

**AN ECONOMIC HISTORY OF MODERN EUROPE: SECTORAL
DEVELOPMENTS, 1870-1914**

Stephen Broadberry
Department of Economics, University of Warwick, Coventry CV4 7AL, United
Kingdom
S.N.Broadberry@warwick.ac.uk

Giovanni Federico
Department of History and Civilization, European University Institute, Via Boccaccio
121, Firenze 50133, Italy
Giovanni.Federico@iue.it

and

Alexander Klein
Department of Economics, University of Warwick, Coventry CV4 7AL, United
Kingdom
Alexander.Klein@warwick.ac.uk

28 September 2007
File: EuroSector4b

Draft chapter for *Unifying the European Experience: An Economic History of Modern Europe, Volume 2: 1870-2000*, edited by Stephen Broadberry and Kevin O'Rourke

I. INTRODUCTION

Gross domestic product consists of a wide array of activities, and the structure of those activities has changed over time as the European economy has developed. Economists have long classified activities on the basis of a distinction between agriculture, industry and services, although there has been less than complete agreement on which occupations to include in each sector (Clark, 1951). In this chapter we will follow the modern European convention of including forestry and fishing together with farming as “agriculture” and include mineral extraction together with manufacturing, construction and gas, electricity and water in “industry”. Services then covers all other activities, including transport and communications, distribution, finance, personal and professional services, and government. We will examine the development of the three main sectors and also consider the effects of the major structural shifts, as the share of the labour force declined in agriculture and increased in industry and services between 1870 and 1914.

For an economy to have high living standards, it is necessary to have high productivity in all sectors. However, it is also clear that the structure of the economy matters, because value added per worker is higher in some sectors than in others. Since agriculture has historically tended to be the lowest value-added sector, the share of the labour force in agriculture turns out to be a very good predictor of per capita income. In general, European countries that remained heavily committed to agriculture remained poor, while those that reallocated labour to industry and services became better off (Broadberry, 2007).

II. STRUCTURE OF THE ECONOMY

Table 1 provides data on the sectoral distribution of the labour force between agriculture, industry and services. For the sample of 14 countries available in both years, the share of employment in agriculture declined from 51.7 per cent in 1870 to 41.4 per cent in 1913. The lowest share of the labour force in agriculture in 1913 was in northwest Europe and the largest share in central and eastern Europe. However, there was considerable variation within each region, ranging from just 11.8 per cent in the United Kingdom to 82.2 per cent in Serbia.

As the share of the labour force in agriculture declined, the shares in industry and services increased, and this trend can also be seen in Table 1. For the fourteen country sample, the share of industry in employment rose from 26.9 to 32.3 per cent, while the share of services increased from 21.4 to 26.3 per cent. Looking at the cross sectional variation in 1913, the share of industry was highest in northwest Europe and lowest in central and eastern Europe. The share of the labour force in services in 1913 was also highest in northwest Europe and lowest in central and eastern Europe, but again with substantial variation across countries within each region.

Figure 1 shows a strong negative relationship between the level of per capita income and the share of the labour force in agriculture in 1913. It was already clear by this time that escaping from poverty required the reallocation of labour away from agriculture, so that modernising governments across Europe adopted industrialisation as a policy goal. However, the relationship between GDP per capita and the share of the labour force in industry was actually much less clear, as can be seen in Table 2. This table formalises the relationship between GDP per capita and the sectoral allocation of labour using regression analysis, and pooling cross sectional

observations for a number of years between 1870 and 1992. The first column confirms the statistically significant negative relationship between living standards and the share of the labour force in agriculture, and also finds a significant positive relationship between GDP per capita and the share of the labour force in industry. However, notice that the fit of the equation, as measured by R^2 , is much weaker for industry than for agriculture. Note also that the fit becomes stronger once again in the regression of GDP per capita on the share of the labour force in services.

III. AGRICULTURE

1. Opportunities and challenges

Growth of population and income increased the demand for agricultural products. Total consumption of calories per capita increased, particularly in poor countries, and demand shifted away from cereals towards more income-elastic goods such as livestock products in southern Europe and fruit and vegetables in northern Europe (Federico, 2003a, Coppola and Vecchi, 2006). The reduction in transport costs fostered trade in agricultural products, with a significant impact on relative prices. Although the real price of agricultural products remained broadly constant, the inter-sectoral terms of trade (the price of agricultural products relative to manufactures) improved in most countries (Williamson, 2002). Prices of crops (mainly cereals) declined relative to livestock in all European countries. Figures 2 and 3 show these trends in the inter-sectoral terms of trade and the relative price of crops to livestock for France, the United Kingdom and the United States.

2. The performance

The widely held view that European agriculture performed poorly during the period 1870-1913 is in need of revision. In Table 3, we see that the growth rate of gross output was quite high for the continent as a whole and also for the main regions. Although medium-term output trends were remarkably stable, production did nevertheless fluctuate quite a lot from one year to another, following the vagaries of the weather (Solomou and Wu, 1999). In particular, there is some statistical evidence of a slowdown in growth between 1873 and 1896. However, the slowdown was not as serious as to warrant the label of “Great Depression” (Saul 1969).

The country rankings of agricultural growth performance in Table 3 are also at odds with the conventional view. In fact, the best growth performance by far was recorded by Russia, where production increased by a factor of 2.5 over 43 years, and the next highest increase was in the Habsburg empire. Clearly, these figures have to be considered with caution, but there is no doubt that Russia was a success story, as confirmed by the great increase in its agricultural exports (Stern, 1960). Most countries increased agricultural production at a rate of around 1.0 to 1.5 per cent per annum, exceeding or keeping up with the increase in their population. In only four cases (Portugal, Greece, the Netherlands and the United Kingdom) did agricultural production per capita decline. Between 1870 and 1913, trade in primary products, which went almost entirely to western Europe, increased by a factor of 3.5. This increase fed Britons and allowed other western Europeans to improve their nutritional standards.

3. The proximate causes of growth: factor inputs and TFP

Table 4 shows that the growth of factor inputs contributed very little to the growth of agricultural output. There are some difficulties in measuring the total stock of land in use, because it is hard to be sure about the extent of pasture in use, but land under crop remained constant or fell in the west, and increased by only a few percentage points in the east. Again, there are difficulties in measuring the agricultural labour input because non-agricultural workers often helped permanent agricultural workers at seasonal peaks, the quality of work differed according to the age, sex and skill of the worker, and the number of hours worked or the intensity of work differed by country. Nevertheless, the labour force data show a pattern that is consistent with the pattern for land, with the number of agricultural workers staying constant or falling in the west and increasing only in the east. Note that this broad stability in the number of agricultural workers was consistent with a substantial fall in the share of the labour force in agriculture because of the increase in the population and the labour force.

