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Economic Geography

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Spatial Inequalities: A Brief Historical Overview

During the second millennium, the world's population increased by a factor of twenty-two, while world income increased by a factor of three hundred. This development, however, was not uniform and did not affect all countries in the same way. Between 1000 and 1820, the annual growth rate of income per capita in the countries of Western Europe was estimated at around 0.15%, which is extremely low. That rate then rose to 1.5%, thus reaching a level ten times higher than it had been for the previous eight centuries. This change of pace was to have considerable consequences for economic disparities between nations. Indeed, income increases by less than 4% in a twenty-five year period (roughly one generation) when the annual growth rate is 0.15%, while it grows by 45% when the growth rate reaches 1.5%. To put it another way, income per capita doubles after 46 years in the second case, while the same doubling takes 463 years in the first. Thus, while the income per capita of Europeans hardly differed from that of other inhabitants of the planet at the beginning of the second millennium, it is currently seven times higher (Maddison 2001, chapter 1). The reason for this dramatic change is well-known: the Industrial Revolution.

In this chapter, we briefly discuss two major features of the Industrial Revolution that have been instrumental in reshaping the European economic space: (i) the existence of gigantic productivity gains and the tremendous lowering of transport costs; and (ii) the profound transformation of agricultural and rural societies into industrial and urbanized ones. Subsequently, we will see how, because of the Industrial Revolution, spatial inequalities became increasingly marked, not only between countries but also within them.

Our historical survey should ideally cover Europe, the United States, and Japan. However, in order to allow for meaningful long-run comparisons, we must consider economic spaces that have (more or less) the same borders. Furthermore, our aim is not to provide a detailed

discussion of all the spatial implications of the Industrial Revolution. Instead, we are interested in a few facts that are directly relevant for economic geography. All of this has led us to focus mainly, but not solely, on Europe.

1.1 The Space-Economy and the Industrial Revolution

The Industrial Revolution began in Great Britain during the second half of the eighteenth century and then diffused to Continental Europe and North America. Since then, productivity gains have been steady and their accumulation has generated considerable multiplier effects.¹ This economic development was accompanied by spectacular decreases in transport costs and massive rural–urban migration. The old agricultural economy became industrial and then, in the twentieth century, services became the primary economic sector.

1.1.1 Productivity Gains and Falling Transport Costs

The most distinctive feature of the Industrial Revolution was the considerable increase in productivity. According to Bairoch:

[I]t can be considered that, for the whole of the economy, the total factor productivity was multiplied on average in Western developed countries by 40 to 45 between 1700 and 1990. Even limiting ourselves to the years 1000 to 1700, which, in Europe, were on the whole a period of progress, it can be very roughly estimated that the productivity of the whole economy was, at best, multiplied by 2.

Bairoch (1997, volume 1, pp. 97–98) [our translation]

Such productivity gains allowed an appreciable increase in individual incomes.² The question of whether European countries were richer than others before the Industrial Revolution is still discussed by historians—but this debate changes the global picture very little. For example, while Bairoch (1993) believes that China and other Asian civilizations were

¹ This does not mean that technological progress was absent before the Industrial Revolution, but it seems to have led to increased population and not higher living standards (Kremer 1993).

² Although some historians still debate the accuracy and relevance of the term “Industrial Revolution,” we find it hard to deny the emergence of a completely new economic trend. This can be illustrated by means of the following counterfactual argument due to Joel Mokyr. In 1890, income per capita in the United Kingdom was about \$4,100 in 1990 dollars. Had the United Kingdom been growing at a rate of 1.5% in the previous three hundred years, income per capita in 1590 would have been \$63, which is far below the subsistence level. Indeed, the average income of the five poorest countries in the world was about \$500 in 1990.

more advanced than Western Europe in the sixteenth century, he is “still inclined to think that there was no sizable difference in the levels of income of the different civilizations when they reached their preindustrial peak” (p. 106). Whatever the value of these differences, there is no longer any question that the Industrial Revolution generated income disparities between countries and regions of a completely different nature and on an unprecedented scale.

The transportation sector underwent the most stunning changes during the Industrial Revolution. In particular, the *great divergence* between nations appeared when all distance-related costs underwent a drastic and historically unprecedented fall. The scope of this decline led Cipolla to contend that:

Fast and cheap transportation has been one of the main products of the Industrial Revolution. Distances have been shortened at an astonishing pace. Day by day the world seems smaller and smaller and societies that for millennia practically ignored each other are suddenly put in contact—or in conflict.

Cipolla (1962, p. 13)

This was later confirmed by Bairoch in an evaluation of that spectacular transformation in the means of transportation:

On the whole, between 1800 and 1910, it can be estimated that the lowering of the real (weighted) average prices of transportation was on the order of 10 to 1.

Bairoch (1997, volume 2, p. 26) [our translation]

The cost of transporting maritime cargo dropped dramatically during the nineteenth century, leading to the convergence of prices of several goods and to the gradual integration of international markets. One example is the case of wheat, whose price in Liverpool exceeded that of wheat in Chicago by 57.6% in 1870 but by only 15.6% in 1913; the price of steel in London was 75% higher than it was in Philadelphia in 1870, but only 20.6% higher in 1913; the price differential of cotton between Liverpool and Bombay fell from 57% in 1873 to 20% in 1913, while the price difference of jute between London and Calcutta dropped from 35% to 4% (Findlay and O'Rourke 2003).

In the first half of the nineteenth century the costs of ground transportation were still very high and weighed heavily on the prices of commodities. France provides a good illustration of this. For example, the transport of coal from Saint-Etienne to the ironworks of Champagnes—a distance of 545 km—multiplied the sale price by five. The coal of Sarrebrück was sold for F 9.50 a ton locally, but the price in Saint-Dizier,

located 220 km away, was F 51.50, with transport costs representing 82% of the total price (Léon 1976).

After the emergence of railroads, things changed dramatically. For example, prior to the Industrial Revolution the average cost of ground transportation of grains per ton-kilometer was equal to the average cost of buying 4 or 5 kg of grain, but this cost fell to 0.1 kg per ton-kilometer in 1910 thanks to long-distance transportation by rail. Once we account for the decrease in the price of grain generated by technological innovations in agriculture, the decrease in transport costs is even larger: they are divided by a factor close to 50 (Bairoch 1997, chapter 4). In the United States, the average cost of moving a ton a mile in 1890 was 18.5 cents, as opposed to 2.3 cents today (in 2001 dollars), while trucking costs have fallen 2% per year since 1980 (Glaeser and Kohlhase 2004).

