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# INTERNATIONAL TRANSACTIONS: REAL TRADE AND FACTOR FLOWS BETWEEN 1700 AND 1870

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## ABSTRACT

This paper describes broad regional and temporal trends in the evolution of international trade and international factor flows between 1700 and 1870, including key differences in trade costs across space and time. We find trade links in Western Europe and the European colonies of North America intensified at the same time these regions experienced the initial industrial revolution and the spread of industrialization, which led to sustained economic growth. At the same time, global differences in specialization and income emerged. To understand the contribution of global market forces, as well as colonialism to these differences, the chapter lays out theoretical reasons for links between trade and economic growth and examines related historical arguments and evidence. We conclude that trade contributed to global divergence, but the magnitude and mechanisms through which trade affected global welfare lies not so much in the direct impact of trade and specialization, but in multiplier effects emerging from the interactions of trade with other factors that affect economic development.

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# Introduction

The link between trade and global economic development stands as one of the most enduring debates in all of economic history. The question goes to the heart of whether the origins of the industrial revolution of 1780 can be traced to one economy or one region in Europe, or whether industrialization was the result of global connections. By the mid-18th century, the world saw an overall increase in openness and the movement of goods across national borders, with considerable growth in trade between European countries and their North American colonies. Concurrently, industrialization started in a small set of countries in Western Europe and on the North American east coast, initiating a global divergence in national incomes. This chapter discusses the main drivers of trade in this period and reviews the factors that contributed to increasing trade.

In Part I, we begin with a survey of the broad regional and temporal trends in trade, as well as the key factors driving differences in trade costs. Part II lays out the theoretical reasons for why trade can be mutually beneficial to trading partners, while Part III examines historical arguments and evidence along with available quantitative estimates of gains from trade. Part IV suggests additional mechanisms that could dynamically result in multiplier effects of trade on growth. We conclude that trade contributed to global divergence, but the magnitude and mechanisms through which trade affected global welfare lies in these types of multiplier effects. In particular, basic resource gains from trade is likely to have a limited impact on growth. Instead, the most important impacts of trade and factor flows are likely to emerge in terms of interactions with other factors.

# I. Historical Background 1700-1870

## Evolution of Domestic and International Trade

Table 1, based on the references in other chapters in this volume, shows low volumes of international trade before 1800. Data on trade volumes and openness are scarce for the period before 1800, and the existing data might somewhat underestimate actual trade flows, given the limited state capacity to record economic activity. Nevertheless, the low incidence of world trade in overall economic activity most likely reflects the reality that international goods were only available to a minority of households in the earlier period.

Though the timing and intensity of trade varied by region, on average trade increased much faster after 1800 than before, both in absolute terms and with respect to total production. The rapid acceleration of trade in the 19th century should be seen in light of its very low initial levels, which, however, exceeded previous centuries: global trade grew three times as fast as global output from 1500 to 1820: 1.0 percent p.a./0.3 percent p.a. (Maddison 2005, p. 22). Between 1820 and 1870, global trade volumes (not including the slave trade) and world production increased faster than ever before, at 4.8 percent p.a. (Federico and Tena 2017) and 0.9 percent p.a., respectively – shares of exports in domestic production also rose almost everywhere.

Commodity price analysis provides another, complementary, assessment of trade. For example, markets may be highly efficient if information about prices is transmitted rapidly; in this case, we may observe little or no trade, but prices are highly correlated, conditional on inter-market distance and local shocks. Market integration measures typically use prices of traded goods, from everyday staple grains like wheat and rice to (initially) scarcer and more luxury goods like spices, tea, sugar, coffee or fine textiles of silk and cotton. Since the possibility of trade implies that price differences of similar goods in different locations will be arbitraged away (up to the level of the trade costs between locations)— price behavior across different markets reveal valuable evidence about the degree of market integration between different locations, relative efficiency, and changes in trade costs. The advantage of this approach is that it can provide insights into the degree of 'national', regional, and intercontinental market integration even in the absence of trade volume data.

Studies on integration have typically shown declining price gaps over time (Federico 2012, Chilosi et al. 2013). Although market integration within domestic markets and across international markets did not always move together, since there were differences in domestic versus and international costs of trade, this finding, like the volume estimates, produces an overall picture of 19th century markets being, on average, much more interconnected than 17th century markets.

In Asia, the absence of an industrial revolution did not mean there was little intra-regional trade. On the contrary, markets in Western Japan and the Yangzi Delta were highly integrated before 1800, and general domestic integration in Japan and China was not sharply different in comparison to regional market integration in Western Europe (Shiue and Keller 2007, Dobado-González et al. 2015). The extent of grain market integration between Asian and European markets, however, was very relatively weak in the seventeenth century (Dobado-González et al. 2015). Comprehensive intercontinental market integration in competing goods was generally not observed in the eighteenth century. Early globalization was generally limited to high value-to-weight goods: spices, sugar, tea, porcelain, Asian textiles. Moreover, global trade between Europe and Asia, Africa, and the Caribbean was possible only through the advantages conferred by European privileged companies (O'Rourke 2006, de Zwart and van Zanden 2018).

## II. Understanding the Basis and the Costs of Trade

Although the historical literature and the economics literature employ different terms to describe the basis of trade, both literatures share the key idea that differences between trading partners form the sources, or basis for trade. The first and most fundamental of the economics definition of these differences is comparative advantage. Differences in opportunity costs[1] lead to gains from specialization between, for example, individuals, households, clans, regions, or countries. Adam Smith' *Inquiry into the Nature and Causes of the Wealth of Nations* (1776) gave specialization and the division of labor a central role in

[1] Opportunity costs are the costs of an alternative use of resources not chosen, e.g., in a cost benefit analysis of making all goods yourself instead of specializing on the production of one and exchanging its surplus for the production of others.

understanding why some places are rich and others poor. Two key insights of Smith's work are that specialization creates improvements in the production of different goods and that the degree of such specialization is determined by the "extent of the market".

