the face of British competition after 1750 (Clingingsmith and Williamson 2008); and it also worked well in helping account for exceptional Mexican success in minimizing the damage

inflicted by foreign imports on its domestic textile industry (Dobado, Gómez Galvarriato and Williamson 2008). But conditions were quite different in the Ottoman Empire since it was a major exporter of foodstuffs, in contrast with India and Mexico. So, how does the Ricardian economics work when applied to the Ottoman Empire?

In order to formalize our intuitions about the relationship between relative prices and de-industrialization, we use a simple neo-Ricardian model.[12] Assume an economy with three sectors: textiles -- the manufacturing importable[13] (T); wheat, fruit, olive oil, opium, silk, tobacco and wool -- the primary-product commodity exportables (C); and barley, rye, lentils and beans, the non-tradable foodstuffs (F). We assume that textiles and commodity exports are traded in world markets and sell for the world prices p_T and p_C, respectively,[14] while p_F is determined by local supply and demand. Labor (L) is mobile between all three sectors, is the only factor of production, and costs a nominal wage w per unit. As is standard in Ricardian models, we abstract from capital and land for simplicity. Finally, when we talk about a decrease in L_T, we refer to this contraction in textile employment as *absolute de-industrialization*, and when we talk about a decrease in L_T/L, we refer to this contraction in the textile employment share as *relative de-industrialization*.

To create a link between agricultural food productivity and wages in the textile sector, we follow Lewis (1954, 1978) in assuming that the real wage in food units was constant (indeed, we set $w/p_F=1$), at least in the short run and medium term. The Lewis assumption may, of course, have been violated in the very long run, but all that we require is that it was quite stable over most of the 19th century. The Lewis assumption implies the possibility of unemployment and underemployment, so L represents employment rather than the population.

Suppose output in each sector is produced according to a Cobb-Douglas production function, where the intercepts F, C, and T are productivity parameters (or include the impact of omitted

[12] The formal details of the model can be found in Clingingsmith and Williamson (2008) and Dobado, Gómez and Williamson (2008).
[13] Textiles were the canonical import-competing activity in the Ottoman Empire. First, they dominated import values. Second, they employed by far the largest share of the Ottoman industrial labor force.

endowments, like land and irrigation canals) and diminishing returns holds everywhere. Labor demand is given by:

$$L_F = (p_F F/w)^{(1/1-\alpha)} = F^{(1/1-\alpha)} \text{ since } w = p_F \quad (1)$$

$$L_C = (p_C C/w)^{(1/1-\beta)} \quad (2)$$

$$L_T = (p_T T/w)^{(1/1-\gamma)} \quad (3)$$

where α, β, and γ are output elasticities. If we assume that there is no productivity change in this pre-industrial economy, the growth rates (*) of labor demand are

$$L_F^* = 0 \quad (4)$$

$$L_C^* = -(1/1-\beta)(w^* - p_C^*) \quad (5)$$

$$L_T^* = -(1/1-\gamma)(w^* - p_T^*) \quad (6)$$

Since the nominal wage is equal to the price of a unit of food, village employment in food production is fixed. Growth of the own wage in textile production (w/p_T) leads to a decline in the absolute number of workers employed there. Thus, *de-industrialization results from an increase in the own wage in textiles.* There are three forces pushing the own-wage upwards (and thus reducing wage competitiveness with imports), one foreign and two domestic. First, the own wage in textiles would increase if the world price for its output fell (that is, if the Ottoman external terms of trade rose due to a fall in the price of imports, as it did up to the late 1850s). Second, it would also increase if the nominal wage rose, induced by a rise in food prices, induced, in turn, by some negative shock to local food output productivity. One source of such a negative shock might have been the shift of food production away from high yielding hectares to accommodate the expansion of export crops like wheat, fruit, olive oil and tobacco, a shift encouraged by foreign demand. Third, it could be induced by a rise in the price of exported wheat, fruit, olive oil and even tobacco.

