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The Great Transformation (1800–1914)

A Frame of Reference

The "long" nineteenth century – from 1800 to the outbreak of the First World War – witnessed the end of an old-regime demographic system in Europe and the beginning of a rapid transition to the system that dominates today; one tending towards stability and characterized by long life expectancy and low fertility. Between 1800 and 1914 the population of Europe more than doubled, swelling from 188 to 458 million. The prospect of living to a ripe old age became the destiny of many rather than the privilege of few. The inevitability of women devoting all their childbearing years to pregnancy, breastfeeding, and the rearing of small children came to an end. And the tens of millions of people that departed from Europe for old and new lands turned emigration into a mass phenomenon. These changes had as profound an impact on the demography of the continent as did the Industrial Revolution on the production of wealth, or the French Revolution on political systems. Indeed these processes all acted together to bring about the social transformation of Europe. My goal in this chapter is to outline the course of European demography in a succinct and orderly way. Thanks to the establishment of national statistical systems in the nineteenth century and the abundance of data they

produced, the course is a well-documented, if complicated, one. Change occurred in fits and starts, across geographical and social gradients, and with extremely different rhythms. In fact, on the eve of the Great War traditional systems, virtually untouched by change, existed side-by-side with well-evolved "modern" systems. We need to outline the main causes for this transformation and, in particular, identify the specific forces that brought the old-regime systems to an end and accelerated, or slowed down, the transition to present-day systems. Finally, we need to outline the impact this demographic transformation had on European society.

From one point of view – the one I have used throughout this book – the demographic dynamics of the long nineteenth century can be interpreted as the result of weakened constraints and greater choices. More resources, the availability of new lands, and changes in the epidemiological context combined to loosen up the rigid framework of the old regime. Improved health, controlled fertility, greater individual choice regarding marriage, and increased mobility all expanded the scope of individual choices. Fewer restraints and more choices allowed the potential for growth to increase and the demographic processes to become more fluid.

The system of constraints began to relax, though it was a gradual and uneven process. The advances in technology and production that made up the Industrial Revolution led to rapid changes in the way people lived. The conversion of inanimate material into harnessable mechanical energy meant an end to depending on land availability for the production of energy, as till that time land was needed both to sustain draught animals and to provide fuel. It is estimated that world production (Europe and North America for the most part) of coal grew tenfold between 1820 and 1860 and by as much again in the following 60 years; the increase in the production of energy from all inanimate sources grew similarly. This multiplication of per-capita energy, once almost exclusively limited to human or animal muscle power, allowed for a proportional diversification of activities and expansion in the production and trade of goods. In this way – very generally speaking – the rise and spread of the Industrial Revolution had a similar effect on the potential for population growth as did the Neolithic Revolution and the transition from a hunting and gathering system to one of settled agriculture. While the latter freed people from their dependence on fixed resources spontaneously produced by the ecosystem, the former allowed the production of energy and resources to be independent of the availability of land.

Two points related to this general process require further consideration. The first is the general improvement in the standard of living that took place. For our purposes, standard of living is expressed by per-capita income, which measures the real flow of goods and services per person. In table 6.1, the economist Maddison meticulously documents the trend in per-capita gross domestic product in dollars for 14 European countries between 1820 and 1913.

Already in the decades before 1870, per-capita income in the leading country – England – had risen considerably (20 percent between 1785 and 1820 despite war and international instability). Then, in less than a century, the per-capita income of Europe as a whole almost tripled; growth was slowest in Russia where GDP doubled, and fastest in Germany where it grew by 3.5 per cent . The most dynamic continental growth occurred in central Europe – Germany, Denmark, Belgium – and the slowest on the periphery – Russia and Spain. Considering the large countries, and setting the level for the UK at 100, in 1820 France ranked second (69),

Table 6.1 Per-capita gross domestic product in selected European countries, 1820–1913 (1990 dollars)

Country	*1820*	*1870*	*1900*	*1913*	*Ratio 1913/1820*	*Ratio 1913/1870*
United Kingdom	1,756	3,263	4,593	5,032	2.9	1.5
Netherlands	1,561	2,640	3,533	3,950	2.5	1.5
Norway	1,004	1,303	1,762	2,275	2.3	1.7
Sweden	1,198	1,664	2,561	3,096	2.6	1.9
Finland	759	1,107	1,620	2,050	2.7	1.9
Denmark	1,225	1,927	2,902	3,764	3.1	2
Germany	1,112	1,913	3,134	3,833	3.4	2
Belgium	1,291	2,640	3,652	4,130	3.2	1.6
France	1,218	1,858	2,849	3,452	2.8	1.9
Spain	1,063	1,376	2,040	2,255	2.1	1.6
Italy	1,092	1,467	1,746	2,507	2.3	1.7
Austria	1,295	1,875	2,901	3,488	2.7	1.9
Czechoslovakia	849	1,164	1,729	2,096	2.5	1.8
Russia	751	1,023	1,218	1,488	2	1.5
Average	1,155	1,801	2,589	3,101	2.7	1.7

Source: A. Maddison, *Monitoring the World Economy 1820–1992*, OECD, Paris, 1995

Germany third (63), Italy fourth (62), and Russia fifth (43). In 1913 instead Germany was second (76), France third (69), Italy fourth (50), and Russia again last (30). In 1913 the most prosperous area in Europe was the United Kingdom and the nearby geographic cluster of Benelux, Germany, and Denmark (plus Switzerland), while the most backward areas were all located on the periphery of the continent: the Balkans, Scandinavia (Finland and Norway), and the Mediterranean. This geography of economic development, as we shall discover, only partly coincided with the geography of demographic development, the course of which took some very interesting turns.

Other indices might be more useful than income – levels of education or urbanization, for example – but income – especially in the early stages of modern development – is fairly closely linked to the basic living conditions of a society and its survivorship. In an essentially rural society with a low standard of living, a dollar-equivalent increase in available wealth meant better diet and clothing, and a cleaner, sturdier, and better-heated home: though rudimentary, these advances are closely associated with increased life expectancy. Of course, culture, knowledge, environment, climate, and social and family structure are equally important factors in bringing about a decline in mortality. Using Maddison's guide, it is doubtful however that a per-capita income less than $1,000–$1,200 (1990 dollars) could have been compatible with a sustained improvement in survival (not attributable to variations in the epidemiological cycle caused by exogenous factors). Old-regime mortality levels continued to persist in impoverished areas with incomes below that level: Ireland, Finland, and Russia, for example, where at the end of the nineteenth century life expectancy at birth only barely exceeded 32 years of age.

The other important point in our discussion is the transition from a rural society to one in which agriculture is important, but secondary in the production of wealth and the organization of labor, and in which the hallmarks of rural lifestyle steadily decline. This fundamental transformation is important demographically for a number of reasons. First, increased productivity, in part predating the Industrial Revolution, permitted the gradual attenuation of subsistence crises. Second, limited available land combined with a rapidly growing rural population and growing productivity resulted in great numbers moving to cities or emigrating. Third, and directly related to emigration, was the opening of new "European" lands, overseas and beyond the Urals, and the expansion of the

food trade. Fourth, the greater availability and variety of foods, together with rising incomes, allowed for improved nutrition. Finally, a shrinking rural population and rural culture permitted demographic behaviors to change more quickly (take, for example, the spread of birth control or different childrearing methods). These five points, to some of which we shall return below, require some clarification.

There is relatively little information available on the breakdown by occupation of the working population. Censuses only began to provide reliable data on occupation around the middle of the nineteenth century when, in much of Europe, the Industrial Revolution had already altered modes of production. Nevertheless, it is generally believed that in preindustrial Europe, between 60 and 80 percent of the working population was employed in agriculture, and that an even greater percentage of the population lived in the countryside. According to Bairoch, approximately 80 percent of the population was traditionally dependent on agricultural work: about 75 percent in England (the birthplace of industrialization) in 1688, and 80–85 percent in France around 1700. Data for the period between 1840 and 1870 give lower percentages of people engaged in farming in more developed countries (England, 26 percent in 1841; Belgium, 51 percent in 1846; France, 54 percent in 1856; Denmark, 60 percent in 1850) but higher ones for those societies still in the early stages of industrialization (Italy, 64 percent in 1871; Sweden, 67 percent in 1860; Austria, 68 percent in 1869; Spain, 72 percent in 1860). On the eve of the First World War, the proportion employed in agriculture in the largest European countries had dropped to 41 percent for France, 37 percent for Germany, and 9 percent for the United Kingdom, while it was still about 54 percent in Italy and over 60 percent in Russia. Beginning in the middle of the nineteenth century, the agricultural population, which had continued to grow in the early part of the century, began its decline in total number (and declined even more abruptly in relative terms).