Second, technology differences between trading partners can also be a reason to trade. The first rigorous formulation of the determinants of the pattern of trade—which economy exports which good—is due to David Ricardo. Inspired by the Methuen Treaty of 1703 between England and Portugal, Ricardo realized that there were benefits in Portugal making port wine while England produces textiles, even if Portugal in principle could produce both cheaper. Developing the concept of comparative advantage, he showed that an economy that is relatively inefficient (has higher opportunity costs) in producing certain goods should import these in exchange for goods that the country produces relatively efficiently (low opportunity costs).

Third, resource differences are potentially an important source of trade. Swedish economists Eli Heckscher and Bertil Ohlin developed the theory of comparative advantage further by noting that differences in the availability of production factors, or 'factor abundance,' is an important determinant of relative production costs across countries. For example, an economy with large amounts of arable land would, in the absence of trade, have a relatively low price of land, and thus would be able to produce goods that use land intensively with relatively low cost. In contrast, manufactured (or artisanal) goods would tend to be cheaper in countries that have an abundance of labor, and therefore relatively low-cost workers.

While Ricardo saw differences in production technologies as the primitive basis determining the pattern of trade since it directly affected relative autarky prices, Heckscher and Ohlin saw relative autarky prices determined by differences in the relative factor abundance across economies. These lead to opportunity cost differences and thus trade even if the production technologies that Ricardo emphasized are the same across countries. Both theories, however, are theories of comparative advantage in that trade is driven by opportunity cost differences across economies (Lampe and Sharp 2019). Empirically, it has been challenging to separate the roles of production technology versus factor abundance differences (Trefler 1995).

Finally, another potential difference between countries may be institutional quality. Depending on the context, institutional differences may be less important than the other three, but following a similar logic, economies with good institutions would tend to export institutions-intensive goods. Comparative advantage thus leads to specialization gains from trade with respect to institutions. For example, countries with better contract enforcement will, all else equal, be able to produce goods that are relatively contract-intensive (in analogy to Heckscher-Ohlin's labor- or land-intensiveness) at lower autarky prices compared to an economy with weak enforcement of contracts and therefore export those products abroad (Nunn 2007).

Even if the basis for trade may exist, the extent to which countries can realize trade gains will depend on the costs of trade. If, for example, England were to export textiles to Portugal in exchange for wine, the price of British textiles in Lisbon would not be the same as that in

Liverpool, and as long as there are non-negligible trade costs. Trade costs will drive a wedge between the prices in the two countries.[2] In particular, trade costs that are too high, relative to differences in comparative advantage, will result in several economies all producing the same type of good at home because trade is not feasible. Thus, falling trade costs will lead to more trade of the same goods ('intensive margin'), but also increase the range of goods that can be traded ('extensive margin').[3] The expansion of trade along both margins can be seen over the period 1700 to 1870, when not only did the spice trade increase between South and South East Asia and Europe, but trade in grain and goods with relatively low value-to-weight ratios increased too.

The central result of trade theory is that given certain conditions, the trade equilibrium has weakly higher welfare than seen in autarky equilibrium, that is, all else equal, people in a world with trade are better off than without it.[4] While such gains from trade have been proven at various levels of generality (Dixit and Norman 1980), the theoretical result that trade cannot lead to lower welfare follows from the fact that when the economy can engage in trade with other economies, the no-trade situation continues to be an option, and an increase in the set of choices—from one (autarky) to two (autarky or trade)—cannot lower welfare.

Despite the positive implication of overall gains, it is important to emphasize that it rests on key assumptions of the relevant conditions. Another key result of trade theory is that in the absence of these conditions, free trade may or may not be the best policy. For example, free trade generally remains the best policy in the presence of increasing returns to scale and monopolistic competition (Helpman and Krugman 1985). At the same time, if an economy has monopoly power in trade, this country can do better than a free trade policy by implementing an import tariff of a certain size because this improves the country's terms of trade.[5] The size of this "optimal" tariff would be chosen to maximize the country's welfare, not global welfare. At least theoretically, in that case, mercantilist and protectionist policies can maximize a country's welfare. In practice, however, such goals are hard to achieve because often there will be retaliation with tariffs by other countries, lowering welfare in all countries (a so-called trade war).

Furthermore, it is important to note that the distributional implications are such that the presence of overall gains from trade to a country is consistent with trade lowering the welfare of certain individuals. Thus, trade does not unambiguously increase the welfare of everyone even when the relevant conditions are fulfilled. One of the most important results in the Heckscher and Ohlin world is that when there are multiple factors of production, opening up trade will lower the welfare of factors used intensively in the import-competing production, while raising the welfare of factors intensively used in the export sector (Stolper

[2] Trade practitioners speak of the fob versus the cif price, for "**f**ree **o**n **b**oard" and "**c**ost, **i**nsurance, **f**reight" inclusive price, respectively, with the latter being higher.
[3] With increasing returns to scale, falling trade costs can also lead to the agglomeration of economic activity, as highlighted in the new economic geography literature (Krugman 1991).
[4] Among the conditions that ensure gains from trade is (i) convex technologies (no increasing returns to scale), (ii) perfect competition (no market power), and (iii) the equality of social and private net costs (no externalities).
[5]

and Samuelson 1944). That is, the impact of trade on welfare is heterogeneous across factors of production. Such distributional effects have been extensively analyzed in work on the period of 1700-1870 (O'Rourke and Williamson 2000), and they may also matter because they affect the incentives of certain factor-using versus factor-saving technology change that some argue plays a role in why Europe industrialized first (Allen 2011).