The growth rate of textile relative to total employment, our measure of *relative de-industrialization*, is:

[14] That is, p_T and p_C are assumed to be exogenous to the Ottoman economy.

$$L^*_T - L^* = \frac{-1}{(1-\beta)(1-\gamma)}\left(\left[(1-\beta)(1-\theta_{TL})(w^* - p_T{}^*)\right] - \left[(1-\gamma)\theta_{CL}(w^* - p_C{}^*)\right]\right) \quad (7)$$

The shares of textile and commodity export employment in total employment are given by θ_{TL} and θ_{CL}, respectively. Thus, *relative de-industrialization will result whenever the own wage in textiles is growing sufficiently fast compared to the own wage in wheat and other commodity exports*. Moreover, de-industrialization will be most severe when the difference in own wage growth rates between T and C is largest, and this can only result when the external terms of trade booms ($p_C^* > p_T^*$), since, by assumption, w* is everywhere the same in the domestic economy. As it turns out, the condition that must be satisfied for *relative de-industrialization* is

$$w^* - p_T{}^* > \frac{(1-\gamma)\theta_{CL}}{(1-\beta)(1-\theta_{TL})}(w^* - p_C{}^*) \quad (8)$$

To the extent that β and γ are similar, and that $(1- \theta_{TL}) > \theta_{CL}$, the ratio on the right-hand side will certainly be less than one. This implies that own wage growth in wheat and other commodity exports would have to be even higher to counteract the relative de-industrialization effect of own wage growth in textiles. In short, we expect to see relative de-industrialization whenever own wage growth in textiles is positive, unless own wage growth in commodity exports is much greater. Own-wage growth in the commodity export sector seems less likely to the extent that nominal wages and prices in export sectors like wheat should have been moving alike, but any own wage growth in the export sector would have dampened the de-industrialization effect because it would have reduced L_C, which is in the denominator of the relative de-industrialization measure. Relative de-industrialization results when nominal wage growth is sufficiently bigger than the growth of the terms-of-trade favoring commodity exports, which discourages production in textiles relative to commodity exports. Thus, *relative de-industrialization should have been most severe when nominal wage growth was strongest and when the terms of trade were shifting most strongly in favor of wheat and other commodity exports*.

7. Assessing the Causes of Ottoman De-Industrialization

It is certainly comforting that the evidence in Table 2 is so consistent with our simple neo-Ricardian model. First, the model invoked the Lewis assumption of stable real wages, and they were indeed, especially over the first sixty years of the 19th century: they rose by only 11 percent between 1800 and 1880, and they fell by 8 percent up to 1860. Second, the model predicted that a rapid rise in the own wage in manufacturing (here proxied by textiles), especially compared with the commodity export sector, would generate powerful de-industrialization forces. And indeed, the own wage in textiles soared across the 19th century. Furthermore, the biggest rise took place between 1800 and 1860 – 3.3 percent per annum – precisely the decades of most dramatic de-industrialization. The own wage in the export sector also rose up to 1860, but by not nearly as much as textiles (0.8 versus 3.3 percent per annum). Third, the rise in the own wage in manufacturing between 1800 and 1860 was being pushed partly by a nominal wage boom (1 percent per annum) -- accounting for a third of the own wage increase, but mostly by the collapse in manufactures prices (-2.2 percent per annum: proxied by imported textiles) – accounting for two-thirds of the own wage increase. Recall that our model predicted a nominal wage boom. Fourth, the predicted rise in food prices seems to have taken place, as the consumer price index (dominated by foodstuffs) doubled between 1800 and 1860. The rising CPI pushed up the nominal wage by almost the same amount -- confirming the predictions of Gerschenkron, Lewis, Smith and our neo-Ricardian model, thereby diminishing Ottoman wage competitiveness in manufacturing.

Fifth, the rise in the own wage in manufacturing slowed down considerably between 1860 and 1880 to 1.5 percent per annum -- precisely the decades of a diminished rate of de-industrialization and some signs of re-industrialization. Consistent with that experience, the own wage in the export sector actually grew a little faster than it did in textiles (2.3 versus 1.5 percent per annum). Furthermore, during these two decades the modest rise in the nominal wage (0.1 percent per annum) accounts for only 7 percent increase in the own wage in manufacturing, while the fall in manufacturing prices (-1.4 percent per annum) accounts for 93 percent. This small rise in the nominal wage is consistent with the 14 percent

fall in the CPI, the latter induced, presumably, by the 11 percent fall in the food export price. Sixth, and finally, the neo-Ricardian model loses its relevance after 1880 when the real wage rises quite impressively – 0.8 percent per annum – presumably because the rate of productivity advance in both the export and import competing sectors rose.

