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Globalization in History: a Geographical Perspective.*

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Abstract:

This paper argues that a geographical perspective is fundamental to understanding comparative economic development in the context of globalization. Central to this view is the role of agglomeration in productivity performance; size and location matter. The tools of the new economic geography are used to illuminate important episodes when the relative position of major economies radically changed; the rise of the United States at the beginning and of East Asia at the end of the twentieth century. It is suggested that while lack of high quality institutions has been a major reason for falling behind geographic disadvantage also merits attention.

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1. Introduction

Globalization is about the changing costs of economic interactions across distance and the effects of these changes on the geographical distribution of economic activity. Technical change has been driving the costs of interactions steadily downwards for many centuries, although policy interventions have sometimes raised them. Changes in the economic geography of the world economy have been more complex. There have been periods when activity has become more unevenly distributed across space, and periods when these spatial differences have narrowed as activity has spread out of established centers into other regions and countries.

The mechanisms driving these changes were, amongst other things, easier movement of people, capital and goods – 'globalization'. But why did the location of economic activity evolve in the way it has? Why did the world not develop some quite different economic geography, with different centres of production, or with activity more evenly distributed? Many factors are important, but in this chapter we highlight the role of geography. This includes the 'first nature' geography of oceans, rivers, mountains and endowments, although our focus will be mainly on the 'second nature' geography of the spatial interaction between economic agents. The essence of globalization is that it changes these spatial interactions.

Most traditional analyses are based on economic models in which there are diminishing returns to most activities. Thus, migration tends to reduce the wage in the host country, and an increase in manufacturing output encounters increasing costs. We argue in this paper that it is not possible to interpret several of the most important aspects of economic development in such a framework. An alternative is provided by models of 'new trade theory' and 'new economic geography' in which market imperfections at the micro level can give rise to increasing returns at a more aggregate level. The balance between increasing and decreasing returns in these models depends crucially on spatial interactions (determining, for example, the extent of the market) and changes in these interactions can have major effects. Globalization can trigger cumulative causation processes that cause uneven development to occur at a variety of different spatial levels – urban, regional and international.

Our objective in this paper is to apply this new approach to several aspects of the historical experience of globalization. We proceed in three stages. First we sketch out some of the facts

about the changing location of activity and the way that spatial interactions between economic agents changed over time. There were dramatic falls in the costs of moving goods, people and information, occurring particularly from the 1870s onwards. The falling costs were associated with large increases in trade relative to income, narrowing of international price gaps, and increases in migration flows. Second, we outline theoretical approaches to thinking about the consequences of these changes. One approach is the neo-classical model of production and trade in which production is determined by factor endowments, technological differences and the freeness of trade. We contrast this with a new economic geography approach in which locations derive some of their comparative advantage from scale, and ability to exploit scale is in turn limited by the extent of the market. In this approach firms seeking profitable locations will be drawn to locations with good market access and proximity to clusters of related activities, as well as locations with appropriate factor endowments. We show that this alternative view provides a broad brush picture that, in many respects, seems consistent with the historical record.

We then turn to look in more detail at several historical episodes. From the nineteenth century we focus on the rise of New-World economies and the development of urbanisation. We confront the central issue of early twentieth century economic history, namely how the United States came to overtake other regions, and argue that insights from new economic geography can shed important light on this change. From the late twentieth century we revisit the East Asian Miracle, the most spectacular shift of the center of gravity in the world economy since the rise of the United States.

In pursuing the theme that geography matters for economic development we are consciously swimming against the tide of recent work both in economic history and in growth economics. Economic historians, notably in the new institutional economic history (North, 1990), have stressed the impact of incentive structures on investment and innovation and have argued that divergence stems from the path dependency of institutional arrangements. Endogenous growth models also tend to underline the centrality of microeconomic foundations for growth outcomes (Aghion and Howitt, 1998), while neoclassical growth economists still believe in ultimate (twenty first century) convergence, following a post Industrial Revolution interlude of divergence due to lags in the diffusion of best practice institutions, policies and technology (Lucas, 2000). Our position is that these conventional wisdoms are significantly modified by taking into account the way that changing costs of distance interact with economies of scale to shape the economic

geography of the world.

A stylised version of this alternative perspective can be outlined as follows. If trade costs are very high then economic activity must be dispersed, while if trade costs are very low then firms will not care whether they are close to markets and suppliers. At intermediate levels of trade costs, however, the likelihood of agglomeration is high. Agglomeration forces operating through linkages across a wide range of activities will cause the world to divide into an industrialized rich 'center' and de-industrialized poor 'periphery' even if there are no differences in institutional quality or economic policy. Over time a number of mechanisms, including falling trade costs and growing world demand for manufactures, will make a new location outside the center become competitive, so industry moves there and it now benefits from agglomeration effects. Following the initial agglomeration phase, development therefore takes the form of enlargement of the set of countries in the 'center'. This is not a process of steady convergence of poor countries to rich ones but rather the rapid transition of selected countries (close to and/or with good transport links to the 'center') from the poor to the rich club.

2. Location and Trade Costs: the historical record.

In 1750 more than 50% of the world's industrial output was produced in China and India, compared to some 18% in Western Europe. The following 80 years saw the Industrial Revolution, with Western Europe's industrial output more than doubling and that of the UK increasing by a factor of seven. Over the same period industrial production in China and India continued to increase (by around 20%). It is not our purpose to analyse the origins of the industrial revolution but instead to study the changing economic geography of the world from this point on. The technological changes that resulted from the industrial revolution, notably in the form of the harnessing of steam power not only raised European industrial output but also facilitated large reductions in both inland and ocean transport costs associated with the coming of the railroad and the steamship.

2.1. Location of production; the three phases.

Figure 1 shows the shares of world GDP attributable to major regions of the world economy at selected dates from 1820 onwards, and figure 2 gives shares of industrial production for the same regions from 1750 on. Three main phases are apparent in both figures, although more pronounced for industrial production than for GDP as a whole. The first phase is the rise of the

UK and Western Europe as a whole and dramatic collapse of China and India from these start dates through to the latter part of the nineteenth century. This period saw not only a decline of industrial production in China and India relative to the rest of the world but also an absolute fall such that 1830s' levels were not regained until the 1930s (Bairoch, 1982). The second phase is the rise of North America. Its share of world GDP and industrial output increased most rapidly from the American Civil War to the start of the Great Depression, peaking shortly after World War II. The third phase is revealed in the data for 1998, but has its origins in the post-war 'Golden Age' of growth, namely, the large and rapid increase in the shares of Japan, China and other East Asian countries in world GDP and industrial output.[1]

These phases correspond first to a concentration of activity in the UK and North-Western Europe (Phase I), and then to two different phases of dispersion, first to North America (Phase II), and then to parts of Asia (Phase III). Figure 3, which reports shares of world population, underlines the tendencies towards concentration especially in industrial production which became apparent during and after the nineteenth century. Whereas in the 1820s China and India accounted for a little over half the world's population and a little under half of world GDP and industrial production, by 1913 Western Europe and North America with about a fifth of the world's population produced over half of world GDP and nearly three-quarters of world industrial output. By 1998, with a rather smaller share of world population, these countries still accounted for well over half of world industrial output while China and India with over 40 per cent of population produced only about 8 per cent of industrial output.

Figure 4 reports manufacturing exports (from 1876-80 onwards). Here there is evidence of even more concentrated activity. In the late nineteenth century the UK looms very large with over a third of all exports even though only representing about 2.5 per cent of world population. It was then superseded as the world's leading exporter by the rise of North America that accounted for over a quarter of manufactured exports in 1955 with only about 6 per cent of world population. (Europe looks large in the figure relative to the US, essentially because intra-European trade is reported, in contrast to intra-US trade). The remarkable feature of the last decades of the twentieth century was the rise of Chinese, Japanese and other East Asian manufactured exports, representing a real breakthrough for newly industrializing countries.

2.2. The history of transport costs.

While distance remains a barrier even at the start of the twenty first century, the continuing communications revolution has been one of the most outstanding features of the last two hundred years. Table 1 reports on the cost of ocean shipping for selected years since 1750. The period between 1830 and 1910 emerges as the era of very substantial decreases and by the late twentieth century ocean shipping rates in real terms were about a sixth of the level of the early nineteenth century.[2]

Table 1. Real Costs of Ocean Shipping (1910 = 100)

1750	298	1910	100
1790	376	1930	107
1830	287	1960	47
1870	196	1990	51

Sources: derived using Dollar (2001), Harley (1988), Isserlis (1938)

Ocean shipping is only a small part of the story, however, especially for the nineteenth century. This was also a period of spectacular declines in inland transport costs which between 1800 and 1910 fell by over 90 per cent (Bairoch, 1990, p. 142). After World War II, however, new modes of transport became important and by 1980 the real costs of airfreight had fallen to about a quarter of its level on the eve of World War II (Dollar, 2001).

Trends in barriers to trade created by policymakers also need to be taken into account. Here the broad trends are well known even though details are sometimes elusive. The estimate of the unweighted world average tariff rate given by Clemens and Williamson (2001) and illustrated in figure 5 rises from about 12 per cent in 1865 to 17 per cent in 1910. In the interwar period, at a time when transport costs had ceased falling, trade wars pushed the Clemens-Williamson tariff rate up to 25 per cent at its 1930s peak and, in addition, quantitative trade restrictions proliferated affecting perhaps 50 per cent of world trade (Gordon, 1941). After World War II, the Clemens-Williamson tariff rate is in the range 12-15 per cent where it remains until the 1970s after which it falls to a low of 7-8 per cent in the late 1990s. The quantitative restrictions of the 1930s and 1940s among the OECD countries were largely removed in the postwar liberalization phase and, despite a revival in the era of voluntary export restraints in the 1970s and 1980s, post-Uruguay Round these are probably as low as at any time since World War I (Daly and Kuwahara, 1998).

Concurrent with these changes in trade costs and tariffs have been changes in ratio of foreign trade to world GDP, reported in Table 2. In the early nineteenth century trade costs are so high and trade volumes so low (around 1% of GDP) that, of necessity, most production is located close to local markets. This constraint becomes relaxed through the nineteenth century, permitting the agglomeration of manufacturing to occur. After the reverses of the inter-war period the growth of trade relative to income resumes, again allowing new economic geographies to develop.

Table 2. World merchandise exports/world GDP (%)

1820	1.0	1950	5.5
1870	4.6	1973	10.5
1913	7.9	1998	17.2
1929	9.0		

Source: Maddison (2001)

Nevertheless, at the beginning of the twenty-first century distance is still a powerful barrier to economic interaction. Gravity modelling finds that, controlling for the economic mass of the countries concerned, trade between them falls off steeply with distance. The elasticity of trade flows with respect to distance is typically estimated to be between -0.9 and -1.5, and the implications of this for trade volumes are given in the first column of Table 3 that expresses trade volumes at different distances relative to their value at 1000km. With an elasticity of -1.25, trade volumes at 4000km are down by 82% and by 8000km down by 93%. Similar methodologies have been used to study other sorts of economic interactions, and some results are summarised in remaining columns of Table 3. Portes and Rey (1999) study cross-border equity transactions (using data for 14 countries accounting for around 87% of global equity market capitalisation, 1989-96), and their baseline specification gives an elasticity of transactions with respect to distance of -0.85, so that flows at 8000km are less than one-fifth those at 1000km. Foreign direct investment (FDI) flows are studied by Di Mauro (2000) who finds an elasticity with respect to distance of -0.42. The effect of distance on technology flows has been studied by Keller (2000) who looks at the dependence of total factor productivity on R&D stocks for 12 industries in the G-7 countries, 1971-95. The R&D stocks include both the own country stock, and foreign country stocks weighted by distance.[3] Both own and foreign country stocks are significant determinants of each country's productivity and so too is the distance effect, with R&D stocks in

distant economies having much weaker effects on productivity than do R&D stocks in closer economies, so that the effect at 8000km is only 5% of its effect at 1000km.