## Drivers of increasing market integration and trade

Several major drivers were responsible for increasing market integration and trade over the 18th and 19th centuries. One of the most basic of these factors were reductions in the costs of transport (shipping), which rise with distance because greater distances increases fuel, crew, equipment, and the opportunity (time) cost of shipping. Road improvements, canals, railroads and steamships naturally reduced transport costs. While trade costs fell substantially over the period 1700 to 1870, the fact that trade declines with geographic distance even today (commonly referred to as the *gravity equation of trade*) gives powerful evidence for the importance of trade costs in shaping trade patterns at any given point in time.

The quality of roads and the transport infrastructure had a direct impact on costs of transportation. In the Netherlands and the UK, considerable investments in internal road construction and canal building contributed to improving the infrastructure in both regions from 1700 to 1870. This helped to deepen the integration of domestic markets and thus also improved the connection of ports to their hinterland (Bogart 2014). By contrast, for example, Indian markets were relatively fragmented in the eighteenth and early nineteenth century, but became more integrated as railway building (for British military purposes) advanced (Studer 2008, Donaldson 2018).

Technological improvements in transport are important for reducing trade costs. In shipping, for example, copper sheeting (Solar and Hens 2016), better navigation instruments, and improved understanding of wind patterns (Kelly and Ó Gráda 2019) not only improved shipping, but also increased the reliability and speed of information transmission carried via the post. The largest advances in shipping and land transport technology were concentrated in the nineteenth century (de Zwart and van Zanden 2018, 32-37). Such advances were reinforced in the early nineteenth century with the invention of steamships, which apart from their early use as gunboats became important for trade from around 1865 (Pascali 2017). From the 1850s, the international telegraph network also spread, but it took until the 1870s to effectively facilitate worldwide access the technology as a means of communication, allowing information to travel faster than people and commodities (Steinwender 2018).

A second factor driving market integration includes the taxes on domestic and international trade (tariffs), as well as non-tariff barriers such as quantitative restrictions on the volume that can be traded. In Europe, the 18th century represented the final stage of European colonial expansion following the Age of Discoveries, and the intellectual and practical means by which that expansion was achieved: namely, mercantilist policies and the domination of

trade by the state-backed monopoly trading companies. The degree of market integration thus depended importantly on the policy stance towards free markets and associated tariff reductions. Under classical mercantilism, Western European powers attempted to capture value-added and employment by monopolizing trade routes for the benefit of their shipping and trading companies, while granting national industries exclusive access to colonial raw materials. A famous example of such measures were the English Navigation Acts, first stipulated under Cromwell in 1651, and finally revoked in 1854. They were aimed at excluding (more efficient) Dutch shippers and traders from transporting goods from and to England and its colonies, and keeping manufacturing concentrated in Britain.

The back and forth on protectionism imply not only that 'free trade' was not the norm, but that there was no uniform 'progress' towards integration and free trade. The British government was financed by tariff revenues and the average ratio of import duties relative to the value of imports was between 30% and 50% from 1790 to 1840, on goods such as sugar, wine, tea, coffee, tobacco, and other high value to weight products, rather than timber, useful as it was for building British warships. The Corn Laws protected landed interests and kept the price of grain high--tariffs had to be raised as high as 40% to keep cheap foreign grain from entering Britain during years when the harvest was good.

Between 1840 and 1870, mercantilist and other trade barriers in Europe were slowly dismantled in Europe (Tena-Junguito et al. 2012). The trend proved to be short-lived, however, and in the post-1870s political backlash resulted in a reversal in the free trade stance for Germany, France, and other countries. Increasing protectionism also occurred beyond Europe, in the United States and much of Latin America after independence, and again from the mid-1800s (chapters I.8 and I.9). Nevertheless, the decades of reduced protectionism in the 19th century had coincided with ongoing national integration. The first and most important customs union of the German states, the *Zollverein*, was officially established in 1834. It resulted in the abolition of tariff barriers among member states, contributing to lower internal trade barriers and increased market integration (Keller and Shiue 2014), but it also established higher trade barriers for some of its neighbors. Recent work by Chilosi and Federico (2015) attributes most of the improvements in the extent of market integration in the trans-Atlantic trade to these types of institutional changes and declines in tariffs, as well as to the dismantling of the monopolies of European trading companies.

Third, there are other costs that are less straightforward to quantify, such as the costs related to the institutional environment in which trade takes place. For example, a relatively high risk of expropriation will increase trade costs because forward-looking traders will want to be compensated through higher prices for the additional risk. Expropriation may be due to the manner of governance (which results in an unwillingness or an inability to protect property rights), the actions of private agents' (such as unfettered piracy), or a combination of the two. We may see both trade increasing, and, price gaps going down when institutions change.

The historical examples of the development of market access in the U.S., India, and Europe suggest institutional changes are closely linked to the development of the domestic infrastructure that ultimately improved market integration (Fogel 1964, Donaldson 2018).

Developments in domestic markets may in turn be closely tied to international trade as increased domestic market integration and urbanization tends to concentrate economic activity, making specialization and international openness and trade much more feasible (Keller, Andres Santiago, Shiue 2017).

One way to study the link between trade and institutions is to consider periods of institutional change or reform. Wars were sometimes fought because of trade conflicts and political hostilities. For example, in the late 17th century, England and the Netherlands fought a series of trade wars, followed by trade-related conflicts between Britain and Spain in the early 18th century. The increasingly global wars between Britain and France left their mark on the 1760-1820 period. Mercantilist trade rivalries accompanied the deepening of European colonization of the world and paradoxically increased trade costs through the militarization of trade (Thomas and McCloskey 1981, 93-97; Findlay and O'Rourke 2009, chapter 5; O'Rourke et al. 2010, 97-101).

