

# British Society, 1680–1880

*Dynamism, Containment and Change*

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# Contents

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|                                                                                        |                |
|----------------------------------------------------------------------------------------|----------------|
| <i>Preface</i>                                                                         | <i>page</i> ix |
| <i>Acknowledgments</i>                                                                 | x              |
| Introduction: beginnings, periods and problems                                         | 1              |
| 1 The economy of manufacture                                                           | 17             |
| 2 A universal merchant to the world: the political economy of commerce and finance     | 52             |
| 3 The ambiguities of free trade                                                        | 88             |
| 4 The reach of the state: taxation                                                     | 123            |
| 5 The age of localism                                                                  | 155            |
| 6 The public, the private and the state: civil society 1680–1880                       | 192            |
| 7 Exclusion and inclusion: the political consequences of 1688                          | 234            |
| 8 Exclusion and inclusion: defending the politics of finality 1832–1885                | 264            |
| 9 The stabilities and instabilities of elite authority: social relations c.1688–c.1880 | 292            |
| Afterword                                                                              | 336            |
| <i>Index</i>                                                                           | 343            |

# 1 The economy of manufacture

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## **Narratives of economic change**

The production system of the period covered by this book was an economy of manufacture. It was not an industrial economy as we came to understand that term in the twentieth century. The application of machine technology and science to production, the factory as the typical worksite of the productive process, and managerial bureaucratization and hierarchy are the key elements to an industrial economy. Yet this manner of organizing the production of goods did not emerge in Britain until the end of the nineteenth century, after which it came to dominate the economy for the next hundred years. By contrast, the economy of the period 1680 to 1880 was an economy directed by customary methods rather than one driven by “modern” forms. The enormous and growing productive capacity of the economy was achieved through small-scale units of production – the workshop and the home preponderantly. It was an economy where technology continued to move at the speed determined by the hand rather than the reverse.

The economy of manufacture was, therefore, a distinct economic formation. It possessed a particular economic and historical ordering, with its own profile and dynamic. This phase of economic development should not be consigned to a “proto-industrial” form, nor more pertinently should it be situated as the precursor to the industrial state of the twentieth century. By the same token, however, the economy of manufacture was differentiated from the economy of the sixteenth and seventeenth centuries by its size and dynamism. From the late seventeenth century, consumer markets expanded more or less continuously and (a new feature, this) international linkages grew increasingly sophisticated and complete. The central purpose of this chapter is to describe the key elements of the economy of manufacture.<sup>1</sup>

<sup>1</sup> See Maxine Berg, *The Age of Manufactures 1700–1820* (London, 1985), for the use of the notion of “manufacture” to understand the economy of this period. See Karl Marx, *Capital: A Critical Analysis of Capitalist Production* (Moscow, n.d.; repr. of English-

The argument that I shall make rests upon a notion of economic change and development that requires some initial explanation – although it will be immediately obvious to the specialist reader. The period c. 1680 to c. 1880 has not typically been regarded as a discrete stage in Britain's economic history. Indeed, the conventional treatment would be still to divide it between a period of “apprenticeship” to industrialization and a period in which the prometheus of industrial capitalism was unbound. In the traditional narrative of British economic history, this transition took place around the end of the eighteenth and the beginning of the nineteenth centuries when an “industrial revolution” set free the forces of unrestrained growth. This produced a composition unimagined before, and it marked the birth of the modern economy and the modern world. In this account, everything that precedes this transformation is but prologue to industrialization, and everything that succeeds it is but the corollary of its consequences.<sup>2</sup>

Until recently this narrative organization of economic history remained virtually unquestioned. Yet it was never entirely convincing. When Sir John Clapham wrote his three-volume economic history of modern Britain in the 1920s and 1930s, for example, he made no use of the term “industrial revolution.” Indeed, Clapham argued that Britain was only halfway toward an “industrial state” by 1850, and not until the 1880s did industry move to a dominance over the economic relations of the society and its politics.<sup>3</sup> Contemporary economic historians have picked up on

language edn., 1887), vol. I, pp. 318–65, for his categories of manufacturing and modern industry, and pp. 432–72 for his attempt to reconcile the persistence of the domestic manufacturing system into the period of modern industry. It is worth noting that there is much evidence in Marx for the argument that modern industry was not a dominant economic form during this period. Like most other commentators, Marx read the evidence in a way that did not allow him to extend the period of manufacture much beyond the early nineteenth century. Thus, he spent quite a few pages trying to reconcile the deep interpenetration of his categories of manufacture and modern industry.

<sup>2</sup> David Landes, *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe 1705 to the Present* (Cambridge, 1969). This book was perhaps the culmination of a narrative that began with Arnold Toynbee, who entered the industrial revolution into the historiography in a series of lectures published as *The Industrial Revolution* (London, 1884). Other notable works in this tradition, of course, include Paul Mantoux, *The Industrial Revolution in the Eighteenth Century: An Outline of the Beginnings of the Modern Factory System in England* (London, 1928); T. S. Ashton, *The Industrial Revolution 1760–1830* (1st edn., Oxford, 1948); Peter Mathias, *The First Industrial Nation: An Economic History of England 1700–1914* (New York, 1969). Transformation was also the theme of the modern leading Marxist economic historians; see E. J. Hobsbawm, *Industry and Empire: An Economic History of Britain Since 1750* (London, 1968), p. 1: “The Industrial Revolution marks the most fundamental transformation of human life in the history of the world recorded in written documents.” Charles Wilson's *England's Apprenticeship 1603–1763* (London, 1965) remains a wise and important book.

<sup>3</sup> J. H. Clapham, *An Economic History of Modern Britain* (2nd edn., Cambridge, 1930), vol. I, pp. 211, 213; (1st edn., Cambridge, 1932), vol. II, pp. 22, 110, 105. Clapham fully

this analysis and have deployed the mysteries of econometric analysis to the scant and bare statistics that survive from the period to demonstrate a view of economic growth as a more continuous process.