Moreover, the actual cost of shipping commodities also involves time costs, along with the cost of inventory holdings and depreciation costs. We deal here with another dimension of falling transport costs, i.e., a big reduction in the time of transport. By 1910, steamships were crossing the Atlantic at five times the speed of seventeenth-century boats, and with twenty times more tonnage. Currently, the value of an additional day of transportation is worth an average of 0.5% of the value of manufactured goods. Because of decreases in transport times, the real drop in transport costs is thus even more marked than that revealed solely by the level of freight. The gains are even more considerable for ground transport. For example, it took 358 hours in 1650 to go from Paris to Marseille but only 38 hours in 1854 and just 3 hours in 2002.

The progressive integration of markets produced by this unprecedented decline in transport costs must have had a considerable impact on the international division of labor, distinguishing between industrialized countries and countries specializing in the supply of primary goods. Yet unlike transport costs, tariff barriers did not experience the same evolution. As shown in table 1.1, a slow advance of free trade is observed at the end of the Napoleonic Wars (up until 1875), and that is followed by a real revival in protectionism, which culminated in the 1930s. On the other hand, customs barriers have been lowered uniformly and constantly since 1950, driving customs duties to their lowest level in history.

Although a large range of factors affect the degree of openness of national economies, a rough estimate of the total impact of the decline in transport costs and tariff barriers may be obtained by looking at the variations of the share of exports in gross domestic product (GDP). Maddison (2001) shows that between 1820 and 1998 the share of world exports in

Table 1.1. Customs duties applied to manufactured goods in developed countries. (Sources: World Bank (1991) and World Trade Organization (2001).)

Year	1820	1875	1913	1925	1930	1950	1987	1998
Average tariff (%)	22	11-14	17	19	32	16	7	4.6

Table 1.2. Export/GDP ratio in the major developed countries. (Source: O'Rourke and Williamson (1999).)

Countries	1870	1913	1950	1973	1987	2000
Belgium	7.0	17.5	13.4	40.3	52.5	86.3
Brazil						10.8
China						25.9
France	3.4	6.0	5.6	11.2	14.3	28.5
Germany	7.4	12.2	4.4	17.2	23.7	33.7
Italy	3.3	3.6	2.6	9.0	11.5	28.4
Japan	0.2	2.1	2.0	6.8	10.6	10.8
Mexico						31.1
Netherlands	14.6	14.5	10.2	34.1	40.9	67.2
Poland						29.3
Russia						44.5
United Kingdom	10.3	14.7	9.5	11.5	15.3	28.1
United States	2.8	4.1	3.3	5.8	6.3	11.2

the world GDP has increased by a factor of 17. At a more disaggregated level, the pattern is similar.

Table 1.2 reveals another interesting, yet less widely known, fact: international trade had a more important role in the economy of industrialized countries in 1913 than it did in 1950. Even more surprisingly, on the eve of World War II, the share of production that was traded in the international marketplace fell back to the level observed in 1840, a century earlier. Protectionist policies, restrictive cartel and labor practices in transport, and the collapse of the gold standard were the main trade-reducing forces (Estevadeordal et al. 2003). The huge development in trade that preceded World War I suggests that the decline in transport costs had overcome fairly high tariffs between 1875 and 1913. This has allowed many economic historians to underline *the emergence during the second half of the nineteenth century of a first phase of globalization ending in 1914*, the main explanation of which lies in the dramatic drop in transport costs (O'Rourke and Williamson 1999).

By contrast, since 1950 the increase in trade seems to be due more to the progressive removal of trade barriers than to the decline in transport

costs.³ Between 1950 and 2000, the global production of commodities—which differs from the world GDP since it includes neither services nor construction—was multiplied by 6, while the volume of goods exported increased 17-fold (World Trade Organization 2000).

As for communication, the invention of the telegraph and then the telephone brought about big falls in the time taken to transmit information. For comparison, let us recall that it took an average of 15–16 days for a letter to travel between Avignon and Paris during the Renaissance, between 25 and 30 days to travel between Florence and London, and 20–22 days between Florence and Paris (Verdon 2003, p. 245). Things were pretty much the same for the next three centuries. For example, Bairoch (1997, chapter 18) notes that it took practically two years for an exchange of correspondence between England and India at the beginning of the nineteenth century. Even after the opening of the Suez Canal it still required several months. So, it is easy to guess that *long before the Internet, thanks to the invention of the telegraph and the telephone, information began to circulate at a speed previously unimaginable*, deeply affecting both the ways in which societies worked and the lives of individuals.

The following quotation from Stefan Zweig's autobiography, *The World of Yesterday*, illustrates probably better than many academic works the impact of the first revolution in the means of communication on lifestyle and on people's mentalities:

There was no escape for our generation, no standing aside as in times past. Thanks to our new organization of simultaneity we were constantly drawn into our time. When bombs laid waste the houses of Shanghai, we knew of it in our rooms in Europe before the wounded were carried out of their homes. What occurred thousands of miles over the sea leaped bodily before our eyes in pictures. There was no protection, no security against being constantly made aware of things and being drawn into them. There was no country to which one could flee, no quiet which one could purchase; always and everywhere the hand of fate seized us and dragged us back into its insatiable play.

Zweig (1944, p. 8 of the English translation)

³Baier and Bergstrand (2001) estimate that the decrease in customs duties explains 22% of the increase in trade between the countries of the Organisation for Economic Co-operation and Development (OECD) from 1960 to 1990, whereas the fall in transport costs explains only 8%. According to these authors, income growth is the major explanatory variable for the increase in commercial flows, accounting for 67% of it. Conversely, Hummels (2007) argues that technological change in air shipping and the declining cost of rapid transit have been critical in the growth of trade during the second half of the twentieth century.

Table 1.3. Indices of transportation and communication costs.
(Source: World Bank (1995).)

	1920	1930	1940	1950	1960	1970	1980	1990
Maritime transport	100	65	67	48	28	29	25	30
Air transport	—	100	70	45	38	25	18	15
Transatlantic telephone	—	—	100	30	28	18	3	1
Communication by satellites	—	—	—	—	—	100	15	8

This phenomenon underwent a drastic acceleration during the second half of the twentieth century. Table 1.3 compares the relative development of transportation and communication costs, with indices standardized at 100 at the first observation. If transport costs have continued to decrease, just not as fast as in the nineteenth century, then communication costs have fallen at an absolutely dizzying speed during the last few decades. For example, the costs of communication have fallen by more than 90% in the last twenty years.