Wars and revolutions were also important flash points that, either temporarily or permanently, changed the trajectory of trade by changing the underlying laws and institutions. A clear example of how war changed international trading regimes is the Opium Wars, in which the British went to war to force open Chinese markets to European traders (Keller, Li, Shiue 2011). Other examples include how the French armies occupied and reformed many of the institutions of the European countries they occupied; or how the American Revolutionary war changed the relationship between the colonizer and the colonists. Among the colonies that did benefit, both trade and institutional transfer appear to be part of the story (Acemoglu, Johnson, Robinson 2001, 2005)

Empire-building and colonial ties affected not only the amount of trade, but the kind of goods traded and the rules of engagement, but not always positively. The gains from trade before 1870 were unevenly distributed, due to colonialism, disease, and exploitation, in particular with respect to Africa and the native populations of North- and South America and Oceania (de Zwart and van Zanden 2018, 5-8, Zahedieh 2014, 395; CEHMW chs. I.8-I.11). Some, but not all, colonies of the industrializing nations could reap gains from specialization in raw material provision.

Fourth, there is a set of trade costs that are typically found to be highly significant in empirical analysis, and yet can also be hard to capture. These are exemplified by "border" effects. It makes sense, for example, that common language tends to increase trade while living in different time zones reduces trade, however border effects exist even after we control for distance, size, and border taxes. While differences in institutional regulation and 'doing business' across the border might play important roles, they do not explain everything (Head and Mayer 2014).

# III. Trade and Industrialization from 1700 to 1820

## Quantitative Estimates of the Gains from International Trade

Theoretically, specialization and trade according to comparative advantage have led to an increase in efficiency that has increased world production, for given resources and technology levels. Trade also distributes the increased production to consumers, raising overall welfare. The magnitude of these potential gains and the importance of trade in explaining the divergence in incomes have been the subject of numerous studies.

In contrast to explanations of industrialization that locate the sources of growth to capital accumulation, the enlightenment, or political revolutions within the British or European region, Immanuel Wallerstein's (1974) influential world systems theory, argues that divergence is the result of a process of Western European colonialism since the 16th Century and the concurrent rise of a new capitalist world system. In his view, trade between the capitalist center (characterized by free labor and productive urban cities) and the peripheries (which were subject to serfdom, feudal land tenure regimes or slavery) magnified the differences in living standards and development between the two regions. The peripheries increasingly specialized in cash-crop production with coerced labor, while the center absorbed a large share of the profits from high productivity goods--the newly established order thus deprived the peripheries of their own development potential (Wallerstein 1974, 86-102, 349-50).

Although Wallerstein emphasized regional disparities in society and institutions, the idea that trade can result in specialization in certain activities with different development potential is a familiar one in economics. It is well-known that comparative advantage in agricultural production will naturally lead to specialization in agricultural production. In Matsuyama (1992), for example, a small open economy with high agricultural productivity that opens to world trade will specialize in agriculture and see industrial stagnation because innovation occurs more rapidly in manufacturing activities. In Grossman, and Helpman, (1991, Ch. 6) opening up to trade leads to specialization in low-tech, low-learning industries, which results in permanently lower rates of growth compared to the no-trade equilibrium.

Like Wallerstein, Kenneth Pomeranz also argued for the central importance of trade between the Old and the New World in the century from 1760 to 1860, but he shifts the emphasis to differences in the ability of different continents, Europe and Asia, to address their shared problem of resource scarcity. Here, Europe's ecological constraints were significantly lessened both by imports of agricultural products such as sugar, timber, and cotton, and other factors that provided a new flush of resources and price adjustments that were critical to industrialization. According to Pomeranz, without this world trade, 18th century living standards would have been "unlikely to lead to a thoroughgoing industrialization, and might even have impeded it." (Pomeranz 2002, p. 445).

How much of the divergence in per-capita income from 1700 to 1870 can be attributed to gains from trade? In light of these extensive qualitative arguments that attribute European success to trade in consequence of the Age of Discoveries, it is notable that quantitative

estimates of gains from trade have, more often than not, failed to find empirical support for trade as a substantial engine of European growth. Studies based on traditional comparative static methods have found the importance of trade and the periphery for the development of the center has been overstated (O'Brien 1982), and the extent to which European colonization before 1800 penetrated the world was relatively limited. This literature argues that trade was of little importance even for the cotton industry, where industrialization was fastest and most pronounced: first, it accounted for only a small share of economic activity, and furthermore, there would have been domestic substitutes for both inputs and markets at relatively little opportunity costs (Thomas and McCloskey 1981; O'Rourke et al. 2010, 110; Zahedieh 2014).

The disagreement is not about whether "ghost acreage" derived from the land and labor of the New World expanded the economy Western Europe, as there is agreement that it did even among the critics. Rather, the objection is that the magnitude of the actual contribution was not that big relative to what is needed to explain income divergence. McCloskey reckoned that at most 13 percent of any change in income in England can be explained by foreign trade (McCloskey 1994). Furthermore, export markets in cotton could not have been an engine of growth if they only acquired prominence at a point in time well into the industrialization process (Thomas and McCloskey 1981).

The relevant question seems to be not whether Britain would have survived a more limited comparative advantage in food production, but whether Britain was dependent on trade to such an extent that without it, industrialization would have failed. Harley estimates that self-sufficiency in 1860 would have cost Britain 6% of national income, a minor fraction of the total rise in output that needs to be explained.[6] From 1855 to 1913, output per worker in Britain rose by roughly 80%, and thus trade, as Harley (1994) notes, would seem to account for "only one-thirteenth of the story".