As a result of their labors, it is now clear that by the middle of the eighteenth century the key departures had been achieved from an agrarian-based economy to a manufacturing-based one. The balance of labor and productivity had tilted away from agriculture and per capita national income had been lifted to the level of an industrializing society. A more continuous model of economic change suggests a view of "industrialization" that diminishes the importance of the factory, though it does not deny its growing presence throughout the eighteenth century. Nevertheless, the overall effect of this approach to economic change is to downgrade the importance of a "modern" sector in favor of the "traditional" sector of the economy. Indeed, it was this section, characterized by the domestic workshop, hand labor and nonmechanized technologies like water power, that lay at the center of innovation and growth and must therefore be placed at the heart of the process of economic development.<sup>4</sup>

Yet it is quite simply misleading to describe the system of manufacture as "traditional." It was a dynamic economic organism; innovation and

realized that "no single British industry had passed through a complete technical revolution before 1830" (vol. I, p. 141). The phrase "industrial revolution" does not appear in the index (or the text as far as I can tell) in volume I, and only once in volume II. In the latter case it is in a quote from L. L. Price, the late nineteenth-century economic observer. Clapham does, however, occasionally use the word "revolution." Usually this is employed as a rhetorical device contrasting the social fate of various groups, sometimes capitalizing it, in other places not. Thus, the "handloom weavers, marked by the Revolution [*sic*] for death" and the "seamen of the 'twenties were untouched by the revolution." Similarly, Ephraim Lipson was quite explicit in his *Economic History of England* that it was dangerous to draw sharp distinctions between the different phases of economic growth. Lipson recognized that the industrial revolution "constituted no sudden breach with the existing order, but was part of a continuous movement which had already made marked advance": E. Lipson, *Economic History of England*, vol. III, *The Age of Mercantilism* (London, 1931), pp. 53–54.

<sup>4</sup> The revisionist literature on the industrial revolution is very considerable, and will be well known to the specialist reader. Perhaps the best statement is N. F. R. Crafts, *British Economic Growth During the Industrial Revolution* (Oxford, 1985); but see also C. Knick Harley, "The State of the British Industrial Revolution: A Survey of Recent Macroeconomic Reassessment," Research Report 9012, Department of Economics, University of Western Ontario, 1990; Harley, "British Industrialization Before 1841: Evidence of Slower Growth During the Industrial Revolution," *Journal of Economic History*, 42, 2 (June, 1982), pp. 267–85; Peter Lindert and Jeffrey Williamson, "Revising England's Social Tables 1688–1812," *Explorations in Economic History*, 19 (1982), p. 390; and Williamson, "Debating the British Industrial Revolution," *Explorations in Economic History*, 24 (1987), pp. 269–92. For an excellent survey that is mildly skeptical of revisionism, see Pat Hudson, *The Industrial Revolution* (London, 1992); and Patrick O'Brien, "Introduction: Modern Conceptions of the Industrial Revolution," in Patrick O'Brien and Roland Quinault (eds.), *The Industrial Revolution and British Society* (Cambridge, 1993), pp. 1–30.

growth were integrally configured in its architecture. Local studies of long-term economic change have demonstrated the dynamism of this system and its capacity for accommodating a wide range of organizational forms.<sup>5</sup> The small-scale and often domestic basis of industrial production was as capable of change, expansion and contraction as were its descendants in the twentieth century. It was a system of mass production by means other than those of factory industry. The main agency of change in this economic system lay in the *intensification* of preexisting forms already well established by the early eighteenth century.

But merely to reverse the focus of historical explanation from heavy industry to the traditional workshop only begins to describe how the British economy may be understood in its historical context. Many historians remain reluctant to abandon the concept of an “industrial revolution.” This reticence is perfectly logical. Whatever conception is used to frame the economic history in the period must have a way of explaining change.<sup>6</sup> The econometric case for continuity in economic growth rests upon aggregate statistics and macroeconomic trends, and necessarily ignores, therefore, the regional and local levels. Yet it was in the regions that the locus of transformation was situated and experienced. Manchester moved from sleepy market town to pulsating industrial center from 1720 to 1800 even if the country as a whole did not. Still, the question is not which category – change or continuity – can present the most “facts” for our inspection. The question is how we position our understanding of the process of this change. It is not enough to point to continuity in the economic structures and leave it at that. To reject the notion of a transformative caesura around a fifty-year period is not to deny the fact of economic growth.<sup>7</sup>

<sup>5</sup> As Charles Sabel and Jonathan Zeitlin have pointed out, this form of industrial production provides a historical alternative to Fordist-style production which can also be found in twentieth-century economies. The difference between that situation and what I am describing is its centrality to the system of production. See Sabel and Zeitlin, “Historical Alternatives to Mass Production,” *Past and Present*, 108 (1985), pp. 133–76; David Rollison, *The Local Origins of Modern Society: Gloucestershire 1500–1800* (London, 1992), pp. 32–34.

<sup>6</sup> There is no denying that a remarkable series of transformations marked the period of the eighteenth and nineteenth centuries as a whole. This fact is the reason why someone like McCloskey believes it is necessary to continue to search for explanation of the “industrial revolution.” See, for example, Donald McCloskey, “The Industrial Revolution 1780–1860: A Survey,” in McCloskey and Roderick Floud, *The Economic History of Britain Since 1750* (Cambridge, 1980), vol. I, pp. 108–23.