These figures reveal the rapidly diminishing importance of agriculture in the development process and, indirectly, the marginalization of those demographic behaviors most deeply rooted in the rural character of a society (the last of the five points listed above). In terms of the logical "sequence" of change in the European system, according to which mortality decline provided the initial and powerful catalyst, the most significant feature was the increased productivity of labor (an "agricultural revolution" that was slower and less spectacular than its industrial counterpart); that increase amounted to around 1 percent annually in western Europe after 1800. According to Bairoch, whose analysis I follow, before the agricultural revolution a worker produced an average surplus of no more than 20–30 percent over family requirements, a surplus needed both to supply workers in nonagricultural sectors and to guard against poor harvests. Fluctuations in yield were often dramatic, easily as much as 25 percent from one year to the next, and so preindustrial populations were victim to those frequent subsistence crises, accompanied by mortality crises. Greater productivity permitted greater surpluses and so reduced the risk of subsistence crises, which during the nineteenth century dwindled in frequency and were often confined to outlying areas. In general terms, the agricultural revolution took place at the beginning of the eighteenth century (or even before) in England, and after mid-century in France, Switzerland, Germany, and Denmark; around 1820–30 in Austria, Sweden, and Italy; and around 1860–70 in Russia and Spain. Naturally the reasons for increased productivity are many: shorter fallow periods; land reclamation; new crops; better tools; selection of seeds and livestock; and the introduction and widespread use of machinery. The spread of new crops – while also the cause of widespread nutritional deficiencies (an almost exclusive reliance on corn, for example, caused pellagra) and greater exposure to risk (for instance, because the Irish diet was almost exclusively based on the potato, the failure of that crop led to the Great Famine) – did in the long run lead to improvements in diet. On the eve of the First World War, nutritional levels in western Europe had improved considerably, as shown by the smaller percentage of the family budget spent on food.

Increased productivity of labor together with limited proprietorship also led to surplus labor in the countryside. This situation was promoted by declining mortality and so natural increase; only later on would fertility decline in the countryside. In Denmark, between 1850 and 1880, the number of people engaged in agriculture grew by 46 percent; in Sweden between 1860 and 1890 by 66 percent. These are two countries in which mortality declined substantially and birth control did not spread to the countryside before the end of the century. These population surpluses became a reservoir which fed the abundant demand for labor in urban and industrialized areas, and so contributed to waves of internal and transoceanic migration. Finally, the opening of new spaces across the Atlantic to the west and beyond the

Urals to the east meant the addition of immense expanses of cultivable land and a significant importation of foodstuffs in the last third of the nineteenth century.

This agricultural transformation influenced demographic evolution during the nineteenth century in many ways. Together with rising wages (in themselves propelled by the changes in agriculture), the "revolution" loosened the tight grip that the factors of constraint had on population growth in Europe, and allowed European population to expand.

Demographic Expansion: Numbers and Interpretations

The uneven demographic development of Europe is best understood when put in historical context: it was a time when deeply rooted structures and behaviors came under pressure, and the divisions between populations and social groups widened. Europe in 1914 represented the moment of greatest demographic variety; a

time in which distinctly old-regime societies coexisted with others near the end of their transition. And then, at the height of its demographic vitality, Europe was leveled by the unifying destruction of the First World War.

Consider the seven major European countries, which account for roughly five-sixths of the total population (table 6.2): between 1800 and 1913 the population of the United Kingdom quadrupled and Russia's more than tripled; the population of France, on the other hand, increased by barely 50 percent, while those of Italy and Spain did not quite double.

A hypothetical NW/SE line that joins Dublin – skirting around England – to Trieste clearly divides Europe into a dynamic and quickly growing half and a sluggish and slow-growing one. Though one should not overlook that the slower growing part of Europe – Ireland, Italy, Portugal, and Spain – were major contributors to mass emigration, and in those cases rates of increase fail to accurately reflect the growth potential. Moreover, a rate of increase that exceeded 10 per 1,000 between 1900 and 1913 was three to four

Table 6.2 Population of major European countries and average annual rate of growth, 1800–1913

Country	*Population (× 1000)*					*1913 index*	*Average annual rate of growth (per 1000)*			
	1800	*1850*	*1870*	*1900*	*1913*	*(1800=100)*	*1800–50*	*1850–70*	*1870–1900*	*1900–13*
United Kingdom	10,834	20,976	26,249	37,334	41,440	382	13.2	11.2	11.7	8.0
Germany	24,500	35,397	40,818	56,367	67,362	275	7.4	7.1	10.8	13.7
Russia	39,000	60,000	73,000	109,700	132,610	340	8.6	9.8	13.6	14.6
Austria-Hungary	24,000	32,604	37,495	47,143	52,578	219	6.1	7.0	7.6	8.4
France	26,900	34,907	36,765	38,962	39,853	148	5.2	2.6	1.9	1.7
Italy	18,124	23,900	26,650	32,475	35,531	196	5.5	5.4	6.6	6.9
Spain	10,745	14,700	16,500	18,618	20,357	189	6.3	5.8	4.0	6.9
Total for 7 countries	154,103	222,484	257,477	340,599	389,731	253	7.3	7.3	9.3	10.4
Europe	187,693	264,591	305,399	400,577	457,515	244	6.9	7.2	9.0	10.2
7 countries as % of Europe	82.1	84.1	84.3	85.0	85.2					

Sources: G. Sundbärg, *Aperçus statistiques internationaux*, Imprimerie Royale, Stockholm, 1908. For 1900 and 1910 corrected and additional figures from I. Svennilson, *Growth and Stagnation in the European Economy*, United Nations, Geneva, 1954.

times greater than it had been during 1500–1800, proof of an entirely transformed system.

Table 6.3 gives the rate of natural increase, as well as birth and death rates, for the six largest countries and Sweden during particular years of the transformation phase. Three points are especially worth mentioning. The first point is that all the countries experienced, to varying degrees, a considerable decrease in both birth and death rates. The second point is that potential increase, expressed by the difference between births and deaths, was for the most part in excess of 10 per 1,000 per year, and came near 15 per 1,000 in more than one case. The third point is that as a result of variations in timing and trajectory for declining births and deaths, marked differences emerge between the several countries: for example, the Russian birth rate is more than double the French on the eve of the First World War, while mortality in Russia is twice that of Sweden or England.

Other synthetic, but more precise, measurements of births and deaths – the rates of which are determined by the age structure of a population – add to our understanding. Tables 6.4 and 6.5 illustrate – again for a select group of countries – two useful and comprehensible measures: life expectancy at birth and average number of children per woman. Again, one must keep in mind that modern statistical methods only became established in the latter part of the century, so many of those figures are estimates.

Table 6.3 Demographic indices for selected European countries, 1800–1913 (per 1,000 inhabitants)

Country	*c.1800*	*c.1850*	*c.1870*	*c.1900*	*1913*
			Birth rate		
Sweden	31.4	31.8	30.7	26.1	23.2
England	37.7	34.0	35.5	28.1	24.1
Germany	40.3	34.6	38.8	34.3	27.5
Russia	–	50.7	50.8	47.8	43.1
France	33.1	25.8	25.5	21.2	18.8
Austria	40.5	36.5	39.3	36.4	29.7
Italy	–	38.6	36.8	32.6	31.7
			Death rate		
Sweden	24.4	21.7	18.3	15.5	13.7
England	27.1	22.5	22.0	16.1	13.8
Germany	25.8	27.1	27.8	19.5	15.0
Russia	–	36.5	37.1	31.0	27.4
France	30.1	23.8	24.9	19.6	17.7
Austria	26.7	32.0	32.6	24.3	20.3
Italy	–	29.9	30.4	22.0	18.7
			Natural increase		
Sweden	7.0	10.1	12.4	10.6	9.5
England	10.6	11.5	13.5	12.0	10.3
Germany	14.5	7.5	11.0	14.8	12.5
Russia	–	14.2	13.7	16.8	15.7
France	3.0	2.0	0.6	1.6	1.1
Austria	13.8	4.5	6.7	12.1	9.4
Italy	–	8.7	6.4	10.6	13.0

Note: Russia: 1861–5 for *c.*1850; Italy: 1862–6 for *c.*1850; Germany: 1913 territory including Lorraine and Holstein, 1817–21 for *c.* 1800; Austria: Cisleithanien not including Lombardy and Venetia, 1820–40 for *c.*1800
Source: Sundbärg, *Aperçus statistiques internationaux*, Imprimerie Royale, Stockholm, 1908

Table 6.4 Life expectancy at birth in selected European countries, 1750–1915

Country	*1750–9*	*1800–1909*[1]	*1850–9*[2]	*1880*[3]	*1900*[4]	*1910*[5]
Sweden	37.3	36.5	43.3	48.5	54.0	57.9
England	36.9	37.3	40.0	43.3	48.2	53.4
Netherlands	–	32.2	36.8	41.7	49.9	54.1
Germany	–	–	–	37.9	44.4	49.0
Russia	(24.2)	–	(24.4)	27.7	32.4	–
France	27.9	33.9	39.8	42.1	47.4	50.5
Italy	(32)	(30)	(32)	35.4	42.8	47.0
Spain	–	28.0	29.8	31.0	34.8	42.3