Table 3 reports our effort to identify the domestic sources of Ottoman de-industrialization which supported the external terms of trade shock. The table focuses on *changes* in Ottoman policy and the appearance of the railroads penetrating the interior in the late 19th century.[15] These two *changing* domestic forces must be assessed against the dramatic 260 percent increase in the external terms of trade between 1800 and 1860 (Table 2).

Consider first the policy impact of the Ottoman free trade treaties of 1838-1841. We estimate that the initial move towards free trade raised Px/Pm in the Ottoman ports and coastal cities by only 2 percent, a trivial impact compared with the 260 percent rise in Px/Pm coming from world market forces. True, the policy impact was bigger in the interior (a 6 percent rise in Px/Pm there), but still very small. It should be added, of course, that the treaties severely reduced the ability of the Ottoman government to raise tariffs later in the century, making it impossible to protect domestic industry from the full force of foreign competition when the free trade damage became clearer. Still, Ottoman policies in the 1860s had the opposite effect, reducing the terms of trade by 14 percent in the coastal areas but raising it by 8 percent in the interior. Since Ottoman Px/Pm in world markets fell by 17 percent between 1860 and 1880 (Table 2), the added impact of policy change was to diminish Px/Pm and increase the relative price of manufactures (Pm) by 31 percent, which must have greatly eased the de-industrialization pressures on local manufacturing. These forces also begin to reveal a differential impact of policy-cum-transport on coast versus interior since they served to raise Px/Pm in the interior by 8 percent (diminishing the total effect on Px/Pm from the coastal 31 percent fall to an interior 23 percent fall). After the 1860s, neither the external terms of trade nor Ottoman policy changed much, so de-industrialization forces lost their destructive

impact on coastal industry. Things were different in the interior, however, as the railroads opened up those markets to import penetration and exports to world markets. Table 3 estimates that the terms of trade in the interior rose by 30 percent, as declining transport costs and the removal of the interior trade tax served to push exportable (e.g. wheat) prices up to world levels and to push importable (e.g. textiles) prices down to world levels.[16] So, while de-industrialization forces were quiet on the Ottoman coast after 1860, they certainly were still present in the Ottoman interior.

8. A Comparative Assessment: The Eastern Mediterranean versus the Rest of the Periphery[17]

The economic impact of the core on the periphery had its source in two forces which arose during the first global century. The first was the world-wide transport revolution that served to integrate world commodity markets (O'Rourke and Williamson 1999: Ch. 3; Shah Mohammed and Williamson 2004). It caused a boom in trade between core and periphery, created commodity price convergence for tradable goods between all world markets, and contributed to a rise in every country's external terms of trade, including the periphery. The second force came from the derived demand for industrial intermediates, like Ottoman raw silk and wool, which soared as manufacturing production led the way in the core. Thus, as

[15] The literature often fails to appreciate that it is *changes* in policy, transport costs and world prices that matter, not levels. After all, de-industrialization implies a change, e.g. a decline in the relative or even absolute importance of manufacturing.

[16] The share of transportation costs in the price of a good moved to and from the Ottoman interior varied substantially according to the good (low-value, high-bulk primary products versus high-value, low-bulk textiles, but also wheat versus other primary goods) and the distance from port. Hence, the estimates underlying Table 3 are rough. Quataert (1977: 143-54) offers an excellent discussion of this issue and some international comparisons with wheat transport on the Anatolian Railway after 1890. The cereal growing areas in Anatolia could not send any wheat to Istanbul or Izmir, the leading ports in western Anatolia, before the railroad, but they did send some to the southern port of Mersin on the Mediterranean via camel caravans. Quataert indicates that per ton-kilometer costs in transporting Anatolian wheat to these ports by railroad were initially significantly higher than on the routes between Chicago and New York. However, he estimates that ton-kilometer charges for wheat and barley dropped across the late 19th century, so that they accounted for 22 percent of the final price in Istanbul at the end of the period. Most other export commodities produced in the interior, like fruits, nuts and tobacco, benefited to a smaller extent from the arrival of the railroads (Kurmuş 1974). Table 3 summarizes this evidence by assuming that between the 1860s and 1913 the railroads by themselves lowered textile prices in the interior by about 7 percent and raised primary product prices in the interior by about 15 percent, all relative to coastal prices.