<sup>7</sup> For the response to the revisionist scholarship around the industrial revolution, see Joel Mokyr (ed.), *The British Industrial Revolution: An Economic Perspective* (Boulder, 1993); Maxine Berg and Patricia Hudson, “Rehabilitating the Industrial Revolution,” *Economic History Review*, 45, 1 (February 1992), pp. 24–50; Berg, “What Difference Did Women’s Work Make to the Industrial Revolution?,” *History Workshop Journal*, 35 (Spring 1993),

Cycles of acceleration and deceleration were well established by the middle of the eighteenth century. A slowdown in the 1740s was followed by periods of growth from the 1750s and then again from the 1780s.<sup>8</sup> The pace of economic growth quickened in the late eighteenth century. This wave of growth, dating from the 1780s, continued a preexisting pattern that customarily secured great productivity gains using conventional methods of labor and resource utilization. Undoubtedly, this was a more rapid spurt of growth than previous ones. Economic historians are much divided as to exactly when it began, how rapid it was and what its effects were on the distribution of wealth.<sup>9</sup> One of its highlights was to intensify some of the innovations of the previous hundred years, such as the steam engine modified by James Watt, and the factory. Shifting our angle of vision to slow the speed, soften the impact and qualify the distinctiveness of this particular phase of economic growth provides a perspective that better fits the different elements of the economic history of modern Britain. Attempts to attach the quality of modern industry to any portion of the years between 1680 and 1880 deflect our gaze from those features of the economy that are central to understanding its dynamic. Identifying those elements and describing their character is the central purpose of the remainder of this chapter.

I shall use three routes into my discussion of the economy of manufacture. The first and broadest avenue of approach is to explain how the factors of production were dynamically configured in the economy of manufacturing. In this respect, the following aspects will be discussed: how land and agriculture continued to set the foundational limits to the conception and reality of domestic growth; how innovation and technological change were embedded in the context of slow growth; how the expansion of the domestic market was limited by the pattern of demographic regime and the class basis for consumption; and, finally, how the relationship was configured between the dominant technically primitive and small-scale sector and the sophisticated and large-scale sectors. Secondly, attention will be drawn to the central role the women's labor market occupied in this system, and the way it was increasingly con-

pp. 22–44; and Javier Cuenca Esteban, "British Textile Prices 1770–1831," *Economic History Review*, 47, 1 (February 1994), pp. 66–105, which, using textile prices, argues for a restoration of the estimates of Phyllis Deane and W. A. Cole in *British Economic Growth 1688–1959* (Cambridge, 1962) against those of Crafts.

<sup>8</sup> Anthony J. Little, *Deceleration in the Eighteenth-Century British Economy* (London, 1976).

<sup>9</sup> For a survey of these issues, see R. V. Jackson, "Rates of Industrial Growth During the Industrial Revolution," *Economic History Review*, 45, 1 (1992), pp. 1–23; Joel Mokyr, "Is There Still Life in the Pessimist Case?: Consumption During the Industrial Revolution 1790–1850," *Journal of Economic History*, 47, 1 (March 1988), pp. 69–92.

strained by the state. And, thirdly, I shall discuss the ways in which regionalism shaped and defined the economy of manufacture.

### **The dynamics of manufacturing**

The economy of manufacture was a terrain of dynamic change that was contained within boundaries of ever visible constraints. The origins of the economy of manufacture lay in the opening years of Elizabeth I's reign. Certainly by the middle of the seventeenth century what Charles Wilson called a "production economy" had emerged. The key feature of this economy was that it afforded society the means to escape from the demographic catastrophes of starvation or population decline. A series of continuous improvements had revolutionized English agriculture from the middle of the sixteenth century to lift the shadow of general subsistence crisis. Few people starved in Tudor England. Yet this did not mean an end to crises and uncertainty. Local emergencies replaced cataclysmic failures. Harvest failures could have quite devastating local consequences among the young and the elderly. Bad harvests led to falling birth rates and opened the way for the increased virulence of disease. A succession of bad harvests occasionally coincided with plague epidemics (which were conspicuously absent in the middle of the sixteenth century) to create widespread crisis. Only the economic collapse of the late 1590s came close to marking a return of the classic subsistence crisis. Yet even that time of dearth was not enough to trigger an emergency of Malthusian proportions and to throw into reverse the generally upward trend of population growth.<sup>10</sup>

A series of dichotomies permeated the manufacturing economy. The certainty of survival was increasingly assumed. Thus, innovation and expansion were natural qualities. Yet the problematic of subsistence had not been forgotten and the sense that there were limits to economic growth was a central fact of economic consciousness. In particular, of course, manufacture was bounded by agriculture and cultivation. As Adam Smith pointed out, it was from the land that the manufacturing sector derived both its raw materials and its sustenance. The economics of land exploitation, therefore, determined the extent to which manufacture could advance. The economy remained, in E. A. Wrigley's words, an "advanced organic economy" rather than the "mineral-energy based" economy of an industrial system. Land and its resources composed the

<sup>10</sup> See Rollison, *Local Origins of Modern Society*, pp. 1–18, for the long-term origins of this economy; Charles Wilson, *England's Apprenticeship*, pp. 236–37, 378; Eric Kerridge, *The Agricultural Revolution* (New York, 1968), esp. pp. 15–40, 326–48; Joyce Youings, *Sixteenth-Century England* (Harmondsworth, 1984), pp. 148–49, 151–53.

ultimate limits to change. These limits were never approached, let alone reached, of course, yet the awareness of their presence conditioned all economic discussion and action.<sup>11</sup>

It was dichotomies such as this that provided the inherent tension within the system of manufacture between constraint and change. On the one hand, the system was capable of considerable gains. It was, after all, within these constraints that the transformation occurred from an economy based on the land to one based on the resources of minerals. On the other hand, such gains were achieved through a long and (relatively) slow pedigree of change. "The date at which the new regime [of a mineral-based energy economy] began to make a substantial general impact on English economic life was later than many accounts of the industrial revolution would suggest, and . . . the advanced organic economy remained the mainstay of economic life until well into the nineteenth-century."<sup>12</sup> Two centuries elapsed, from the middle of the seventeenth to the early to middle years of the nineteenth, before this shift was effected.