If imports were not that high, could it be the case that a significant part of the industrial revolution was financed by repatriated profits from slave trading and slave plantations to Britain, as the so-called 'Williams' hypothesis' argues? Like the above calculation on imports, one critic of this hypothesis concluded that the argument would 'founder on the numbers' (O'Brien 1982, 16): total profits, as such, did not make up a large share of British investments. A counterargument is that such calculations rely on the strong assumption of full employment of resources (i.e., there is an almost equally valid alternative with little opportunity cost), and that most individual magnitudes are small in comparison to national income (Findlay 1990, Zahedieh 2014).

As rough and simplistic as they are, the calculations of Thomas, McCloskey, Harley, and other authors dovetail with the recent theoretical and empirical literature by trade economists that have quantified the gains of trade for more recent periods with fully-specified general equilibrium models. Based on theory and employing a variety of counterfactuals, Costinot and Rodriguez-Clare (2014) compute the welfare of forty countries (27 in Europe and 13 other major countries) based on the observed levels of international trade in the year 2008.

[6] Assuming a prohibition of trade would have reduced the price of exportables to importables by 50%, and the share of imports in income is assumed to be half of what it actually was (25%) = 50% x 12.5%, or 6%.

They then re-compute incomes for the counterfactual case where trade costs are infinite, implying there is no international trade. The difference in incomes can be thought of as the welfare gains of going from autarky to the observed levels of trade in 2008. On average, across all countries, this is about 15% of annual GDP (Costinot and Rodriguez-Clare 2014, Table 4.1).[7] Specifically, for the Netherlands, gains are around 24%, for Great Britain, about 12%, and for the larger countries China and the US, the gains are about 4%. Alternatively, they calculated hypothetical welfare losses of applying 40% tariffs on all trade partners – only 1.5% of income in 2008, suggesting that even a fairly large decline in trade barriers generates limited gains.

Although these estimates are for contemporary periods, the fact that trade as a fraction of national income was much smaller in the past suggests that in the 18th or 19th trade gains would have been below the estimated 15% of annual income. The result shows that at least as far as the static effects of trade are concerned, the potential gains from international trade are unlikely to have generated the large divergence in growth rates in global developments of the nineteenth century, even if it did contribute to them.

Of course, the extent to which actual trade flows and specialization patterns follow Ricardian differences in efficiency, differences in endowments, or other factors is difficult to ascertain empirically given the multitude of factors that affect trade historically. But one rare example where specialization patterns and shifts in relative prices have been assessed in a specific historical context is the forced opening of the Japanese market after 1853. Employing a factor abundance trade model with detailed data before and after Japan's opening, the estimated comparative advantage-based gains from autarky to trade is between 5% and 9% of GDP (Bernhofen and Brown 2005, Table 4). While non-negligible, these estimates are consistent with comparative advantage-, specialization-based gains from trade being fairly small relative to the difference in income between countries that need to be explained (in Japan's case, the income change of before versus after the Meiji restoration).

### Trade and Domestic Market Efficiency

An important part of the European story of growth is not only the Atlantic trade between the Old World and the New World, or between developed Europe and lagging Europe, but also of the very rapid growth in trade and integration of markets within West European markets from the 18th to the 19th centuries. As discussed in Part I, a standard method of evaluating the efficacy of trade for different time periods and regions comes from price studies, since the behavior of prices in different markets are affected by all types of trade costs, even those related to institutions or property rights. Unlike the estimates that focus on the value of imports or the profits from trade, which tend to capture specific aspects of the value or quantity of trade in the aggregate, or of goods categories, price studies tend to focus on questions of the efficiency of markets.

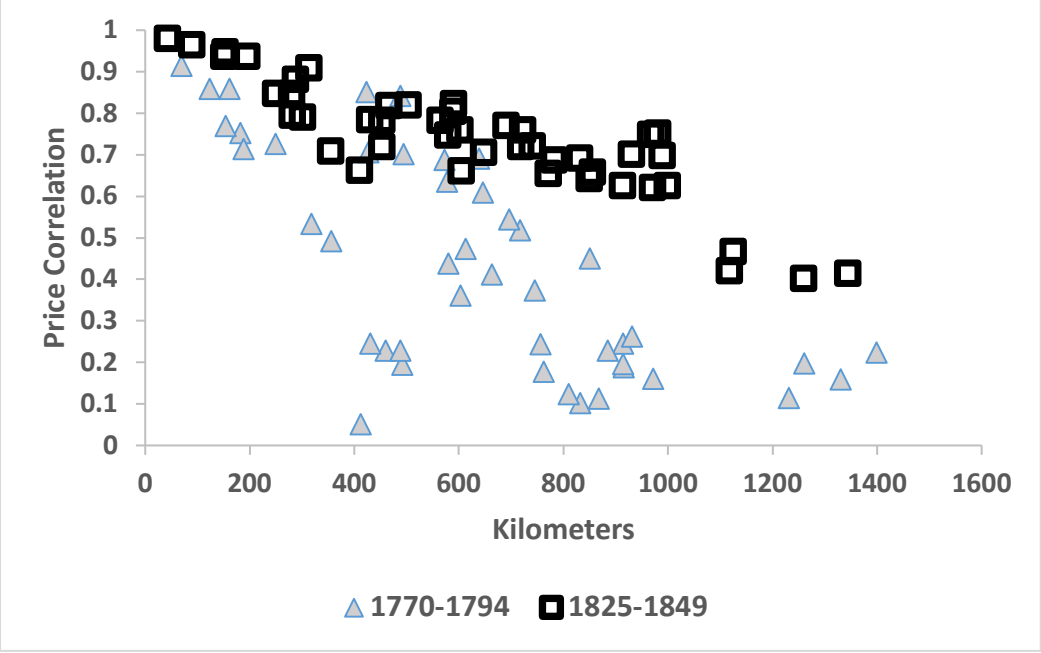
Price data confirms the key elements of the qualitative history about when and where markets developed first, showing that a critical juncture can be dated to between the late

[7] We focus here on the most plausible model assumptions for the period 1700 to 1870, shown in columns 2 and 3, with multiple sectors but no intermediate goods trade.

