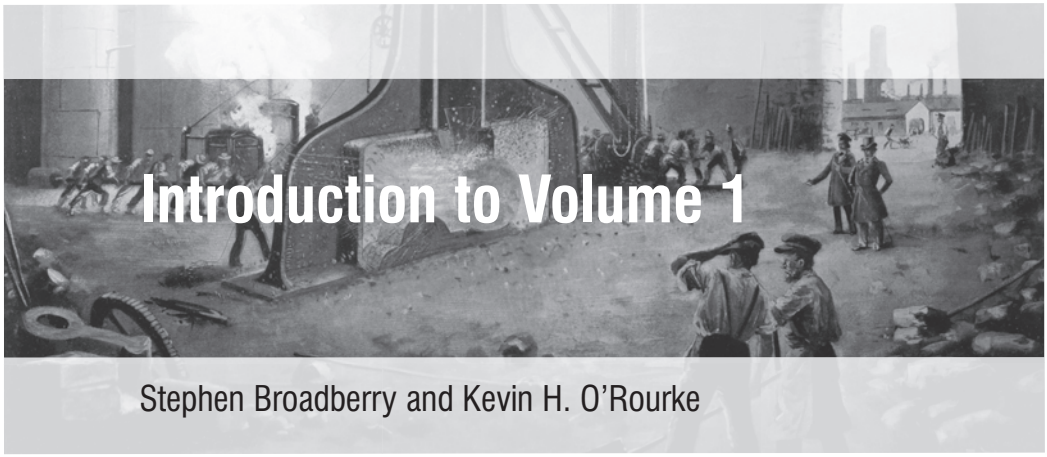

Introduction to Volume 1

Stephen Broadberry and Kevin H. O'Rourke

Volume 1 of this new economic history of modern Europe is centered on the transition to modern economic growth, which Kuznets (1974) defined in terms of the following six characteristics: (i) high rates of growth of per capita product and population; (ii) a high rate of growth of output per unit of all inputs – that is, total factor productivity; (iii) high rates of structural transformation from agriculture to industry and services, and from personal enterprise to large-scale impersonal organization of firms; (iv) changes in the structure of society and its ideology, including urbanization and secularization; (v) opening up of international communications, or globalization; and (vi) the limited spread of growth, leading to the divergence of living standards between "developed" and "underdeveloped" nations. The transition to modern economic growth occurred in Europe between 1700 and 1870, beginning in Britain, but spreading quite rapidly to other parts of western Europe.

Viewed in the grand sweep of history, this change was undoubtedly radical, and must be ranked alongside other epoch-making changes such as the change from hunting and gathering to settled agriculture. In recent decades, however, as it has proved increasingly possible to reconstruct the path of economic development at this time, it has become clear that the changes were more gradual and spread more widely across the economy than earlier generations had thought, thus calling into question the use of the term "Industrial Revolution." We have nevertheless retained the term, partly because it has become firmly embedded in the popular consciousness as well as the professional literature. However, perhaps more importantly, it should also be borne in mind that although the growth rate was slower than once thought, the economic changes of this period were nevertheless revolutionary in the sense that they proved irreversible and became an ideal type (de Vries, 2001). This is the true meaning of the attachment of the term "French Revolution" to the events of 1789, rather than the fact that the storming of the Bastille happened in a short space of time. Furthermore, it

Table I.1 GDP per capita in European countries, 1500–1870: growth rates and comparative levels

A Growth rates of GDP per capita (% per annum)

	1500–1700	1700–1750	1750–1820	1820–1870
UK	0.12	0.35	0.20	1.25
Netherlands	0.24	0.00	−0.02	0.83
Belgium	0.09	0.19	0.02	1.44
France	n.a.	n.a.	n.a.	0.85
Italy	−0.08	0.14	−0.22	0.61
Spain	−0.02	−0.10	0.10	0.27
Sweden	0.02	0.03	0.06	0.65
Poland	−0.13	−0.24	0.21	0.59
Russia	n.a.	n.a.	n.a.	0.64
Turkey	n.a.	0.16	0.07	0.52

B Comparative levels of GDP per capita (United Kingdom in 1820 = 100)

	c.1500	c.1700	c.1750	1820	1870
UK	57	73	87	100	187
Netherlands	67	109	109	107	162
Belgium	58	69	76	77	158
France	n.a.	n.a.	n.a.	72	110
Italy	83	71	76	65	88
Spain	63	61	58	62	71
Sweden	64	66	67	70	97
Poland	50–54	38–42	34–37	41	55
Russia	n.a.	n.a.	n.a.	40	55
Turkey	n.a.	35	38	40	52

Sources: Derived from van Zanden, 2001; Maddison, 2001; Pamuk, 2006; Álvarez-Nogal and Prados de la Escosura, 2007.

remains true that industry came to play a greater role in the economy as the modernizing economies shifted resources away from agriculture (Crafts, 1985a).