Notes: [1]Netherlands, 1816–25; Spain, 1787–97. [2]Netherlands: 1841–50 and 1851–60 average; Spain, 1863–70. [3]Sweden, Germany, and Netherlands, 1871–80 and 1881–90 average; England, 1876–80. [4]England, Sweden, Germany, and Netherlands, 1891–1900 and 1901–10 average; Russia, 1896–7. [5]Netherlands, 1900–9 and 1910–19 average; Sweden, 1911–15
Sources: L. I. Dublin, A. J. Lotka, and M. Spiegelman, *Length of Life*, Ronald Press, New York, 1949. Data for Spain are taken from D. Reher, *La familia en España. Pasado y presente*, Aleanza Editorial, Madrid, 1996, pp. 169–71. For Italy, averages for Lombardy, Venetia, and Tuscany for 1750, 1800, 1850 taken from M. Breschi, L. Pozzi, R. Retaroli, "Analogie e differenze nella crescita della popolazione italiana, 1750–1911," *Bollettino di Demografia Storica*, XX (1994); for Russia, the data refer to Moscow, 1745–63 and 1851–8, and are taken from A. Blum and I. Troitskaja, "La mortalité en Russie au XVIIIe et XIXe siècles: estimations locales à partir des Revizie," *Population*, LI, 2 (1996)

Table 6.5 Average number of children per woman (total fertility rate) in selected European countries, 1800–1910

	1800	1850	1870	1900	1910
Sweden	4.27	4.27	4.49	3.91	3.31
Finland	5.07	4.91	4.95	4.80	4.36
England	5.55	4.95	4.94	3.40	2.84
Netherlands		4.60	5.23	4.48	3.32
Germany	–	–	5.29	4.77	3.52
Switzerland	–	–	4.03	3.32	3.01
France	–	3.38	3.42	2.79	2.25
Italy	–	–	4.88	4.43	4.28

Sources: J.-C. Chesnais, *La transition démographique*, PUF, Paris 1985 and national sources

The life expectancy figures confirm that progress had already been made in several countries before the mid-nineteenth century. Other countries – Italy, Spain, Germany – made strides only later in the century, while Russia continued seriously to lag behind. Between 1800 and 1900, most of the countries had experienced a 15- to 20-year increase in life expectancy at birth.

Fertility began its decline after 1870 in all countries save France, a pioneer in the use of birth control; France's fertility was already significantly lower than that of other countries by mid-century. In fact, on the eve of the First World War, French fertility had dropped below replacement (that is below the level at which offspring numerically just replace the parents' generation). Between 1870 and 1910 fertility dropped in the countries under consideration, from between a minimum of slightly more than 10 percent (in Finland and Italy) and a maximum of over 40 (in Great Britain).

Emigration also became quantitatively relevant in this period, particularly after 1840. It is estimated that throughout western Europe (that is, excluding Russia, Hungary, the Balkans, and Greece), net population loss due to emigration amounted to nearly 35 million people between 1841 and 1914, the equivalent of about half a million per year, or roughly 2.5 emigrants per 1,000 inhabitants. This net loss amounted to between 25 and 30 percent of natural increase (the excess of births over deaths) for that period. Emigration varied a great deal of course depending on time and place, a variation which these figures tend to obscure; they do however tell us that for much of the century emigration was an important outlet for surplus population. Emigration in eastern

Europe was not quite so great; total net population loss for the period 1840–1915 was about 10 million, less than 10 percent of the natural growth of the period. However, one must keep in mind that the 5 million Russians who went to Siberia (a true intercontinental migration) are not included in these figures, and that at the same time Russia was busy settling its southern territories.

The sober data presented in tables 6.2–6.5 summarize the elements of the great demographic revolution that occurred in the nineteenth century. This transformation is generally referred to as the "demographic transition," a term that has entered into common usage much as has Industrial Revolution, and refers to the complex process of passage from the old regime to that of the present day: the former characterized by high fertility and mortality, and the latter by low.

The great transformation of the long nineteenth century presents a series of interpretative problems which multiply in number as we move away from broad generalizations. There is a well-established model of demographic transition, which at its most general identifies declining mortality as the first agent of this change. This mortality is ascribed partly to exogenous causes – the disappearance of plague and natural changes in epidemic cycles – but primarily to factors endogenous to the social and demographic system including: increased agricultural productivity and better economic organization which reduced famine; growing per-capita resources; and changes in sociocultural practices which helped to reduce the spread of infectious diseases. Mortality decline spurred demographic growth; while increased pressure on available resources stimulated the equalizing mechanisms of the system and led to fertility decline by restricting marriage and, especially, by spreading the practice of voluntary birth control. This sequence – mortality decline/accelerated growth/fertility decline- is self-propelled until equilibrium is reestablished when first mortality and then fertility reach low levels. The duration of the entire transition cycle varied according to the economic progress that accompanied it. The above is an adaptation of the Malthusian model that implies an adjustment of population to available resources by means of a check on reproduction – reproduction being less and less conditioned by biological factors and more and more dependent on individual fertility control.

The transition model can also be applied at the micro level, for individuals, or families. Assuming that mortality decline is a prerequisite for the transition process, families found themselves –

assuming constant fertility – with an increasing number of surviving offspring and therefore sought to balance family size by reducing fertility, the simplest and least painful remedy. At the same time, economic development influenced reproductive behavior: the growth of urban industrial society increased the relative "cost" of raising children. This increase came about as children themselves became autonomous wage earners and producers at a later age than in agricultural societies; they also required greater investments in terms of health, education, and welfare, thus increasing financial and parental obligations. In particular their presence prevented mothers from returning to the workplace, which was by now distinct from the domestic sphere. The increased cost of children (a cost that was increasing relative to rising incomes) appears to have been the spur behind fertility control, a behavioral change made easier by the relaxation of social controls exercised by tradition, religion, or institutions. Improved communication aided the spread of these practices from city to country, from the upper classes to the lower, and from centers of development to more peripheral regions.

This model is based on several major postulates: (a) that mortality decline sets off the process; (b) that diminished fertility follows as a consequence; (c) that economic and social progress lead to demographic change; (d) that other demographic factors are of secondary importance. These four postulates, however, have not always held, and, as we shall discover, there have been many significant exceptions in the demographic history of Europe. Declining mortality, for example, has not always preceded declining fertility; demographic transition has not always taken place at the pace dictated by economic development; the other demographic factors have not always been of secondary importance; nor, as it turns out, is there a simple dependent relationship between demography and economics, but, as we shall see, the two interact in important ways.

It is this mutual dependence that we should emphasize when revisiting the transition model. Earlier we discussed the interaction between the factors of constraint and the factors of choice. For many centuries the relationship between the two was fairly static and demographic structures remained relatively fixed, cemented in the similarly relative stability of the old regime, a stability which, it goes without saying, was constantly jeopardized by major crises. However, when the system of constraints relaxed – as it did in the eighteenth century for reasons tied to technological progress, biological and pathological change, or the settlement of new lands

– then the system of choices was affected as well. The reactions varied in their nature and timing. For example, accelerated demographic growth may follow a Malthusian path whereby an increase in population (caused by a decline in mortality or increased nuptiality following the relaxing of constraints) leads to the re-establishment of equilibrium through an increase, or even an explosion, of mortality levels. This was the case for some of the more backward European populations which made the transition from an old-regime to a contemporary system relatively late. Or else adjustment may occur by means of different combinations of restricting factors – lower nuptiality, lower fertility within marriage, higher emigration – according to particular natural, historical, or cultural factors. So, for example, the reaction of France was a precocious and widespread control of fertility, whereas the Scandinavian countries reacted through emigration and delayed marriage. Yet another reaction was to adjust to rapid population growth by relaxing the factors of constraint even further and creating, for example, new resources to support demographic growth. This happened in England where fertility began to decline almost a century later than in France because the greater human resources in the presence of capital stimulated economic development, and for a long period population growth was regulated – insofar as it was regulated at all – through migration.

We need then to consider the demographic transition as a collection of reactions to rapid population increase following the weakening of the traditional system of obstacles and constraints. In this light, the fact that fertility declined later in England, home of modern industrial development, than in France, which remained very rural until well into the last century, is no longer incomprehensible. Nor for that matter, is the case of Ireland, where emigration and delayed marriage helped to re-establish demographic equilibrium, and where fertility within marriage declined later than in Sicily; in Sicily instead migration was an available option but not changes in nuptiality, the patterns of which were profoundly rooted in tradition. In other words, the paths that various societies followed towards low-fertility/low-mortality regimes differed from one another and did not necessarily follow the procedural logic and order of events prescribed by the transition model.

Two Months Per Year: Increasing Life Expectancy

The causes of the great increase in life expectancy during the nineteenth century are at the same time both extremely simple and extremely complex. On the eve of the Great War, Koch, Pasteur, and a legion of microbiologists had discovered and isolated the origins of the major infectious diseases; public health and medicine had organized and spread; the broad dissemination of scientific knowledge had an ever greater impact on human behavior, in particular in the area of childrearing; nutrition had improved considerably; and per-capita economic resources had roughly tripled since the beginning of the long century. Little surprise then that life expectancy was increasing at the pace of two or three months every calendar year.

What is difficult, however, to sort out are the causes of mortality decline: how much was due to improvements in the standard of living and better nutrition, and how much instead to medical discoveries and their applications, the role of public health, and changes in individual behaviors? That the causal web is tightly woven has not prevented scholars from trying to isolate, as much as possible, the role of the dominant factors of decline; moreover, this historical experience can help us to understand the problems that high-mortality populations face in today's world.