Capital is the most difficult factor of production to measure accurately, but the available data on buildings, land improvements and machinery rule out rapid growth, with the exception of Russia (Federico, 2005: Table 4.7). Capital stock declined in the United Kingdom and rose at about 1 per cent per annum in other West European countries. The effect of the diffusion of modern techniques can be detected in the growth of purchases outside agriculture. A simple measure of these purchases is the ratio between value added (which excludes them) and gross output (which includes them). As Table 3 demonstrates, the ratio in 1913 shows quite substantial differences among countries, which tally well with conventional views about the level of technical development in each country.

The combination of substantial production growth and relatively slow increase in inputs implies a healthy growth of total factor productivity (TFP). Federico (2005: Table 5.5) finds an average rate of TFP growth for ten European countries of 0.7 per cent per annum, which corresponds to a cumulated 30 to 40 per cent increase over the 1870-1913 period. This is broadly consistent with the findings of van Zanden (1991) and suggests that European performance compared quite favourably with that of the countries of Western Settlement over the same years, with TFP in agriculture growing at a rate of 0.2 to 0.5 per cent per annum in the United States.

4. The underlying causes of growth: technical progress or market integration?

Most authors attribute growth in TFP to technical progress, and there were some important technological innovations in nineteenth century European agriculture.

Fallow practically disappeared from Western Europe, with the conspicuous exception of Spain, although it remained important in the East (Bringas Gutierrez, 2000: Table I.3; Antsiferov, 1930: 16). Tools improved, with iron ploughs substituting for wooden ploughs in backward countries and with better design improving performance and reducing the need for draft power in more advanced areas. Mechanisation proceeded more slowly, with the steam thresher the only “modern” machine widely used in the early twentieth century (Federico, 2003b). However, there was a major breakthrough from the 1860s, as the chemical industry made available new products such as ammonium sulphate and calcium-cyanamide at lower and lower prices, and fertiliser consumption per hectare increased dramatically (van Zanden, 1994: Table 4.7; Federico, 2005: Table 6.3).

TFP growth may also have been due to the more efficient allocation of resources, as a result of the growing development of markets, including commercialisation and market integration (price convergence). There is a substantial literature on market integration, at least for wheat (Jacks, 2005; Federico and Persson, 2007) and some work on commercialisation (Federico, 1986). However, the effects of these developments on agriculture have hardly been explored. The only exception (Grantham, 1989) focuses largely on the pre-railway age in France. To what extent did integration cause relative prices to change and to what extent did production adjust via local specialisation? To be sure, there is evidence of the growth of specialised production around the cities or in some well-endowed areas, such as the South Italian and Spanish vineyards. Also, there was a modest increase in the share of livestock in total gross output, from 41 to 46 per cent, consistent with the increase in its relative price (Federico, 2004). However, much more detailed data would be needed to provide a comprehensive assessment of the real impact of commercialisation and globalisation.

5. The role of institutions

By and large, farmers were left to themselves. Support for technical progress was very limited and although land reform was much debated, very little action followed, except in Ireland. Even intervention in product markets was relatively modest. This statement may seem surprising in the light of the conventional view of a protectionist backlash to the grain invasion from the United States (O'Rourke, 1997). However, it is important to remember that (1) Russia rather than the United States was the main invader in most European markets, at least for wheat (2) tariff barriers on wheat were erected in only a few Continental countries and were not particularly high (3) wheat

accounted for only 15 to 20 per cent of total output, while the rest of agriculture was affected much less by global competition.

Many historians blame institutions for what they perceive as the disappointing performance of European agriculture, arguing that common property of land and traditional contracts, such as sharecropping, hindered innovation. However, the empirical evidence for such a proposition is at best mixed, as can be seen from the following two examples. First, sharecropping is often blamed for the poor performance of Mediterranean agriculture (Sereni, 1968). Landlords are said to have been more interested in accumulating land than in making productivity-increasing investments, while tenants were too poor to risk anything. However, econometric tests on Italian data have failed to find any effects of contracts on productivity (Galassi 1986, Galassi and Cohen, 1994). Second, in Russia, serfdom was abolished only in 1861 and land ownership was vested in peasant communes, the *obshchina* or *mir*, where periodic redistribution of land is usually seen as having hindered investment or innovation (Gerschenkron, 1966). But the *obshchina* was actually rather flexible (Gregory, 1994) and agricultural output grew rapidly in Russia while it stagnated in Britain, where the institutional framework was most developed. This example reminds us that the catching-up perspective suggests that we should expect a negative relationship between the growth rate and the starting level of productivity. Since Britain had the highest level of agricultural labour productivity in Europe in 1870, slow productivity growth was only to be expected. Similarly, the low initial level of productivity in Russia opened up the opportunity of rapid catching-up growth. Also, institutions are only one possible reason for the failure of a country to catch-up, with other factors such as land quality and economic policy also playing their part.

IV. INDUSTRY

1. Europe's industrial production, 1870-1913

Industrial production generally grew faster than GDP in Europe between 1870 and 1913, as Europe developed, and agriculture declined in relative importance. Table 5 presents data on the average annual growth rate of industrial production by countries grouped together in the main regions. The scope for rapid catching-up growth was greater in the less developed parts of Europe, which in 1870 had still not embarked upon the development of modern industry. In eastern and central Europe, Germany, Austria-Hungary and Russia all recorded rapid growth rates of industrial output as they began the process of catching-up on Britain, the most highly developed country in Europe. In northwestern Europe, the Netherlands and Sweden also began a sustained period of industrial development from around 1870. However, being backward is not sufficient for the achievement of rapid industrial growth, and many relatively poor countries, particularly in southern Europe, recorded unimpressive rates of industrial output growth.

It is therefore important to consider both levels and growth rates when assessing economic performance. Russia, for example, shows rapid industrial growth after 1870, but starting from an extremely low level of industrialisation. In Table 6, we thus see that despite this very rapid industrial growth after 1870, Russia had still reached only 17.4 per cent of the UK level of industrialisation on a per capita basis by 1913.

Table 6 provides a good summary of the industrial development gradient within Europe, with the UK the most heavily industrialised country and with Belgium, France and Switzerland also substantially more heavily industrialised than Europe as a whole throughout the whole period 1860-1913. Sweden and Germany started the period with below average levels of per capita industrialisation, but ended it with significantly above average levels. Although per capita industrialisation increased in all countries, the level remained relatively low in much of Europe. European industrialisation can thus be thought of as geographically concentrated in a series of Marshallian districts. Marshall [1920] explained the spatial concentration of industrial production through external economies of scale, which he attributed to learning (knowledge spillovers between firms), matching (thick markets making it easier to match employers and employees) and sharing (giving firms better access to customers and suppliers in the presence of significant transport costs) (Duranton and Puga, 2004).