Table 3: Economic interactions and distance.
(Flows relative to their magnitude at 1000km)

	Trade	Equity flows	FDI	Technology
1000km	1	1	1	1
2000km	0.42	0.55	0.75	0.65
4000km	0.18	0.31	0.56	0.28
8000km	0.07	0.17	0.42	0.05

Sources: see text.

3: Location and Trade Costs: Theory.

How have the changing costs of spatial interactions shaped the geography of world economic activity? In this section we show how theory suggests that declining costs can explain the observed phases of concentration and of dispersion.

3.1 The location of activity:

Two sorts of considerations determine the structure of production and level of income of a country or region. One is its internal capacity, depending on its endowment of stocks of factors of production, skills, knowledge, and social infrastructure. The other is its relationship with other countries or regions; its geography, meaning the access that it has to world markets and to external supplies of goods, factors, and knowledge.

Traditional trade theory's analysis of location focuses heavily on the endowments of primary factors of production. Special cases of the approach are the Heckscher-Ohlin trade model (with equal numbers of goods and factors) and the specific factors or Ricardo-Viner model, with more factors than goods. Both models show how, given world prices, the production structure and income of each country is determined, with countries tending to export goods intensive in their abundant factors. What are the predictions of these models about the effects of globalization? The first is that goods trade liberalization allows countries to exploit their comparative advantage more fully so that we expect to see land abundant countries becoming increasingly specialized in agricultural products, and so on. The second prediction derives from the fact that factor mobility

and goods trade are, in general, substitutes. This means that goods trade liberalization reduces factor price differences between countries and thereby reduces the incentives for migration and capital movements.[4] Conversely, factor mobility will in general reduce trade flows, as factors flow to countries where they are relatively scarce, and thereby reduce the cross country endowment differences that are the basis of trade.

The traditional approach is based on constant returns to scale in production, whereas new trade theory and new economic geography are based on increasing returns within the firm, and possibly in the economy more widely. The analysis focuses on the location decisions of firms and workers. Drawing on developments made in trade theory in the 1970s and 80s, manufacturing production is modelled as distinct increasing returns to scale firms operating in imperfectly competitive markets (usually monopolistically competitive). There is intra-industry trade, as firms – subject to transport costs and trade barriers—sell their products into each market. What determines whether a country is profitable place for a firm to locate? As in traditional theory, factor prices and factor supplies matter. So too does geography, as firms seek to locate close to large markets and to good sources of intermediate input supply. The fact that locations with good market access are particularly attractive means that these locations will typically have a disproportionately large share of manufacturing firms and can support substantially higher wages than remote regions.[5]

Two implications follow from this. The first is that size matters: a location with a large market will tend to draw in manufacturing activity, possibly bidding up the wage in the location. The second implication follows from combining this with labor mobility. If labor is mobile between locations then the higher wage will attract labor inflow, enlarging the market still further. This interaction between firms wanting to locate in large markets and demand from their workers enlarging the market provides the basis for a process of cumulative causation leading to spatial concentration of activity. Krugman (1991a) shows how, if transport costs are low enough, mobile factors will agglomerate in just one location.

While labor mobility can provide a basis for agglomeration of activity, it is not a necessary condition for it to occur. Much of the demand for firms' output comes not from final consumers but from other firms that purchase intermediate goods and services. Thus, as downstream firms move to a location they enlarge the market for upstream firms, and as upstream firms move they

increase the supply and lower the price of intermediate goods. This interaction can create cumulative causation and clustering of linked industrial activities in a location (Venables, 1996). The process is no more than the interaction of forwards and backwards linkages that received so much attention in the development literature of the 1960s, and whose origins date back (at least) to Marshall (1890), in whose words,

> 'Subsidiary trades grow up in the neighbourhood, supplying it with implements and materials, organising its traffic, and in many ways conducing to the economy of its material… the economic use of expensive machinery can sometimes be attained in a very high degree in a district in which there is large aggregate production of the same kind….subsidiary industries devoting themselves each to one small branch of the process of production, and working it for a great many of their neighbours, are able to keep in constant use machinery of the most highly specialised character, and to make it pay its expenses…

The contributions of the new literature are to identify circumstances under which these linkages will lead to clustering of activity and the extent to which they support wage differences between locations. As we will see, outcomes depend critically on the level of trade costs, so clustering occurs at some levels of trade costs, and dispersion at other levels.

Other forces too can give rise to spatial clustering of activity and we note just two further mechanisms, drawing on Marshall's treatment. His second clustering force is a thick labour market:

> 'A localized industry gains a great advantage from the fact that it offers a constant market for skill. Employers are apt to resort to any place where they are likely to find a good choice of workers with the special skill which they require; while men seeking employment naturally go to places where there are many employers who need such skill as theirs and where therefore it is likely to find a good market. The owner of an isolated factory, even if he has good access to a plentiful supply of general labour, is often put to great shifts for want of some special skilled labour; and a skilled workman, when thrown out of employment in it, has no easy refuge'

This – while undoubtedly important -- has received much less attention in the modern literature, although see Krugman (1991b) for a rudimentary model.

The third mechanism is geographically concentrated technological externalities:

> The mysteries of the trade become no mystery; but are as it were in the air… Good work is rightly appreciated, inventions and improvements in machinery, in processes and the general organisation of the business have their merits promptly discussed; if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and this it becomes the source of further new ideas…

This idea is applied in much of the regional and urban literature (see for example Henderson 1974), as well as in some older trade literature (Ethier 1979). It is perhaps best viewed as a black box for a variety of difficult to model yet important proximity benefits.

3.2 History of the world?

Once these clustering forces are put in a full general equilibrium model of trade and location, what happens, and what predictions are derived for the effects of globalization? A sweeping view of world history is provided by the model of Krugman and Venables (1995) which studies the effects of falling trade costs on industrial location and income levels. Their model has just two countries (N and S), endowed with the same quantities of internationally immobile labor. There are two production sectors, perfectly competitive agriculture, and manufacturing. Manufacturing has increasing returns (modelled as monopolistic competition) and forward and backward linkages (modelled as firms using manufactured products as well as labor to produce output for use by other firms as well as for final consumption).

The Krugman and Venables story is summarized in figure 6 that has trade costs on the horizontal axis and real wages in North and South on the vertical axis. At very high trade costs the two economies have the same wage rates ($w_N = w_S$), reflecting the fact that they are identical in all respects. The linkages between manufacturing firms create a force for agglomeration but when trade costs are high these are dominated by the need for firms to operate in each country to supply local consumers. As trade costs fall (moving left on the figure) so the possibility of supplying consumption through trade rather than local production develops, and clustering forces become relatively more important. At point A clustering forces come to dominate, and the equilibrium with equal amounts of manufacturing in each country becomes unstable; if one firm relocates from S to N then it *raises* the profitability of firms in N and *reduces* the profitability of firms in S, causing further firms to follow. Four forces are at work. By moving to N the firm raises wages in N and increases supply to N consumers, both aspects tending to reduce profitability in N. But against this it increases the size of the N market (the backward linkage, creating a demand for intermediates) and reduces the costs of intermediates in N (the forward linkage, offering a supply of intermediates). The last two effects come to dominate and we see agglomeration of industry in one country, this raising wages in the country with industry, as illustrated.[6]

For a range of trade costs below A, the world necessarily has a dichotomous structure. Wages are lower in S, but it does not pay any firm to move to S as to do so would be to forego the clustering benefits of large markets and proximity to suppliers that are found in N. However, as trade costs fall it becomes cheaper to ship intermediate goods; linkages matter less so the location of manufacturing becomes more sensitive to factor price differences. Manufacturing therefore starts to move to S and the equilibrium wage gap narrows. In this model wage gap goes all the way to factor price equalization when trade is perfectly free -- the 'death of distance'.

The relationship between the model and our earlier discussion of the changing spatial patterns of industrial location is apparent. Falling trade costs combined with industrial linkages offer an explanation of both the concentration of manufacturing activity and its dispersion. As trade costs go from very high to somewhat lower levels there is de-industrialization of some regions and widening income gaps – the first phase of concentration of activity. At lower levels of trade costs industry starts to spread out of established centers to some lower cost regions.

Of course, the model is stylized, and many extensions are needed if it is to be convincingly linked to the historical record. We discuss some of these in detail in following sections, and outline them here. Most obviously, figure 6 assumes international immobility of labor. Labor migration can be an additional force for agglomeration – at the city and regional level, as well as internationally – and was clearly important historically, notably in the nineteenth and early twentieth centuries. We return to this in section 4. Also, the story needs to be enriched to include many countries, many sectors and other clustering mechanisms. If there are many countries then the convergence phase is no longer smooth; it involves an increasing number of locations with industry, rather than steady industrialisation of them all. Other clustering mechanisms may interact with trade costs in different ways from the linkages described above. For example, the strength of clustering forces arising from labor market skills is likely to be largely unaffected by trade costs. In sectors where this is important falling trade costs will not bring about the death of distance, and clusters are likely to remain in place. We take up some of these issues in following sections, and formal analysis of them is undertaken in Fujita, Krugman and Venables (1999).

4. The Nineteenth Century

We have already shown the potential that a geographical approach has for the explanation of one of the three phases highlighted in figures 1 and 2, namely, the decline – absolute as well as

relative – of industrial activity outside the emerging core of North-Western Europe. In this section we want to pursue two further aspects of the 19th century experience in greater detail. One is the rise of the New World, and the other the growth of urbanization.

4.1 The economic development of the New World

Following the relative and absolute decline of the Asian economies, the other main change in the economic geography of the 19th century world was the rise of the New World, and within this the particular dominance of the United States. By 1913, the USA was a leading industrial producer and a successful manufacturing exporter. Its industrialization, accomplished behind high tariff walls, was concentrated in the "manufacturing belt" of the North East, a region with the highest GDP per person in the world. This had not seemed at all probable in 1860 when America's role in the world economy was apparently destined to be that of a large primary products exporter based on an abundant endowment of natural resources.

This prompts two obvious, related questions. First, why did the United States rather than Latin America become the area that overtook the UK and the rest of Europe in real GDP/person? Second, why did the United States also become the only non-European country to establish a position as a net manufactured exporter? In 1913, while Canada, Latin America and Oceania had net imports of manufactures to the value of $525mn, $828mn, and $361mn, respectively, the United States had net exports of $368mn and already represented the third largest share in world manufactured exports (Yates, 1959).

The contrast with the overall experience of Latin America was marked. The nineteenth century can be seen as a period when Latin America fell seriously behind, although by 1913 its most successful economy, Argentina had experienced several decades of rapid growth and had an income level greater than many European countries. Even so, Argentina had failed to match the USA over the course of the nineteenth century from a position of near parity of incomes per head in 1800 (Coatsworth, 1998). Latin America as a whole, which accounted for slightly more of world GDP than the United States in 1820, produced only 4.5 per cent in 1913 compared with 19.1 per cent for the United States and fell from a level of GDP/person at 52.9 per cent that of the United States in 1820 to 28.5 per cent in 1913.

Recent interpretations of these developments by economic historians have stressed the differing

role of institutions and rent-seeking in North and South America and the political economy configurations from which they emerged. North et al. (2000) pointed to the unfortunate legacy of the ending of Spanish colonialism and an associated failure to establish secure political foundations for economic growth in Latin America and contrasted this outcome with the aftermath of British rule in the USA which resulted in a constitution with strong protection of property rights. They see this as the crucial difference: "No deus ex machina translates endowments into political outcomes. If that were so, Argentina would be as rich as the United States" (North et al., 2000, p. 19).