In short, the questions raised by the current globalization of economies are far less new than is asserted in the general press. Keynes (1919) described marvelously the changes in the lifestyle and consumption habits of his contemporaries brought about by the globalization preceding World War I. The extract is a little long, but it is so relevant to this discussion that it is worth including:

What an extraordinary episode in the economic progress of man that age was which came to an end in August 1914! ... [L]ife offered, at a low cost and with the least trouble, conveniences, comforts, and amenities beyond the compass of the richest and most powerful monarchs of other ages. The inhabitant of London could order by telephone, sipping his morning tea in bed, the various products of the whole earth, in such quantity as he might see fit, and reasonably expect their early delivery upon his doorstep; he could at the same moment and by the same means adventure his wealth in the natural resources and new enterprises of any quarter of the world, and share, without exertion or even trouble, in their prospective fruits and advantages; or he could decide to couple the security of his fortunes with the good faith of the townspeople of any substantial municipality in any continent that fancy or information might recommend. He could secure forthwith, if he wished it, cheap and comfortable means of transit to any country or climate without passport or other formality... and would consider himself greatly aggrieved and much surprised at the least interference. But, most important of all, he regarded this state of affairs as normal, certain, and permanent, except in the direction of further improvement, and any deviation from it as aberrant, scandalous, and avoidable.

Keynes (1919, p. 4)

1.1.2 Motorization of Transport and Urbanization

The second feature marking the economic development of Europe is the almost perfect synchronization of the Industrial Revolution and urbanization due mainly to the advent of motorized transportation (steamboats, railroads, and finally automobiles). Steam navigation began in the United States in 1807 and the first railroad line was built in England in 1825. Although the urban population in Europe (outside Russia) in 1800 corresponded to only 12% of the total population, it reached 41% in 1910 and it is now 75%; a similar evolution arose in the United States, where the urban population share was 5% in 1800, 42% in 1910, and was close to 75% by 2005 (Bairoch 1988, chapter 13). On a historical scale, such figures are an indisputable sign of *an explosive growth in urbanization*.⁴

The beginning of the Industrial Revolution meant that agricultural employment had to undergo an equally spectacular development in the opposite direction, reaching its lowest historical level in the whole EU-15 with 6.3 million farmers, while the United States had only 2.3 million by 2003. Although France has long preserved a considerably more important agricultural sector than other industrial countries, its farming population represents only 2.5% of its current labor force. Note too that without the steep drop in transport costs mentioned above such human concentrations would have been impossible, as they had been for centuries—except in a handful of big cities like London and Paris, which were endowed by nature and royal power with dense networks of navigable routes. Indeed, strong declines in freight costs were necessary to allow for a rapid increase in urban population because larger volumes of foodstuffs had to come from increasingly distant places.

The link between the structure of employment and the structure of economic space was the same almost everywhere. Initially, the creation of and boom in big industrial cities (e.g., Manchester, Saint-Etienne, Charleroi) can be seen. As Bairoch noted:

of the 228 cities of more than 100,000 inhabitants in the developed world (except Japan) in 1910, about 98 ... did not exist at all or were simple villages at the beginning of the nineteenth century (or, for England, in the middle of the eighteenth century).

Bairoch (1997, volume 2, p. 196) [our translation]

⁴Forcing the point a bit, Cipolla (1962) argued that, from a strictly economic standpoint, the city as we know it is a product of the Industrial Revolution. The economic activity of traditional societies was so dominated by agriculture that cities were “often nothing more than collecting centers of agricultural rents.” Such an opinion, however, is probably too extreme, for some cities played a crucial role in the development of banking and financial institutions. They even welcomed the first industries of the Middle Ages, which then left for the rural world (Hohenberg 2004).

Indeed, at the start of the Industrial Revolution the transportation of primary materials was still costly and hence the proximity of natural resources remained an essential location factor. This justified the establishment of new urban entities in the places where those resources were found. Moreover, industry used an unskilled labor force that it could borrow from the agricultural sector at a time when important productivity gains allowed the release of a large number of people (Bairoch 1997, chapter 4). Agricultural jobs were thus gradually replaced by industrial jobs, explaining the strength of rural-urban migration in all countries affected by the Industrial Revolution. The most representative case is probably England, for which historians have provided a complete reconstruction of population shifts between 1776 and 1871, a period covering the two phases of the Industrial Revolution in that country (Williamson 1990, chapter 1). The rate of urbanization in England was 25.9% in 1776 and 65.2% in 1871, making it the most urbanized country at the time. Yet for more than a century the annual growth rate of the urban population remained astonishingly stable, barely more than 2%.⁵

Because of the decline in transport costs, firms were progressively freed from natural factors of location—sources of primary material or energy—giving rise to what was to become known as “footloose industry.” New location factors governing firms’ spatial strategies then appeared. The new activities often needed workers who were more skilled than before, and they also needed a growing number of specialized services. These production factors were available mainly in an urban environment—especially in the big, old cities, because many cities created by the Industrial Revolution did not have a sufficiently diversified set of activities. Thus, a reverse causality emerges: it is the city that now favors the rise of industry. The intense urbanization that began in the preceding period enhanced the attraction of the cities insofar as they offered growing markets for new industrial products.

During the second half of the twentieth century, the preponderance of industrial jobs in modern economies decreased because of the productivity gains associated with advanced technologies. At the same time, industrial plants moved out of cities, where land and labor were too expensive. This departure was also facilitated by falling communication costs, which accelerated the vertical disintegration of firms into

⁵Contrary to general belief, such migratory movements were not limited solely to national economies. On the contrary, they had an increasingly international dimension. Before the formation of the welfare states that separate local people from foreigners, a sort of unregulated European labor market developed from the end of the nineteenth century, to such a degree that workers crossed borders more easily than commodities did (Bade 2002).

increasingly specialized and spatially separate units. In big cities, industrial jobs gave way to jobs in the various service sectors, which showed a common taste for urbanity. In addition, because of the variety of goods and services that they offer, contemporary cities are akin to gigantic public goods, which may be viewed as *consumer cities*: one lives in them to benefit from their commercial and cultural amenities, but one works in them less (Glaeser et al. 2001). On the other hand, in the older industrial regions, where cities are synonymous with concentrations of unskilled labor, redevelopment is still on the agenda. The economic fabric there is often too tenuous to allow their transformation into consumer cities.