One potential explanation for these patterns is simply geographical, with an important role for natural resource endowments. In particular, it would be difficult to understand patterns of industrial location at this time without taking into account mineral deposits. Put simply, much industrial development in the age of iron and steam took place around coal and ore fields, although this is not always particularly well captured by the boundaries of nation states (Pollard, 1981: xiv-xv).

However, the period after 1870 also saw the development of a new scientific approach to industry, which began a process of freeing industry from the constraints of location around natural resource deposits. This was most obvious in the

development of wholly new industries such as synthetic dyestuffs, based on new chemical processes, or electrical goods, based around a new source of energy (Chandler, 1990; Landes, 1969). However, it also affected many old industries, such as brewing, where research could improve both processes and products, and iron, where research led to the utilisation of new ores and the production of better products, such as varieties of steel. Also, the development of “mass production” in engineering industries on the basis of the assembly of interchangeable parts, allowed the possibility of substituting machinery for skilled craft labour, threatening the position of established producers and creating opportunities for newly industrialising nations without a large stock of experienced workers. The “Second Industrial Revolution” thus offered countries with little previous industrial experience the opportunity to replace established producers through the more rapid development and adoption of new technology.

2. Performance of countries and regions

The United Kingdom was Europe’s most industrialised country in 1860, in terms of the absolute level of production as well as on a per capita basis. However, Britain’s very dominant position in world export markets on the basis of early industrialisation was vulnerable to competition from follower countries and was challenged during the period 1870-1913 by Germany and the United States. However, as Broadberry (1997) notes, there has been a tendency to overstate any failings in British industry at this time, and to ignore success stories. First, comparative labour productivity in manufacturing as a whole changed little between the three major industrialised countries of Britain, the United States and Germany during the period 1870-1913. So the proximate cause of the faster industrial output growth in Germany compared with

Britain was simply the faster growth of the labour input, with labour productivity in Britain and Germany remaining broadly equal. Labour productivity in manufacturing in both countries remained substantially lower than in the United States, where higher labour productivity has usually been attributed to labour scarcity and natural resource abundance, leading already by the mid-nineteenth century to the development of a machine intensive technology that was not well suited to European conditions (Habakkuk, 1962; Broadberry, 1997). Second, although Germany did very well in a number of heavy industries, such as chemicals and iron and steel, where labour productivity was higher than in Britain, and where Germany took an impressive share of world export markets by 1913, there were also lighter industries such as textiles and food, drink and tobacco, where Britain retained a substantial productivity advantage and remained strong in world export markets (Broadberry and Burhop, 2007).

The traditional view of French industry during the late nineteenth century was that it was relatively backward and, in contrast with Germany, failed to catch up with Britain (Kindleberger, 1964; Landes, 1969; Milward and Saul, 1977). Nevertheless, this generally negative assessment of French industrial performance was tempered by the fact that the pace of industrial output growth picked up after 1895, particularly in sectors based on the new technologies of the Second Industrial Revolution, such as electrical engineering, electro-metallurgy, electro-chemicals and motor vehicles (Caron, 1979: 135-160; Lévy-Leboyer and Bourignon, 1989: 105). However, the revisionist views of O'Brien and Keyder (1978: 91), who claimed that levels of industrial labour productivity were higher in France than in Great Britain for most of the nineteenth century, surely went too far in rehabilitating French industrial

performance. Taking both output and employment from census sources, Dormois (2004) finds that in 1906, output per worker in French industry was just 74.1 per cent of the British level. The French may have found an alternative path to the twentieth century, based on small family firms catering to niche markets, but it was not without its costs in terms of living standards (O'Brien and Keyder, 1978: 196; Caron, 1979: 163-170).

Austria-Hungary had a relatively low level of industrialisation per capita, as can be seen in Table 6, but the Empire nevertheless produced a significant share of Europe's industrial output on account of its size. In fact, levels of economic development within the imperial territories varied widely, with Austria (Cisleithania) generally more industrialised than Hungary (Transleithania), and with considerable variation even within Austria (Milward and Saul, 1977; Pollard, 1981; Komlos, 1983; Good, 1984). Although early quantitative research indicated a very rapid growth rate of industrial output in the Austrian part of the Empire, subsequent research has modified this picture. Whereas Rudolph (1976) suggested an industrial growth rate of 3.8 per cent per annum for the period 1870-1913, the addition of a wider range of industries and the use of improved value added weights has reduced this to 2.5 per cent (Komlos, 1983; Schulze, 2000). Allowing for a faster rate of growth in Hungary, however, produces a rate of industrial growth for the Empire as a whole of 2.8 per cent per annum, reported here in Table 5 (Schulze, 2000). The downward revision of the industrial growth rate by the later researchers was concentrated particularly in the period before 1896, leading to an unfortunate resurrection of the use of the term "Great Depression" for a period when output did not fall but continued to grow (Komlos, 1978; Good, 1978). The catching-up

perspective leads to the expectation that Austria-Hungary should have been experiencing rapid industrial growth to catch up with the leading European industrial nations at this time. From this perspective, Austria-Hungary clearly under-performed during the period 1870-1913.

We have already noted in our discussion of Table 6 that Russia was a very backward economy in the mid-nineteenth century, so the rapid rate of industrial growth exhibited by Russia during the period 1870-1913 in Table 5 conforms to the predictions of the catching-up framework. The experience of Tsarist Russia led Gerschenkron (1962) to formulate a number of propositions concerning the link between backwardness and economic development. These included (1) a greater role for the state, substituting for the lack of private entrepreneurship (2) a greater focus on capital goods industries to get around the lack of consumer demand (3) a greater role for banks in directing scarce capital into industrial projects (4) a greater role for imported technology. Gerschenkron placed little weight on the role of agriculture, which he saw as almost immune to change in backward societies. Although some of Gerschenkron's generalisations do seem to fit the Russian case well, others have not stood up so well to quantitative scrutiny (Falkus, 1972: 57, 61-74; Gatrell, 1986: 144, Gregory, 1982: 133-134).

The catching-up perspective suggests that we should expect a similar performance from the countries of the northern and southern peripheries of Europe. In Table 6 we see that per capita levels of industrialisation in Italy and Iberia were similar to levels in Scandinavia in 1860. Industrial growth rates in Table 5, however, were much higher in the Scandinavian countries than the Mediterranean countries. In

particular, Sweden stands out as having experienced a very rapid phase of industrial growth, achieving a level of industrialisation by 1913 that was on a par with the European core. This represents a notable case of leap-frogging on the basis of the technologies of the Second Industrial Revolution, drawing particularly on Sweden's abundant supply of hydro-electric power (Pollard, 1981: 233-236). The relatively slow overall rate of industrial growth in Italy and Iberia masks some regional sparks of industrial development, most notably in a triangle between Genoa, Milan and Turin, and based again on hydro-electric power (Pollard, 1981: 229-232).