18th century and the early 19th century. To compare market performance visually, we plot bilateral correlations between grain markets—since grain is a commonly traded commodity, grain markets will reflect aspects of market conditions more generally. Price correlations tend to decline the further apart are markets, consistent with idea that as distance increases, trade becomes more costly, and so higher is the correlation, the more integrated are the markets.

European markets in the 19th century were very different from what it had been in the preceding centuries. Figure 1, based on Shiue and Keller (2007), plots bilateral price correlations for wheat between ten centrally to moderately important markets in Europe, conditional on distance for two 25-year periods: 1770 to 1794 and 1825 to 1849. The two samples are slightly different due to data availability, but both samples are based on central locations in France, the German speaking regions, and the Low Countries. Significant improvement in market performance from the late eighteenth to the nineteenth century is apparent: the correlation at all distances increases strongly and the slope of the correlation decline much more slowly with distance in the nineteenth century compared to the eighteenth.

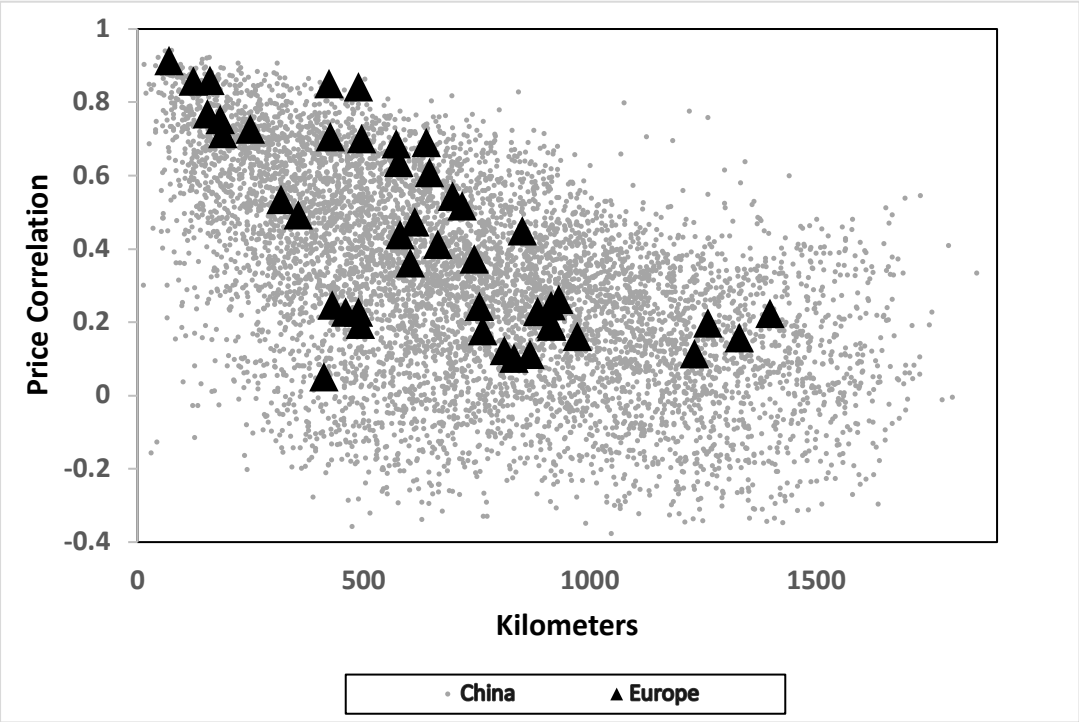
**Figure 1. European Markets 1770-1794 and 1825-1849**




To understand what this improvement means in global terms, Figure 2 plots the late 18th century European sample against a Chinese sample consisting of all prefectural markets in the ten central and southern provinces. The Chinese sample is more comprehensive than the European sample (a total of 14,520 points are plotted for China) and includes not only key trading hubs, but also peripheral regions. Nevertheless, there is a great deal of overlap

and little evidence that Europe was more exceptionally more integrated than China before the 19th century.

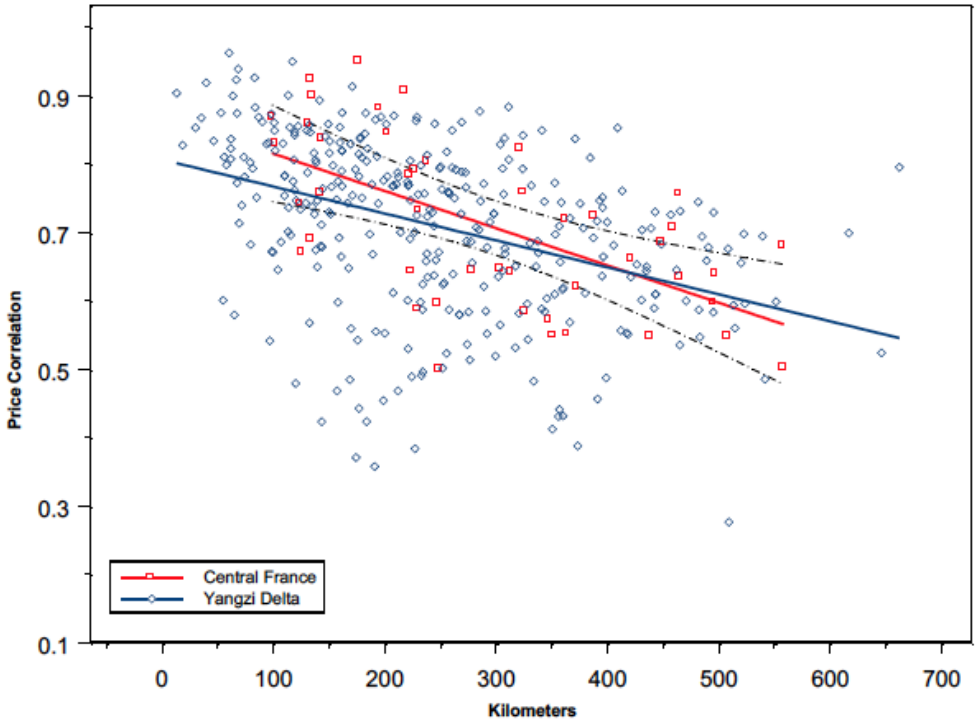
**Figure 2. China and Northwest Europe, 1770-1794**