Nevertheless, if the fall in transportation and communication costs generally favors the economic and social development of populations by permitting a greater spatial distribution of goods and ideas, this distribution is still quite unequal. Specifically, the economic development of Europe during the nineteenth century displays a major feature that seems paradoxical: *the various costs linked with the circulation of goods and ideas have dramatically decreased, but this has not contributed to a more equal distribution of prosperity among regions*. On the contrary, this reduction in distance-related costs instead seems to accompany a growing polarization of economic spaces. In other words, even when the costs of communication and transportation decline, growth processes are localized, are experienced only in certain regions, and are transmitted only very imperfectly to others, thus making regional development more uneven. This idea is confirmed by the English historian Sidney Pollard, who considers it misleading to speak of England and the continent as a whole when discussing the spread of the Industrial Revolution; it would be more appropriate to mention Lancashire and the valley of the Sambre and the Meuse (Pollard 1981, chapter 1).

It is precisely these complex bonds between economic development, transport costs, sectoral mutations, and spatial inequalities that the models of economic geography presented in the second part of this book intend to describe and understand. Beforehand, we want to complete the stylized facts presented in this chapter with some data highlighting the relationships between spatial inequalities and obstacles to trade.

1.2 Regional Disparities: When an Ancient Phenomenon Becomes Measurable

The existence of strong regional disparities is not new. During every great historical period, prosperous cities and small regions that were much richer than the average coexisted with poor zones within the major

traditional societies of Europe and Asia. For Fernand Braudel, a “world-economy” is formed by at least three types of space:

The centre or core contains everything that is most advanced and diversified. The next zone possesses only some of these benefits, although it has some share in them: it is the “runner-up” zone. The huge periphery, with its scattered population, represents on the contrary backwardness, archaism, and exploitation by others. This discriminatory geography is even today both an explanation and a pitfall in the writing of world history—although the latter often creates the pitfalls by its connivance.

Braudel (1979, p. 39 of the English translation)

As a result, even if the differences in development between big preindustrial economies were small, regional inequalities were probably very important within those societies.

While the lack of reliable data does not allow evaluations comparable with those of today, there is broad agreement among social scientists in considering the “tyranny of location” to be one of the major causes of spatial inequalities. This includes the presence of navigable ways, the fertility of the soil, and the climatic characteristics of a zone, that is, factors that are almost all natural. These natural factors dominated choices about location for several centuries, but things changed a great deal with the revolution in transportation.

1.2.1 Spatial Inequalities in Nineteenth-Century Europe

GDP per capita is a standard indicator of the economic performance of a region or a nation. Paul Bairoch has estimated the GDP per capita from 1800 to 1913, a period of intense technological progress that preceded a long period of political turmoil; his results are presented in table 1.4.

These figures must be used with care, but even allowing for that they reveal clear tendencies. First, it is readily verified that, during the nineteenth century, all European countries experienced important development. Yet, while the initial levels of development were roughly the same, varying by about 10% around the European average (except perhaps in the Netherlands and, to a lesser extent, the United Kingdom), *countries were affected quite differently by the Industrial Revolution*, the income gains generated by it varying greatly. Indeed, international differences grow progressively and reach a ratio of 1 to 4 between the richest and poorest nations in 1913. While the average European GDP per capita increased gradually from \$199 to \$550—that is, by a factor slightly greater than 2.5—the standard deviation increased even faster, going from 24 in 1800 to 229 in 1913, which means a progression by a factor close to 10.

Table 1.4. GDP per capita in U.S. dollars and 1960 prices.
(Source: Bairoch (1997, volume 2, pp. 252–53).)

Countries	1800	1830	1850	1870	1890	1900	1913
Austria-Hungary	200	240	275	310	370	425	510
Belgium	200	240	335	450	555	650	815
Bulgaria	175	185	205	225	260	275	285
Denmark	205	225	280	365	525	655	885
Finland	180	190	230	300	370	430	525
France	205	275	345	450	525	610	670
Germany	200	240	305	425	540	645	790
Greece	190	195	220	255	300	310	335
Italy	220	240	260	300	315	345	455
Netherlands	270	320	385	470	570	610	740
Norway	185	225	285	340	430	475	615
Portugal	230	250	275	290	295	320	335
Romania	190	195	205	225	265	300	370
Russia	170	180	190	220	210	260	340
Serbia	185	200	215	235	260	270	300
Spain	210	250	295	315	325	365	400
Sweden	195	235	270	315	405	495	705
Switzerland	190	240	340	485	645	730	895
United Kingdom	240	355	470	650	815	915	1035
Mean	199	240	285	350	400	465	550
Standard deviation	24	43	68	110	155	182	229
United States	240	325	465	580	875	1070	1350

In other words, the Industrial Revolution produced a rise in the average level of well-being in all European countries. However, they were affected quite unequally by this process of development. Indeed, the disparities between nations grow more than proportionally, the coefficient of variation increasing from 0.12 in 1800 to 0.42 in 1913. As usual, such aggregate measures hide even stronger contrasts between countries: while the GDP per capita of the United Kingdom increased by a factor exceeding 4, that of the Balkans (Bulgaria, Greece, and Serbia) barely rose 50%. Observe also that *the United States was the leading industrial power from the end of the nineteenth century onward*, and also does better than Europe over the whole period.

Another aspect of this development process is worth stressing. Indeed, the countries that experienced the strongest growth (Belgium, France, Germany, the Netherlands, Sweden, and Switzerland) are almost all close to the new European center, the United Kingdom, despite the fact that

Table 1.5. Elasticity of GDP per capita with respect to the distance from the United Kingdom (European countries).

	1800	1830	1850	1870	1890	1900	1913
Elasticity	-0.090	-0.195	-0.283	-0.371	-0.426	-0.437	-0.436
Standard deviation	0.028	0.029	0.028	0.032	0.052	0.058	0.078
R^2	0.376	0.717	0.857	0.883	0.796	0.764	0.647

Note: all elasticities are significantly different from 0 at the 1% level.

their economic takeoff arose at different times. Thus, more generally, distance to the United Kingdom strongly influenced national rates of growth: *the further away from the United Kingdom a country was, the lower its level of growth.*

To show this more precisely, for each of the years and countries listed in table 1.4, we estimate the impact of the distance between a country and the United Kingdom on this country's GDP per capita by using the ordinary least squares method (OLS).⁶ Table 1.5, which sums up the results of these regressions, confirms the initial intuition: the effect of distance to the United Kingdom on development is significantly negative. That is, the farther one is from the United Kingdom, the lower the GDP per capita, no matter what date is considered. Moreover, this effect regularly increases in absolute value, starting from a value of 0.090 in 1800, increasing to 0.426 in 1890, and then stabilizing. In other words, before the Industrial Revolution spread on the continent, a reduction of 10% in distance to the United Kingdom was associated with an increase of 0.9% in the GDP per capita. On the eve of World War I, the absolute value of that elasticity was multiplied by almost 5. In other words, a decrease in the distance of a given country from the United Kingdom from 1000 km to 900 km is associated with an increase of 4.4% in the per capita GDP of that country in 1913, as opposed to a 0.9% increase in 1800. We may thus safely conclude that *inequalities across European countries strongly increased over the nineteenth century, while the distance to the new center became increasingly important for the economic development of a country.* The data in table 1.5 provide a clear illustration of the process of divergence, which triggered here the emergence of a center and a periphery.