Historians have found in this period the origins of the era of exponential growth. Yet it is important to reflect that none of the political economists of the day possessed that understanding. Neither Adam Smith, Robert Malthus nor David Ricardo spotted the transition to a new level of economic growth. This is not to say, of course, that they failed to recognize the facts of economic expansion. The perception that economic growth was altering the dynamic of society itself was a constant fact of economic thought, and reached a level of frenetic intensity in the early nineteenth century. It was a major purpose of Adam Smith to understand how the substantial gains in output had been achieved since Tudor times. The importance of securing increased productivity, and the various devices to reach this end were commonplace concerns of economic commentators. Yet neither Smith nor Parson Malthus – to take two particularly pertinent examples – believed themselves to be the cusp generation of economic revolution.

Classical political economy was well named the dismal science. It was inherently pessimistic about the economic process. The essential focus of political economy settled on the constraints to continued expansion. There was little optimism that economic growth contained the key to a better life for all in society – which is the basis of a modern economic culture. Indeed, any economic advance was qualified by the expectation of economic theory that the constraints on growth would soon be

<sup>11</sup> E. A. Wrigley, *Continuity, Chance and Change: The Character of the Industrial Revolution in England* (Cambridge, 1988), pp. 50, 80; see chs. 2 and 3 for the meaning of advanced organic economy and mineral-energy-based economy.

<sup>12</sup> *Ibid.*, pp. 68–82 (quote, p. 82).

reached and a cycle of decline and deprivation would reassert itself. The duty of economic science was constantly to remind society of these limits and to identify the warning signs of their appearance. For Malthus, Mill and Ricardo the stationary state economy was the natural model for understanding economic processes, however delayed was the arrival at those ultimate boundaries. It was not until the 1860s that political economists began to realize that the era of exponential growth might have dawned. As late as the 1870s basic textbooks of political economy were still operating on the assumption that available land was the ultimate arbiter of growth.<sup>13</sup>

This view of the economic world mirrored the boundedness of the economy of manufacture. Growth remained firmly within the bounds of a dynamic that was familiar and traditional. Thus, the constraint of a finite amount of usable land remained a fundamental economic preoccupation in the period, yet agriculture remained the most important site of innovation until the early nineteenth century. By the 1740s over half the laboring population had been shifted from agriculture into at least some working relationship to the manufacturing sector. This release of labor from agriculture occurred earlier than the other European countries, but it was no faster.

Agriculture yielded up the necessary labor supply for manufacturing reluctantly, partially and in a protracted manner. It took over a century for manufacturing employment to outweigh agricultural occupations in the labor market. In 1688 the percentage split of the labor force between agriculture and industry was about 60–40. This proportion was not reversed until around 1800, and even afterwards agriculture remained the largest single sector of employment until 1851. The early movement of labor from agriculture into production neither broke the tie between manufacture and land nor diminished the importance of agriculture to the economy and the political economy. The interpenetrations between agriculture and manufacturing remained close and complicated well into the nineteenth century. Factories continued to be established in the countryside in the 1850s, and domestically based proto-industry – straw plaiting and lace and nail making, for example –

<sup>13</sup> Wrigley, “The Classical Political Economists and the Industrial Revolution,” in his *People, Cities and Wealth: The Transformation of Traditional Society* (Oxford, 1987), pp. 21–45; John Stuart Mill, *Principles of Political Economy* (London, 1848), vol. I, pp. 211–25. Historians have not sufficiently grasped the implications of the way that classical political economy worked within an understanding of the constraints on growth. These were not economic theorists of an age that conceived of limitless economic advances that were characteristic of economic modernism. They worked within assumptions that were commonplace to the eighteenth century. Thus, Malthus, writing at the time of the “industrial revolution,” is entirely concerned about the natural limits to growth.

continued to demonstrate the connection well into the later nineteenth century.<sup>14</sup>

The same combination of growth and constraint ran through the manufacturing sector. Well before 1680 the expansion of industries like coal, salt, shipbuilding and glass had been stimulated by the massive property transfers of the Reformation, changes in property law and shifts in consumer demand. This phase of economic growth was of the same order as that of the later eighteenth century; they were part of the same pattern. Both were placed in a context of gradualism and continuity and both possessed similar markers of development. In the early seventeenth century, for example, coal occupied the place that cotton was later to assume as a leading industry. Indeed, if the rudimentary statistics from the period have any value, they demonstrate a rate of expansion in the coal industry comparable to that of the nineteenth century.<sup>15</sup>

At the turn of the eighteenth century, Britain was already producing between two and a half and three million tons of coal. This was *five times* the production of the rest of the world. By this measure, Britain's economic weight had sharply diminished by 1840 when it produced only two-thirds more tonnage than the rest of the world. The availability of coal encouraged significant changes in other industries in exactly the same knock-on pattern that underlay the expansion of the early Victorian iron and textile industries. In the copper, tin and lead mines of the South West of England, for example, the accessibility of energy sources altered smelting techniques to make this area a hive of heavy industrial activity and technological innovation. Indeed, it was from this inventive culture that the principle of steam condensation was first applied by Savery and Newcomen in the 1680s and which Watt was to improve greatly in the 1760s.<sup>16</sup>

<sup>14</sup> Wrigley, *Continuity, Chance and Change*, chs. 2, 3; Michael Turner, "Enclosures in Britain 1750–1830," in L. A. Clarkson (ed.), *The Industrial Revolution: A Compendium* (Atlantic Highlands, NJ, 1990), pp. 218, 236–37; Michael Turner, "Agricultural Productivity in England in the Eighteenth Century: Evidence from Crop Yields," *Economic History Review*, 35, 4 (November 1982), pp. 489–510; Crafts, *British Economic Growth*, pp. 12–14, 54, 66; Hudson, *Industrial Revolution*, pp. 80–81; Ivy Pinchbeck, *Women Workers and the Industrial Revolution 1750–1850* (London, 1981), pp. 202–26.

<sup>15</sup> It is important to note that the claims of J. U. Nef about the expansion of the coal industry in this earlier period have tended to be confirmed by subsequent research: Nef, *The Rise of the British Coal Industry* (London, 1932), vol. I, pp. 123–26, 133–64, 176–79; John Hatcher, *The History of the British Coal Industry* (Oxford, 1993), vol. I, pp. 8–10, 547–56. Nef's claim that this was an industrial revolution of equal significance to that of the eighteenth century was, however, an unnecessary and diversionary claim. See Coleman, *Myth, History and the Industrial Revolution*, pp. 55–58, for the reservations regarding Nef's claim for an industrial revolution of the sixteenth century.