"The enjoyment of old age preceded medical progress," writes Ariès, and the changed view that Europeans in the eighteenth and early nineteenth centuries took of death was an important factor in the progress of European society: "Given the growing complexity of social life, intelligence and organizational capability, as opposed to physical strength, became increasingly important, and so continued economic activity at older ages." Still we need to ask what made this changed attitude possible? How did the prospect of a longer life become no longer a chimera but a reasonable certainty? Four elements can help us better understand the mortality transition.

The decline of subsistence crises

A decline of subsistence crises was the outcome, as we have already discussed, of an agricultural revolution; increased agricultural productivity mitigated the impact of annually fluctuating crop

yields. Those crop yields – and consequently grain prices – did continue to fluctuate for most of the century (also affecting mortality), but they did so to a lesser extent than in preceding ones. The integration of economic markets also played a role, while a greater variety of foodstuffs freed many (though certainly not all) from the traditional heavy dependence on grain. As an example of the new importance trade assumed: in 1878–9 Russia exported 20.6 million tons of wheat, more than half of Italy's total production for the same period, while Germany during 1875–9 imported the equivalent of more than one-fifth of its entire production. The last great European subsistence crisis occurred in 1816–17 – caused by severe weather and rising prices, and accompanied by an outbreak of typhus – and led to a widespread rise in mortality. Later crises were increasingly local and confined to those areas which had yet to experience the agricultural revolution.

Ireland provides an example of a classic old-regime, Malthusian-type crisis. Its population, 8.6 million according to the census of 1841, had tripled since the beginning of the eighteenth century; and most of that population consumed a diet based almost exclusively on the potato. In the decade prior to the crisis, indications of overpopulation were already evident: delayed marriage and increased emigration. These developments did not, however, avert catastrophe: in 1845 a fungus badly damaged the potato harvest; in 1846 it destroyed it entirely. The winter of 1846–7 brought famine, poverty, desperate and massive emigration, and typhus. It has been estimated that the Great Famine together with associated epidemics caused between 1.1 and 1.5 million more deaths than normal. Emigration became an exodus, and 200,000 people per year left Ireland between 1847 and 1854. The long-term repercussions of this catastrophe – perhaps the most intense in the history of Europe – were profound. Not only did people emigrate *en masse*, but the demographic regime itself was transformed into a system characterized by later marriage and a high percentage never married. By 1901 the population had fallen to 4.5 million, just over half that registered on the eve of the Great Famine.

There were other subsistence crises over the course of the century. The 1860s in Finland were marked by a series of famines; first in 1862, then 1865, and the most severe in 1867. The impact of the first shortage in 1862 was minimal as it followed many years of plenty, but the effects of the other two were tragic. Mortality in 1868 was three times greater than normal, and the population of Finland declined 9 percent between 1866 and 1868. Once again,

high mortality was accompanied by an outbreak of typhus. In Russia, the severe shortages of 1891 in the black earth wheat-producing regions cost many lives; a crisis which even showed up in statistics for the whole of that vast country. In fact mortality was 20–5 percent higher in 1892 as cholera also ravaged the population. Such events nevertheless were the exception, and in general subsistence crises – even in rural and backward parts of Europe – became rarer and less devastating in demographic terms.

Improved nutrition

General nutritional levels tended to improve not only because of the absence of subsistence crises, but also because day-to-day diets improved. By 1914 the nutritional situation in almost all of Europe was certainly better than at the beginning of the long century. There is both direct and indirect evidence to support this claim. For instance, family incomes had increased and less of the family budget was being spent on food, a sure sign of improved living standards (as incomes rise, food expenditures increase by a smaller percentage). Diets became richer and more varied. Fewer total calories came from grains, and meat consumption increased. Moreover, sound nutrition is a necessary condition – if not a sufficient one – for longer life expectancy. In this regard, we should consider an "intuitive" explanation for mortality decline that has gained favor in recent years: the "nutritional" theory championed by McKeown, according to which demographic acceleration starting in the eighteenth century was due to mortality decline. That mortality decline, however, can be explained neither by medical advances, which had no impact for the whole of the nineteenth century and beyond (except for Jenner's smallpox vaccine discovered in 1798), nor by changes in public or private hygiene (which in some cases, for example the large cities, probably deteriorated), nor by other causes. The true cause, according to McKeown, was the improvement of the population's nutritional level, which increased organic "resistance" to infection, and so led to increased life expectancy.

This theory is contradicted by a number of factors which force us look to other causes. First, there is the complex relationship between nutrition and resistance to infection which we have discussed at length in chapter 3. The link holds in cases of severe malnutrition or undernourishment, but is less certain when basic nutritional levels are adequate, as was the case for most of the

population of nineteenth-century Europe. Second, mortality had already begun to decline in the latter half of the eighteenth century and the first decades of the nineteenth (in northern Europe and France; see table 6.4). However, that period did not witness great improvements in diet. In France – to use the example of a country which experienced a notable decline in mortality – in 1870 about 70 percent of total calories were supplied by grain and carbohydrates and few came from animal proteins. This diet scarcely differed from that of the late eighteenth century. And in fact meat consumption in all of Europe had reached an all-time low at the beginning of the nineteenth century. The introduction of new more productive crops such as buckwheat, potatoes, and corn, while they increased the supply of foodstuffs, actually contributed to qualitative deterioration. In addition, the decline in real wages in most of Europe between the middle of the eighteenth century and the early nineteenth is well documented, and almost four-fifths of those wages were spent on food. Yet another indicator of nutritional levels is average height, which seems in this period to have stagnated or even declined, certainly not a sign of dietary improvements. There are, then, strong arguments against the nutritional theory of mortality decline, at least until the middle of the nineteenth century, after which improved nutrition certainly did play a positive role in increasing life expectancy.

Changes in epidemiology

The definitive retreat of plague from eastern and western Europe, the control of smallpox by the spread of the vaccine, the gradually diminishing frequency of outbreaks of typhus, in part because of the attenuation of subsistence crises, all played a role in removing the threat of irregular – though frequent and intense – mortality crises. Cholera, on the other hand, was a new disease, contracted by ingesting a bacillus transmitted directly by contact between people or indirectly through contaminated water. The epidemic originated in India, reached Russia in 1829, and had crossed the whole of Europe by 1837. In general, only one person in ten of those infected with cholera actually develops the disease, but it tends to be highly lethal. The pandemic of the 1830s was followed by others in every decade of the century save the 1870s, though public health measures – Koch had identified the cholera vibrio in 1883–4 – helped to contain the later outbreaks. While cholera

devastated Hamburg, Germany, in 1892, causing 9,000 deaths, in nearby Bremen – where a system of water purification had been installed – it claimed only six lives, an illustration of the impact of medical discoveries by that time. In Italy, the most severe epidemic occurred in 1865–7 and caused 128,000 deaths, about 5 percent of total deaths for the three-year period. In France the 1854–5 epidemic claimed 150,000 lives, just under 10 percent of total deaths for those two years. Cholera did not, however, raise mortality on the scale of old-regime crises: despite the tragic events of 1867, Italy experienced only an 18 percent increase over normal mortality for the time, a relatively mild outcome compared to earlier crises. In any case, the epidemiological events that most strongly marked the century were the return of old diseases, such as tuberculosis and malaria, and the continued spread of more recent ones, such as pellagra, rather than the introduction of new diseases (though one of the latter was yellow fever, which arrived in Mediterranean Europe from the Americas).

The frequency and severity of tuberculosis depends on many factors, perhaps the most significant of which are levels of immunity and resistance, and the virulence of infection. These factors, however, evolve over very long periods of time and so cannot explain how the disease changed over the course of the nineteenth century. More and more evidence points to the fact that tuberculosis mortality peaked early in the century and began to decline in the latter half. Though statistics on causes of death only document the declining phase of the disease's cycle, recent research on mid-eighteenth century Sweden and Finland support this basic claim. This distinct epidemiological cycle was strongly influenced by living standards: nutritional levels and their relation to resistance to infection; population density; conditions of the home and workplace; personal hygiene, and so forth. Those above factors influence the risk of exposure to disease, and are in turn associated with growing urbanization. We can characterize the early nineteenth century then as an era in which industrialization and urbanization contributed to rising mortality and the latter part of the century as one in which improved living standards began to have a positive effect. In England in 1871 one out of every seven deaths was from tuberculosis, and the situation was similar in Sweden and Finland around the middle of the century. In Stockholm one death in five was from tuberculosis between 1750 and 1830, with significant differences by social class. By contrast, at the end of the 1880s, in those European countries for which we have reliable data, death

from tuberculosis was between 2 and 3 per 1,000 at a time when total mortality was between 20 and 30 per 1,000. The cyclical history of tuberculosis indeed confirms the observation that the effect of nineteenth-century economic development on mortality was both positive and negative.