[17] This section draws extensively on Williamson (2008a).

core economies raised their industrial output shares, manufacturing output growth raced ahead of GDP growth. Rapid productivity growth lowered the cost and price of manufactures, and by so doing generated a soaring derived demand for raw materials in the core. This event was reinforced by accelerating income per capita growth and a high income elasticity of demand for luxury consumption goods, like Ottoman wheat, raisins, figs and even opium. Since industrialization was driven by unbalanced productivity advance favoring manufacturing relative to agriculture and other natural-resource based activities, the relative price of manufactures fell everywhere, especially in the periphery where they were imported. The world transport revolution made it possible for the distant periphery to supply this booming demand for primary products. Both forces produced positive, powerful and sustained terms of trade shocks in the periphery, raising the relative price of primary products, and through an epoch which stretched over as much as seventy or eighty years.

Eventually these two forces abated. The rate of decline in real transport costs along sea lanes slowed down, approaching a late 20th century steady state (Shah Mohammed and Williamson 2004). The rate of growth of manufacturing slowed down in the core as the transition to industrial maturity was completed. As these two forces abated, the resulting slow down in primary product demand growth was reinforced by resource-saving innovations in the industrial core, induced, in large part, by those high and rising primary product prices during the 19th century terms of trade upswing. Thus, the secular boom faded, eventually turning into a secular bust. Exactly when and where the boom turned to bust depended on the export commodities in which a periphery region specialized, but the periphery peak ranged between the 1850s and the 1890s.

This 130-year cycle in the periphery terms of trade is illustrated in Figure 2 by Latin American experience up to 1939. The region's terms of trade underwent a steady increase from the 1810s to the early 1890s, and, like the Ottoman Empire, the improvement was especially dramatic during the first four decades: the annual rate of increase was 1.3 percent per annum between the starting the half-decade 1815-19 and concluding the half-decade 1890-94, equivalent to almost a tripling over the 75 years; and the rate between 1815-19 and 1855-59 was even larger, 2.05 percent per annum. Furthermore, that increase is

probably understated since it fails to take account of the likely increase in the quality of traded manufactures relative to primary products, estimated in Figure 2 by the dashed line. Based on the estimates underlying Figure 2, the quality-adjusted terms of trade may have grown at a little more than 2.2 percent per annum between 1815-19 and 1855-59, and at a little more than 1.4 percent per annum between 1815-19 and 1890-94. There is no reason to expect these quality adjustments to have been any different for the rest of the poor periphery, including the Ottoman Empire.

How does the terms of trade boom for the Ottoman Empire and the rest of the eastern Mediterranean compare with Latin America, Asia and the European periphery? Figure 3 documents terms of trade performance for the five major regions in the poor periphery, between 1796 and 1913. Each region is a population-weighted average of the following components: European Periphery (Italy, Portugal, Spain, Russia); Middle East (Egypt, the Ottoman Empire and Levant); Latin America (Argentina, Chile, Mexico, Venezuela); South Asia (India, Ceylon); and Southeast Asia (Indonesia, the Philippines, Siam, Malaya). Figure 3 does not break out the country experience of which the five regions are aggregates, but the original source does (Williamson 2008a).

First and most important, the secular terms of trade boom was even bigger in Egypt and the Ottoman Empire than the rest. If we ignore the few years around 1820 when the terms of trade spikes, it appears that South Asia (and India, which dominates the regional series) underwent relatively modest improvements in its terms of trade from 1800 to the mid-1820s, and in fact it *fell* thereafter up to 1850. Over the half century between 1800-1804 and 1855-1859, India's terms of trade rose less than 0.5 percent per annum. No doubt this was a significant secular price shock, but it was *far* smaller than what happened in Egypt, the Ottoman Empire and the Middle East as a whole. The Latin American terms of trade increased by 1.7 percent per annum between 1820-1824 and 1855-1859. The Ottoman terms of trade increased by 2.4 percent per annum between 1815-1819 and 1855-1859 while the Indonesian terms of trade (which dominates the Southeast Asia regional experience) increased by 2.5 percent per annum between 1825-1829 and 1865-1869. The Egyptian terms of trade rose by 2.7 percent per annum between 1820-1824 and 1855-1859. In short, on the secular upswing in the terms of trade shared by all regions in

the poor periphery, Egypt and the Ottoman Empire underwent about the biggest increase. Did the region therefore also undergo the biggest de-industrialization shock and the most pronounced "Dutch disease" experience?