<sup>16</sup> Wrigley, *Continuity, Chance and Change*, p. 54; David Levine and Keith Wrightson, *The Making of an Industrial Society: Whickham 1560–1765* (Oxford, 1991), pp. 2–4, and ch. 2.

The elements that composed the “industrial revolution” of the late eighteenth century were embedded in this earlier period, and not disjunctive to it. The much celebrated increase in patents issued at the end of the eighteenth century can be matched by the 100 percent increase in the final two decades of the seventeenth century. New industries, like calico cloth printing, emerged just as they were to do in the late eighteenth century and early nineteenth century. Older industries were changed by the fusion of new technology and large-scale organization. The shift of brewing from a household to an industrial enterprise was, of course, a classic example of “industrial” development before industrialization. Soap boiling, glass making and the salt industry were similar examples of industries where specialization and concentration into large units were the basis for immense output. In these industries the rate of progress matched anything that was to be achieved during more celebrated periods of economic growth. Throughout the course of the sixteenth century, for example, the output of the salt industry in the North East increased from 300,000 bushels to over one million bushels. Similar examples could be easily multiplied. Factories with complicated divisions of labor were common by the 1730s in industries like silk production and calico printing. Some employed over 150 workers and others belonged to conglomerates of outworking establishments owned by one master.<sup>17</sup>

The rhythm of economic growth in the age of manufacture moved by spasmodic lurches within an overall pattern of gently protracted upward advance. Although per capita income growth jumped significantly in the first two-thirds of the nineteenth century, for example, it had been at a relatively high level compared to other European countries since 1700. Britain’s per capita income in 1700 was the same as Sweden’s in 1870, for example. Yet it took Britain one hundred years to move to the level that, in the late nineteenth century, Sweden and other countries could achieve in twenty years. Even without the mechanized sector, national annual income per head would have doubled between 1780 and 1860 from £11 to £22; the technologically advanced sector added only another £6 to this total. Domestic rates of capital accumulation were typically quite low. As a percentage of gross domestic product, fixed capital had reached 10 percent by 1800 and remained there until the 1850s. Growth in real output did not reach 3 percent (the level reckoned

<sup>17</sup> Charles Wilson, *England’s Apprenticeship*, pp. 83, 187, 195–96, 198, 202–05; Nef, *Rise of the British Coal Industry*, vol. I, pp. 174–84; J. Parakunnel Thomas, “The Beginnings of Calico-Printing in England,” *English Historical Review*, 39 (1924), pp. 213–14; Christian Simon, “Labour Relations at Manufactures in the Eighteenth Century: The Calico Printers in Europe,” *International Review of Social History*, 39, suppl. 2 (1994), pp. 115–44.

to mark an industrializing economy) until the 1830s, about the same time as Belgium.<sup>18</sup>

Productivity growth – a key economic index – demonstrates the unity of the eighteenth and nineteenth centuries.<sup>19</sup> No significant difference distinguished the two centuries in total factor productivity growth, with the partial exception of the middle of the nineteenth century. There was no decisive upward shift in the rate of total factor productivity, although individual sectors provided clear exceptions to this rule. Yet this had always been true. At no time during the industrial revolution did Britain attain 1.5 percent productivity growth per year, and the nineteenth century as a whole continued to be characterized by low growth rates. Even during the “great Victorian boom” of the midcentury (when growth rates were higher than ever before), the pattern of growth was highly variable and contained many indicators of ossification and early senescence. The point is that this pattern was extended and enlarged during the late eighteenth century and early nineteenth century; its basic designs were not fundamentally altered.<sup>20</sup>

These figures suggest another constraint upon the economic dynamism of this period: productivity gains were sought through the more extensive

<sup>18</sup> Crafts, *British Economic Growth*, pp. 46–48, 61, 66, 87, 160.

<sup>19</sup> This raises the whole question of Britain’s comparative international economic performance and the explanations for it. The various explanations for low growth rates in twentieth-century Britain are of variable quality. The argument about the destructive impact of the world wars has more to recommend it than the suggestion that Britain somehow “lost” the “industrial spirit” that had produced the innovations of the industrial revolution. As early as the 1840s Palmerston was being warned that the Germans were in front of Britain in design, metal working and chemicals. By the 1850s British watchmaking was exhibiting all the signs of “entrepreneurial failure” that was to obsess observers forty years later. Britain’s productivity rate has always been at variance from that of other nations. As early as the middle of the nineteenth century, productivity rates in the United States were twice that of Britain. Long-term differentials in productivity are a function of the different histories of manufacturing structures and resource constraints. The pattern that Britain revealed in the late nineteenth and twentieth centuries was a product of the period of this book. Yet it is important to point out that economic “failure” was not predetermined by this history. See Clapham, *Economic History of Modern Britain*, vol. II, p. 111; Alun Davies, “British Watchmaking and the American System,” *Business History*, 35, 1 (1993), pp. 40–54; S. N. Broadberry, *The Productivity Race: British Manufacturing in International Perspective, 1850–1990* (Cambridge, 1997), chs. 5, 10; Corelli Barnett, *The Audit of War* (London, 1988); Martin Weiner, *English Culture and the Decline of the Industrial Spirit 1850–1980* (Cambridge, 1981).