Engerman and Sokoloff (1997) also argued that institutions made all the difference to development outcomes between Latin and North America but placed their emphasis on the role of initial factor endowments in creating institutional divergence which exhibited path-dependent tendencies. Interestingly, one of the ways in which their story plays out is through different implications for labor inflow with small family farms in North America conducive to good institutions and greater equality of wealth and political power which underwrote both rapid growth and high immigration.

Similarly, David and Wright (1997) have pointed to several highly favorable aspects of American institutions and policies for the exploitation of abundant resources that led to American primacy in the minerals-based, resource intensive technology that was central to technological progress in the early twentieth century. These included promoting education and scientific research in relevant disciplines, subsidizing transportation and organizing geological surveys and sustaining minerals property rights but without claiming government entitlement to royalties. Organized thus, American endowments promoted a technological trajectory that no European country could emulate.

We have no wish to dispute these claims but we do suggest that it is important that they are placed more firmly in a geographic context. In particular, we believe that size and increasing returns to scale mattered. Table 4 displays some information on the size of the USA compared with other leading New World economies and the UK. In addition, we disaggregate the United States into the North East and other regions. It is clear that, by 1870, when international transport costs began to fall rapidly, the USA was already a very large economy.

Table 4. Population, GDP, and GDP/person, 1870 and 1913

	1870	**1913**
Population (000)		
Argentina	1796	7653
Australia	1770	4821
Canada	3781	7852
USA	40241	97606
North East	21609	49193
Rest of US	18632	48413
UK	31393	45649
GDP(mn $1990 int)		
Argentina	2354	29058
Australia	6452	27552
Canada	6407	34916
USA	98374	517383
North East	65615	320004
Rest of US	32759	197379
UK	100179	224618
GDP/Person ($1990 int)		
Argentina	1311	3797
Australia	3645	5715
Canada	1695	4447
USA	2445	5301
North East	3036	6505
Rest of US	1758	4077
UK	3191	4921
Real Wages (UK = 100)		
Argentina	86	101
Australia	169	127
Canada	147	200
USA	165	160
UK	100	100

Source: Maddison (2001); US regional figures approximated using the data in Perloff et al. (1960) and their definition of the North East which comprises the New England, Middle Atlantic, and Great Lakes regions. Real wage comparisons from Williamson (1995, 1998).

Indeed, at that time, the USA had almost matched the UK in terms of total GDP and its population was nearly a third larger. The population of the United States by then already exceeded that of the whole Latin American and Caribbean area defined by Maddison (2001), and its GDP was well over three times larger. Relative to the other individual economies of the New World the United States was in a completely different league in terms of the size of its economy. This was also true, however, for the North East which taken separately matched the UK in terms of GDP per person around 1880 and for population by about 1900. This region already had 29.5 per cent of the labor force in manufacturing in 1870 rising to 38.7 per cent by 1910 (Perloff et al., 1960), far ahead of any New World country and approaching British levels of industrialization.

The growth of the New World economies was boosted by massive factor flows from the Old World. Declining costs of transport together with rising incomes in a world relatively free of immigration restrictions encouraged large international migration. Between 1870 and 1910 this augmented the New World labor force by 40 per cent while at the same time reducing the Old World labor force by 13 per cent. The impacts on labor force size in some individual countries were much larger –, for example, an increase of 86 per cent in Argentina and a fall of 45 per cent in Ireland – while the United States inflow amounted to 24 per cent and Britain's outflow to 11 per cent of the 1910 labor force (Taylor and Williamson, 1997). The ratio of foreign assets to world GDP grew from 7 per cent in 1870 to 18 per cent in 1914, about the same level as in 1980 (Obstfeld and Taylor, 2001). The UK was the principal capital exporter and outflows averaged almost 5 per cent of GDP; 34 per cent of all British foreign investment went to North America compared with 17 per cent to Latin America (Simon, 1968). Further discussion of Old World – New World factor flows from a neoclassical perspective can be found in Lindert and Williamson (2001).

4.2. Modeling migration and development

If we take the drivers of change to be falling transport costs of goods and factor mobility (in particular labour migrations, facilitated by falling costs of moving people), the challenge for a model is to explain the following stylised facts. The continuing wage advantage of North America relative to the UK and to other New World economies, despite migration flows; the rise of manufacturing in the US, overturning its apparent comparative advantage in agricultural products: the failure of manufacturing to develop in other New World economies.

The overtaking of Britain by the United States used to be explained in terms of various kinds of market failure in the former. Briefly, these arguments claimed that inefficiencies in the capital market encouraged excessive foreign and inadequate domestic investment while conservative British firms were slow to adopt new techniques and to diversify into new industries. These claims have, however, failed to stand up to the scrutiny of economic historians using neoclassical economics as it is now recognized that foreign investment was justified in terms of its returns, diversification into new lines of activity was not impeded by the capital market and choices of technique were rational given British factor costs (Crafts, 2002a).

Given the successful use of neoclassical economics to debunk crude claims of British failure it is perhaps not surprising to find that existing studies modelling the development of North-Atlantic economy have been built largely on a comparative advantage trade model. Applications of the Heckscher-Ohlin model are said to have performed well (Hutchinson, 2000; Wright, 1990). In this tradition, O'Rourke and Williamson (1994) concluded that a calibrated CGE model of this type allowed a good explanation of trends towards Anglo-American factor price convergence, driven by commodity market integration in the face of falling transport costs and by labor migration. General equilibrium modeling in this tradition by O'Rourke and Williamson (1994) as summarized by O'Rourke (1996) found that over the period 1870-1910 an initial wage gap of 71.2 per cent between the USA and the UK would have been reduced by 34.8 percentage points by migration but raised by 13.7 percentage points by capital flows. The net impact of factor flows would therefore have reduced the gap by 24 percentage points to which commodity market integration would have aded a further 28.5 percentage points. Interestingly, however, instead of narrowing sharply (by 52.5 percentage points) the US/UK wage gap decreased by just 5 percentage points (table 4).[7]

This last points to American access to sources of productivity improvement not available to the UK and, as such, reveals a serious problem with the neoclassical exoneration of the late Victorian British economy, namely, that it does not have an adequate explanation for American overtaking. Indeed, it might be argued that is a general difficulty with neoclassical growth economics; in principle, it can readily embrace catching-up and convergence but not changing leadership in a Solovian world of constant returns to scale and common technology. There are two ways to address this issue in the context of the North-Atlantic economy. The first is to drop the assumption of common technology and argue that the United States developed its own technology

(based on cheap raw materials and mass markets) that was not transferable to Europe at this time (Abramovitz and David, 1996). This has historical plausibility but may not be the whole story, however. The second, relatively neglected, is to focus on the role that geography played through scale economies and agglomeration benefits. While accepting that localized technical change also mattered, we explore this by undertaking some rather simple formal modelling to draw out the differences between a comparative advantage approach and a new economic geography approach, and to argue that the latter does much better at explaining both the factor-price and the quantity side.

Before developing the models, it is worth recording other voices that have suggested that the traditional neoclassical framework does not encompass an important part of the picture in that economies of scale in manufacturing are ignored. While this may be entirely reasonable for the pre-Civil War American economy, it is much less appropriate for the later nineteenth century. Both the traditional business history literature (Chandler, 1977) and the cliometricians (Cain and Paterson, 1986; James, 1983) agree that economies of scale in manufacturing between 1870 and 1913 were substantial and pervasive. These were associated with labor-saving and materials-using biases in technological change and were exploited in the context of a large and rapidly expanding domestic market. Moreover, a closer look at trade flows also reveals some limitations of analyses of the Heckscher-Ohlin type. There was already a considerable amount of intra-industry trade prior to World War I and this was associated with scale economies in labor and materials use (Hutchinson, 2000).

Turning to the modeling, let us start with a stylized model of how people and activity relocate between world regions. We suppose that there are three regions each having the same endowment of land and the same spatial relationship to each other (they are located at vertices of an equilateral triangle). The model is intended to be suggestive of the location of activity between Europe, the USA and the Rest of the New World, but we impose symmetry in order to get to the heart of the economic forces at work. We assume that there are two production sectors, agriculture and manufacturing. The output of both these sectors is tradable, although both are subject to transport costs. Production in agriculture uses labor and land, while manufacturing uses labor and manufactures (as an intermediate good). Sales of agriculture all go to final consumption, but sales of manufacturing go both to final consumption and to meet the derived demand for manufactures from manufacturing industry. The structure of the model is similar to

Krugman and Venables (1995) and is set out formally in the appendix.

The experiment that we undertake is to start with an initial position in which most of the labor force is in region 1 (Europe), and look at the effects of moving labor out of this region. As it moves we shall assume that it goes to regions 2 and 3 in a way that equalizes real wages in 2 and 3. The idea we seek to capture is that there is out-migration from 1 which is costly, but (in the spirit of our symmetry assumption) the same migration costs are incurred in going to either of the other regions. In the exposition that follows we will talk as if out-migration from region 1 is exogenous. However, we keep track of the real wage gap between region 1 and other regions, so inverting the relationship between the distribution of population and the wage gap shows how a given wage gap (equal to the migration cost) is consistent with a level of population movement.[8]

Globalization and geography: the competitive model

We start with a perfectly competitive variant of the model, in which production in all sectors takes place under constant returns and comparative advantage is determined entirely by factor endowments. The proportion of the world labour force in regions 2 and 3 combined is measured on the horizontal axis of figure 7, so that migration is measured by a movement to the right along the figure. On the vertical axis we measure the real wages in regions 2 and 3 relative to region 1 ($w_2/w_1 = w_3/w_1$). The light line is for a case when goods trade costs are high (both agriculture and manufacture face an iceberg transport cost factor of 1.7) and the heavy line corresponds to a lower transport cost factor of 1.25.

The information contained in the figure is in line with expectations. We see that as long as region 1 is labor abundant (regions 2 and 3 combined have less than 2/3rds of the world labor force although each region has 1/3rd of the land), then the wage in regions 2 and 3 exceeds the wage in region 1. Migration narrows the wage gap, as does a reduction in the cost of shipping goods (as in O'Rourke and Williamson 1994). At a given level of migration costs, indicated by the horizontal line ww, migration flows are smaller the lower are trade costs, indicating that factor mobility and goods trade are substitutes.

Figure 7 is the benchmark case, demonstrating how either factor flows or goods trade liberalization cause factor price convergence. However, in this competitive neither region 1 nor region 2 can become a net exporter of manufactures. These regions expand their share of

manufacturing only by attracting labor inflow, and attract labor inflow only by being land abundant, and hence a net importer of manufactures. This means that there is no mechanism in this model by which an economy that initially has a comparative advantage in agriculture can overturn this and become a net exporter of manufacturing. Furthermore, regions 2 and 3 are, in this model, bound to follow identical development paths. Given symmetry in technology, preferences and endowments, the two regions must have the same outcomes.