Malaria is also an old disease in Europe, found especially but not exclusively in the Mediterranean and in both coastal and swampy areas. Bonelli has described the impact of malaria in the context of Italy: "each occurrence [of malaria] caused people to flee to the healthier hillsides or mountains, and so led to the exploitation and deforestation of those areas. The subsequent deterioration of the water system and the flight of inhabitants slowly created more extensive swamplands and caused malaria to continue to spread." It was widely held in late nineteenth-century Italy that malaria was spreading geographically, spurred by random deforestation, public building projects (in particular the extension of the railway system which created pools of stagnant water), expansion of rice cultivation, and the greater mobility of seasonal laborers, a factor which increased the population exposed to infection. In 1887, the first year for which cause of death statistics were published, there were 21,000 deaths from malaria (slightly less than one per 1,000), but the effects of malaria are multiplied because those infected are more vulnerable to other diseases as well. It was for this reason that mortality levels were higher in malarial regions than could be explained in terms of deaths ascribed to the disease. Malaria, without a doubt, contributed to the high mortality levels in Iberia, Italy, Greece, and the Balkans, but it also spread (and not always in a benign form) to the Atlantic coast of France, England, the Netherlands, northern Germany, parts of the Danube basin, and large areas of central and southern Russia. In southern Tuscany, where malaria was endemic, life expectancy between 1810 and 1850 was five to six years shorter than in the nonmalarial parts of the region. Examples of this sort abound. A recent study has shown that sharp differences were registered even in northern climes: in early nineteenth-century Essex, Kent, and East Sussex, the infant mortality rate in ten inland and hilly parishes was between 62 and 149 per1,000, while in nine parishes located in malarial coastal areas or in the Thames estuary it was between 240 and 377. Some interesting figures for the prewar period give a good idea of the incidence of the phenomenon: in Greece in 1905, 38 percent of the population was infected by malaria, and deaths were equivalent to 2.3 per 1,000; in Romania it is estimated that between one- and

two-thirds of the population in malarial zones (along the Danube River and on the coast) was infected; in the Soviet Union, 9 million cases were recorded in both 1934 and 1935, primarily in the Volga basin and Black Sea regions.

Pellagra, a more recent disease, is connected to the cultivation and consumption of corn, as a diet consisting almost exclusively of that grain creates severe vitamin deficiencies. A chronic and seasonally acute disease, it could cause death. Pellagra appeared in Spain, where it was described by the Asturian physician Gaspar Casal, then spread to southern France, northeastern Italy, and the Balkans. Although it caused fewer deaths than malaria, pellagra nevertheless afflicted a high percentage of the population and was seriously debilitating.

I have discussed tuberculosis, malaria, and pellagra – in descending order of effect and diffusion – because these diseases were recognized in their time as veritable social scourges, requiring the mobilization of great resources. They are also relevant because their decline began before the discovery of the responsible pathogens and the mechanisms for the infection and transmission of the diseases, and before the introduction of medicines for their treatment. Because contemporaries recognized the factors associated with their outbreaks – poor hygiene, poor and crowded living conditions, and insufficient diet in the case of tuberculosis; swampy conditions in the case of malaria; a corn-based diet for pellagra – they were able to combat them even in the absence of effective treatment. In addition, death from these diseases was – presumably – on the rise in the early part of the century, encouraged by deteriorating living conditions for certain social and professional classes (the urban proletariat, the peasantry) or deteriorating environmental conditions caused by hydrogeological upheaval. Public measures, and in particular an improved standard of living, served to attenuate their impact already in the pre-World War I period.

The impact of medicine

This topic is a highly controversial one because the pronounced decline in nineteenth-century mortality has long and widely been attributed to advances in medicine. Nevertheless, the prevailing opinion is that, with the obvious exception of smallpox, immunization and effective therapeutic treatments had little effect on mortality decline before the twentieth century. For example, the

incidence of typhus had already declined dramatically when in 1909 it was discovered that lice transmitted the disease; and similarly that of malaria before Ross proved in 1897 that a mosquito bite was responsible for the infection. As for tuberculosis, Koch isolated its agent in 1882, but effective treatments only became available in the early decades of the twentieth century. It is true, however, that although not providing specific cures, biology and medicine by the end of the nineteenth century had developed a series of defensive strategies for the control of infectious diseases. It was possible, for example, to almost completely repress infections by interrupting their transmission: uncontaminated food and water prevented cholera and typhoid fever; good hygiene and the elimination of parasites and carrier animals contained the risk of plague, malaria, or typhus; and the isolation of patients helped to control acute infections such as diphtheria, scarlet fever, and measles. Bacteriological discoveries subsequently provided the scientific foundation for these strategies, and encouraged successful public measures and more prudent individual behavior. This complex line of defense was further reinforced with the discovery of vaccines and immunizing serums, and, when prevention of the infection proved impossible, therapeutic cures.

In conclusion, we can make the following observations: the abatement of subsistence crises was a first important advance made in the early decades of the nineteenth century; overall improvement of nutrition, however, only became significant at the end of the century; industrialization, urbanization, and environmental change jeopardized the health and survival of many people, while benefiting others, and caused a slowing (or inversion) of the general trend towards declining mortality; the specific curative or immunizing role of medicine was weak or nonexistent before the twentieth century, though accumulated scientific knowledge did permit the organization of a rational defense against many diseases.

Infant Mortality Yet Again

In chapter 5 we traced a general outline of infant mortality in the old-regime demographic systems of Europe, with a particular emphasis on the variability associated with breastfeeding customs, childrearing practices, and a series of complex social factors that influenced the spread of infectious disease and therefore the survival of small children. Very distinct differences persisted among

national groups in the middle of the nineteenth century. Infant mortality rates were twice as high in Austria, for example, as in Denmark; and twice as high in Bavaria as in France. Even sharper differences can be found between villages, among families living in the same neighborhood, between streets in the same city, or among different professional groups. A closer look at infant mortality is interesting not only because it helps us understand how mortality declined in the nineteenth century – life expectancy increases only when infant and child mortality levels drop – but also for the three fundamental reasons relating to a changing demographic system. First, a greater number of surviving offspring – fertility being equal – increases the burden of childrearing and favors the limitation of family size. Second, the higher infant mortality, the shorter the intervals between births, in the absence of voluntary birth control: the death of an infant in the early months of life interrupts breastfeeding and increases the chances of another pregnancy. Third, fewer children per family allow for greater investment in each surviving child and is therefore in and of itself a reason behind improved survivivorship. Infant mortality and fertility are interrelated, and variations in one are never independent of variations in the other. The processes of production and destruction of human capital, so intense in old-regime societies, are inextricably linked.

In some European countries – France, England, Sweden – infant mortality was already declining between the middle of the eighteenth century and the early decades of the nineteenth, while in almost all, levels dropped sharply by the end of the century. For much of the continent, though we lack national series for the period, there is a wealth of local data indicating that infant mortality levels for much of the nineteenth century differed little from levels in previous centuries, and that the experience of the northern countries and France, while not unique (similar trends were registered in northern Italy), did not apply to the majority of European populations. We also find that for those countries in which mortality began to decline early, there was a period of stagnation or regression in the trend starting in the third or fourth decade of the century. Comparing the periods 1840–5 and 1895–9, infant mortality was 150 and 158 per 1,000 (respectively) in England, 160 and 162 per 1,000 in France, 156 and 158 in Belgium, and 137 and 134 in Denmark. For the countries which had already made considerable progress (or in any case had achieved moderate levels for the times) and were forerunners of economic development, this slump can be interpreted as the price

paid for industrial and urban development, and for a relative deterioration in living standards. The high mortality of cities such as London, Manchester, Birmingham, Liverpool, Sheffield, and other northern industrial centers, well above the national average, was well known to the nineteenth-century public, from the Farr reports for example, and was openly debated. The growing percentage of urban population, with a shorter life expectancy than its rural counterpart, is one of the reasons for the stagnation, or increase, in infant mortality in England. In other industrialized areas, such as Belgium and Germany, where more and more people were residing in cities, there was a direct link between level of urbanization and infant mortality rates. Indeed throughout Europe – in Stockholm, Madrid, Rome, Paris – urban survivorship was poor. On the other hand, the reason behind the mid-century stagnation of infant mortality rates in strongly rural countries such as France remains something of a mystery (a decrease in duration of breastfeeding or heavier workloads for women are possible explanations).

It seems reasonable to maintain that general levels of knowledge prior to the discovery of bacteria would not have allowed – except in particular social and environmental situations – infant mortality to decline below about 150 per 1,000. Subsequently, beginning in the 1890s, a significant drop in infant mortality was registered almost everywhere: in the brief period between 1895 and 1899 and 1910 and 1914 infant mortality declined 20 to 30 percent: from 100 to 72 per 1,000 in Sweden, from 158 to 109 in England, from 162 to 119 in France, from 171 to 139 in Italy, and from 217 to 163 in Germany. In the meantime, almost all the agents of the principal infectious diseases had been identified; pasteurization of milk had made artificial feeding for children safe; water purification reduced the risk of intestinal infections; a number of effective treatments had been introduced (for diphtheria, for example). According to Catherine Rollet, there are three phases in the history of social commitment to the problem of infant survival. Between 1860 and 1880, the public awoke to the social problem of high infant mortality, viewing it as the destruction of a precious family and societal resource. The 1871 English parliamentary hearing on the subject, and the 1874 introduction in France of the Roussel law to control wet-nursing are two examples of this growing public sensitivity. In this period public activism sought to improve environmental and living conditions associated with high mortality. The second phase, between 1880 and 1900, followed the bacteriological discoveries of the day; and questions of correct infant

nutrition became central to battling against digestive diseases. The third phase began in the twentieth century and addressed the problem of reducing infant mortality by safeguarding the health of mothers in order to better protect infants. These phases can also be seen as a process of gradually substituting the "quality" of children for their "quantity," a sign of the increasing importance of human investment to families and society.