Will current economic integration accentuate this tendency toward a more unbalanced economic space in Europe? This is what Sicco Mansholt

⁶In the regression, we use the logarithm of both variables so that the coefficients can be interpreted directly in terms of elasticity.

thought as early as 1964. Mansholt, who was one of the major architects of the Common Market Agricultural Policy, worried that

[i]f we do not conduct an active policy within some countries, we will see that, by the unification of Europe, the great stimulus and strong expansion it can and will give, the most advanced regions will develop fastest and will profit most from it. Marginal regions will then become submarginal.

Quoted in Husson (2002, p. 28) [our translation]

However, even if the regional question retains its relevance within the European Union, it will subsequently be seen that the response to it needs qualification.

1.2.2 The Regional Question

The current standard of living is comparable across developed countries. These countries have reached similar stages of technological development and are governed by social rules and codes of behavior that are quite similar to those of other countries and to their own in the past. Yet there is another fact that cannot be denied: within each country or each block, striking contrasts between regions can be observed.

Figure 1.1 provides a map showing GDP per capita for the 269 NUTS2 regions of the EU-27, plus Norway and Switzerland, for the year 2004.⁷ It reveals the existence of a bicentric structure: (i) the “Blue Banana” (an area that stretches from London to Northern Italy and goes through part of Western Germany and the Benelux countries) and (ii) the Nordic countries. It is also worth noting that several countries seem to belong entirely to what may be called the European economic periphery: Greece, Portugal, and the new Eastern European member states. However, regional disparities within some countries are also very striking. For example, Northern Italy contrasts strongly with Southern Italy, a textbook case frequently mentioned under the banner of the *Mezzogiorno*. While the Milan region groups with Switzerland in terms of wealth category, the southern part of Italy lies in the same income per capita category as Greece. To a lesser extent, the same holds in the United Kingdom, Spain, Belgium, and Germany, where the divide between western and eastern “Landers” remains strong. Note, however, that regions belonging to the new member states form most of the new periphery of Europe, whereas the old periphery, mainly made up of regions of Greece,

⁷NUTS (“nomenclature des unités territoriales statistiques”) is the regional classification used by Eurostat, usually building on existing regional borders inside each country. It is organized by level of geographical detail: ranging from NUTS0 (countries) to NUTS5, which lists more than 100,000 areas in the EU-15.

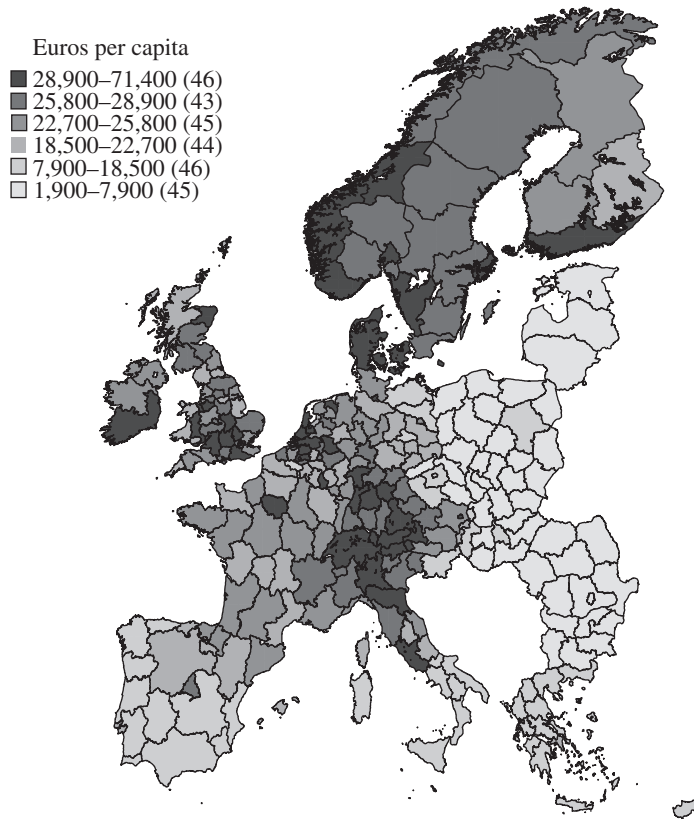


Figure 1.1. GDP per capita of the NUT2 regions of the European Union in 2004 (number of regions in parentheses).

Ireland, Portugal, Spain, and Italy, has, at least partly, caught up with the core regions.

Finally, what is perhaps the most striking feature of the GDP per capita map is that the level of regional wealth seems to exhibit “spatial contagion”: being close to rich regions makes it very unlikely that your region will be very poor. This is true inside countries and across national borders. This suggests some form of spatial diffusion of development. We will see in this book that economic geography theory has a lot to say about the source of such development, in particular through the concept of *market potential* proposed by the geographer Harris (1954).

GDP level provides a crude, but simple, measure of the economic size of a region. It thus gives us some insight into the potential of this region to attract new activities. Besides its size, one expects the accessibility of a region from others to be another critical determinant of firms’ and workers’ locational decisions. In order to account for this, we use Harris’s