What went up then came down with a crash, as the terms of trade fell everywhere in the periphery from the 1870s or 1890s to World War II. But note that Egypt and the Ottoman Empire reached a relatively early peak in their terms of trade, the series leveling off and even falling after the 1850s and 1860s. Does this imply that "Dutch disease" de-industrialization forces lost their power much earlier in the region than in Latin America and other parts of the poor periphery where their terms of trade continued to rise during the late 19th century?

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Appendix 1: Ottoman 1800-1913 and Levant 1839-1913 Terms of Trade

In order to extend the Ottoman net barter terms of trade back before 1854 and to link it to the beginning of Pamuk's (1987) 1854-1913 series, we constructed price indices that made use of price series for six of the leading Ottoman exports taken from the following sources; wheat in Istanbul from Pamuk (2001); opium in India from Clingingsmith and Williamson (2008); tobacco and raisins in Philadelphia from Bezanson *et al.* (1936); silk and wool from microfilmed supplement to Gayer *et al.* (1953). All current prices were converted to British pounds using the nominal Ottoman kuruş / British pound (Pamuk, 2001) and US dollar/British pound exchange rates (Taylor 2003: $ to £). The prices of raisins, silk and wool cited in these sources are c.i.f., so transportation and insurance costs needed to be subtracted from them in order to reach f.o.b. prices in Ottoman ports. For this purpose, we relied on the methodology and calculations undertaken in Pamuk (1978: Appendix I, pp. 187-99). Those calculations used North (1958) for freight rates indices and Simon (1960) for insurance rates. We extended Simon's 1861-1900 insurance rate trends back to 1800 assuming that insurance rates moved similar to North's freight rates but did not decline as fast in the period before 1860. We remained on the conservative side and assumed that the difference between the c.i.f. and f.o.b prices did not fall as fast as the North freight rate indices suggest. Trends in the f.o.b. series for raisins, silk and wool obtained through these calculations were not very different from trends in the f.o.b. series for wheat, opium and tobacco as can be seen in Table 2. The price indices for Ottoman exports were then calculated both with and without weights, where the trade weights were guesstimates since these do not exist for this period. Since Ottoman exports were quite diversified throughout the 19th century -- the share of any one commodity in the total value of exports rarely exceeding 10 percent -- the two alternatives gave very similar results. (Pamuk 1987: 150).

British export price indices were used as a proxy for Ottoman import prices, thus yielding a terms of trade series extending from 1800 to 1860 (Mitchell and Deane 1962: 331, based on Imlah). This series

was then linked to Pamuk's 1987 Fisher index 1854-1913 series, using an arithmetic average of the seven overlapping years.

Additional Appendix 1 References:

Bezanson, A., R. D. Gray, and M. Hussey (1936), *Wholesale Prices in Philadelphia 1784-1861* (Philadelphia: University of Pennsylvania Press).

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Appendix 2: Egyptian Terms of Trade 1796-1913

Egypt's terms of trade 1820-1913 has been constructed using only cotton prices to estimate export price trends, a reasonable assumption since cotton was Egypt's dominant 19th century export commodity accounting for "one-third of exports in the 1840's-50's, over 80 percent in the 1880's and over 90 percent in 1910-14" (Issawi 1982: 31). For the years 1820-1899, Alexandrian cotton prices were used (Issawi 1966: 447-8). For the remaining 14 years, American cotton prices were taken as a proxy for Egyptian prices (US Department of Commerce 1975: 208). This US cotton price proxy was chosen because Egyptian cotton followed closely "world, and more particularly American, prices" (Issawi 1982: 41).

The series reported by Issawi gives the cotton price in dollars per qantar, so his was converted to dollars per pound in order to make it consistent with the US series. In Egypt, the qantar was equal to 120.6135 pounds until 1835. Thus, for the period 1820-1935, the reported figures were divided by 120.6135 in order to obtain $/lb. After 1835, Egyptian qantars were equal to 99 pounds, so the reported figures were divided by that number to get $/lb (Issawi 1966: 518).