Notably, economies of England and Western Europe became notably more integrated simultaneously with their industrialization, or even after industrialization has begun. Market integration in England in the late 18th century was somewhat higher than in Yangzi Delta for distances under 400 km—but English markets were also performing better than France, Germany, and other European markets (Shiue and Keller 2007). With respect to England, since industrialization in England is commonly believed to have already started by 1770, the high levels of integration seen in the late eighteenth century does not predate industrialization. It is also instructive to consider France, a country that would industrialize soon after Britain. Up until the late eighteenth century, integration among markets of France was comparable to that of the Yangzi Delta; see Figure 3.

Of course, inefficient markets—and the numerous and varied reasons behind why markets might perform poorly—will reduce the likelihood of growth occurring. However, if we ask whether market efficiency can consistently *predict* growth, or in this case, give rise to the great divergence, the results are in line with the estimates of the gains of trade. Efficiency may have contributed to welfare increases, but the advantage, if there was any, enjoyed by the earlier industrializers was unlikely to have been a necessary and sufficient condition for generating industrialization.

**Figure 3. Price Correlations of Yangzi Delta compared to France, 1770-1794**




## IV. Growth effects of trade

The low static gains from trade reported above are not the end of the link between trade and growth. Econometric estimates in the framework of growth regressions typically suggest larger gains than those based on static general equilibrium models (Frankel and Romer 1999). This requires an explanation of how trade affects growth besides static efficiency gains. For example, trade might be a proxy of underlying changes in institutions that promote growth more effectively than trade itself. The institutions that make trade possible are also likely to make property rights more secure. Trade also contributes to knowledge about new products, markets, practices, preferences, organizations, opportunities, religions, and legal systems. The question seems to be whether we can separate observable qualities about institutions that benefit the economy anyway, from those institutions that exclusively impact on trade (Shiue and Keller 2007, Nunn and Trefler 2014). Keller and Shiue (2019) investigates the impact of institutional change on market integration, showing that institutional reforms can lead to changes not only in a given economy with reforms, but the impact is multiplied through openness and the integration of markets.

One influential argument at the intersection of trade and institutional changes is that by Acemoglu, Johnson, and Robinson (2005) who show that trade is positively related to urbanization. Here, contrary to the static considerations above, international trade does not

matter in itself so much as through the effect of trade on improving institutional quality. They argue that in the non-absolutist countries of Western Europe, relatively open access to trading aided the economic, and later political, rise of new capitalist merchant elites that changed the institutional environment towards more secure property rights, which later also benefitted industrial innovators and entrepreneurs, and thus contributed to industrialization. On the other hand, societies that failed--as a consequence of European intervention (Acemoglu, Johnson, and Robinson 2001) or because of control of trade through the crown (as in Spain and Portugal)--to achieve such an institutional framework, also failed to reap the institutional and long-run economic benefits (Pascali 2017).

Furthermore, trade and general openness to ideas can be a vehicle for the transfer of ideas and a stimulus for technological development. In a simple Smithian framework, larger markets imply more specialization and enhanced learning by doing, especially before the advent of systematic applied scientific inquiry (Persson and Sharp 2015, chapter 2). More formally, Desmet and Parente (2012) argue that with larger markets, there arises higher demand elasticities. This leads to increased profits for larger firms, and potentially more innovation (Findlay and O'Rourke 2009, 344, Meissner 2014).

A second reason that trade could have a wider impact on the economy is that trade introduces new goods to a country. This possibility addresses the criticism that traditional static computation of gains of trade assumes domestic production can provide close enough substitutes of imports, if at a higher opportunity cost. Even if the volume of imports is not large, new goods could provide great benefits since if the importing country cannot produce those goods, for example, for climatic or geological reasons (Ossa 2015). For Europe, such commodities included pepper, tea, cane sugar, silk, cotton, indigo, nutmegs or cloves, and certain furs in the period after 1500. Today, precious metals like gold and silver as well as oil would be outstanding examples for trade based on geological endowments.

In Europe, new and more varieties of goods likely also promoted an 'industrious revolution', increasing work effort and market orientation in the population (De Vries 1994). In Asia, new goods may have had similar effects, but greater access to European goods among consumers was delayed until the mid-nineteenth century, when ports of trade in Japan as well as in China were forced open by Western troops. But even as Western powers took control of China's customs houses and tariff policy, and installed their own legal institutions in China, trade increased incrementally in the first decades. Only later, as trade expanded beyond Shanghai and to ports along the southeast coast and the trunk lines of the Yangzi River, did exports and imports increase not only in volume, but also in their diversity.