3. Developments in particular branches

Industry covers a wide range of activities, and we now survey briefly a number of important sectors, highlighting the contributions of the major European producers. We begin with coal, the major source of energy in the age of steam. As noted earlier, industry was heavily concentrated around coalfields during the nineteenth century, so it is not surprising to see in Table 7 that Britain was Europe's major coal producer throughout the period, followed by Germany. Belgium, a very small country but an early industrialiser, was overtaken by Germany, France and Russia as these much larger countries industrialised. Although Britain remained Europe's largest coal producer, and increased output significantly, labour productivity stagnated, with technological and organisational changes merely offsetting diminishing returns, as pits were sunk ever deeper and coal was mined further from the pithead (Greasley, 1990). Although European production was still increasing, coal from the New World was already being mined in more favourable geological conditions and taking an increasing share of world production (Svennilson, 1954: 107).

In iron and steel, major technological developments drew on science, with wrought iron increasingly replaced by varieties of mass-produced steel, following the introduction of the Bessemer process in 1856, the Siemens-Martin (open hearth) process in 1869, and the Thomas (basic) process in 1879 (Svennilson, 1954: 121). The general picture of Germany leap-frogging Britain is illustrated in Table 7, which shows output of pig iron among Europe's main producers. Allegations of entrepreneurial failure in Britain have been exaggerated, since account must be taken of iron ore endowments and demand side factors such as protective barriers raised in the rapidly growing markets of Germany and the United States, combined with Britain's continued free trade policy (McCloskey, 1971; Tolliday, 1991). The Russian growth spurt of the 1890s is also evident, with Russia overtaking France before the French forged ahead again after 1900 (Gatrell, 1986: 153; Caron, 1979: 158-159). Austria-Hungary was also a major iron and steel producer despite a low per capita level of industrialisation. Like Russia, Austria-Hungary was dependent on the large home market, with a railway construction boom providing a substantial boost to demand (Milward and Saul, 1977: 304-306).

During the period 1870-1914, the chemical industry was transformed on the basis of scientific research. The production of inorganic products that had been produced on an industrial scale since the early nineteenth century, was revolutionised by new processes such as the replacement of the Leblanc process by the Solvay process in soda ash, and the introduction of electricity as an important agent in chemical processes (Svennilson, 1954: 162). However, of more significance for the long run development of the industry was the synthesis of organic (carbon-based) products, such as dyestuffs, pharmaceuticals, perfumes and photographic chemicals

(Svennilson, 1954: 163). Since the synthesis of organic products needed large quantities of inorganic chemicals, the production of sulphuric acid in Table 7 can be taken as an indicator of the general state of Europe's national chemical industries (Svennilson, 1954: 163-164). As in other heavy industries, Germany overtook Britain, although the scale of the German advantage towards the end of the period is understated, since Germany was much more dominant in organic products, where Switzerland was the only serious competitor. In synthetic dyestuffs, for example, Germany produced 85.1 per cent of world output in 1913 (Svennilson, 1954: 290). The chemical industry remained relatively underdeveloped in eastern Europe, with neither Russia nor Austria-Hungary featuring among the major producers. Small, relatively rich countries such as Belgium and the Netherlands were also significant producers, alongside France, while Italy showed strong growth from the 1890s.

The Industrial Revolution began in cotton textiles, which continued to be an important branch of European industry until 1914. Britain remained the largest producer in the world despite some inevitable loss of market share as other countries industrialised (Sandberg, 1974). The switch from mules to rings in spinning and from the powerloom to the automatic loom in weaving removed some of the skill from the production process, and enabled countries with a less skilled but cheaper labour force to compete with Britain, in line with Vernon's (1966) product cycle model. Broadberry and Marrison (2002) emphasise the importance of external economies of scale in the British industry, which was highly localised in Lancashire, but consisted of around 2,000 spinning and weaving firms. The product cycle perspective also helps to understand the high output figures achieved towards the end of the period in low-wage countries such as Russia and Austria-Hungary, with Russia almost catching-up

on Germany, and with Austria-Hungary ahead of Italy and not too far behind France (Gatrell, 1986: 160; Milward and Saul, 1977: 238).

The home market was more important for the food, drink and tobacco sector, although even here tradability was increasing with urbanisation and the emergence of a substantial urban working class demanding more processed foodstuffs. Data on beer production are available on a consistent basis in Table 7, and suggest a strong link to home market size and per capita income, with the highest levels of production and consumption in Germany and Britain, and with substantial production also in Austria-Hungary, France and Russia. Although possibilities of transporting such a heavy and perishable product were limited, a small country such as Belgium was able to export to neighbouring countries. Of course, it must be borne in mind that France produced large quantities of wine for export as well as for home consumption, so that more general data on production of alcoholic drinks would show a much bigger contribution from the Mediterranean countries, including Italy, Spain and Portugal (Pinilla and Ayuda, 2002).

V. SERVICES

1. Europe's service sector output, 1870-1914

Most economic histories of the period 1870-1914 pay little attention to services, apart from railways and banks, which are seen as supporting industry. The national accounting approach allows us to place the contributions of the railways and banks in the wider context of the service sector as a whole, and to bring out the contributions to consumers as well as to industrial producers. Railways moved people and agricultural produce as well as industrial goods, and it was not the sole purpose of banks to

provide cheap loans to heavy industry. Furthermore, in addition to transport and communications and finance, services also comprised the important sectors of distribution, professional and personal services and government.

2. Regional developments

The most highly developed service sectors were in northwest Europe, particularly in Britain and the Netherlands, where high productivity was achieved in the specialised and standardised supply of services in a highly urbanised environment. In sectors where international trade was possible, this played an important role in increasing the size of the market and allowing economies to benefit from the division of labour. High productivity required the “industrialisation” of services, involving a transition from customised, low-volume, high-margin business organised on the basis of networks, to standardised, high-volume, low-margin business with hierarchical management (Broadberry, 2006). In some sectors, such as shipping, and insurance, this involved the emergence of large firms in classic Chandlerian fashion, but in others, such as investment banking, it involved Marshallian external economies of scale for the financial districts of London and Amsterdam, on the basis of large numbers of small firms (Broadberry and Ghosal, 2002; van Zanden and van Riel, 2004: 305-319). Large firms also grew in importance in a number of sectors where international trade was impractical, such as retail distribution, retail banking and the railways.

Germany was a land of contrasts. Although it contained some modernised service sectors such as the railways and the universal banks, which have been highlighted in the literature, the continued importance of agriculture and the

associated low levels of urban agglomeration limited the extent of the market for specialised services. Distribution remained dominated by small wholesalers and retailers, and although Gerschenkron (1962) focused on the role of the universal banks in directing funds into heavy industry, a balanced overview of the banking sector as a whole has to take account of the many small institutions that made up the bulk of the German banking sector, and which pulled down the average productivity performance (Guinnane, 2002; Broadberry, 2004).