To get the real export price series, the resulting nominal price series was divided by the US consumer price index for each of the years 1820-1913 (McCusker 1992: 327-30) and then indexed at 1880=100. In order to derive the terms of trade series, the nominal cotton price series was divided by the price of British exports (a proxy for the price of Egyptian imports) for each year of the period (Mitchell and Deane 1962: 331-32).

Although cotton was always Egypt's dominant export commodity, it increased in importance throughout the century. Egypt's other important exportable, wheat, held substantial export shares earlier in the century (Issawi 1982: 31). In order to see if the cotton series accurately captures a more comprehensive export price index, the price of wheat (US Department of Commerce 1975: 208-9) was correlated against the price of Egyptian cotton. The correlation is very high, indicating that Egypt's cotton terms of trade series is likely to be a good indicator of its terms of trade as a whole. However, this

correlation is weaker for the earlier years of the series, when wheat occupied a greater share of export trade.

The prices used here differ from those reported in Issawi's 1982 book, in spite of the fact that cotton price data from Issawi's 1966 book was used for both. Judging from the numbers presented by Issawi (1982: 39), he may have failed to account for the change in the measurement of the Egyptian qantar. Nonetheless, both series show an unambiguous improvement in Egyptian terms of trade during the period.

This terms of trade series, the Middle East regional aggregate (including Ottoman Empire and Levant: Appendix 1) and all other series from the poor periphery are reported in Williamson (2008a).

Additional Appendix 2 References:

McCusker, J. J. (1992), *How Much Is That in Real Money? A Historical Price Index for Use as a Deflator of Money Values in the Economy of the United States* (Worcester: American Antiquarian Society).

Mitchell, B. R. and P. Deane (1962), *Abstract of British Historical Statistics* (Cambridge: Cambridge University Press).

US Department of Commerce, Bureau of the Census (1975), *Historical Statistics of the United States: Colonial Times to 1970* (Washington D.C.: US Government Printing Office).

Appendix 3: Sources and Notes to Table 2

Wages (unskilled construction workers) and consumer prices are for Istanbul, and are taken from Pamuk (2001: Table 4.1, pp. 72-4). Prices of Ottoman imports and exports in and after 1860 are taken from Pamuk (1987: Appendix 2).

For the period before 1860, prices of imported textiles are taken from Imlah (1958: Appendices). The import price estimates assume that, in this early period, the costs of transportation and insurance declined at least as fast as the prices of f.o.b. textiles so that the decline in the c.i.f. prices of imported textiles in Ottoman ports was at least as rapid as the f.o.b. prices in England. Freight rates actually declined faster than prices of manufactures during this period, based on the North indices cited below.

Prices of Ottoman commodity exports for the period before 1860 are based on the indices and sources discussed in Appendix 1. The price indices for various categories of Ottoman exports were then calculated both with and without weights, where the trade weights were guesstimates since these do not exist for this period. Since Ottoman exports were quite diversified throughout the 19th century, the two alternatives gave very similar results. British export price indices were then used as a proxy for Ottoman import prices, thus yielding a terms of trade series extending from 1800 to 1860 (Mitchell and Deane 1962: 331, based on Imlah). This series was then linked to Pamuk's 1987 Fisher index 1854-1913 series, using an arithmetic average of the seven overlapping years.

Table 1

Comparative De-Industrialization: Textile Import Penetration 1800s-1880s, Around the Third World

	Percent of Home Textile Market Supplied by Foreign Imports	Domestic Industry
India 1800	-6 to -7	106 to 107
India 1833	5	95
India 1877	58 to 65	35 to 42
Ottoman 1820s	3	97
Ottoman 1870s	65-75	25-35
Ottoman 1910s	74-80	20-26
Indonesia 1822	18.1	81.9
Indonesia 1870	62	38
Indonesia 1913	88.6	11.4
Mexico 1800s	25	75
Mexico 1879	40	60

Source: Williamson (2008b: Table 5.3) for all but Ottoman observations, which are calculated from Pamuk (1987: 115).