Globalization and geography: the monopolistic competition model

The second variant of the model makes manufacturing monopolistically competitive, containing firms that operate under increasing returns and are subject to forward and backward linkages.[9] The model now predicts a quite different development path, for two main reasons. The first is that market size (as well as factor prices) becomes an important determinant of where manufacturing locates; as we have already seen, if two locations differ only in market size then disproportionately many firms will locate in the larger market. The second reason for the different development path is the propensity of manufacturing to agglomerate, arising because of forward and backward linkages and reinforced by the mobility of labor.[10]

Figures 8a and 8b give the case when trade costs are relatively high. Like figure 7, the horizontal axis measures the combined population of regions 2 and 3. On the vertical axis figure 8a has relative real wages, and 8b has the share of world manufacturing activity in region 2 and in region 3. We see that when the combined population of regions 2 and 3 is small all manufacturing is agglomerated in region 1. The wage in regions 2 and 3 is quite high because of high land-labor ratios, and adding more labor reduces the wage gap (like in figure 7). However, as the labor force of regions 2 and 3 increases the combination of lower wages and larger market size make it profitable for manufacturing activity to start in these regions (at point A). Industrialization in both simultaneously is, however, unstable, because if one region got just slightly ahead then agglomeration benefits would make it more profitable, attracting more manufacturing and more labor inflow. If the regions are identical it is a matter of chance which one industrializes, and we suppose that it is region 2, as indicated in 8b. The effect of this is to increase wages, as labor in region 2 is drawn off the land and into manufacturing.

Further labor outflow from region 1 will go predominantly to region 2, but after some point the additional labor in these regions starts to reduce wages again, as well as further enlarging market

size. Region 3 then industrialises (at point B), catching up with region 2, and resulting in another increase in relative wages. The relative wage path illustrated in figure 8a can then be understood in terms of labor inflow tending to depress wages as land-labor ratios fall, punctuated by industrialisation episodes raising labor demand and wages. We can also use figure 8a to analyse the endogenous migration story. If migration were perfectly free so responded to any wage differential however small, then labor flows would move the world economy to the point S, at which all three regions are identical with the same economic structures and factor price equalisation. Alternatively, if we contrive migration costs to be just such as to support a wage gap illustrated by the line ww then there are three stable migrational equilibria (as well as two unstable), as marked by the solid circles. Thus, industry just in region 1, in regions 1 and 2, or in regions 1, 2 and 3 are all stable equilibria. However, at this level of migration costs simple dynamics starting with population concentrated in region 1 would leave the world in the first of these equilibria, with regions 2 and 3 remaining agricultural.

Figures 9a and 9b are analogous, but computed for a lower value of trade costs. There are three main differences. First, manufacturing commences in region 2 only when more population has moved to regions 2 and 3; this is because a larger market size is required to offset the effects of more intense import competition from region 1. Second, manufacturing never takes off in region 3 – again, because of the more intense import competition it faces; essentially, at this level of transport costs world demand for manufactures can be met from just one or two clusters. Region 2 therefore develops a different economic structure from region 3, with a larger population and higher share of world income. Third, region 2 becomes a net exporter of manufactures, this occurring at the point at which its share of world production of manufactures exceeds its share of world income (see figure 9b).

Lower trade costs have the effect of decreasing wages in labor abundant economies (as in the competitive case, figure 7), and the wage path is illustrated by the heavy line *aa* on figure 9a. There is a kink in this curve at the point at which industrialization in region 2 commences, but in the case illustrated this kink occurs when real wages are lower in regions 2 and 3 than in region 1, suggesting that migration would not bring about sufficient labor movement to reach the point at which manufacturing develops. Thus, product market integration has the effect of locking the manufacturing agglomeration into an established center and also, because of the labor demand this creates, of reducing the incentive for out-migration from this center.

The higher wage curves in figure 9a offer some responses to this dilemma. The first of these, *bb*, is computed allowing transport costs to fall concurrently with the movement of labor. Higher trade costs mean higher wages in regions 2 and 3 relative to region 1, so increasing migration flows and creating a migration path that supports industrialization by region 2 although not by region 3. Thus, the model is able to explain both the asymmetric development of ex ante identical countries and the way in which an economy with initial comparative advantage in agriculture can industrialize and become a net exporter of manufactures.

The next curve, *cc*, introduces (additionally) an asymmetry between regions, letting region 2 have 20% greater land endowment than regions 1 and 3. This raises wages and increases the population and market size of region 2, thereby bringing forwards the industrialization of region 2, as indicated by the position of the kink in this wage schedule. The final curve, *dd*, illustrates the effect of a region 2 import tariff on manufactures of 10% (on top of the different land endowment). When region 2 has no industry this reduces real wages, for the usual reasons of welfare loss associated with tariffs. However, the tariff brings forward industrialization, which in turn raises wages and accelerates the growth of population of the region.

Although these are very stylized exercises, we think that viewing the development of the New World through this lens can offer important insights. As we have seen, if offers an explanation of how one region can industrialize and another not; of how this region can have its relative wages increase despite population inflow; and of how it can become a net exporter of manufactures despite its initial comparative advantage. The importance of scale effects suggests that open access migration policies may have mattered much more than is generally acknowledged and it indicates a potentially more powerful and different role for tariff policies than traditional analyses would allow (Irwin, 2000). Given the inter-relationship between migration and trade costs, the model also highlights the importance of the timing of the transport improvements that came when migration into the American economy was already substantial and when manufacturing production functions were being transformed. None of this should be taken to negate the insights of those economic historians who have rightly pointed to the role of institutions in growth outcomes but it might suggest that undue emphasis on property rights is to be avoided.

Finally, in related research, Crafts and Venables (2001) have simulated the development of the

North Atlantic economy using a computable general equilibrium model, calibrated to 1870/1913 data. This gives results that are consistent with the approach set out here. The competitive variant of the model cannot replicate the large growth of American manufacturing and predicts a large decline in the US/UK real wage gap, while incorporating increasing returns and linkages in the manufacturing sector largely rectifies these deficiencies. Comparison of results with and without the high American tariffs of the period shows that these had a substantial positive effect on industrialization based on the positive feedbacks associated with the migration that it induced. In nineteenth century conditions, these results suggest that the United States, starting with an 'empty country', gained from employing the opposite of the current OECD policy norm of blocking migration from poorer countries and freeing up trade.

4.3. Urbanization

The implications of declining trade costs are felt at the sub-national level as well as internationally, and just as they facilitated concentration of world manufacturing so they also promoted the development of urban agglomerations. Urbanization is one the most dramatic changes in economic geography that occurred during the decades before World War I and its impact on the location of the labor force far outweighed that of international migration. Whereas about 34 million people emigrated from European countries between 1851 and 1910 (Ferenczi and Willcox, 1929), the increase in urban population in Europe and North America totalled 145 million in the same period. Moreover, the number of large cities grew disproportionately; in 1800 there were 24 cities in the developed world with a population over 100,000 by 1914 this had risen to 281 (Bairoch, 1988). Table 5 reports the rapid increase in urbanization rates in these countries that contrast with an unchanged urban proportion in the Third World.

Table 5. Urbanization Levels (% population: criterion of 5000 for urban population).

	1800	1850	1910	1980
England	23	45	75	79
France	12	19	38	69
Germany	9	15	49	75
Europe	12	19	41	66
United States	5	14	42	65
Australia	-	8	42	80
Latin America	14	18	22	63
Third World	9	9	10	32

Source: Bairoch (1988), Tables 13.4, 29.1.

The hypothesis underlying the growth of urban centers is simple: the division of labor is limited by the extent of the market and improved transport technologies overcome this, enabling production to take place at larger scale (and with more division of labor), and enabling cities to form and reap the agglomeration benefits outlined above.

Until recently, there has been surprisingly little formal economic analysis of this hypothesis. The central place theory of Losch (1940) puts forward the trade-off between returns to scale and transport costs, but its focus is on the optimal lattice of market areas, rather than the equilibrium size and structure of cities. Henderson (1974) broke with these traditions and modelled city size on the basis of technological externalities within industries. But at the same time, he took a strangely aspatial approach, saying nothing about where cities are located, the spatial nature of economic interactions, or the role of transport and communications technologies in enabling city formation. Fujita (1989) developed both an explicit geography and micro-foundations for returns to scale.[11] The trade-off between transport costs and increasing returns means that the real wage that can be paid in a city is a function of its size, and there is in general a unique city size that gives the maximum wage. This wage maximizing city size depends on transport costs; as transport costs fall cities will become larger.

In Britain, this process became really apparent during the canal era of the late eighteenth century and is epitomized by the growth of Birmingham (Turnbull, 1987). Detailed simulation of British

experience during the industrial revolution reveals that cities were underpinned by an elastic supply of agricultural imports from the rest of the world contingent on the development of an improved commercial and transport infrastructure (Harley and Crafts, 2000; Crafts and Harley, 2001). For nineteenth century Europe, regression analysis shows that the major influences on the pace of urbanization across countries were the growth of industrialization, international trade, and agricultural productivity (Bairoch and Goertz, 1986). Lowered transport costs and, in particular, new rail facilities, facilitated the growth of large cities in nineteenth century America, and gave rise to agglomeration benefits as the costs of moving goods fell. The division of labor was enhanced by increased market size (Ades and Glaeser, 1999). Small-scale producers in regions like the mid-west were disadvantaged and manufacturing activities became increasingly spatially concentrated. By 1890, over 25 per cent of value added in American manufacturing originated in New York, Philadelphia, and Chicago (Pred, 1977).

While clustering of activities promotes development of cities, there has been debate about the extent to which clustering forces are industry specific or broader. If they are industry specific, then the process of city growth will be accompanied by specialization. High degrees of specialization were indeed an important feature of nineteenth century cities. In 46 of the largest 100 American cities in 1880 one or two industries accounted for more than 50 per cent of manufacturing employment (Kim, 2000). In the second half of the nineteenth century large cities were increasingly industrial and spatial concentration of manufacturing in already large cities was a prominent feature of the industrialization experience.

David's (1989) study of Chicago confirmed that its phenomenal growth was founded on agglomeration effects rather than internal economies of scale. Chicago's success, however, stemmed from a diversified industrial base that suggests that inter-industry knowledge spillovers may also have been important as hypothesized by Jacobs (1969). This is also a strong theme in the account of late nineteenth century European urbanization by Hohenberg and Lees (1985) who stressed an explosion of knowledge centered economic growth and appears to be borne out by the econometric investigation of English city growth performed by Simon and Nardinelli (1996).

In fact, it appears likely that both industry specific (Henderson type) and Jacobs type external economies of scale were operative in Victorian cities and could be of substantial importance. This is the conclusion reached by Broadberry and Marrison (2002) in an analysis of the British

cotton textiles industry on the eve of World War I. They found that both types of external scale economies were critical to the industry's ability to withstand foreign competition from relatively low wage producers.

Thus, while we usually think of globalization as occurring at the international level, its driving forces are also important at the subnational level. They promoted the urbanization of the nineteenth century world, thereby facilitating the division of labor and exploitation of returns to scale associated with industrialization. In addition, it is clear that the experience of nineteenth century urbanization bears out the value of the new economic geography approach to explaining the location of production.

5. The Late Twentieth Century.

The interwar period is well-known to have been a period of globalization backlash in which there was disintegration of the world economy. This was an epoch of trade wars, international capital controls and also a time when transport costs ceased to fall. The reconstruction of the world economy after World War II involved a successful liberalization of international trade in manufactures under the GATT and a resurgence in international capital mobility notably from the breakdown in the Bretton Woods fixed exchange rate system in the early 1970s. As Table 2 reported, the ratio of world merchandise exports to world GDP, which had fallen to 5.5 per cent, in 1950 rose to 10.5 per cent by 1973 and to 17.2 per cent in 1998. Foreign assets as a proportion of world GDP which had fallen to 5 per cent in 1945 regained their 1914 level of 18 per cent in 1980 and by 1995 had surged to 57 per cent (Obstfeld and Taylor, 2001).