Another relevant, if ambiguous, indicator was the practice of infant abandonment in the first days and weeks of life, an ancient practice that underwent a dramatic increase between the eighteenth and nineteenth centuries. Abandonment characterized Catholic countries in particular, though it was not unknown in Protestant areas as well – London, Germany, Scandinavia; in the latter it was, however, dealt with differently, often involving intervention at the level of the parish. Catholic countries, instead, had institutions specifically designed for the receipt of foundlings, some of which were quite old; the Spedale degli Innocenti in Florence, for example, was founded in 1445. The growth of infant abandonment in the second half of the eighteenth century seems to have been widespread, and can be attributed to a variety of factors, not the least of which were the creation of foundling homes themselves, their large capacity and territorial spread, and their easy acceptance policies. Still, what we might today refer to as the increased "supply" of services was not the only, or even the major, reason for increased abandonment; instead, more and more mothers and couples felt pressure to free themselves of the burden of their newborns; at an extremely general level of explanation, this phenomenon can be interpreted as an adaptation to changing circumstances (the higher cost – absolute or relative – of offspring) which, in the second half of the nineteenth century, took on the less traumatic form of fertility control. This interpretation finds confirmation in the fact that the abandonment of legitimate children rose (in some cases more numerous than the abandonment of illegitimate children) and much of the abandoning was done by nondestitute segments of society (workers, artisans). As to the scale of abandonment, 4.3 percent of children born in the Kingdom of Naples were abandoned in 1836; 2.3 percent in Tuscany in 1843–52; 4.8 percent in Lombardy in 1842; 2.7 percent in France in 1846, but over 10 percent in districts of major cities such as Paris, Naples, and Milan. With regard to mortality, the precariousness of the circumstances surrounding abandonment, inadequate breastfeeding, and the ease of transmitting infectious diseases combined to insure that a

minority of abandoned infants survived to their first birthday. Infant abandonment is a complex phenomenon; more than simply a crude surrogate for birth control, and rarely an indirect form of infanticide, it certainly was a sign of widespread hardship.

The Advent of Birth Control

Birth rates in much of Europe by about 1910 had already begun to decline. More precise measures like the number of children per woman (technically speaking, the Total Fertility Rate) reveal an average decline between 1870 and 1910 (for the countries listed in table 6.5 on p. 136) from 4.7 to 3.4. As we know, it was the beginning of an irreversible decline that has brought us to the extremely low levels of the past 25 years. For precisely this reason, it is important to understand what prompted this great change. We know that the primary immediate cause of fertility decline was the spread of voluntary birth control; other related causes (nuptiality variations, among others) had a relatively minor impact.

In order to better understand this process we must keep in mind this important fact: as a mass phenomenon, voluntary birth control was something new, but among select groups of people it had been practiced for some time. Moreover, individuals have had recourse to it in the simple form of coitus interruptus ever since people first became aware of the consequences of sexual intercourse. Family reconstitutions and genealogies, for example, have shown in the eighteenth century, and in some cases, even a century earlier, fertility limitation was relatively diffuse among the privileged classes of Europe: royal families, French dukes and peers, English peers, the aristocracies of Belgium, Milan, Genoa, and Florence, the bourgeoisie of Geneva, and the prominent families of Ghent. Proof is found not only in the lower rates of legitimate fertility for these groups, but also in other unequivocal signs of "control," for example the lowering of the average age at the birth of the last child, which is about 40 years old in a natural fertility regime and approaches 30 as fertility declines. Other select groups, such as Jewish communities in Italy (Florence, Livorno, Modena) and outside of Italy (Bayonne), had already reduced their fertility in the eighteenth century; and there is increasing evidence for similar behavior among certain urban groups. In other words, the "precursors" for voluntary birth control existed, but their behavior did not extend beyond the strict limits of family strategies practiced by

privileged classes or religious communities, small groups that did not transmit their behavior to outsiders. Then, during the first Restoration, the French clergy came to realize that an apparent decline in births – evident from their parish birth registers – was the outcome of new marital behavior; no longer limited to certain well-defined groups, the practice of "onanism" (this term was also used for coitus interruptus) had become widespread (and the Penitentiary tribunal in Rome received no end of queries about whether it was permissible behavior). Voluntary birth control was developing into a mass phenomenon.

By that time, the effectiveness of the marital check – the traditional method of reproductive control in old-regime societies – had been largely exhausted in almost all of western Europe. At the beginning of the nineteenth century, average age at marriage west of the St. Petersburg–Trieste line was high – 25–27 years for women – and a considerable percentage of the population did not marry at all, a model already discussed in chapter 5. In the face of declining mortality, especially in the second half of the century, the ultimate Malthusian preventive check (reduced nuptiality) was no longer sufficient to moderate growth; a more powerful one was needed.

Measures for marital fertility, which are not affected by nuptiality, allow us to follow, though indirectly, the trend in voluntary birth control. Table 6.6 gives figures for 1910 and an earlier period (in most cases between 1850 and 1880) during which uncontrolled natural fertility was the rule, except in France where fertility had already begun to decline.

The measure used is standardized by age and marital status (eliminating the influence which different age structures and marital structures can have on less sophisticated measures); it is expressed in parts of 1,000, where 1,000 (a measure no European society achieved or even came close to) represents the highest empirical level of legitimate fertility. Values greater than 650 usually correspond to unchecked fertility (which could vary from country to country according to factors such as the duration of breastfeeding, intrauterine mortality, etc.); values lower than 600 were almost surely the result of deliberate measures to increase the interval between births or stop procreation.

With the exception of France and Hungary, all the countries in the table registered levels between 650 and 800 in the period between 1850 and 1880; on the eve of the Great War, legitimate fertility had dropped below 600 in nine countries, representing declines of 10–40 percent; in still others (Scandinavia, Italy, Spain)

the drop was less than 10 percent and the average remained above 600, but there were indications in those countries as well that fertility had begun to decline.

Figure 6.1 reflects table 6.6, giving the distribution of over 700 subnational European areas (provinces, departments, districts) according to the presumed date of the onset of "irreversible" fertility decline: this date is taken to be when marital fertility declines by 10 percent with respect to a preceding period of stability (and without subsequent increases). Applying this criterion to national groups, the earliest date is 1827 for France and the latest 1922 for European Russia and Ireland. The rest date their decline some time after 1880. At the disaggregated level of figure 6.1, two distinct distributions emerge: the French departments (clearly preceding the rest of Europe) began their fertility decline between 1780 and 1850 and occupy the left side of the figure, while the rest of Europe is on the right. In 60 percent of the cases the date of the onset of decline falls between 1890 and 1920; and the most crowded decade is 1900–10. The last areas only began decisive decline in the 1940s.

The geography of fertility decline reveals a process that began in France and spread to the more developed parts of Europe, including Catalonia, Piedmont, Liguria, and Tuscany in the south, and England, Belgium, Germany, and parts of Scandinavia in the center-north. The more peripheral areas (in the Mediterranean, southern Italy and much of Spain; on the Atlantic, in Portugal and Ireland; the Balkans; Russia) and areas geographically central but culturally traditional (the Alps) were the last strongholds of high fertility, gradually conquered in the course of the twentieth century.