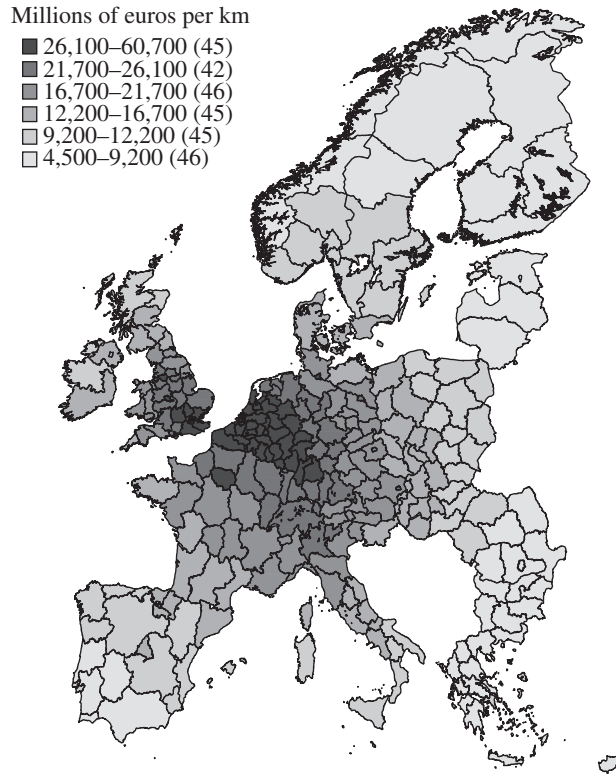


Figure 1.2. Market potential of the NUT2 regions of the European Union in 2004 (number of regions in parentheses).

market potential of region r , as defined by Harris (1954), which is given by the sum of regional GDPs, where the GDP of region s is weighted by the inverse of its distance to region r .⁸ By using these weights, the market potential aims to capture the idea that being close to prosperous regions makes a region more attractive because it offers good access to several large markets.

Figure 1.2 depicts the market potential for all the regions considered in figure 1.1. Much more than the latter, the former map reveals a very strong core-periphery structure for the European Union in 2004: as the distance to the old core regions increases, the market potential steadily decreases. This is supportive of the idea that market potential is important for economic development. There are exceptions, however, the main one being the group of Nordic countries. One possible explanation is

⁸This sum includes region r itself. Its GDP is divided by the intraregional distance, which is equal to two thirds of the radius of a circle whose area represents that of region r . We will return to the measurement of intraregional distance in chapters 5 and 12.

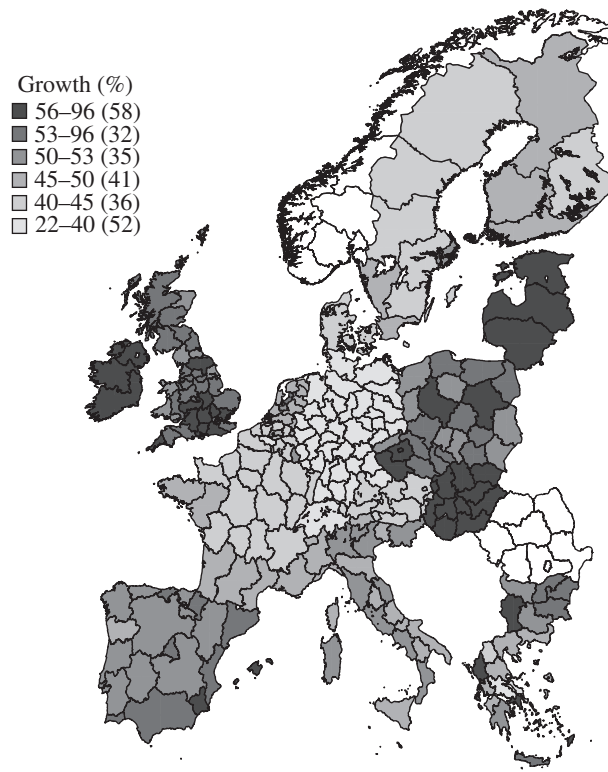


Figure 1.3. The evolution of market potentials in the European Union from 1995 to 2004 (number of regions in parentheses).

that, although they suffer from poor accessibility to the rest of the European Union, the Nordic regions have been quite successful in overcoming their locational disadvantage. This is confirmed by figure 1.3, which shows the evolution of market potential from 1995 to 2004 (data for Norway and Romania are missing). More precisely, we see that *almost all regions located on the outskirts of the European Union have been more successful than the central regions in improving their market potential*. This in turn implies the existence of a catching-up process within the European Union. One of the objectives of economic geography is then to uncover (i) why being spatially central provides such a strong advantage in terms of GDP and (ii) how this advantage evolves over time when transport costs change? In particular, what are the main forces explaining why some initially disfavored and peripheral regions have caught up with the old European core.

Let us now turn to the United States. A glance at figure 1.4, which maps the GDP per capita for the forty-eight states of the continental

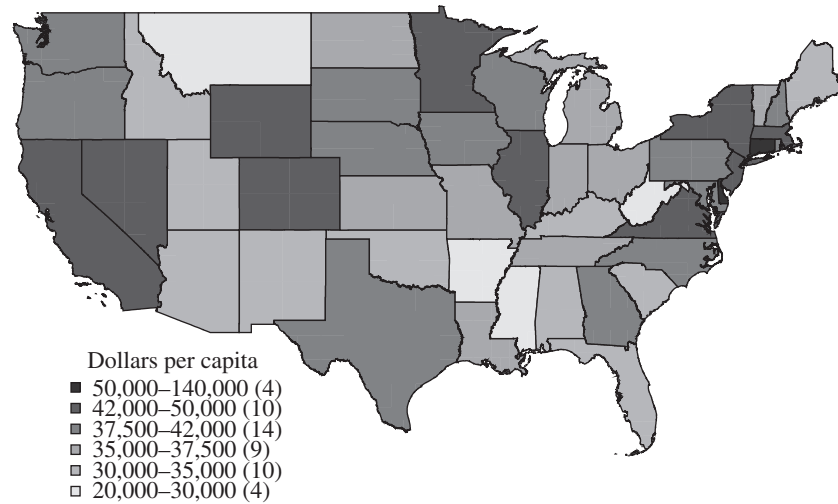


Figure 1.4. GDP per capita of the states of the continental United States in 2004 (number of states in parentheses).

United States, shows that there is more dispersion there than in the European Union, with prosperous states being scattered all over the country. Another major difference is worth noting. Looking at the extreme values taken by regional incomes, it appears that *regional disparities are much wider within the European Union than in the United States*.

As we did for the European Union, we map the market potential of each of the forty-eight U.S. states in figure 1.5. Even though there seems to be a core-periphery structure in the United States, it is not as strong as it is in the European Union. In particular, the gradient of the market potential becomes positive in the southwest (Arizona and California).

Repeating what we have done for the European Union, figure 1.6 shows that, from 1995 to 2004, the market potential has increased significantly in *all* the states of the U.S.'s western half as well as in the southeast, thus showing that a catch-up process is also at work in the United States. All in all, this confirms that *spatial development is more even within the United States than within the European Union*. This could be because the space-economy has been integrated for much longer in the former than in the latter. We will return to this important issue in subsequent chapters, especially chapters 7, 8, and 12.