Falling transport and communications costs continued to be a driver of globalization, as Table 1 suggests. Declining shipping costs was augmented by several other important developments. One was the development of new information and communications technologies (ICT), the implications of which we discuss in section 5.3 below. Another was the reduction in transit times associated with the development of air travel (and airfreight) and the development of containerization, bringing both faster port handling and faster ocean shipping. The importance of time in transit has been estimated in recent work by Hummels (2000) who finds that the cost of an extra day's travel is (for imports as a whole) around 0.3% of the value shipped. For manufacturing sectors, the number goes up to 0.5%, costs that are around 30 times larger than the interest charge on the value of the goods. One implication of these figures is that transport costs

have fallen much more through time than suggested by looking at freight charges alone. The share of US imports going by air-freight rose from zero to 30% between 1950 to 1998, and containerization approximately doubled the speed of ocean shipping. Together these innovations give a reduction in average shipping time of 26 days, equivalent to a shipping cost reduction worth 12-13% of the value of goods traded.

The growing value of trade only tells part of the story, as there were also new types of trade developing. The growth of international production networks is reflected in growing volumes of trade in parts and components. Yeats (1998) estimates that 30% of world trade in manufactures is trade in components rather than final products. Hummels et al. (2001) chart trade flows that cross borders multiple times, as when a country imports a component and then re-exports it embodied in some downstream product. They find that (for 10 OECD countries), the share of imported value added in exports rose by one third between 1970 and 1990, reaching 21% of export value.

Finally, the period saw the growing role of foreign direct investment (FDI). Although the world FDI stock showed virtually no growth between 1938 and 1960 (Jones and Schroter, 1983) after that it rose rapidly from 5.4 per cent of world GDP in 1980 to 14.1 per cent in 1998 (World Bank, 2000). The vast majority of this capital was in Europe and North America –about 68 per cent in 1980 and 63 per cent in 1999 –but East Asia not including China or Japan had 10 per cent already by 1980 and China's share had grown to over 6 per cent by 1999.

5.1 Divergence Big Time

Traditional neoclassical theories of economic growth predict convergence of incomes based on the catch-up of countries with initially low levels of (broad) capital and output per worker in a world of universally available technology. The empirical application of these ideas has usually been phrased in terms of conditional convergence allowing some role for differences in rates of factor accumulation (Barro and Sala-i-Martin, 1995). The actual experience of the world in the twentieth century has, however, been described recently as 'divergence big time' (Pritchett, 1997) which is not surprising given the trends reported in Table 6. Whereas in 1870 income per head in Africa was about one eighth that in the leading country by 1998 the ratio was about one twentieth (Maddison, 2001). In 1998, as Table 6 shows, many of the world's population lived in countries where income levels were a lower percentage of the US level than in 1950. Western Europe and East Asia gained ground relatively while other countries fell back. This is the pattern of 'twin

peaks' highlighted by Quah (1997).

Table 6. Real GDP/person gaps with the United States: US = 100.

	1950	1998
Western Europe	48.0	65.6
Eastern Europe	22.2	20.0
China	4.6	11.4
Japan	20.1	74.7
Other East Asia	9.6	20.1
British India	6.4	6.1
Latin America	26.7	21.2
Africa	8.9	5.0

Note: in each year the income level is expressed as a percentage of the US level. Regions defined as in Figure 1.
Source: Maddison (2001)

A variant on the neoclassical perspective is provided in Lucas (2000). He argues that the divergence of the twentieth century will be reversed as sooner or later every country will join the industrial revolution as best practice policies and institutions are imitated in hitherto unsuccessful countries and thus the Solovian assumption of 'universal technology' becomes valid: "the restoration of inter-society income equality will be one of the major economic events of the century to come" (Lucas, 2000, p. 166). He bases his prediction on a simple model in which new entrants to the growth process start at $(2 + 2.5n)$ per cent per year where n is the number of 50 year periods to have elapsed since 1800; thus a country experiencing take-off in the early twenty-first century will grow initially at 12 per cent per year compared with 7 per cent for the 1900 entrant. All countries have an equal chance of joining the growth club with a hazard rate evolving from .01 to .03 over time. This last assumption is clearly contrary to the predictions of the geography school as well as the new institutional economic history.

The new institutional economic historian's perspective provided by North (1990) sees institutions as the key stumbling block. In this view there are no Coasian bargains available to ensure that bad institutions are replaced but rather the world is one of path dependency where network

externalities, vested interests spawned by the existing arrangements and informal constraints, embodied in customs, traditions and codes of conduct which are impervious to deliberate policy reform, hold sway. The economic geography perspective argues that agglomeration benefits dominate the development process such that size and distance matter, as set out above in section 3.

The evidence of growth regressions certainly suggests that institutions have a strong effect on growth outcomes (Knack and Keefer, 1995) and bad institutions remain unreformed in many countries (Kaufmann et al. 1999). But recent experience also shows that institutional reform in the third world has delivered a good deal less than followers of growth regressions might have expected (Easterly, 2001). This last study found that taking into account standard conditioning variables third world growth is strongly influenced by growth in the country's main OECD trading partner. It is also typically the case that either regional dummy variables (East Asia positive; Africa, Latin America negative) show up strongly or that justifying their omission requires the inclusion of explicit geographic variables (Gallup et al. 1999). And when income levels are related to measures of market and supplier access about 70 per cent of the variance can be explained in this way (Redding and Venables, 2000).

Thus the world may not be quite the level playing field that the Lucas model supposes. Both institutional and geographic variables affect catch-up growth prospects. The chances of joining the fast growth club appear to be quite uneven. East Asia has succeeded, however. According to conventional wisdom this has been the result of good institutions and policy that have underpinned high rates of capital accumulation and strong productivity performance (World Bank, 1993). What does a geographic perspective have to add?

5.2 The spread of industry.

At the heart of East Asian success has been prowess in manufacturing. In section 2 we established the growing spread of industry out of established centers and pointed out how exceptional East Asian performance had been, especially in growth of manufactured exports and production.

Conventional treatments suggest that Japan and then the Tigers and China established institutions and policies that were conducive to strong investment in both human and physical capital and

facilitated technology transfer. In most cases 'developmental states' were involved in jump-starting the development process and in creating institutions that lowered transactions costs in imperfect markets thus implementing a Gerschenkronian escape from economic backwardness (Crafts, 2002b). In particular, these economies were committed to an outwardly oriented growth process in which competition to succeed in world markets held rent-seeking in check (World Bank, 1993).

These arguments are well-taken but they are not the whole story. As the development process evolved, aspects consistent with what would be expected from the geographical approach outlined above play an increasingly important role. If we add many countries to the Krugman-Venables story of figure 1, the approach predicts that during phase III convergence will not be uniform, but instead take the form of countries, in sequence, making a relatively rapid transit from the 'poor club' to the 'rich club'. For example, Puga and Venables (1996) modelled a situation of a large number of identical countries, with manufacturing initially agglomerated in just one of them. They considered a steady (exogenous) growth in demand for manufactures, which had the effect of bidding up the wage in the country with the agglomeration. At some point the wage gap between this country and others becomes too large to be sustainable, and industry starts to move to other countries. However, moving to all other countries is unstable, as in figures 8 and 9; if one country gets just slightly ahead then cumulative causation causes this one to take off and the others to fall back. The model therefore predicts rapid transit by one country from the poor club to the rich club. Continuing demand growth (as well as falling transport costs) then make the cycle repeat itself – industry once again spills out, and another country makes rapid transit to the rich club. The model was intended to be suggestive of the industrialisation experience in Asia, which is illustrated in figure 10. The vertical axis of this figure is the share of manufacturing in GDP in selected Asian countries, and the story is very much as predicted by the theory.

In this perspective, the initial success of Japan adds to the development prospects of the rest of East Asia much as the so-called 'flying geese' model suggests. As Japanese wage costs rose, particularly from the 1980s, domestic manufacturing investment was discouraged and foreign direct investment flowed out to other parts of the region; 'hollowing out' of Japanese industry became a noticeable feature (Cowling and Tomlinson, 2000). In 1991-5 Japanese investment in Asian manufacturing totalled $22.9bn compared with $7.6bn in 1951-85 (Legewie, 1999). East Asian wage costs typically were low relative both to other parts of the world and the labor

productivity gap with the established centers. Thus, even in the mid-1980s labor costs in Korea and Taiwan were only around 10 per cent of the American (20 per cent of the Japanese level) (Jacobs, 2000) when manufacturing labor productivity was close to 20 per cent of the American level (Timmer, 1999) and at a time when African wages were, in most cases, 15 to 25 per cent of those in the United States.

The costs of regional transactions fell sharply. As one recent survey put it, both the hardware and software of East Asian linkages improved rapidly; better communications and networks of overseas Chinese both played an important part (Petri, 1995). As new economic geography models predict, clustering became apparent (e.g., microcomputers in Taiwan, electronics in Malaysia) and external economies of scale from agglomeration accrued. In a detailed study of Korea, Henderson et al. (2001) found that in the period 1983-93 these were comparable to US experience and that a doubling of an industry's size in a particular city implied a productivity increase of about 6 per cent. Japanese FDI has tended to cluster which also underlines the importance of agglomeration benefits (Head et al., 1995).

The manufacturing export performance of the newly industrializing Asian countries has been impressive. It cannot be explained, however, within the confines of the traditional Hecksher-Ohlin model, as Lall (1998) showed. The pattern of exports with its strong achievement in high-technology sectors has relied on external economies of scale which accrue from learning and labor market pooling. Undoubtedly, this has been the result in part of good policy, in terms of addressing market-failures, for example, through public-private partnerships although not through inter-sectoral transfers of resources (Crafts, 1999), but it seems clear that intra-sectoral productivity improvement based on agglomeration benefits has been central to the achievement (Hobday, 1995).

5.3: New technologies: the death of distance?

We conclude with some remarks about the implications of new technologies for the likely future economic geography of the world. While continuing spread of industry – through lower trade costs, easier remote management, and the development of production networks – seems likely, what are the prospects for a more radical change, a ‘death of distance’ where technologies will enable suitably qualified countries to operate ‘as though geography has no meaning’? (Cairncross,

2001). Evidently, some activities can now be fully digitized and located and transmitted around the world at essentially zero cost. The best examples are the 'IT enabled services', such as transcription of medical records or cartoon film drawings, that now (with other software services) make up around 10% of India's total exports. While these activities have brought prosperity to some developing regions, it seems unlikely that more than a few percent of world GDP is likely to fall in this category. Activities that become digitizable fall rapidly in price, and are likely to be fully automated in time (eg by voice recognition software or computer graphics).

Other activities remain tied to markets, or retain a propensity to cluster. Some technical changes seem to increase the value of proximity – for example the improved stock control and information flows that support just-in-time technologies, and the consequent clustering of suppliers around assembly plants. The importance of access to pools of skilled or specialist labour (one of Marshall's agglomeration forces) is not likely to be significantly diminished, nor the mobility of this labor significantly increased, by new technologies. Indeed, the micro foundations of agglomeration economies for US manufacturing industries now, unlike the nineteenth century, seem to rest more than any other single factor on labor market pooling (Rosenthal and Strange, 2001). The role of cities in reducing transport costs for goods is much less important now, while the role that cities play in eliminating the distance between people appears to be growing as time costs increase (Glaeser, 1998).

It is quite probable that the growing use of e-commerce will in some cases increase the attractiveness of market transactions relative to vertically integrated production, i.e., will change the optimal boundaries of the firm for example by raising the effective number of suppliers of intermediates and reducing the scope for opportunism in the presence of asset specificity. Thus the classic historical example of vertical integration, the take-over of Fisher Body by General Motors in the 1920s, was reversed in 1999 when the parts division of General Motors became a separate company, Delphi Automotive Systems (Lucking-Reiley and Spulber, 2001).