The patterns in the types of commodities traded with China suggests that trade, even when forced, produced increases in welfare for all trading partners. In addition, new goods introduced via trade could result in competition effects or innovation responses. For example, among the new goods imported to China in the nineteenth century were machines, for which domestic firms initially lacked the know-how, but over time learned to copy and reconstruct them. Similarly, trade in porcelain, silk textiles, and other goods may lead to the establishment of new forms of manufacturing in foreign countries. To the extent that foreign goods, in and of themselves, embodies a flow of technology, quality standards, or

manufacturing technique, the effects of trade are not limited to the static gains from trade analysis outlined above (Keller, Andres Santiago, Shiue 2017).

## Conclusions

The traditional gains of trade that have most studied are what can be called the static gains. Despite the positive correlation between trends in trade and growth, both empirically and in theory, the magnitude of the causal impact of trade on growth derived from static gains are not large relative to the gains reaped from industrialization. GDP gains from greater openness along these lines are too small to explain the emerging differences in per-capita GDP of the 1700 to 1870 period.

Such static gains are only one part of the story, however. Therefore, we discussed several possible extensions to current models and estimates, based on evidence suggesting a broader role for trade. Many of these extensions have a dynamic element, in which trade triggers something else that matters for growth, or is part of a larger process of growth. This could occur, for example, if growth itself creates large increases trade, or if trade interacts with another factor that matters for economic development. In this context, dynamic processes of learning, technology diffusion, and imitation of new goods might change the pathways by which trade ultimately affects domestic efficiency in the aggregate. This implies that much more than reductions in trade or transport costs are involved. In addition, openness of borders can generate incentives for migration, which can in turn transfer technologies across locations. Thus, migration in the eighteenth and early nineteenth century, although small compared to what happened after 1850 (de Zwart and van Zanden 2018, CEHMW ch. II.17), was probably another important factor, as evidenced by the fact that once transport technologies enabled intercontinental trade in bulky food stuffs large waves of migration led to the intensive cultivation of initially sparsely populated regions in North and South America, North and South East Asia and Oceania.

Thus far, dynamic gains have been challenging to capture in a definite way. However, reduced form estimates of trade and growth suggest these are quite important.
While these dynamic processes can be grasped in principle through theory and descriptive evidence, tracing the relative importance and impact through causal links – and thus ultimately revising the breadth of the multiple influences of trade outlined above – establishes a promising research agenda for economic historians in the decades to come.

**Table 1**

| Region (example) | Openness 1700 | Openness 1760 | Openness 1820 | Openness 1870 | Trade growth 1700-60 | Trade growth 1760-1820 | Trade growth 1820-1870 | Share of world exports in 1870 |
|---|---|---|---|---|---|---|---|---|
| United Kingdom | 8 | 15 | 8 | 19 | 1.6% | 1.8% | 4.9% | 19.5% |
| Continental Europe (France) | | | 5 | 12 | 2.3% (1716-1780) | -2.1% (1787-1821) | 4.6% | 44.4% (France: 11.2%) |
| Japan | | | | 3 | | | 14.3% (1860-70) | 0.3% |
| India | | | | 7 | (0.2%) (EIC) (-2.2%) (Surat) | (2%) (EIC) | 3.8% | 5.5% |
| China | | | 0 (1840) | 1 | | | 1.8% (1830-70) | 2.1% |
| South East Asia (Dutch East Indies) | | | (1) | (5) | ? | (2.6%) (VOC exports) | 4.8% (1822-1870) | 2.1% (Dutch East Indies: 0.9%) |
| Ottoman Empire | <2 | <2 | 2 | 6 | | | 4.3% | 1.7% |
| Latin America (Mexico) | | | (8) | (12) | | (0.6%) | 2.2% | Latin America and Caribbean: 9.0% (Mexico: 0.6%, Brasil: 1.9%) |
| Latin America (Brasil) | | | 27 | 23 | | 0.1% (1800-1830) | 4.9% | |
| Africa (Nigeria) | | | | (Africa: 16) | | | 3.2% | 3.1% (Nigeria: 0.1%) |
| Africa (Slave trade) | 0.3 | 0.7 (1790) | 0.3 | 0 | 0.8% | ? | -100% | n/a |
| Australia | | | 7 (1826) | 21 | | | 10.7% | 1.6% |
| United States | (9 Mid-Atlantic/ 24 Lower South, 1720s) | (9 Mid-Atlantic/ 22 Lower South, 1770) | 6 | 5 | 3.7% Mid-Atlantic / 4.3% Lower South 1720-70 | 2.0% (US, 1790-1820) | 4.3% | 8.4% |

Notes: Openness=Exports/Gross Domestic Product in current prices (if in parenthesis, data refers to estimates in constant prices). Trade growth per year is measured in constant prices. Share of world exports is measured current prices and refers to 1913 borders. Data for 1820

and 1870 based on Federico and Tena (2016, 2017, 2018), for periods before 1870 refer to chapters I.1, I.5, I.6, I.10 and the sources given in appendix 1.

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Appendix 1: data sources for Table 1 (can be put online).

Openness UK 1700 and 1760: Crafts (1985, p. 131). Trade Growth UK 1700-1760, calculated from Bank of England, A millennium of macroeconomic data, v. 3.1, 1760(1772)-1820 based on Cuenca Esteban 2001. Trade growth France 1716-1780 from Daudin (2001, p. 166), 1787-1821 calculated from Ricardo (http://ricardo.medialab.sciences-po.fr/#/); trade growth India 1700-1760 and 1760-1820 refer to nominal values: 1700-1760: East India Company exports from Chaudhury (1978, 508-10, value 1699-1701 compared to 1658-60 for Madras, Bengal and Bombay), for Surat based on Swarmy (ch. I.5) and Das Gupta (1970, p. 383). East India Company export growth, total invoice value 1760/2-1819/21 of British imports from Madras, Bengal, Bombay from Bowen (2007). Indonesia trade growth 1760s-

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