How rapidly did Europe grow between 1700 and 1850, and how much of a radical break with the past was this growth performance? In recent years, economic historians of Europe have made dramatic progress in quantifying the process of economic growth, and Table I.1 sets out the basic data for annual growth rates and comparative levels of gross domestic product (GDP) per capita. The systematic monitoring of comparative levels of per capita income is a relatively recent development, and helps to provide a consistency check on the growth rates for particular countries, which have normally been derived on an individual country basis.

The first thing that is apparent from Table I.1 is that the growth rate was much higher during the period 1820–1870 than during the early modern period 1500–1700. Indeed, during the early modern period, information on the parts of southern and eastern Europe for which we have data suggests declining living standards, in contrast to the slowly rising incomes of northwestern Europe, particularly Britain and the Low Countries. This is part of the well-known reversal of fortunes within Europe following the opening of new trade routes to the East via the Cape of Good Hope and the discovery of the Americas. The accompanying shift of per capita income leadership from the Mediterranean region to the Atlantic-facing economies of northwestern Europe has recently been termed the Little Divergence, to distinguish it from the Great Divergence of living standards between Europe and Asia which occurred after 1800 (Pomeranz, 2000; Allen, 2001; Broadberry, 2007).

The second result which is apparent from Table I.1 is that the transition to modern economic growth was a long-drawn-out process. Even in the lead country, the United Kingdom, the annual growth rate of per capita income remained less than 0.5 percent until well into the nineteenth century. Only after 1820 were rates of growth above 1 percent per annum seen, and then only in a handful of countries. The third conclusion which can be drawn from Table I.1 is that although its origins were British, modern economic growth transferred relatively easily to the rest of Europe, and indeed to the European settler colonies of the New World. All European countries in Table I.1 show an increase in per capita income growth after 1820, and this led to the Great Divergence of living standards between Europe and Asia.

The organization of this volume reflects our belief in the centrality of this transition to modern economic growth to understanding European economic history between 1700 and 1870. Part I focuses on aggregate developments, including shorter run business cycle fluctuations in Chapter 5 as well as longer run economic growth in Chapter 1. The inclusion of a separate Chapter 2 on population as well as a chapter on economic growth reflects the distinction that Kuznets made between modern economic growth and pre-industrial growth. As Malthus (1798) famously argued, rising living standards were typically only short-lived in the pre-industrial period, as population growth almost literally ate away any temporary gain in real wages. The Industrial Revolution period, by contrast, was marked by the coexistence of rapid population growth and rising per capita incomes, before Europe entered a demographic transition to a regime of lower population growth accompanied by sustained per capita income growth. Chapter 4, on trade and empire, reflects Kuznets's emphasis on globalization, as well as addressing the long-running debate on whether the West grew rich by exploiting the periphery. For a long time now, economic historians have established that the scale of the interaction between Europe and the wider

world was not large enough on its own to explain the rise of the West (O'Brien, 1982). The alternative way of understanding the "European Miracle" is through institutional change, allowing Europe to achieve modern economic growth through the establishment of a system of incentives embedded deeply in the institutional framework of society. This is considered in Chapter 3, on state and private institutions.

Part II then provides a more detailed sectoral breakdown, examining developments in agriculture in Chapter 6 and in services in Chapter 8, as well as industry in Chapter 7. These three chapters focus on the issues of output and productivity growth as well as the changes in structure and organization that Kuznets emphasized. Part III then considers the upshot for living standards. In this section, as well as Chapter 9 on real wages and other indicators of the standard of living, we have included Chapter 10 on urbanization. This is one of the structural changes emphasized by Kuznets, which clearly also had a major impact on living standards. Finally, we address the issues of globalization and the divergence of living standards through Chapter 11 on Europe in an Asian mirror.