But in an increasingly information-based economy much information seems to be too complex to be codifiable, so face-to-face contact remains important. Sometimes this is because of the inherent complexity of the information (as in R&D and coauthorship), and sometimes because of incomplete contracting, which requires face-to-face contact for monitoring and for building trust (Leamer and Storper 2001). Indeed, the possibility of spatially separating these activities from

more routine parts of the supply process will likely enhance their concentration. For example, in financial services once the backroom operations can be separated from the front room then the agglomeration forces on the latter become overwhelming and the attractions of London, New York and Tokyo are no longer diluted by the expense of office space for clerical activities.

What this suggests then is agglomeration forces – and consequent inequalities in the location of activity and in income levels – are likely to remain important. However, the basis of these forces might change. From the nineteenth century model of high transport costs for goods and agglomeration of heavy industries, to the twenty-first century model of agglomeration of information based activities – in finance, R&D, entertainment -- in cities with pools of highly specialized labor.

6. Conclusions.

Our aim in this paper has been to show that placing the economic history of the past two centuries in a geographical perspective can add to our understanding of the past experience of economic development and thus to future prospects for income convergence following a long phase of divergence. We have argued that agglomeration has mattered a great deal and will continue to be important. Modeling of the shifting international location of industry is enhanced by including scale economies and linkage effects.

A historical episode in which this approach offers major new insights is the performance of the United States relative both to Britain and to Latin America. This cannot readily be encompassed in a traditional neoclassical framework and is not wholly explained by the quality of American institutions. Our analysis highlights the roles played by migration and tariff policies in promoting the industrialization of the United States.

For today's world, recognizing the importance of agglomeration in economic development implies that size and location will continue strongly to influence future relative income levels. Predictions of the 'death of distance' in the New Economy based on ICT are premature. However, there are several distinct sources of agglomeration benefits and, in the twenty-first century these are likely to revolve much more around complexities of information and pools of skilled labor than the costs of transporting manufactured goods.

With regard to the issues of catch-up and convergence in economic growth, we have stressed that both the neoclassical growth and the new institutional economic history schools are missing an important dimension. We do not share the optimism of Lucas (2000) that the present century will be one in which international income inequality is eliminated and we believe that current fashions in economic history are in danger of exaggerating the role played by institutional quality in development outcomes. A geographical perspective suggests that in economic development the playing field is far from level and that recognition of this casts a different light both on past performance and future prospects.

Obviously, this paper is no more than a preliminary analysis. Nevertheless, we hope that it may help to establish a research agenda that can enrich the study of comparative economic development in an imperfectly integrated world economy.

Appendix: The three country model:

There are three countries, and country specific variables are denoted by subscripts. The two sectors are manufacturing and agriculture, indicated by superscripts. Proportion μ of consumers' expenditure goes on manufacturing, the remainder on agriculture. Within each sector there are differentiated products, and demands are derived from a sub-utility function (or price index) taking the forms:

$$G_j^M = \left(\sum_i n_i^M \left(p_i^M t^M \right)^{1-\sigma^M} \right)^{1/(1-\sigma^M)}, \quad G_j^A = \left(\sum_i \left(p_i^A t^A \right)^{1-\sigma^A} \right)^{1/(1-\sigma^A)}$$

where n_i^M is the numbers of industrial products and each country produces a single agricultural variety. p_i^M and p_i^A are the prices, and where t^M and t^A the iceberg transport costs. Values of demand for a product produced in country *i* and sold in country *j* are,

$$p_i^M x_{ij}^M = \left(p_i^M t^M / G_j^M \right)^{1-\sigma^M} E_j^M, \qquad p_i^A x_{ij}^A = \left(p_i^A t^A / G_j^A \right)^{1-\sigma^A} E_j^A$$

Agriculture is produced by a Cobb-Douglas production function using each country's endowment of land (set equal to 1), and an amount of labour. The labor share in the production function is θ. If L_i and L_i^M denote the total labor force and labor employed in manufacturing respectively, then agricultural output and the wage are,

$$x_i^A = \left(L_i - L_i^M \right)^\theta, \qquad w_i = \theta \left(L_i - L_i^M \right)^{\theta-1}$$

Manufacturing firms use labor and manufacturing to produce output, with manufacturing share γ. They therefore have price equal to

$$p_i^M = \left(w_i \right)^{1-\alpha} \left(G_i^M \right)^\alpha$$

Input demands can be found by Shephard's lemma. In the perfect competition case n_i^M is exogenous, and quantities of each variety are given by demand. In the monopolistic competition case n_i^M is endogenous and adjusts so that each firm makes zero profits. Given an increasing returns to scale technology this occurs when it reaches a certain level of output, *x*, so we have the additional equation

$$x = \sum_j x_{ij}^M$$

Expenditure levels come from income (wage income and agricultural rent) and from derived demands, according to

$$E_i^M = \mu \left(w_i l_i^M + p_i^A \left(L_i - L_i^M \right)^\theta \right) + \alpha n_i^M p_i^M x, \qquad E_i^A = (1-\mu) \left(w_i l_i^M + p_i^A \left(L_i - L_i^M \right)^\theta \right)$$

Real wages are nominal wages deflated by the price index, $\left(G_i^A \right)^{1-\mu} \left(G_i^M \right)^\mu$.

Results are presented for $\theta = 0.1$, $\mu = 0.3$ and $\alpha = 0.35$, and $\sigma^A = 20$ and $\sigma^M = 20$ (perfect competition) or $\sigma^M = 6$ (monopolistic competition). Trade costs in the two sectors are equal, and the 'high' level of the iceberg factor is 1.8, and the low level 1.475.

Endnotes:

[1] A complementary perspective on geographic aspects of catch-up and convergence is set out in Dowrick and DeLong (2001).

[2] A much more detailed account of this phenomenon can be found in Findlay and O'Rourke (2001).

[3] Distance weighting according to $\exp(-\theta\ \text{distance}_{ij})$.

[4] See Markusen (1983) and Venables (1999) for discussion of the issue of whether trade liberalization and factor mobility are substitutes or complements.

[5] The implications of good market potential for production is sometimes called the 'home market effect'. Davis and Weinstein (1997) find considerable empirical support for it. Wage implications of market access are studied in Redding and Venables (2000). The advantages of coastal regions and other geographical factors in developing countries are documented in Gallup, Sachs and Mellinger (1999).

[6] There is a range in which agglomeration (with $w_N > w_S$) and dispersion (with $w_N = w_S$) are both stable equilibria. See Fujita, Krugman and Venables (1999) for details.

[7] Or possibly actually widened, depending on data sources used.

[8] Migration plays a central role in our story. Further analysis of the economic impact of migration in this period can be found in Chiswick and Hatton (2001).

[9] As outlined in the appendix. This is the same structure as in 3.2, except that there are three regions, labor migration is studied, and agriculture, as well as industry, has transport costs and product differentiation.

[10] This input-output structure was also present in the perfectly competitive variant of figure 6, but the linkages are important only when combined with increasing returns.

[11] Fujita, Krugman and Venables (1999) extend this approach. See also Puga (1998) for the interaction of scale economies and transport costs.

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Figure 1: Regions' share of world GDP