<sup>20</sup> P. L. Payne, “British Entrepreneurship in the Nineteenth Century,” in Clarkson, *The Industrial Revolution*, p. 101; McCloskey, “The Industrial Revolution 1780–1860,” p. 116; Hudson, *Industrial Revolution*, p. 25. See C. H. Lee, *The British Economy Since 1700: A Macroeconomic Perspective* (Cambridge, 1986), pp. 10, 12, for tables registering the contribution of various sectors to the growth of gross domestic product. See also R. A. Church, *The Great Victorian Boom 1850–1873* (London, 1975); Esteban, “British Textile Prices.”

use of labor rather than through harnessing the technology of the machine. This reflected an economic practice that was embedded in the economic structures and in cultural attitudes. It was a practice inherited by Britain's nineteenth-century economy, with significant consequences for that in the twentieth. The transfer of labor from agriculture to manufacturing at an early historical stage was a significant achievement for Britain. Yet this did not imply an ability or desire to capture high rates of productivity from the industrial labor force.

Productivity gains remained firmly tied to innovations in which muscle power counted for more than technological efficiencies. This was true, most revealingly, in the massive textile industry. The rapid expansion of output and varieties of cloth production in the middle of the seventeenth century was facilitated by extending the use of labor on the hand-driven Dutch loom and stocking frame. In the late nineteenth century, low-cost and experienced labor allowed Britain to meet competitive pressures by moving to the cheaper cloth markets without the expense of adopting new technology. Until about 1860, 50 percent of all productivity growth came from the unmechanized sectors of the economy. The building industry's contribution to total net capital formation, for example, continued to surpass the contribution from factory textiles until the 1860s. Over the same period the traditional, nonmechanized sector of the economy grew at a faster rate than either the high-tech iron industry or the well-organized woolen industry.<sup>21</sup>

Manufacture was not a factory-based activity. The factory sector was a presence throughout the eighteenth century and it became more important as the nineteenth century progressed. This was especially true in specific sectors like cotton spinning. But factories remained a relatively uncommon site of employment. In 1831, only 10 percent of males worked in machine-based manufacture, 32 percent in handicraft and retail. As late as 1851, only 27 percent of the male and female labor force worked in industries that were dominated by technology and factory organization. This was an economy which produced goods using labor rather than labor-saving technology; it was to prove very difficult to break free from that legacy.<sup>22</sup>

<sup>21</sup> Similarly, productivity increases were achieved by increasing the division of labor on the model of Adam Smith's famous pin-factory example, rather than by adding to the technology at each worker's elbow. See Maxine Berg, "Small Producer Capitalism in Eighteenth-Century England," *Business History*, 35, 1 (1993), pp. 17–39; Berg, "What Difference," p. 27.

<sup>22</sup> There was enormous variation of factory size even within the same sector. In the 1830s the woolen mills employed an average of 43 workers; it was 93 in linens, 125 in silk and 175 in cotton. See Berg, "Small Producer Capitalism," p. 23; Crafts, *British Economic Growth*, pp. 63–68, 155–56; Joel Mokyr, "Introduction," in Mokyr, *British Industrial Revolution*, p. 15; Charles Wilson, *England's Apprenticeship*, pp. 184–95.

Steam power and machinery were widely applied during this period. Yet their engagement was determined by their relevance to manual labor – another example of how the pulses of change were checked. Mechanical processes were understood to be subordinate to the needs of hand labor; they were not generally intended to revolutionize it. The manufacturing phase in the history of steam power opened in the 1690s when the Savery patent opened its use for mechanical uses. This stage closed when Charles Parson successfully developed the steam turbine in 1884. The turbine ended the dominance of the reciprocating mechanism that had hitherto provided the central driving force of all steam engines. It made obsolete the technology that James Watt had adapted from Newcomen in the 1760s.<sup>23</sup>

In the meantime, many modifications had been made to steam technology. Yet its energies were harnessed as an ancillary source of motion for a fairly narrow range of uses. As late as 1800, the steam engine was principally employed to fulfill its original purpose of pumping water from the mines. Fifty percent of all steam engines were used in the mines; only 21 percent were used in textiles. Most of the latter were secondary to water power, which into the 1840s and 1850s continued to be a cheaper source of energy than steam power. Steam did not become the prime energy source for manufacturing until the 1870s. Machines in the early factories were often driven by hand or horses; it was the exception that required steam power. Furthermore, the use of steam power in factories was restricted largely to the textile industry. As late as the 1870s textiles used one-half of all the steam power engaged in British manufacturing. Even in textiles the application of steam power varied greatly, both sectorally and geographically.<sup>24</sup>

Like all other mechanical inventions, steam-driven machinery remained a novelty much longer than was theoretically necessary. The lag time between invention and adoption is a product of forces wider than technology alone. Steam was adopted in the framework knitting trade only from the 1860s. In both the advanced and dynamic Yorkshire and the sleepy, more restrained West Country woolen cloth industry, machines of all sorts did not begin to penetrate until the 1830s and 1840s. For

<sup>23</sup> The turbine was still a *steam*-driven engine, of course. It opened a new era primarily because it enabled machines to be driven by electricity rather than by pulleys, belts and drive axles. See A. Stower, "The Stationary Steam Engine 1830–1890," in Charles Singer et al., *A History of Technology*, vol. V, *The Late Nineteenth Century, c. 1850 to c. 1900* (Oxford, 1958), pp. 124–26, 138–40.

<sup>24</sup> G. M. von Tunzelman, *Steam Power and British Industrialisation to 1860* (Oxford, 1978), pp. 289–95; Dolores Greenberg, "Power Patterns of the Industrial Revolution: An Anglo-American Comparison," *American Historical Review*, December 1982, pp. 1237–61; Phyllis Deane, *The First Industrial Revolution* (Cambridge, 1969), pp. 128–29.

twenty-five years after Edmund Cartwright had developed the power loom, they were introduced at the rate of fewer than 100 per year. (It is fair to note, however, that the water frame and the spinning jenny spread much more quickly.)<sup>25</sup>

Thus steam power was integrated in British industry through a prolonged and lengthy accretion rather than a sudden transformation. Ironically, the progress of steam power was somewhat more rapid in agriculture, although it got a much later start. In the 1860s only about 200,000 acres of the fifteen million acres of arable land in England were ploughed by the steam plough. This decade marked the moment of breakthrough to a mechanized agriculture, however. Artificial fertilizers had begun to be developed by the 1830s; by the 1860s Peruvian guano was a well-established aid to soil fertility. At the end of Victoria's reign, English agriculture was the most highly mechanized in Europe.<sup>26</sup>