Two other factors must be added to this description of the fertility transition. As expected, fertility appears to have declined first, and more quickly, in urban areas as compared to rural. In Italy, for example, marital fertility in large towns (over 100,000 inhabitants) in 1871 was 15 percent lower than in small, mostly rural, towns (fewer than 30,000 inhabitants). Between 1871 and 1901 fertility in the former declined by 16 percent and in the latter by only five, widening the gap even further. However, this contrast, which can be applied to much of mid-nineteenth century Europe, needs to be understood in relation to both peculiarities inherent to urban areas and their close ties to rural ones, complicating the interpretation of data, especially during phases of intense urbanization. In particular, city-dwellers included a high percentage of people for whom marriage and reproduction were unlikely (those

Table 6.6 Marital fertility in European countries

	Austria		Ireland
1880	677	1871	708
1910	588	1911	708
Index	87	Index	100
	Belgium		Italy
1846	757	1864	677
1910	444	1911	616
Index	59	Index	91
	Denmark		Netherlands
1852	671	1859	816
1911	522	1909	652
Index	78	Index	80
	England		Norway
1851	675	1875	752
1911	467	1900	701
Index	69	Index	93
	Finland		Portugal
1880	698	1864	682
1910	647	1911	636
Index	93	Index	93
	France		Russia
1831	537	1897	755
1911	315	1926	665
Index	59	Index	88
	Germany		Scotland
1867	760	1861	742
1910	542	1911	565
Index	71	Index	76
	Hungary		Spain
1880	589	1887	650
1910	529	1910	623
Index	90	Index	96
	Switzerland		Sweden
1860	724	1880	700
1910	513	1900	652
Index	71	Index	93

Note: The index gives the more recent value as a percentage of the earlier one. Marital fertility (Ig) is standardized for age and marital status
Source: A. J. Coale and S. Cotts Watkins, eds., *The Decline of Fertility in Europe*, Princeton, Princeton University Press, 1986

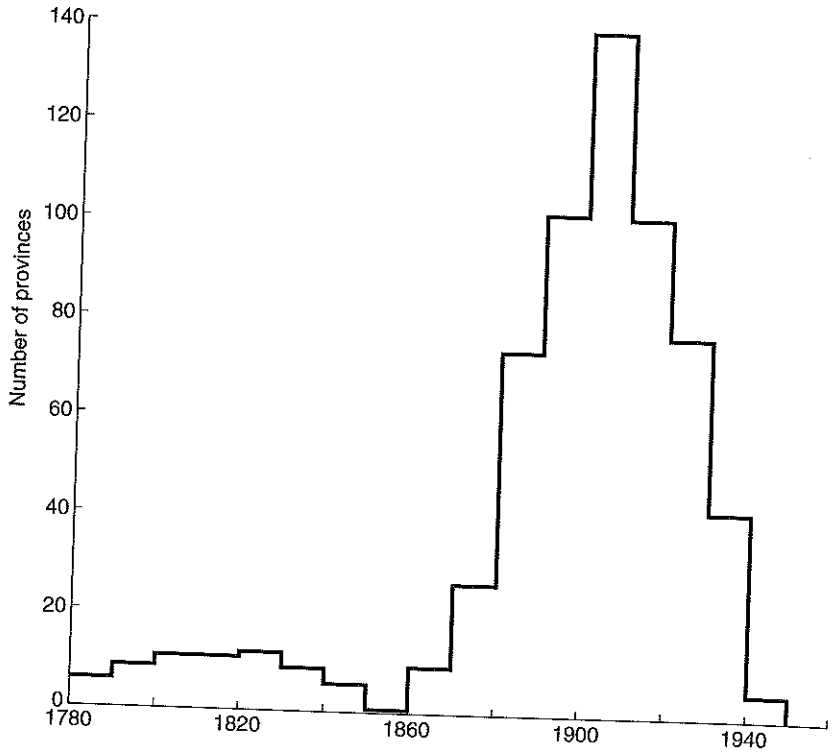

Figure 6.1 Distribution of European provinces by date of onset of fertility decline

Source: Coale and Cotts Watkins, eds., *The Decline of Fertility in Europe*, Princeton University Press, Princeton, 1986

belonging to the military or to religious orders, those living in institutions, domestic servants); there was a large proportion of recently arrived inhabitants who had left behind their families; in the case of France especially, there were many families who sent their children to wet nurses in the countryside (shortening the breastfeeding period this way made for briefer intervals between births, in the absence of birth control); and finally, the ratio between men and women was often out of balance. These factors skew statistics and make them difficult to interpret. Nevertheless, over the course of the nineteenth century fertility seemed to come under control earlier and more quickly in cities than in the country. Once again France presents an important exception: voluntary birth control

seems to have taken hold in cities beginning in the early eighteenth century (this was certainly true in the case of Rouen), but early on its effect was barely sufficient to counterbalance the higher fertility that resulted from sending children out to wet nurses (as described above). The second point to take into consideration is that fertility decline occurred first among the higher social classes (by income, profession, or education), and took its time to spread to other social groups.

The French exception has been, and continues to be, a subject of great debate and research. There is no doubt that French couples in cities and the countryside alike practiced contraception some 50 to 100 years before the rest of Europe, and that urban, industrialized England discovered birth control much later than did rural France. The beginning of the birth control movement coincided with the French Revolution, and fertility decline, coincided more or less with mortality decline. Two not necessarily mutually exclusive lines of reasoning exist to explain this. The first is a cultural explanation and based on the widespread influence of revolutionary ideology, the sudden termination of religious and moral control, and the suspension of individual and collective religious practices. These factors would have accelerated transition where it had already begun, and produced new behaviors where it had not, supported by greater mobility, new social contacts, and the unifying experiences of the revolutionary and imperial armies. Of course everything cannot be attributed to the Revolution: fertility decline was already evident in Normandy and Vexin in the decades preceding 1789, but cultural or social changes of this magnitude do not take place from one day to the next. The other explanation is more economic than social or cultural. France remained for a long time a rural society and could not have absorbed over the long term the demographic pressure caused by declining mortality without, for example, having to excessively fragment land holdings. Moreover, the nuptiality check in the form of late marriage together with a high percentage unmarried in the old regime was already well developed and could not have offset resultant demographic increase. According to Bardet: "We can hypothesize that in general the adoption of contraceptive practices helped avoid what would have been excessive delays in marriage within the traditional system of land tenancy". He adds moreover, that the decline in births between 1790 and 1850, "did not truly constitute a modern demographic transition but the continuation by other means of the usual agrarian Malthusian practices." Meanwhile, industrialization in England created new "niches" in cities and in new sectors that absorbed surplus population (both the rural surplus and that created by lower mortality) and made mass migration possible, all without modifying reproductive behavior. In France, again, the persistence of traditional economic structures and the relative lack of the migration option led to adjustments in the system through fertility control, more easily practiced in the "revolutionary" environment of relaxed religious and moral controls. The cultural component then also plays a role in the economic argument, and helps to explain the much later adoption of voluntary birth control in other rural societies like France.

The transition paradigm is challenged by more than just the French exception. The map of economic development in western Europe corresponds only very roughly to that of fertility decline, and the France/England contrast is by no means unique. For instance, Lombardy in Italy and the Basque provinces of Spain, though leaders in economic growth, were not in the avant garde of fertility control; the more economically developed north of Portugal controlled fertility later than did the less developed south; in 1890 fertility began to decline simultaneously in Hungary, where three-quarters of the workforce was employed in agriculture, and in highly-industrialized Germany. There seems to be no end of evidence for and against the transition model, but ultimately the debate fails to suggest an explicative model which incorporates the many variables and produces convincing results, either because the evidence itself is ambiguous or because what it must explain is not only differences in fertility but the whole complex process of demographic transition that involves the other demographic variables as well.

A final important observation is that by the early twentieth century declining mortality had made traditional fertility levels unfeasible almost everywhere, because of the subsequent accelerating population growth. The nuptiality check had reached a limit and controls were being placed on emigration by the receiving countries who were finding it difficult to absorb the surpluses, so fertility control emerged as really the only way to reign in demographic expansion. The process of fertility decline, for the most part, followed the geographical path of economic development and declining mortality, but with many deviations and exceptions attributable to culture and tradition, religions and institutions, permanence and change, all of which can only be understood at local and specific levels of analysis.

Outside of Europe

What would Europe have been like without America, and America without Europe? While no scholar should ever pose such a question, the temptation is great, given the enormous importance of emigration in linking together the two continents in the nineteenth century. We have already discussed the importance of preninteenth-century transoceanic emigration, which though scant in absolute terms was demographically relevant (not to mention politically and socially influential); it constituted an important outlet for some societies (Great Britain, Spain, and Portugal), had an important "founding" effect (relatively few families generated many descendants), and even laid a receptive foundation for later emigration, based on linguistic and cultural affinities and similarities in family and social structures.

During the nineteenth century, but especially after 1840, European emigration developed into a mass phenomenon. The following are estimates for gross European transoceanic migration between 1840 and 1932 from the major countries of departure: 18 million from Great Britain and Ireland, 11.1 million from Italy, 6.5 million from Spain and Portugal, 5.2 million from Austria-Hungary, 4.9 million from Germany, 2.9 million from Poland and Russia, and 2.1 million from Sweden and Norway. This flood of emigration, which was of course balanced to some degree by a countercurrent of return migration, went primarily to the United States (34.2 million), Argentina and Uruguay (7.1 million), Canada (5.2 million), Brazil (4.4 million), Australia and New Zealand (3.5 million), and Cuba (0.9 million). In the first 15 years of the twentieth century the annual rate of European emigration exceeded 3 per 1,000 equal to about one-third of natural increase. Figure 6.2 shows emigration reaching a peak in the early part of the century; the First World War and later restrictions on emigration imposed by the United States, the principal destination of emigrants, dramatically reduced the numbers. The composition of emigrants to North America, whose number was about triple that for the rest of the continent, changed in the last two decades of the nineteenth century: from predominantly British, Germanic, and Scandinavian origins to Mediterranean, mostly Italian, eastern European, and Balkan. This was a "new" immigration, geographically and socially remote from the "old," and the new immigration laws of the 1920s were surely prompted by this change in composition as much as by the changes in the economy and American society in general.