PART I Aggregate growth and cycles

CHAPTER

1 Understanding growth in Europe, 1700–1870: theory and evidence

Joel Mokyr and Hans-Joachim Voth

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Incomes of ordinary citizens in developed countries today dwarf those enjoyed even by the wealthy elite during most of mankind's history. John Maynard Keynes, with slight incredulity, observed in 1930 that the economic problem of mankind (in Europe and North America at least) had been solved (Keynes, 1930). People no longer go hungry. Clean clothes, shelter, and warmth have gone from luxuries to necessities. By 1870, developments that would eventually deliver this full complement of riches were already in full swing. This chapter summarizes recent research by growth economists on how mankind escaped from a life that was, in the words of Thomas Hobbes, "nasty, brutish, and short." It contrasts these interpretations with the existing historical evidence and recent findings of economic historians. Four areas are of particular concern – demography, institutions, human capital, and technology. We conclude with suggestions for future research.

Theoretical approaches

In the late 1980s and early 1990s, macroeconomists began to turn their attention from business cycles to the determinants of long-run economic growth. Papers in the endogenous growth literature sought to explain why some countries had grown more rapidly than others. The main period of interest to which these models were applied was the post-war era. They returned to Kuznets's classic argument that current growth rates, when extrapolated backward, implied absurdly low incomes in early modern times and before. Therefore there must have been a long period of stagnation before modern growth started. But what was the source of the phase transition from a world of very low or zero rates of growth to a modern world of rapid and sustained growth?

From the 1990s onwards, scholars started to search for an overarching theory that could encompass both slow growth and the transition to rapidly increasing per capita incomes – a "unified growth model." The field has flourished since. A number of themes stand out – demography, the influence of institutions, human capital and culture, and the role of technology. We first summarize some of the most prominent contributions in the theoretical literature. In the main part of the chapter, we compare the theorists' predictions with the main facts unearthed by economic historians. Our conclusion offers some suggestions on how progress can be made.

Early models in unified growth theory, such as Kremer's (1993) paper, modelled the transition from stagnation to growth as one long, gradual acceleration of growth rates. As in some other papers in the endogenous growth literature, Kremer's model assumes that more people spell faster technological change,

since the probability of a person having a bright idea is more or less constant. Because ideas are non-rivalrous, growth accelerates. Kremer showed that some of the basic predictions derived from such a simple growth model hold both over time and in cross-sections. Since 1,000,000 B.C., growth rates of population can be predicted from the current size of the population. Also, geographically separated economic units with greater surface areas produced bigger populations and higher densities. As population size and technology increase jointly, there is no steady state in Kremer's model. To avoid all variables showing explosive behavior, a demographic transition is necessary, so that fertility responds negatively to higher incomes above some threshold level.

In contrast, in exogenous growth models, technology "just happens," and adoption decisions are not explicit. Size itself does not affect technology or productivity change. In one application of exogenous growth to the transition to self-sustaining growth, Hansen and Prescott (2002) model the transition "from Malthus to Solow" by assuming that technological change in both the land-using (diminishing returns) and the non-land-using modes of production is exogenously given and constant. Initially, only the Malthus technology is used. In every generation, each lasting thirty-five years, productivity in their model increases by 3.2 percent in the "Malthus sector" (i.e. agriculture, where labor is subject to declining marginal returns) and by 52 percent in the "Solow sector" (where all factors of production are reproducible). Eventually, as the productivity of the unused technology increases exponentially, the Solow technology becomes competitive and is adopted. In this setup, an Industrial Revolution is inevitable, and does not depend on anything other than the differential growth rates of productivity used in the calibration.

A second class of models in which size matters also takes technological change to be exogenous. Here, the focus is on the conditions under which new techniques will be adopted. Early models in the tradition of Murphy, Shleifer and Vishny (1989) relied on demand effects, and hence the size of economies, to explain when a "big push" might occur. By "big push," authors in the tradition of Rosenstein-Rodan mean the simultaneous adoption of advanced technologies in many sectors. In order to pay the fixed cost necessary for adopting modern production, demand needs to be sufficiently high. This will often be the case only if a whole range of industries industrializes. The chances of this occurring increase with total output. One implication of these models is that industrialization might have been feasible long before it got under way – if only everybody had decided to invest earlier in fixed-cost technology, profits would have been high enough to justify the expense. Advances in technological knowledge themselves need not translate into greater output. Coordination failure can thus undermine the transition to modern technology.