The service sector in Italy during the late nineteenth century bears a certain resemblance to its German counterpart, with the railways playing an important role in the unification of a new state that was keen to foster modernisation, and with universal banks channelling resources into heavy industry (Milward and Saul, 1977: 243-247, 260-264). However, recent research has tended to play down the contribution of these two sectors to economic growth, with Cohen and Federico (2001: 72) pointing out that Italy's per capita railway mileage was still only one-half that of France in 1913, and with Fohlin (1998) claiming that Italy's universal banks tended to support large, established companies rather than provide venture capital to small, promising firms.

The existing literature on services in the Habsburg Empire is also heavily oriented towards the railways and the banks. The Austro-Hungarian railway system was one of the largest in Europe, although this owed more to geography than high levels of economic development (Milward and Saul, 1977: 304). In Gerschenkron's (1962) work, the banks are seen as playing an important role in mobilising capital for

industry and the railways. However, they became less involved in financing investment in industry and the railways after the crash of 1873 (Rudolph, 1976).

3. Developments in particular sectors

Table 8 provides some indicators of activity in Europe's transport and communications sector on the eve of World War I. Railways are often seen as playing an important role in integrating national economies in the nineteenth century, and were in many cases actively promoted by governments seeking to speed up the process of industrialisation (Gerschenkron, 1962). The largest railway systems were inevitably in the countries covering the largest geographical area, with central and eastern Europe claiming the three largest systems within the empires of Russia, Germany and Austria-Hungary. Western Europe was more fragmented politically, with the next largest systems being in France, the United Kingdom and Italy.

For freight traffic, the social savings of the railways are calculated as the extra cost of transporting the quantity of freight shipped on the railways by the next best alternative (Fogel, 1964). O'Brien (1983) provides a survey of social savings estimates for a number of European countries, reproduced here in Table 9, from which a number of conclusions follow. First, the estimates for Belgium, England and Wales, France, Germany and Russia are consistent with Fogel's expectation of relatively small social savings where a good alternative system of transport such as inland waterways existed. Social savings were large only where there was no good system of inland waterways, such as in Spain. Second, the social savings of the railways increased over time, due to technological progress, which led to freight rates on the railways falling relative to freight rates on inland waterways.

There was no scope for international competition in railways, so that relatively under-developed countries in Eastern Europe had the largest systems on account of their geographical size. In shipping, however, international competition was possible, allowing the most efficient providers to gain market share. Data on the net tonnage of the main European merchant fleets are shown in Table 8. By far the most successful nation in shipping was the United Kingdom, which operated around 35 per cent of the world merchant net tonnage throughout the period 1870-1913 (Kirkaldy, [1914]). The next largest shipping nation was Germany, with less than 10 per cent of world net tonnage, while the third largest owner of merchant tonnage was Norway. Indeed, the Scandinavian countries, despite their relatively small populations, revealed a strong comparative advantage in shipping at this time.

Turning to telecommunications, international competition was not possible at this time, so that population and income per capita were the main determinants of the level of activity, as with the railways. The highest levels of activity, visible in Table 8, were in the rich, large countries of Britain, France and Germany, but the poorer large countries such as Russia, Austria-Hungary and Italy also show large volumes of business. By 1913, telephones were becoming more common, and there is some evidence to suggest that public sector telecommunications monopolies delayed the development of the telephone system to protect their investments in the older telegraph technology (Foreman-Peck and Millward, 1994: 97-111; Millward, 2005, 103-104).

Table 10 provides some indicators of activity in finance and distribution in 1913. Financial activity is represented by banknotes in circulation and commercial bank deposits. Since estimates for individual countries are in national currencies, it is necessary to convert them to a common currency (US dollars) to make international comparisons. Again population size and per capita income were important determinants of activity. However, per capita income had a negative effect on the circulation of banknotes but a positive effect on the scale of bank deposits, since the degree of financial intermediation increases with the level of economic development (Bordo and Jonung, 1987). Hence large, backward economies such as Russia and Austria-Hungary had high levels of banknote circulation, whilst even small but highly developed economies such as Belgium had quite high commercial bank deposits. Note that the United Kingdom, with the most highly developed financial sector, had very high levels of commercial bank deposits but very low levels of banknote circulation. The City of London established a dominant position at the centre of world finance in the second half of the nineteenth century, which it retained until after World War I, despite challenges from Berlin and Paris as well as New York (Lindert, 1969; Kynaston, 1995).

To capture levels of activity in distribution, it is necessary to turn to indirect indicators such as the level of exports and domestic consumption of agricultural and manufactured products. Table 10 provides comparative data on merchandise exports. The most successful European exporters were the United Kingdom, Germany and France, whose exports dwarfed those of the large eastern economies, Russia and Austria-Hungary. Even the small nation of Belgium had exports that were larger than Austria-Hungary's and close to the Russian level. Furthermore, if re-exports were to

be added in, the Netherlands would also feature as a major international wholesale distributor, on account of its links with Indonesia. While wholesale distribution tended to remain in the hands of entrepreneurial merchant houses, the process of industrialising services went further in retailing, which saw the emergence of large scale organisations, including co-operative societies as well as department stores and multiple (or chain) stores (Broadberry, 2006). This shift towards large-scale distribution was dependent on the process of urbanisation, and therefore proceeded more rapidly in industrialised areas than in more rural societies.

VI. CONCLUSION

This chapter reminds us that GDP consists of a wide variety of activities, and that prosperity depends both on achieving high productivity in each sector and on allocating resources efficiently across sectors. In general, we find that within Europe between 1870 and 1914, achieving high productivity overall required shifting labour out of agriculture and into industry and services. Although the literature has tended to focus on industrialisation as the main way out of economic backwardness, the growth and modernisation of the service sector was of at least equal importance. Indeed, much of the process of achieving high productivity in services required a kind of “service sector industrialisation”, with provision on a high volume basis, in a standardised form, using modern technology, overseen by hierarchical management.