Table 2

Wage and Price Trends for the Ottoman Empire 1800-1913 (1860 = 100)

	1800	1860	1880	1913
Nominal Wages	54	100	103	156
Consumer Prices	50	100	86	106
Real Wages	108	100	120	147
Imported Textile Prices, c.i.f.	380	100	76	63
Imported Cotton Textile Prices, c.i.f.	440	100	76	63
Wheat Export Prices, f.o.b.	103	100	86	90
Other Export Foodstuff Prices, f.o.b.	86	100	92	84
All Export Foodstuff Prices, f.o.b.	93	100	89	87
Raw Material Export Prices, f.o.b.	80	100	63	54
All Export Prices, f.o.b.	86	100	65	55
Own Wage in Textiles	14	100	136	248
Own Wage in Exports	63	100	158	284
Price All Exports/Price All Imports	39	100	83	89

Source: See Appendix 3.
Notes: All prices and wages are given in both silver (and gold after 1844) and in British pounds as the exchange rate between the Ottoman kuruş (piaster) and the British pound was consistent in all the benchmark years with the silver and gold content of the two currencies. The own wage is the nominal wage divided by the price of output in the given sector, e.g. textiles or exports.

Table 3 The Impact of Ottoman Policy and Railroads on Px/Pm 1800-1913: Percentage Impact on Price

	Coastal		Interior	
	Imports	**Exports**	**Imports**	**Exports**
Policy and Transport Cost Conditions before Free Trade Treaties 1838-1841				
Import tariff or export tax	5	10	5	10
Tax on interior trade	0	0	8	8
Transport cost	0	0	25	43
Policy and Transport Cost Conditions from Free Trade Treaties to 1860				
Import tariff or export tax	5	12	5	12
Tax on interior trade	0	0	0	8
Transport cost	0	0	25	43
Policy and Transport Cost Conditions 1861-1869				
Import tariff or export tax	8	1	8	1
Tax on interior trade	0	0	0	8
Transport cost	0	0	25	43
Policy and Transport Cost Conditions 1870-1906				
Import tariff or export tax	8	1	8	1
Tax on interior trade	0	0	0	0
Transport cost	0	0	18	28
Policy and Transport Cost Conditions 1907-1913				
Import tariff or export tax	11	1	11	1
Tax on interior trade	0	0	0	0
Transport cost	0	0	18	28
Changes in 1838-1841: assuming no change in transport cost (pre-rails)				
Total Pm or Px	0	+2	-8	-2
Px/Pm	+2		+6	
Changes in 1860: assuming no change in transport cost (pre-rails)				
Total Pm or Px	+3	-11	+3	+11
Px/Pm	-14		+8	
Changes in 1870: including change in transport cost (rails)				
Transport cost	0	0	-7	+15
Total Pm or Px	0	0	-7	+23
Px/Pm	0		**+30**	
Changes in 1907: assuming no change in transport cost (post-rails)				
Total Pm or Px	+3	0	+3	0
Px/Pm	-3		-3	

Notes: See text.