High fixed costs and indivisibility also play a crucial role in models that put risk diversification at the heart of adoption decisions. Acemoglu and Zilibotti (1997) present a model with a tension between production requirements and household investment. Productive projects using new technology require substantial set-up costs. At the same time, households want to diversify their investments to minimize risks. Because of this, investment in the new, productive technology is initially very low, and so is output. This changes as households become richer – their savings become sufficiently large, relative to the capital requirements of new technologies, to avoid "putting all their eggs in one basket." Industrialization, once under way, generates the means with which to sustain itself. A number of lucky draws can get it started. Two identical economies may end up on very different paths, depending on whether they get lucky in the first round or not. Acemoglu's and Zilibotti's model also has the feature that households do not take into account the effect of their investment decisions on aggregate productivity. Industrialization may not occur, while being feasible. The model incorporates a stochastic component – industrialization may partly be the result of chance. One implication is that not every aspect of actual industrial transformations is fraught with meaning – and the country that actually went first may simply have been lucky.[1]

Many unified growth models link human capital accumulation with technology and the ideas-producing properties of population growth. These papers have argued that the transition to modern growth is accompanied by a growing importance of human capital (Becker and Barro, 1988; Lucas, 2002; Becker, Murphy, and Tamura, 1990). Galor and Weil (2000) made the nexus between human capital and technological change a cornerstone of the transition to rapid growth. They argue that the escape from stagnation took place in two steps – a transition from the Malthusian to a post-Malthusian state, and then to a modern-growth regime. Galor and Weil's key assumption is that, as technological change accelerates, human capital becomes more valuable: it allows people to cope with a rapidly changing workplace. Technological change accelerates as more people produce more ideas during the long Malthusian period. Because of a delay in the response of population to income growth, per capita incomes grow, if very slowly. Eventually, parents invest more in the human capital of their offspring. This in turn accelerates the growth of knowledge. Higher incomes make it easier for parents to have more children. At the same time, a growing value of human capital produces incentives to increase the quality of one's offspring, reducing quantity. Initially, after the start of

[1] Following Crafts's (1977) original contribution, this idea has been the subject of substantial debate among economic historians.

modern growth, the income effect dominated, leading to more births; later, the substitution effect became more important, and fertility declined.

Cervellati and Sunde (2005) as well as de la Croix (2008) alter this setup by arguing that life expectancy rose quickly with productivity. This in turn encouraged investment in human capital, as payback horizons lengthened. Even if technological change is only slightly skill-biased, a self-reinforcing cycle of better technology, greater life expectancy, and higher investment in human capital can get started. Boucekkine, de la Croix and Peeters (2007) show how rising population density may encourage higher literacy, through the cheaper provision of schooling services. Jones (2001) combines the population-ideas mechanism with a property rights regime that reserves a share of output for innovators. Based on his calibrations, Jones concludes that the single most important factor leading to a take-off in growth after the nineteenth century was more effective enforcement of intellectual property rights, which created the necessary incentives for the sector that produced the ideas.

Some observations from economic history

The population–idea nexus is key in many unified growth models. How does this square with the historical record? As Crafts (1995) has pointed out, the implications for the cross-section of growth in Europe and around the world are simply not borne out by the facts – bigger countries did not grow faster.[2] Modern data reinforce this conclusion: country size is either negatively related to GDP per capita, or has no effect at all. The negative finding seems plausible, as one of the most reliable correlates of economic growth, the rule of law (Hansson and Olsson, 2006), declines with country size. Even if we substitute "population" with more relevant concepts like market size, which might have influenced the demand for new products, the contrasting growth records of Britain and France are hard to square with endogenous growth models emphasizing size.[3] Moreover, it is disconcerting for these models that in 1750, on the eve of the Industrial Revolution, Britain had just experienced half a century of virtual demographic stagnation. One could also point out that if population size

[2] It is indeed striking that prior to the coming to the fore of the British economy, Europe's most successful economies tended to be city states (Hicks, 1969, p. 42). These, with high density but relatively small populations, had an advantage in solving the problems of setting up effective institutions of commerce and finance. Market size was less of a problem, in part because the fixed costs of setting up these institutions were not all that high, and because they tended to be open economies. The main source of economies of scale was not economic but military. Military power depended on total income and population.

[3] Some later models in the spirit of Kremer, such as Jones (2001), attempt to provide a solution to this problem by assuming increasing returns in the production of goods, and by allowing the number of new ideas to be a function of the existing stock of ideas.