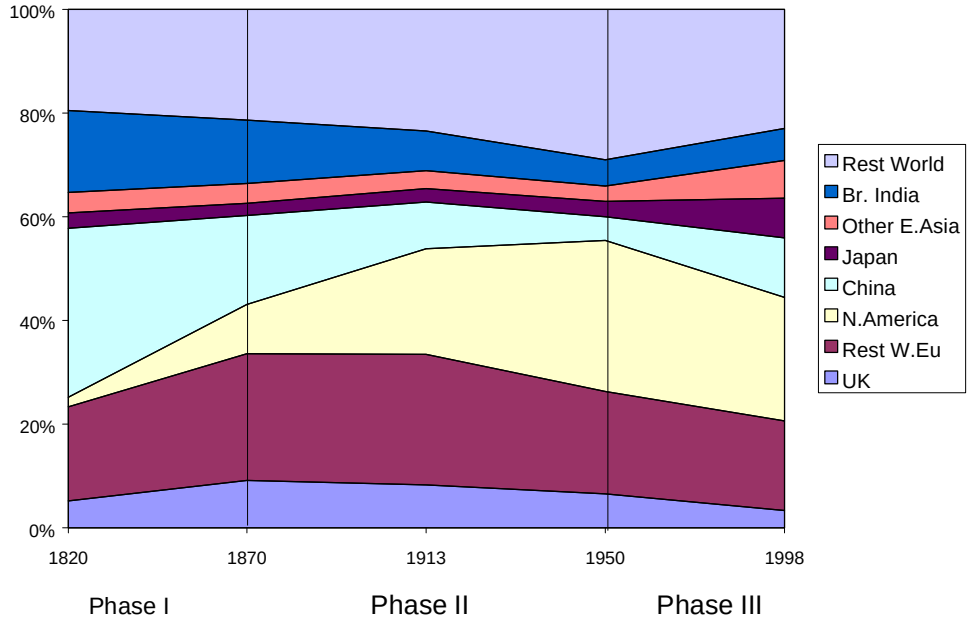


Figure 2: Regions' share in world industrial production

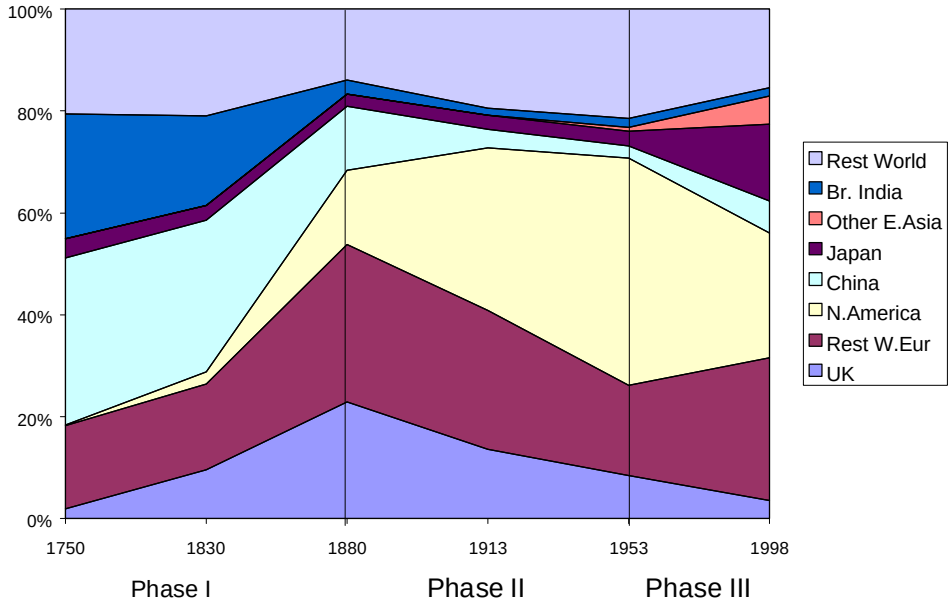


Figure 3: Regions' share in world population

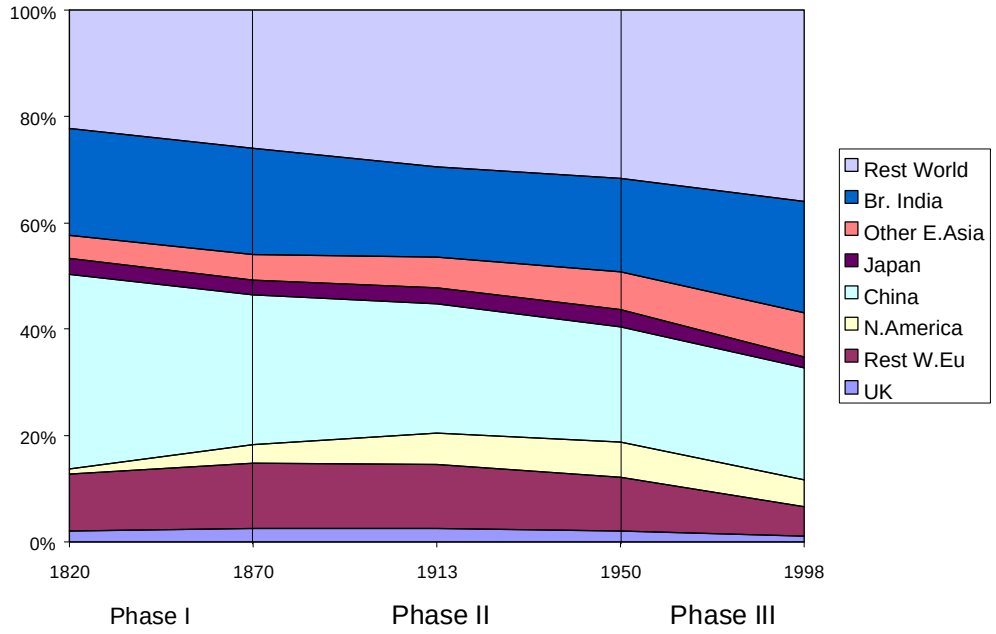


Figure 4: Regions' share in world manufactured exports

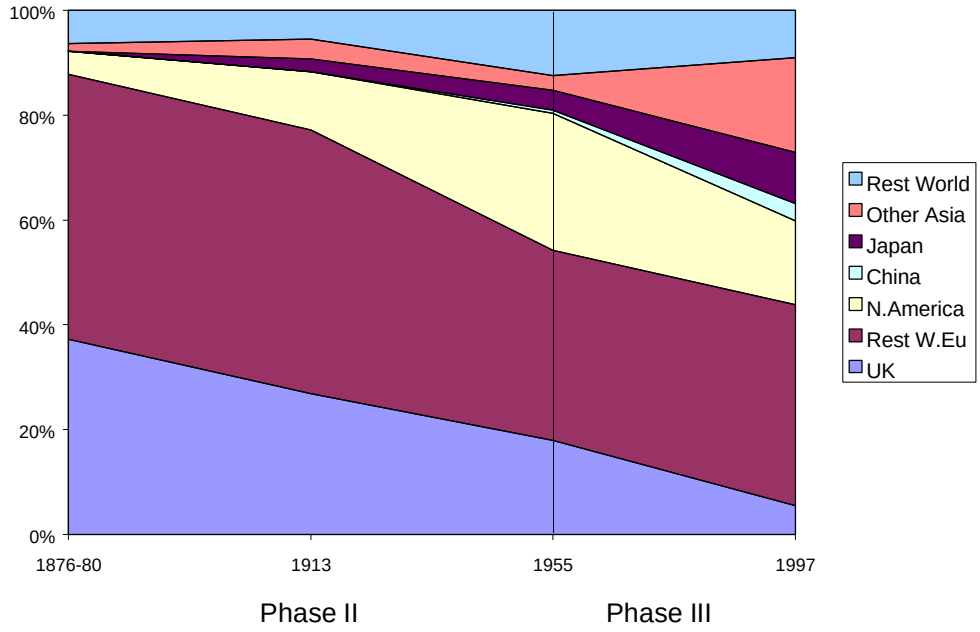
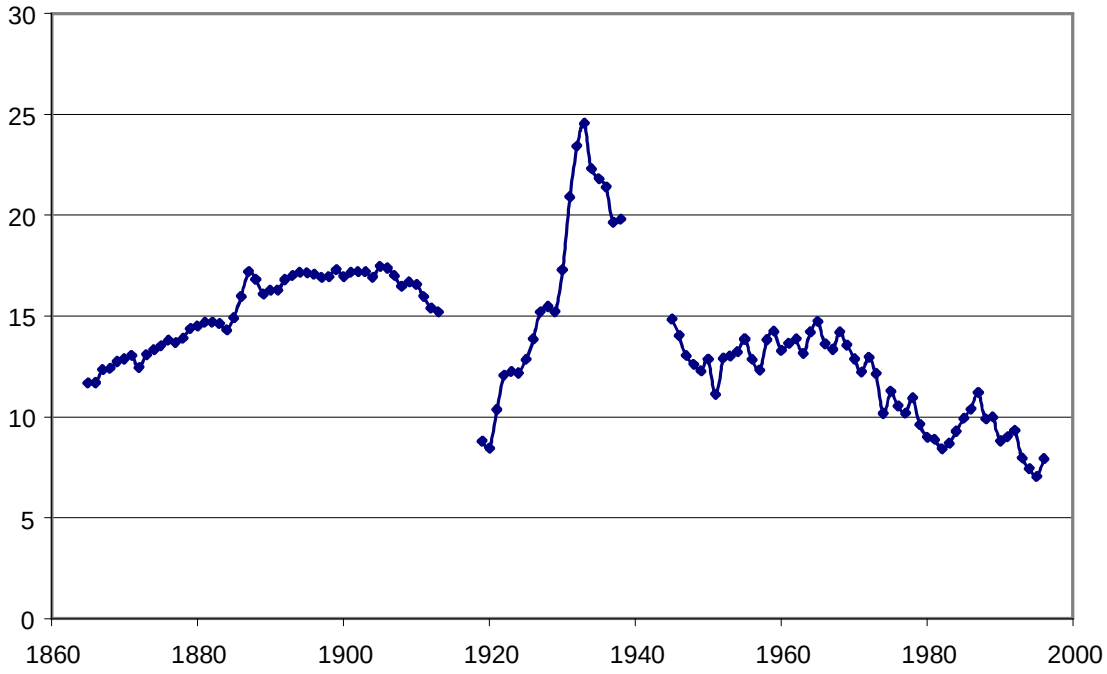