What was true on land was even more true on the seas. The tea clippers remained the fastest ships in the world until the 1870s. The tonnage of ships powered by steam surpassed those driven by wind and sail only in 1882. The steam engine and the sail represented the technological duality of the age of manufacture with its uneasy blend of old and new, change and constraint. By the 1870s the limits of this combination were in sight. The compounding steam engine developed by Watt and subsequently improved by marine engineers had arrived at the boundaries of its technological and economic potential. The use of sail for many marine purposes was finally doomed by the quantum leap of the turbine, although steam did not become more cost-effective than sail for voyages over 5,000 miles until almost the twentieth century. The steam turbine was an emblem of the age of industry. Unambiguously technological, the turbine was autonomous of hand labor and superordinate to it.<sup>27</sup>

The dynamism of the manufacturing economy was fueled by a high level of internal consumer demand. Indeed, it is possible to speak of eighteenth-century Britain as a "consumer society." Consumer markets depend on a growing population ready and able to spend money. Britain possessed both qualities. Yet there was a particular pattern of population growth that was peculiar to this period of Britain's history. The demo-

<sup>25</sup> Duncan Blythell, *The Sweated Trades: Outworking in Nineteenth-Century Britain* (London, 1978), pp. 88–90; J. de L. Mann, *The Cloth Industry in the West of England From 1640 to 1880* (repr., Gloucester, 1987), pp. 187–88.

<sup>26</sup> Hugh Prince, "Victorian Rural Landscapes," in G. E. Mingay (ed.), *The Victorian Countryside* (London, 1981), vol. I, p. 18.

<sup>27</sup> Charles K. Harley, "The Shift from Sailing Ships to Steamships, 1850–1890: A Study in Technological Change and Its Diffusion," in Donald McCloskey (ed.), *Essays on a Mature Economy: Britain After 1840* (Princeton, 1971), pp. 215–31; Clapham, *Economic History of Modern Britain*, vol. II, pp. 61–72, vol. III (Cambridge, 1938), pp. 133–34.

graphic regime of the age of manufacture balanced a capacity for growth within definite limits and expectations. Three elements were central to the demographic regime of this period: its evident escape from the mortality trap that linked population growth to food prices; the constraint of the "preventive check" that inhibited a breakthrough to a thoroughly "modern" demographic system; and the gestation of a new pattern of nuptiality from the middle of the nineteenth century that only came to term from the 1870s.

By 1690 Britain had moved well beyond the "pre-industrial" demographic trap that linked mortality to food prices. Indeed, with the benefit of hindsight we can see that the decisive escape from the determination of population by harvests had begun as early as the 1590s. Yet this was a slow and tentative process. Thus, the 1690s registered a favorable shift in the ratio of births to deaths that broke the previous tendency toward a static balance between the two. Still, the new pattern remained fragile. The birth rate fell and the death rate rose during certain years in each decade until the 1730s when the full demographic potential of the deliverance from a subsistence regime began to be realized. After the late 1740s, births begin to outpace deaths consistently. The escape to a demographic world free from natural calamities had been achieved.

There was little perception at the time that this was so, however, and this demographic regime can in no way be considered "modern." It was a regime that went through several modifications, especially around the end of the eighteenth and beginning of the nineteenth centuries. Well into the nineteenth century the "preventive check" remained a powerful and real constraint on the demographic growth. Mortality was no longer linked to natural disasters. Nevertheless, the age and rate of marriage and therefore the rate of fertility continued to be constrained by fluctuations of real income and expectations of economic opportunities. This was not altered even during the economic expansion of the later eighteenth and early nineteenth century, when the Malthusian model of linking family size to changing food prices or real wages was first formulated.

Economic expansion was by no means neutral to population patterns, of course. The eighteenth-century expansion had strengthened the "positive feedbacks" in the demographic regime by allowing rising population to be compatible with falling food prices. The spurt of expansion in the late eighteenth century was critical to this process. This undermined Malthusianism, yet it did so only in theory and in retrospect. It took quite some time for this lesson to permeate into popular consciousness and thus decisively change behavior. Marriage rates continued to be highly sensitive to real wages in the expectation that falling real wages presaged a decisive downturn in living standards and a collapse of expansion. This

was a lesson well learnt from population theory, in which the possibility was discounted that populations could continue to grow in conjunction with economic expansion. At the national level the demographic dynamic of the early and mid-Victorian years suggested a basic continuity with the past. National evidence indicates relatively little movement in fertility rates until the onset of a modern demographic regime was heralded by their dramatic decline after the 1870s.<sup>28</sup>

The possibility of self-sustaining economic expansion was only just beginning to be glimpsed in this period. There was nothing irrational about behaving as if Malthus lived when the major script of economic discourse still broadcast the stationary economy as the natural state of affairs. If John Stuart Mill continued to regard the available land as the ultimate limit to economic growth, how can we expect lesser mortals to have displayed greater insight about the dynamics of economic change? Not until the 1870s was the Malthusian link finally abandoned in general behavior and perception. Like other significant changes in this period, the transition from a pre-industrial to a modern demographic regime was prolonged; it did not happen until the end of our period. Only by 1870, when “the classic pre-industrial system [was] on the point of disintegration,” does the link between real wages and nuptiality snap, and family size is finally divorced from the prospects of demographic survival.<sup>29</sup>

<sup>28</sup> National demographic statistics gathered from parish records will not produce a model of population growth that can be replicated at the local level. Local evidence does not undercut the picture presented here, but it does suggest the importance of local modifications. Evidence from Kent suggests a sharp response to the installation of the new poor law after 1834 with an almost immediate decline in fertility in the following decade. This indicates that social policy achieved some success in its intention to limit family size and it reveals the sensitivity of local society to changing socioeconomic circumstance. See, for example, Barry Reay, *Microhistories: Demography, Society and Culture in Rural England, 1800–1930* (Cambridge, 1996), pp. 39–67.