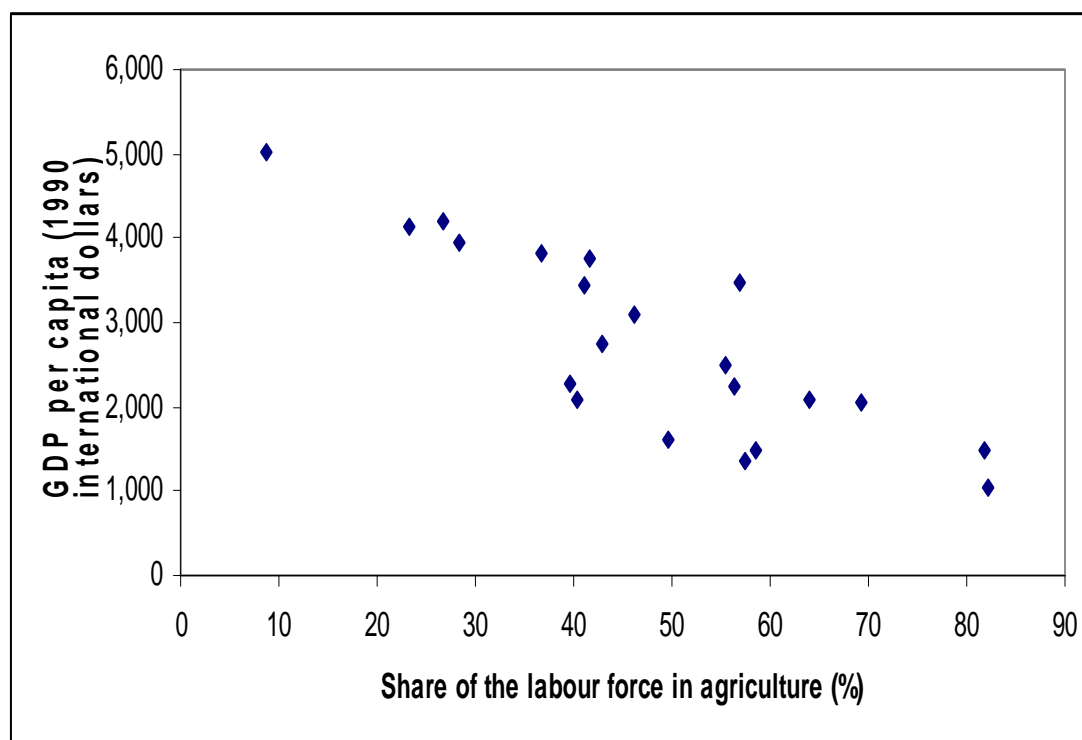
TABLE 1: Distribution of the working population by major sector, 1870-1913

	Agriculture		Industry		Services	
	c.1870	c.1913	c.1870	c.1913	c.1870	c.1913
<i>Northwestern Europe</i>	31.7	20.9	35.0	39.5	33.3	39.6
Belgium	44.4	23.2	37.8	45.5	17.8	31.3
Denmark	47.8	41.7	21.9	24.1	30.3	34.2
Finland	75.5	69.3	10.1	10.6	14.4	20.1
Netherlands	39.4	28.3	22.4	32.8	38.2	38.9
Norway	49.6	39.6	22.9	25.9	27.5	34.5
Sweden	67.4	45.0	17.4	31.8	15.2	23.2
United Kingdom	22.2	11.8	42.4	44.1	35.4	44.1
<i>Southern Europe</i>	58.6	49.3	23.2	26.8	18.2	23.9
France	49.8	41.0	28.0	33.1	22.2	25.9
Greece		49.6		16.2		34.2
Italy	61.0	55.4	23.3	26.6	15.7	18.0
Portugal	65.0	57.4	24.9	21.9	10.1	20.7
Spain	66.3	56.3	18.2	13.8	15.5	29.9
<i>Central & eastern Europe</i>	56.6	54.9	25.8	24.4	17.6	20.7
Austria-Hungary	67.0	59.5	15.5	21.8	17.5	18.7
Bulgaria		81.9		8.1		10.0
Germany	49.5	34.5	29.1	37.9	21.4	27.6
Romania		79.6		8.0		12.4
Russia		58.6		16.1		25.3
Serbia		82.2		11.1		6.7
Switzerland	42.3	26.8	41.8	45.7	15.9	27.5
<i>Total Europe</i>	51.7	47.1	26.9	27.8	21.4	25.1
<i>Total Europe (14 countries)</i>	51.7	41.4	26.9	32.3	21.4	26.3

Source: Derived from Mitchell (2003) except as follows: Sweden: Krantz and Schön (2007); UK: Feinstein (1972); Germany: Hoffmann (1965).

Notes: Regional figures are weighted country averages within each region. Total Europe figures are calculated for the 14 countries available in both years, as well as for the differing sample sizes.

FIGURE 1: The relationship between GDP per capita and the sectoral allocation of labour in 1913



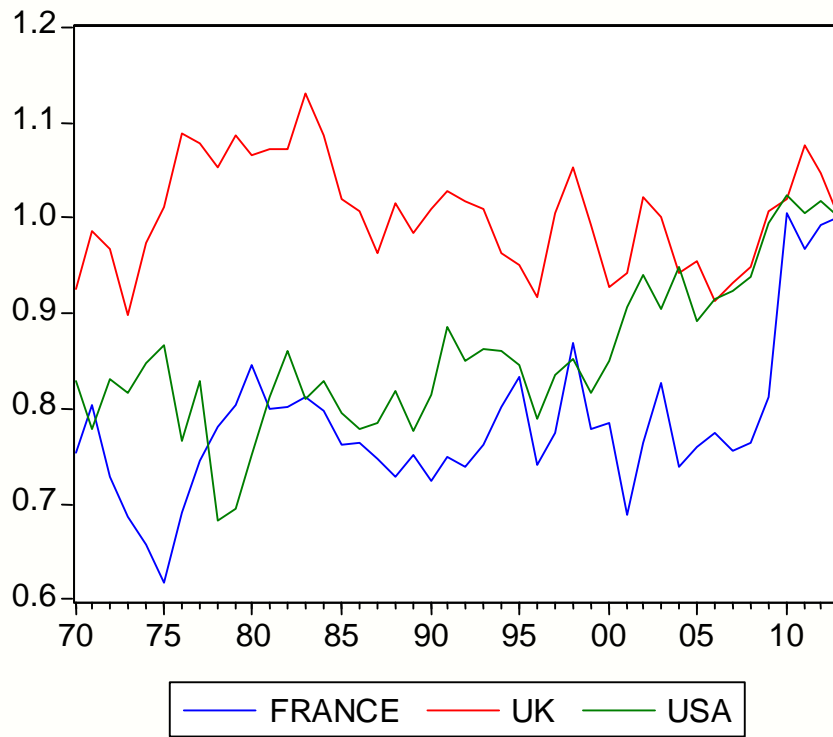
Source: Broadberry (2007).