1.2.3 Spatial Inequalities in France: A Long-Run Perspective

To the best of our knowledge, there exists no historical data available about GDP at the regional level that would allow one to estimate the evolution of spatial disparities within countries over a long time period.

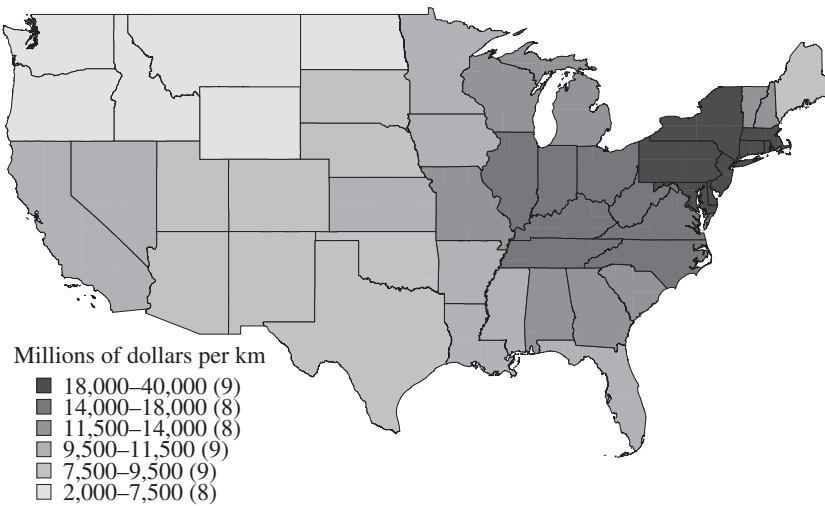


Figure 1.5. Market potential of the states of the continental United States in 2004 (number of states in parentheses).

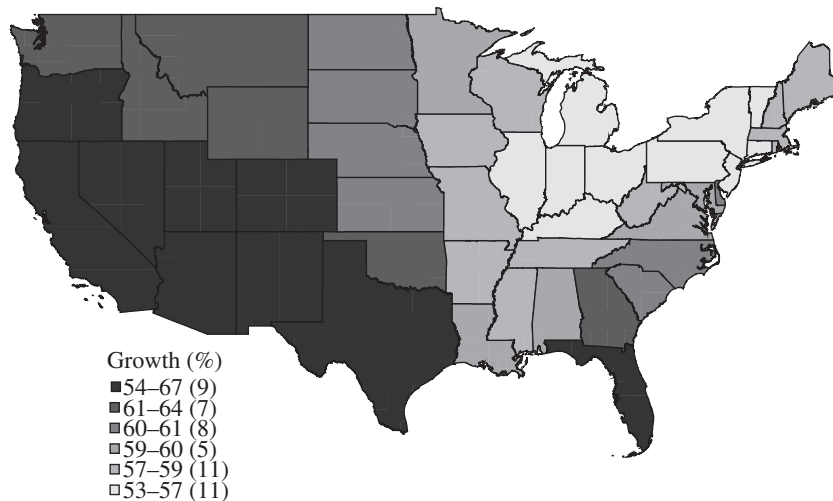


Figure 1.6. The evolution of market potentials in the United States from 1995 to 2004 (number of states in parentheses).

However, thanks to the work of the economic historian Jean-Claude Toutain, the case of France can be studied at a very fine geographical level (eighty-eight continental “départements”), and the existence of strong spatial disparities over a very long period is revealed. These data relate to employment, population, and value-added (VA) for the years 1860 and 1930, distinguishing three large sectors: agriculture, industry, and

Table 1.6. Theil indices for French départements.

Variable	1860	1930	2000	Percentage change 1860-1930	Percentage change 1930-2000	Percentage change 1860-2000
Population	0.12	0.34	0.39	175.9	16.1	220.4
Employment	0.13	0.37	0.50	177.0	34.2	271.6
VA	0.30	0.68	0.71	124.9	5.0	136.1
VA/employee	0.05	0.03	0.01	-47.5	-76.7	-87.8
VA agriculture	0.10	0.10	0.22	-4.4	119.5	109.7
VA industrial	0.69	0.93	0.50	33.9	-45.8	-27.4
VA services	0.61	1.00	0.84	62.9	-15.7	37.4

services. We have gathered similar data for the year 2000 (Combes et al. 2008a).

In table 1.6 we give the value taken by an index measuring the spatial concentration of population, employment, and GDP across French départements. More precisely, we use the Theil index, whose properties will be studied in chapter 10. For now, let us simply note that a zero value means that the activity is uniformly distributed across space, while it reaches its highest value when all the activity is concentrated into a single region. More generally, the higher the index, the greater the spatial concentration. The first line of this table shows *the strong increase in spatial concentration of the French population* over nearly a century and a half, with the Theil index increasing by a factor of more than three. Thus, the French population gradually regrouped within a small number of départements. In terms of employment, the variation is even stronger. It is slightly weaker in terms of value-added, but this is more concentrated regardless of which period we are looking at.

A second striking fact emerges from this table. The value-added per employee, which can be interpreted roughly as the productivity or income per employee, became very homogeneous across regions. Even though inequalities in productivity were initially much lower than those observed in terms of production, they fell by two thirds between 1860 and 2000. Thus, the stronger concentration of the population and of economic activities that has been observed over the last 140 years has been accompanied by *a stronger decrease in regional inequalities in terms of labor income and productivity per worker*.

Looking at the maps of the total (figure 1.7) or per-employee (figure 1.8) value-added for the French départements confirms some of the facts observed today at the European level. There is a core region, the metropolitan area of Paris, and a periphery—a contrast that has