Figure 1 Net Barter Terms of Trade 1796-1913 in the Middle East

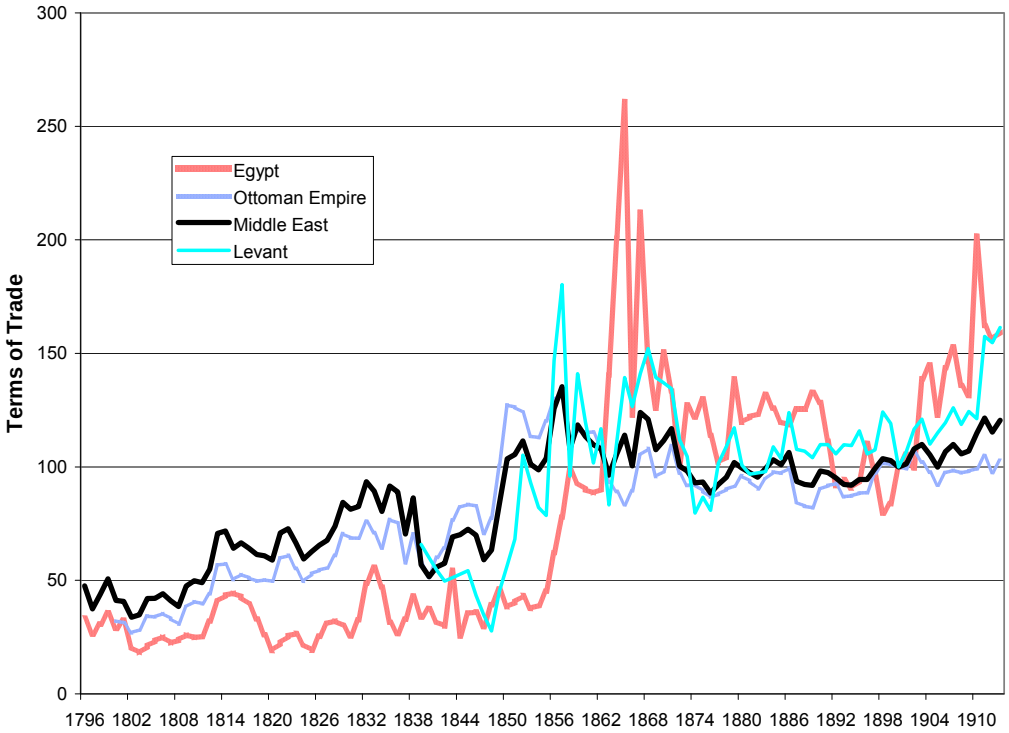
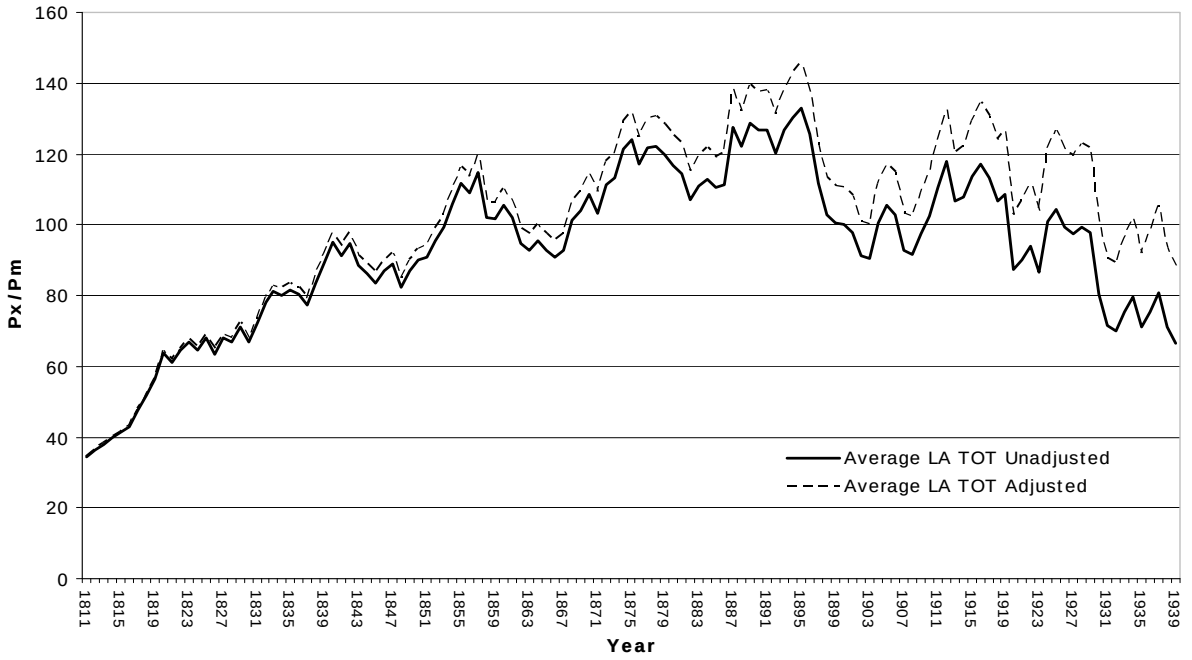


Figure 2
Latin American Terms of Trade 1811-1939



Source: Unadjusted--Clingingsmith and Williamson (2004), Figure 9, based on data in Coatsworth and Williamson (2004a); Adjusted--see Appendix 1.

Figure 3 The Poor Periphery: Net Barter Terms of Trade 1796-1913