TABLE 2: Regression analysis of the relationship between GDP per capita and the sectoral allocation of labour, 1870-1992

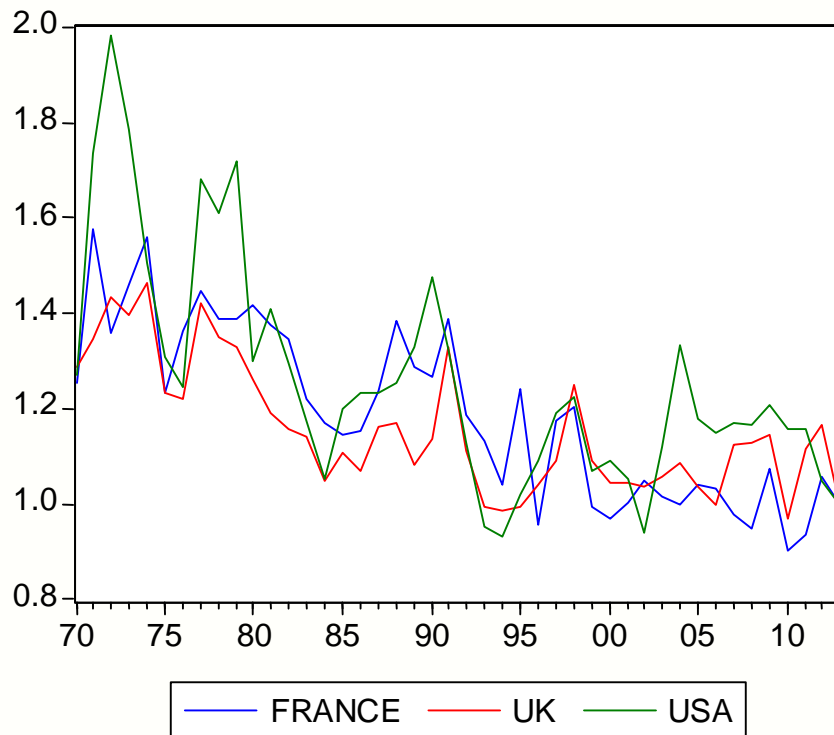
	Agriculture	Industry	Services
Constant	9.47 (166.62)	7.10 (48.10)	6.72 (88.32)
Sectoral share of labour	-0.032 (-23.69)	0.041 (8.82)	0.047 (22.80)
R ²	0.795	0.349	0.782

Notes: The dependent variable is the log of GDP per capita in 1990 Geary-Khamis dollars. Figures in parentheses are t-statistics. Data are for up to 22 countries in 1870, 1913, 1929, 1938, 1950, 1973 and 1992, yielding 147 observations.

Source: Broadberry (2007).

FIGURE 2: Inter-sectoral terms of trade, agriculture/industry, 1870-1913

Source: Williamson (2002).

FIGURE 3: Relative prices, crop/livestock, 1870-1913

Sources: US Department of Commerce (1975), Levy-Leboyer (1970), Mitchell (1988).

TABLE 3: Agricultural production in 1913, by country

	Value Added (£m)	Gross Output (£m)	Share VA/ gross output	Share livestock	Growth rate of gross output, 1870-1913 (% p.a.)
Austria-Hungary	383	414	0.925	0.262	1.88
Belgium	34	54	0.630	0.665	0.76
Denmark	36	67	0.540	0.940	1.62
Finland	15	18	0.833	0.746	1.56
France	516	587	0.879	0.426	0.62
Germany	526	575	0.915	0.698	1.56
Greece	18	20	0.900	0.363	2.12
Italy	326	352	0.926	0.307	1.14
Netherlands	30	56	0.536	0.591	0.65
Portugal	26	28	0.929	0.236	0.54
Russia	729	767	0.950	0.344	2.24
Spain	137	145	0.945	0.344	0.46
Sweden	37	44	0.841	0.661	0.96
Switzerland	31	35	0.886	0.795	0.70
UK	135	201	0.672	0.747	0.00
North West Europe Central & Eastern	287	440	0.653	0.748	0.88
Europe	1,132	1,132	0.904	0.429	1.91
Southern Europe	1,791	1,791	0.932	0.372	0.78
Europe	2,979	3,363	0.886	0.452	1.36
"World"	5,640	6,387	0.883	0.437	1.56

Notes: Countries at their 1913 boundaries.

Source: Federico (2004).

TABLE 4: Factor inputs and labour productivity in agriculture

	Land (millions of hectares)			Labour (millions of workers)			Labour productivity (UK in 1913=100)		
	Ca. 1850	Ca. 1880	Ca. 1910	Ca. 1850	Ca. 1880	Ca. 1910	Ca. 1880	Ca. 1910	Total growth
Aust-Hung	20.2	25.6	26.7	13.8	14.9	15.5	16.8	28.9	1.725
Belgium		1.6	1.5	1.0	1.1	0.8	27.6	46.1	1.667
Bulgaria		1.8	2.5			0.9			
Denmark	2.0	2.4	2.9		0.95	0.5	23.7	79.0	3.341
Finland				0.4	0.45	0.6	20.7	26.6	1.288
France	34.3	32.7	29.6	9.1	8.6	7.7	48.6	74.0	1.523
Germany	24.4	26.2	26.2	8.3	9.6	10.5	34.8	52.4	1.506
Greece	0.85	0.9	0.9						
Italy	13.5	15.4	14.8		9.4	10.5	25.4	32.5	1.281
Netherlands	1.9	2.0	2.1	0.49	0.62	0.68	40.9	50.3	1.228
Norway					0.22	0.37			
Portugal	1.9		3.2		1.1	1.1	22.7	29.1	1.283
Romania	2.5		5.0			1.6			
Russia	82.5	103.8	113.4	17.6°	25.7°	37.0°			1.571°
Spain	16.0	15.8	19.1	4.5	4.9	4.4	25.6	33.7	1.314
Sweden		3.4	3.4	0.7	1.1	1.0	26.0	39.4	1.518
UK	8.0	8.0	6.7	2.0	1.6	1.5	87.9	100.0	1.137
India							9.3	10.5	1.136
USA							82.8	108.5	1.310

Notes: ° males only.

Sources: Land (acreage and tree-crops only) Federico (2005, Table 4.1); Labour (males and females), Federico (2005: Table 4.16); Labour productivity computed as ratio of GDP (averages 1878-1881 and 1911-1913) to workforce.

TABLE 5: Growth of industrial production, 1870-1913 (% per annum)

Country	Growth rate	Country	Growth rate	Country	Growth rate
<i>Northwestern Europe</i>		<i>Southern Europe</i>		<i>Central & eastern Europe</i>	
Belgium	2.5	France	2.1	Austria-Hungary	2.8
Denmark	3.4	Greece		Bulgaria	
Finland	4.1	Italy	2.7	Germany	4.1
Netherlands	3.0	Portugal	2.4	Romania	
Norway	3.3	Spain	2.7	Russia	5.1
Sweden	4.4			Serbia	
United Kingdom	2.1			Switzerland	3.2

Sources: Belgium: Gadisseur (1973); Denmark: Hansen (1974); Finland: Hjerpe (1996); Netherlands: Smits, Horlings and van Zanden (2000); Norway: unpublished data kindly made available by Ola Grytten; Sweden: Krantz and Schön (2007); United Kingdom: Feinstein (1972); France: Crouzet (1970); Italy: Fenoaltea (2003); Portugal: Lains (2006); Spain: Prados de la Escosura (2003); Switzerland: unpublished data kindly made available by Thomas David; Austria-Hungary: Schulze (2000); Germany: Hoffmann (1965); Russia: Goldsmith (1961).