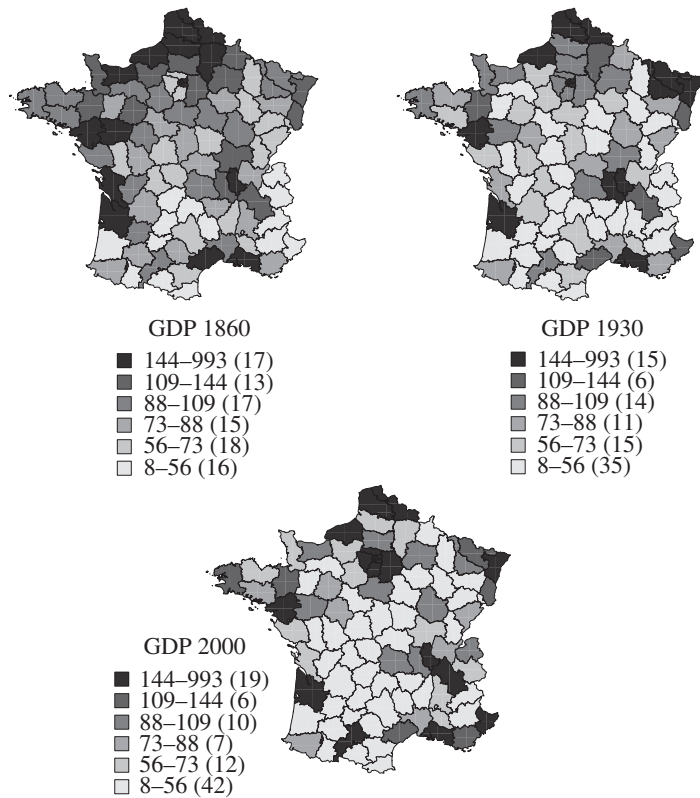


Figure 1.7. GDP of the French départements in 1860, 1930, and 2000 (annual average = 100; number of départements in parentheses).

been reinforced over time as the Parisian economic region gradually expanded. Nevertheless, apart for this well-known phenomenon, no strong tendency seems to appear among the other départements, apart from a rather strong mobility in the French hierarchy, since the three maps corresponding to the years 1860, 1930, and 2000 are ultimately quite different. Some industrial (and hence rich) areas at the end of the nineteenth century, like the north and the northeast, have seen their incomes collapse, while the takeoff of others, like the Rhône-Alpes region, is spectacular.

A breakdown of the data by sector is also worth considering. Table 1.6 shows that while the spatial distribution of agriculture, which is clearly less concentrated than industry and services, did not evolve strongly between 1860 and 1930, there has been a rather marked phenomenon of concentration since 1930. In addition, services are always more concentrated than industry. We also observe an important result that seems

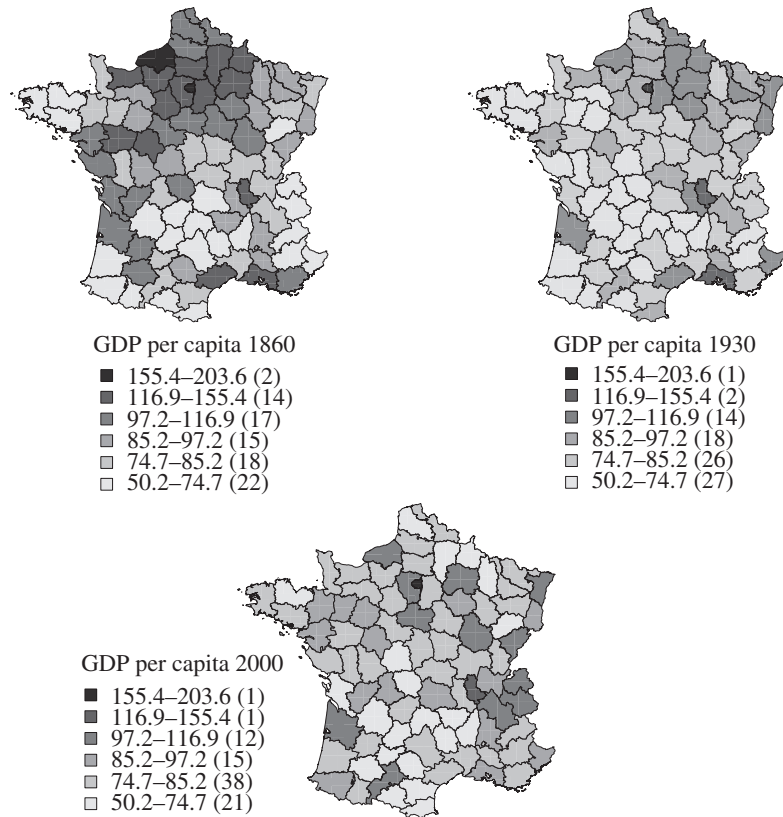


Figure 1.8. GDP per capita of the French départements in 1860, 1930, and 2000 (annual average = 100; number of départements in parentheses).

Table 1.7. Correlations between population density and value-added among French départements.

	1860	1930	2000
VA agriculture	−0.12	−0.16	−0.12
VA industry	0.94	0.95	0.84
VA services	0.96	0.98	0.96
VA agriculture/employee	0.37	0.11	−0.22
VA industrial/employee	0.31	0.45	0.44
VA services/employee	0.22	0.28	0.64

to validate the bell-shaped curve of spatial development mentioned in the foreword: *while the spatial concentration of industry and services increases over the period 1860–1930, it drops during the next seventy years.*

Table 1.7 provides correlations between the density of population and the levels of value-added and of labor productivity. The first three rows show that, in 1860, unlike agriculture both industry and services were located in densely populated regions, a tendency which is slightly reinforced in 1930. In 2000, such regions are slightly less attractive to industrial firms, while services remain in populated regions. The last three rows reveal that, in 1860, the correlation between labor productivity and population density was highest in agriculture and lowest in services. Since then, the ranking of sectors has undergone a complete reversal. Even though correlations increased for both manufacturing and services between 1860 and 2000, industrial productivity benefits most from population density in 1930; in 2000, the correlation is highest in services. As for agriculture, the correlation between productivity and density decreases and becomes negative in 2000, meaning that rural regions are now the most productive ones in this sector. Thus, as the economy gets more and more developed, agriculture, which has been the dominant sector for a long time, loses its comparative advantage in densely populated regions; industry then takes the lead but it is subsequently replaced by services. At first sight, these correlations might suggest that the spatial concentration of population is one of the main factors explaining the increase in labor productivity, and hence in growth. In fact, such a conclusion, at first sight correct, lacks solid foundations and we will see in chapter 11 that a finer analysis is needed to uncover the reasons for such correlations.

1.3 Concluding Remarks

Ever since the nineteenth century the downward trend in the costs of transporting goods, persons, and information has vastly relaxed the constraints imposed by natural factors over human activity. A rough economic analysis suggests that such a dramatic drop in transport costs allows economic agents to benefit from more freedom in their location choice, thus fostering a greater homogeneity across regions. Yet in most developed countries, wide spatial variations are still observed in the size and composition of populations, in average incomes, in regional structures of production, in the cost of living and the price of housing, and in the distribution of occupations. All these magnitudes are endogenous and the values they take are not imposed by nature. On the contrary, they are determined by the interaction between markets, public policies, and the mobility of production factors. It is the spatial facet of these numerous interactions that forms the realm of economic geography.