How do we explain the genesis and development of this mass emigration? All phenomena of this type commonly begin with a supply of potential migrants in a continent rich in human resources but lacking in capital (land scarcity, for example), and a demand for labor in a continent scarce in human resources but rich in capital (land availability). In order to understand how this came about let us concentrate on supply, and once more choose synthesis and the identification of macromechanisms over analysis and micro-explanations. Three fundamental elements stand out: the purely demographic factor of accelerated growth of the labor force; increased agricultural productivity and the creation of surplus labor; and the demand for labor by the industrial and urban sector.

In terms of population growth, as we already know, natural increase was well above 15 per 1,000 many parts of Europe (United Kingdom, Germany) and was everywhere increasing significantly compared to old-regime levels. Over the course of the nineteenth

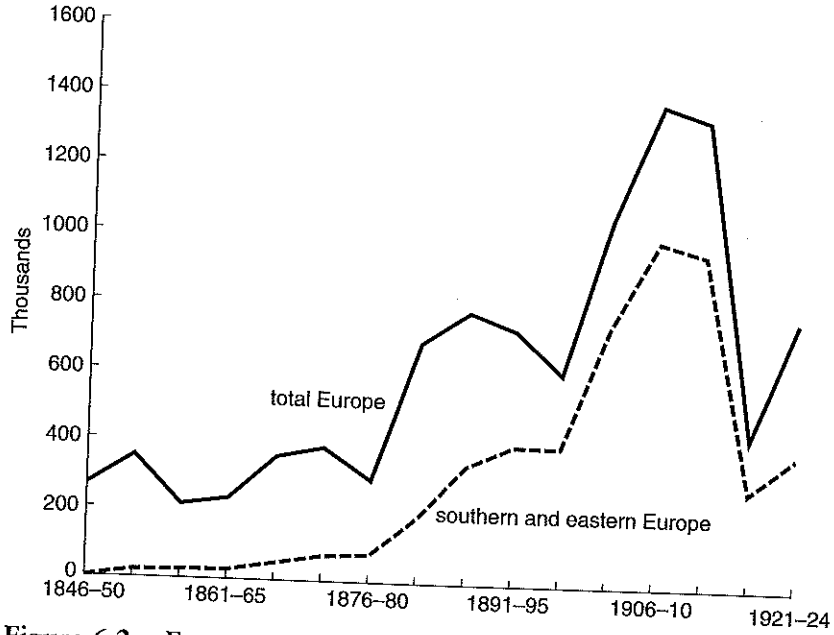

Figure 6.2 European emigration 1846–1924 (five-year averages)

Source: I. Ferenczi and W. F. Wilcox, *International migrations*, 2 vols., NBER, New York, 1929–31, vol. I, pp. 230–1

century this acceleration was on average greater in rural areas where birth rates remained high and fertility control was introduced later relative to mortality decline. There is a striking relationship between growth rates (the difference between births and deaths) and the intensity of emigration about 25 years later (more or less the average age of the emigrants); emigration served to lower demographic pressure caused by the influx of larger cohorts of workers into the labor market. The significance of changes in natural growth from year to year or between countries of emigration finds confirmation in econometric studies that have also taken other variables into consideration, such as wage differences between sending and receiving countries. Johnson recounts a telling example of the effects of demographic pressure:

> A case in point was furnished by Rum in the Hebrides. The proprietor of the island found, in 1825, that his rents were £300 in arrears. A visit to the locality conclusively showed him that the indebtedness of the people was not due to any lack of industry on their part, but that the overcrowded numbers precluded any of them from gaining an adequate livelihood. Recognizing that matters would never improve of themselves, he canceled their debts, shared a sum of £600 amongst them, gave them cattle, and paid their passage out to Canada. Later on, it is recorded that this proprietor had repeopled his island on a less crowded basis and was deriving £800 per annum as a rent for it.

This example – peculiar for both the proprietor's shrewdness and its location in the far north of Europe – sounds like a Malthusian parable, but one runs into mechanisms of this type throughout the continent.

Earlier in this chapter I discussed the second factor: the increase in agricultural productivity and the resulting creation of surplus manpower. According to Bairoch, productivity of labor in Europe (excluding Russia) increased 0.6 percent annually between 1800 and 1850, 0.9 percent between 1850 and 1880, and 1.2 percent between 1880 and 1910. These substantial increases were entirely consistent with the growing importance of emigration during this period. The combined pressure on the demographic system of rapid population growth and increased productivity had complex consequences, from declining real wages to the breaking up of landholdings, the impoverishment of small landowners, and the rising number of landless families. Outside of Russia, no new lands were available in Europe for cultivation: Grigg has calculated that

arable land in Europe grew slowly, from 140 to 147 million hectares between 1860 and 1910. So the pressure to emigrate grew, encouraged by improved means of communication and lower shipping costs; in other words, by the "shrinking" of the world.

Though pressure to leave the countryside grew considerably over the course of the century, it did not necessarily translate into international or intercontinental emigration. The process of industrialization absorbed a significant percentage of the rural population surplus. Indeed, the very same forces that stimulated agricultural growth and increased productivity contributed to the Industrial Revolution. Industrialization and urban growth, accompanied by the growth of the service sector, created new opportunities for rural surplus labor. About three-quarters of the European workforce (again not including Russia) were employed in agriculture at the beginning of the nineteenth century, but by 1850 only about one-half were, and by the beginning of the twentieth century the proportion had dropped to one-third. The size of the agricultural workforce had grown steadily up until 1850, after which it stabilized and began to decrease. Europe was steadily becoming less rural while manufacturing, mining, building, and what we now call the "tertiary" sector expanded. The urbanization process was intense; the total population of the 39 European cities with more than 100,000 inhabitants in 1850 grew from 6.1 million in 1800 to 11.2 in 1850, 29.5 in 1900, and 34.4 in 1910, an almost sixfold increase. Medium and small cities were also growing, and so the number of jobs available in administration, shipping, trade, and services.

As industry developed and the demand for labor in manufacturing grew, the pressure to emigrate diminished. Between the late nineteenth century and the early twentieth there was a clear inverse relationship between industrialization levels and emigration; when the number employed in industry approached the number employed in agriculture the level of transoceanic emigration declined. There were more people employed in industry than agriculture in Great Britain in the last decades of the nineteenth century, and emigration had long ceased to be a mass phenomenon. Prior to the First World War, there were more people employed in industry in Belgium, where mass emigration had never taken hold, and in Germany and Switzerland, where it had ceased. In Mediterranean countries such as Italy and Spain, where industrialization took hold generally only in the two decades after the Second World war, large-scale emigration ended at the same time. In other

countries (the Netherlands, Sweden, Norway) where manufacturing industries came to dominate the national economy in the period between the World Wars, emigration had already been halted by restrictions relating to the economic crisis.

In discussing emigration, we have emphasized certain macro-level aspects while ignoring others; a few of these merit mention. The first is the "political" aspect of emigration, ranging from religious persecution (relevant not only in old-regime societies but in the nineteenth century as well; consider the emigration of Russian Jews) to domestic politics, both liberal and protectionist, including price and tax policies that encouraged or discouraged emigration, policies regulating or hindering emigration and so on. The case of France, again an exception in Europe for the absence of migratory pressure (even though it was a politically influential colonial power), can be analyzed from a number of perspectives. Demographically speaking, for instance, low fertility created less demographic pressure and made emigration "superfluous". From the economic and social point of view, one has to consider the multitude of small landowners who were strongly attached to the land, and so not attracted by emigration. Culturally and politically, France rejected the subordinate status that went with mass emigration. Another factor often neglected in explaining the phenomenon of emigration is the self-feeding nature of the migration process; once an initial group of select and adventurous pioneers departs, their conationals are more willing to go as well because the "costs" of integration are effectively diminished by the presence of a welcoming community. Yet another factor, mentioned briefly above, was easier and more rapid transportation through a spreading railway system, the expansion of maritime transport, and lower costs. Finally, the policies of the host countries were an important factor in emigration: consider the Homestead Act of 1862 which granted land outright to heads of families over 21 years of age who intended to farm the land and who were either U S citizens or had requested citizenship.

By the eve of the First World War, Europe had exported tens of millions of its inhabitants overseas, both easing demographic pressure at home and contributing dramatically to the demographic growth and consolidation of the receiving countries. The Western expansion of the U S, and the peopling of the interior and the south of Argentina owed much to European emigration. In 1860 cultivated land in the United States, Canada, and Argentina amounted to 66 million hectares as compared to 140 million in Europe

(excluding Russia): by 1910, 174 million hectares were being farmed in the former and 147 in the latter. The American expansion should not, however, make us overlook the expansion taking place in the other direction, beyond the Ural Mountains and into inhospitable Siberia. Between 1850 and 1914 – when emigration all but ceased – 5.3 million people settled in Asiatic Russia, 3.5 million of whom arrived between 1897 and 1911. Initially the movement involved a few tens of thousands of people per year, encouraged by the 1861 freeing of the serfs and the progressive saturation of the best farmland; it accelerated enormously in the 1890s with the opening of the Trans-Siberan railway. And then, in 1914, the great era of European expansion came to an end.