Note: Growth of industrial production in Switzerland is for the period 1891-1913.

TABLE 6: Per capita levels of industrialisation, 1870-1913 (UK in 1900 = 100)

	1860	1880	1900	1913
<i>Northwestern</i>				
<i>Europe</i>				
Belgium	28	43	56	88
Denmark	10	12	20	33
Finland	11	15	18	21
Netherlands	11	14	22	28
Norway	11	16	21	31
Sweden	15	24	41	67
United Kingdom	64	87	100	115
<i>Southern</i>				
<i>Europe</i>				
France	20	28	39	59
Greece	6	7	9	10
Italy	10	12	17	26
Portugal	8	10	12	14
Spain	11	14	19	22
<i>Central & eastern Europe</i>				
Austria-Hungary	11	15	23	32
Bulgaria	5	6	8	10
Germany	15	25	52	85
Romania	6	7	9	13
Russia	8	10	15	20
Serbia	6	7	9	12
Switzerland	26	39	67	87
EUROPE	17	23	33	45

Sources: Bairoch (1982: 294, 330).

TABLE 7: Europe's major producers of some important industrial products

A. Coal (millions of metric tons)					
	1870	1880	1890	1900	1913
United Kingdom	112	149	185	229	292
Germany	26	47	70	109	190
France	13	19	26	33	41
Russia	1	3	6	16	36
Belgium	14	17	20	23	24
Austria-Hungary	4	7	10	12	18

B. Pig iron (thousands of metric tons)					
	1870	1880	1890	1900	1913
Germany	1,261	2,468	4,100	7,550	16,761
United Kingdom	6,059	7,873	8,031	9,104	10,425
France	1,178	1,725	1,962	2,714	5,207
Russia	359	449	928	2,937	4,641
Belgium	565	608	788	1,019	2,485
Austria-Hungary	403	464	965	1,456	2,381

C. Sulphuric acid (thousands of metric tons)					
	1870	1880	1890	1900	1913
Germany	43	130	420	703	1,727
United Kingdom	590	900	870	1,010	1,082
France	125	200	--	625	900
Italy	--	--	59	230	645
Belgium	--	30		165	420
Netherlands	--	--	--	--	320

D. Raw cotton consumption (thousands of metric tons)					
	1870	1880	1890	1900	1913
United Kingdom	489	617	755	788	988
Germany	81	137	227	279	478
Russia	46	94	136	262	424
France	59	89	125	159	271
Austria-Hungary	45	64	105	127	210
Italy	15	47	102	123	202

E. Beer (thousands of hectolitres)					
	1870	1880	1890	1900	1913
Germany	23,700	38,572	52,830	70,857	69,200
United Kingdom	--	44,955	52,100	60,010	58,836
Austria-Hungary	9,993	10,957	14,117	21,471	24,070
Belgium	7,794	9,239	10,771	14,617	16,727
France	6,499	8,227	8,491	10,712	12,844
Russia	--	--	--	5,872	11,612

Source: Mitchell, (2003).

TABLE 8: Indicators of European transport and communications activity, circa 1913

	Railway track open in 1913 (km)	Merchant ships registered in 1910 (1000s of net tons)	Telegrams sent in 1913 (millions)	Telephone calls in 1913 (millions)
<i>Northwestern</i>				
<i>Europe</i>				
Belgium	4,678	191	9.5	138
Denmark	3,868	547	3.9	227
Finland	3,560	411		
Netherlands	3,305	534	7.1	170
Norway	3,085	1,526	4.0	170
Sweden	14,377	771	5.0	434
United Kingdom	32,623	11,556	88.5	1,098
<i>Southern</i>				
<i>Europe</i>				
France	40,770	1,452	67.1	396
Greece	1,584	447	2.0	3
Italy	18,873	1,107	25.3	230
Portugal	2,958	114	5.0	7
Spain	15,088	789	6.6	35
<i>Central &</i>				
<i>eastern Europe</i>				
Austria-Hungary	43,280	510	37.8	568
Bulgaria	2,109		2.3	8
Germany	63,378	2,903	64.3	2,325
Romania	3,549		4.3	20
Russia	70,156	723	45.0	900
Serbia	1,958		2.4	6
Switzerland	4,832		6.5	69
EUROPE				

Sources and notes: Railways from Mitchell (2003), except railway track open in Austria-Hungary, from Bachinger (1973: 301, 482); Shipping from Kirkaldy [1914: Appendix XVII] and Mitchell (2003); Telegrams and telephone calls from Foreman-Peck and Millward (1994: 109).

TABLE 9: Social savings on freight transport by railways

	Date	Social savings as a percentage of GNP
Belgium	1865	2.5
Belgium	1912	4.5
England and Wales	1865	4.1
England and Wales	1890	11.0
France	1872	5.8
Spain	1878	11.8
Spain	1912	18.5
Germany	1890s	5.0
Russia	1907	4.6
USA	1859	3.7
USA	1890	8.9
Mexico	1910	25-39

Source: O'Brien (1983: 10).

TABLE 10: Indicators of European financial and commercial activity in 1913

	Banknotes in circulation (\$m)	Commercial bank deposits (\$m)	Merchandise exports (\$m)
<i>Northwestern</i>			
<i>Europe</i>			
Belgium	206	451	717
Denmark	44		171
Finland	0.2	120	78
Netherlands	125	117	413
Norway	29	159	105
Sweden	63	429	219
United Kingdom	177	5,231	2,555
<i>Southern</i>			
<i>Europe</i>			
France	1,093	2,200	1,328
Greece	47	40	23
Italy	537	330	485
Portugal	95		38
Spain	373		183
<i>Central & eastern Europe</i>			
Austria-Hungary	505	164	561
Bulgaria		33	94
Germany	691	2,526	2,454
Romania	82		130
Russia	770	1,308	783
Serbia			18
Switzerland	61	355	226
EUROPE			

Sources and notes: Banknotes and deposits: nominal values in national currencies from Mitchell (2003) converted to US dollars using exchange rates from Svernilson (1954: 318-319); Merchandise exports: nominal values in national currencies from Mitchell (2003) converted to US dollars using exchange rates from Svernilson (1954: 318-319). Adjustment for re-exports from Maddison (1995: Table I-1).

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