Figure 5: Unweighted World Average Own Tariff, 35 Countries, %



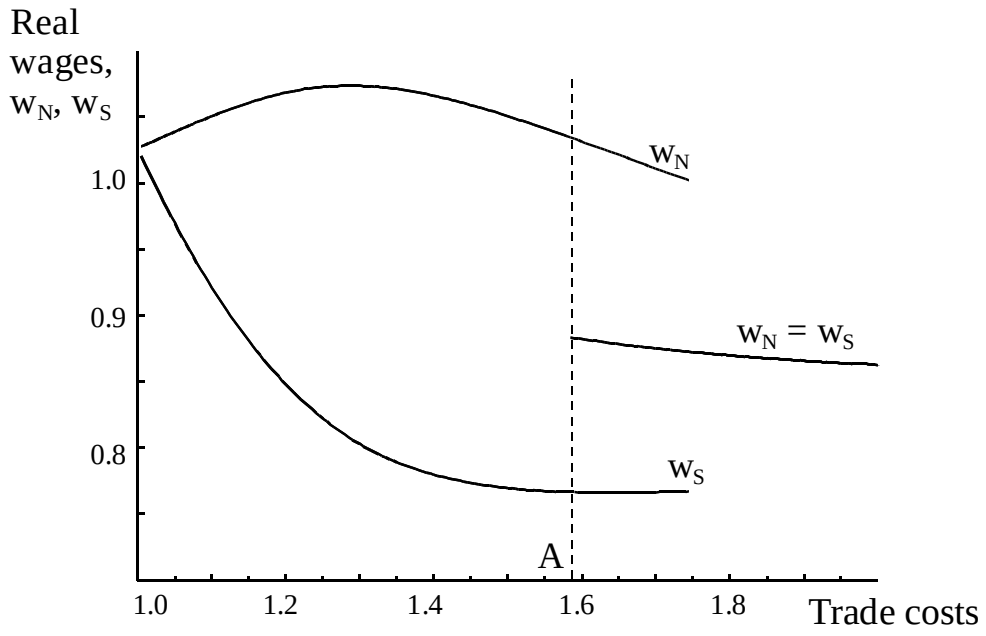


Figure 6: History of the world

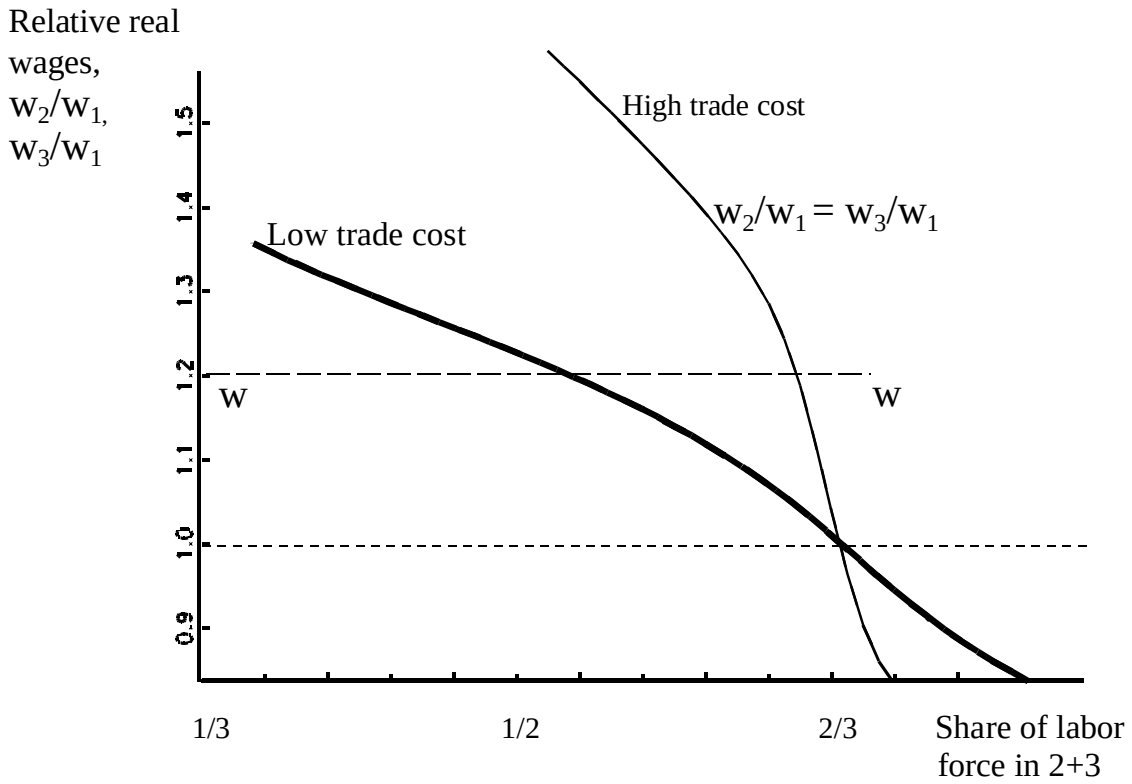


Figure 7. Relative wages in competitive model

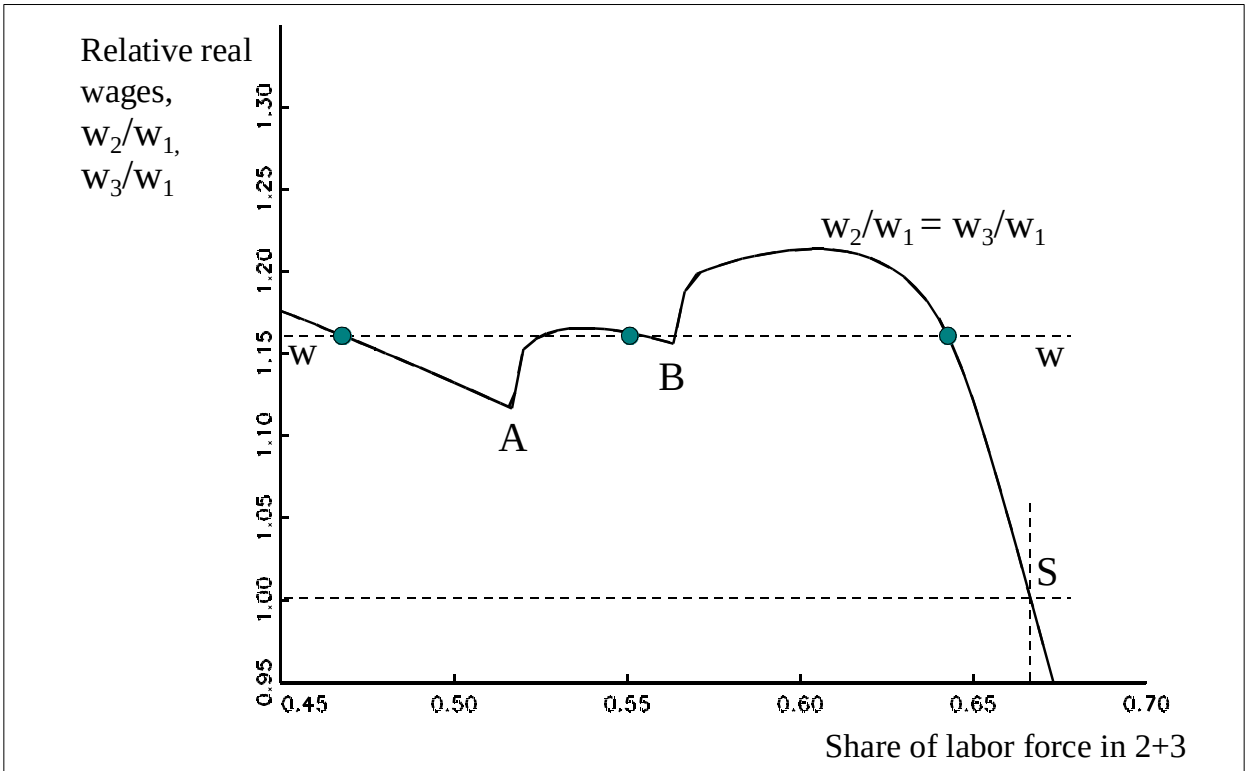


Figure 8a: Relative wages, high trade cost.

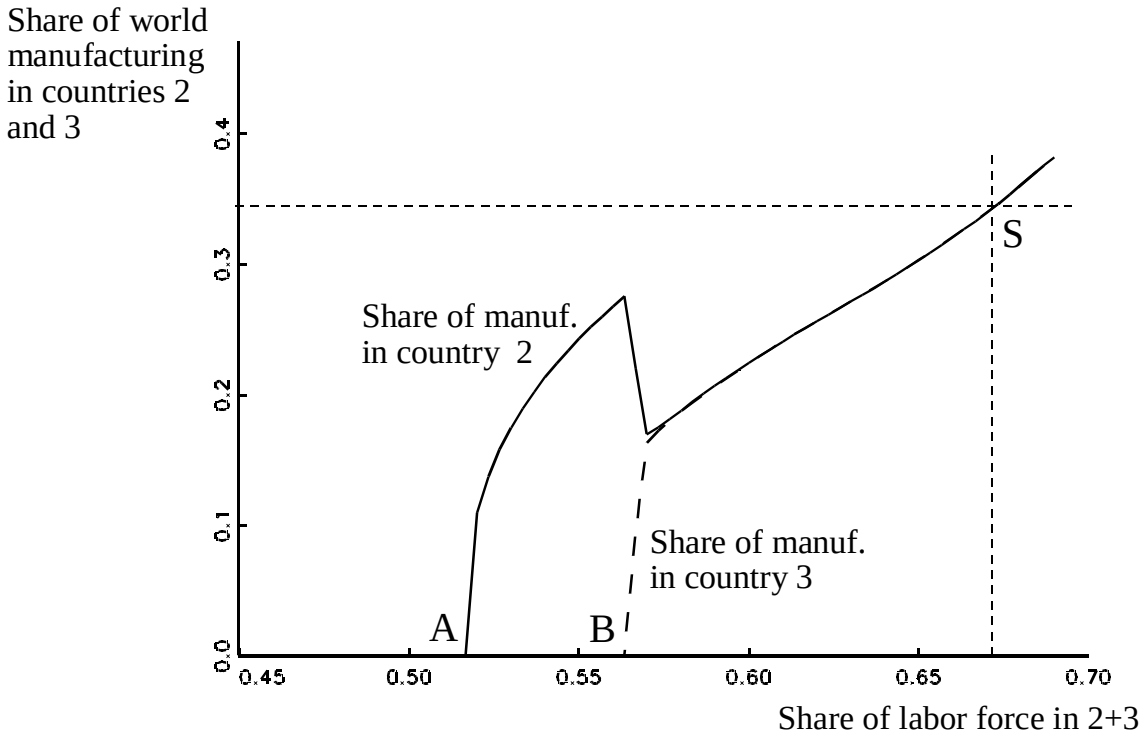


Figure 8b: Manufacturing shares: high trade cost

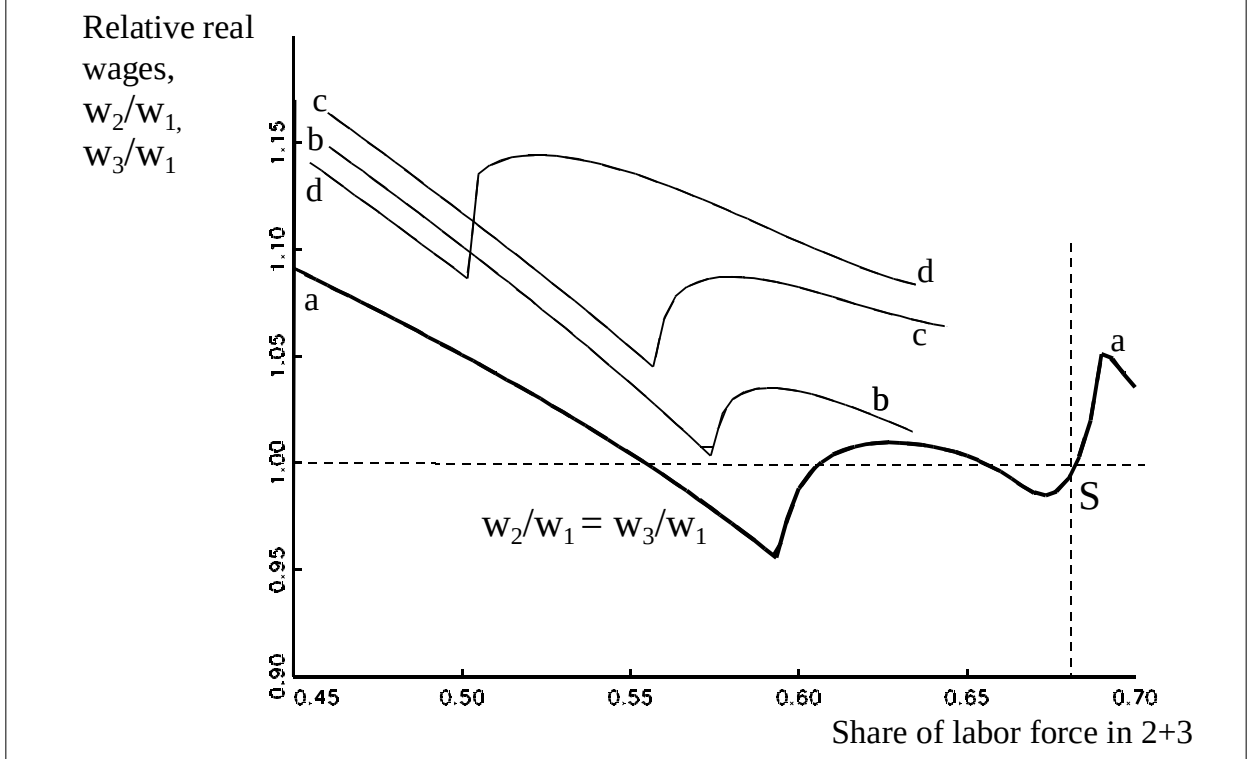


Figure 9a: Relative wages, low trade cost.

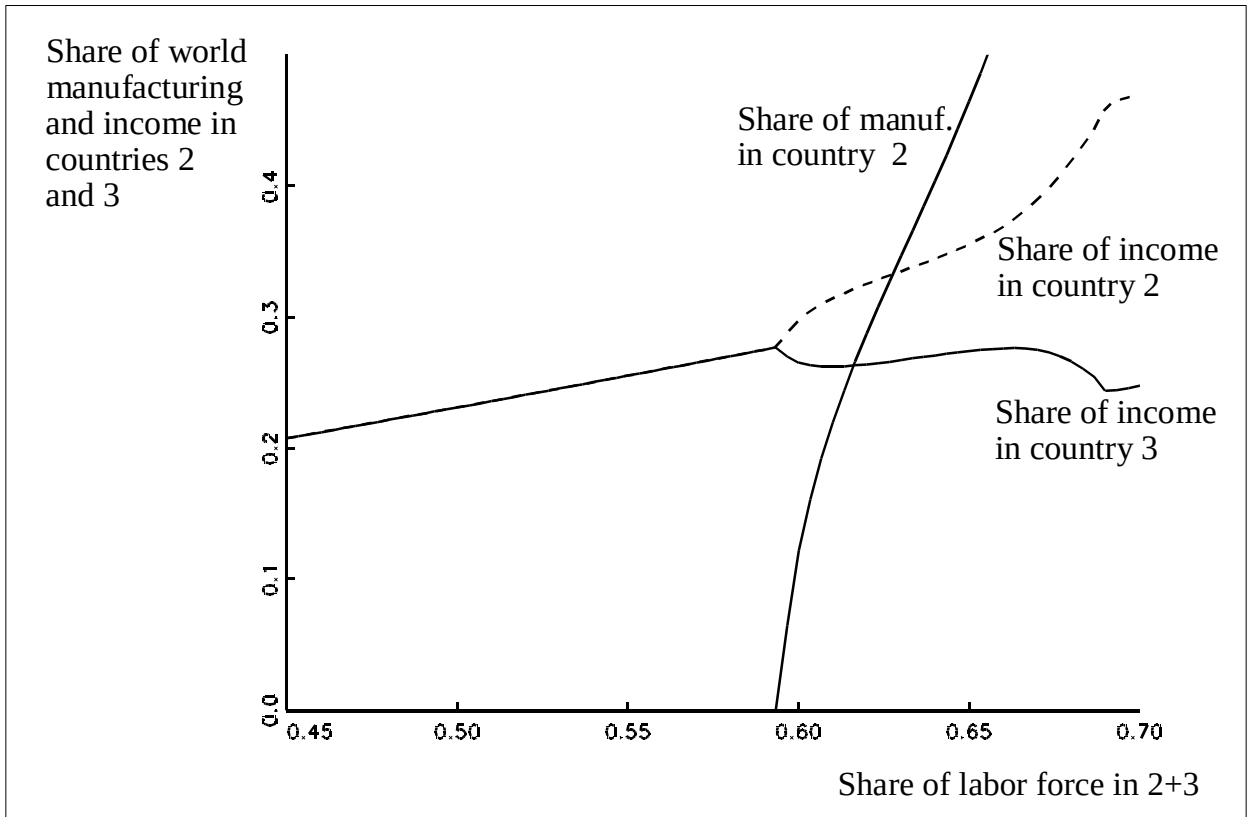


Figure 9b: Manufacturing and income shares: low trade cost

Figure 10: Manufacturing VA share of GDP - 5year moving average