FNNPTXDemographic possibilities were also altered by changes in the deployment of labor and the form of wage payment. In the rural areas the decline of farm servants living in the farmer's house began in the middle of the eighteenth century and extended well into the second third of the nineteenth century. As living-in declined, so the possibilities for nuptiality changed, since the pressure to delay the age of marriage disappeared. This applied especially to men. At the same time, however, the tendency of enclosure to diminish the opportunities for female employment pushed women also to contemplate earlier marriage. Similarly, the increased importance of urban living tended to undermine the presumptions of the old demographic regime. Urban dwelling made irrelevant the prudential check of delaying marriage and family until the resource of land or small holding was available. The expansion of waged labor therefore worked to lower the age of marriage. See Hudson, *Industrial Revolution*, pp. 136–40; Martin Daunt, *Progress and Poverty: An Economic and Social History of Britain 1700–1850* (Oxford, 1995), pp. 387–401; Geoffrey Holmes, *The Making of a Great Power* (London, 1993), pp. 44–48; K. D. M. Snell, *Annals of the Labouring Poor: Social Change and Agrarian England 1660–1900* (Cambridge, 1985), pp. 210–11, 345–48.

<sup>29</sup> Michael Teitelbaum, *The British Fertility Decline* (Princeton, 1984), pp. 220–25; E. A. Wrigley and R. S. Schofield, *The Population History of England 1541–1871* (London,

An expanding population was a basic foundation for the exponential growth of the internal consumer market in the eighteenth century. The value of the home market tripled in the first seventy years of the century, and tripled again in the final thirty. The origins of this particular stage of consumer markets appeared first in the late seventeenth century. Retail shops had first appeared at the end of the sixteenth century, yet there was a significant departure in the size and sophistication of the consumer market structures at the end of the seventeenth century. In the urban areas, networks of retail shops joined the system of chapmen, peddlers and markets (still the most common source of consumer items) to serve consumer needs. Retail tailoring shops were well established in London by the 1680s, for example. The increasing complexity and sophistication of the consumer markets were reflected in the dramatic increase from the 1670s in the inventories of household goods. Items that had not been present in households before, such as clocks, china, curtains, prints and utensils for drinking hot liquids, began to appear in large numbers.<sup>30</sup>

The consumer market was driven by the demands of the burgeoning middle classes. Aristocratic patrons remained very important to certain trades, particularly in London, but consumer markets were no longer responsive solely to the demands of this social segment. A mass market for middle-class consumer durable goods clearly existed by the middle of the eighteenth century. This reflected the sharp increase from the first half of the century in the numbers of households with incomes between £50 and £400 per year. In 1750 such households constituted 15 percent of the population; by 1780 they had grown to 25 percent of the population. In addition, there was a reorientation of middling-class consumption away from necessities, like kitchenware, for example, and furniture, toward a whole new range of "luxury" goods that were designed to enhance domestic comfort. East India calicoes were an early example of a product to attract this sort of attention. Clocks were an-

1981), pp. 458–78; Wrigley, "The Growth of Population in Eighteenth-Century England: A Conundrum Resolved," *Past and Present*, 98 (May 1983), pp. 143–50. The findings of this earlier work by the Cambridge group has been confirmed by their recent work on family reconstitution. See E. A. Wrigley, R. S. Davies, J. E. Oeppen and R. S. Schofield, *English Population History from Family Reconstitution 1580–1837* (Cambridge, 1997).

<sup>30</sup> McKendrick et al., *Birth of a Consumer Society*, pp. 9–10, 28–29; Lorna Weatherill, *Consumer Behaviour and Material Culture in Britain 1660–1760* (London, 1988), pp. 24–28, 77, 195–98; T. H. Breen, "An Empire of Goods: The Anglicization of Colonial America, 1690–1776," *Journal of British Studies*, 25 (1986), pp. 467–99; John E. Wills, Jr., "European Consumption and Asian Production in the Seventeenth and Eighteenth Centuries," in Brewer and Porter, *Consumption and the World of Goods*, pp. 131–47, for the international dimensions; Peter Earle, *The Making of the English Middle Class* (London, 1989), p. 45.

other, as technical advances enabled them to be produced in greater numbers.<sup>31</sup>

This was a consumer economy, but it was not a *mass* consumption economy. The consumer market did not embrace the working classes. The economic stimulant of demand derived almost entirely from the body of the middling classes, and the limits to the territory claimed by the consumer market were sharply defined at the boundary between the middling and working classes. Yet this did not mean that opportunities to dabble in the consumer economy were denied to the working classes; they were not. There are reports in the late seventeenth century of working-class consumption of minor luxuries like shoe buckles and ribbons. Such items were undoubtedly purchased as fluctuations in income allowed. Working-class consumption of household items was also a feature of the period. Yet the main class distinctions regarding consumer purchases must have lain – as they always have – in the amounts and types of goods that were owned. Until the middle of the nineteenth century, working-class consumption of “luxuries” like tobacco, tea and coffee remained at a fairly low level. This is hardly surprising. Working-class budgets contained no margin for expenditures beyond rent and food.

This did not change until after the 1870s. Class was a key factor in a series of changes that enter into play in the last quarter of the nineteenth century. Class was not the only element, however. Advertising strategies begin to segment consumer markets by gender, for example. Still, the important point is that working-class men and women were identified as potential consumers for goods other than household necessities or the noxious luxuries of drink and tobacco. Only after c. 1870 is it possible to speak of a working-class consumption market that paralleled the middling class’s ability to purchase nonessential goods. Items such as the sewing machine, the bicycle and the piano were the markers of this (mainly upper) working-class consumer market which served as the scouting party for the truly mass consumerism of the twentieth century.<sup>32</sup>

Such a market could not have been imagined within the demographic regime of the age of manufacture. A mass consumption market could not be installed until reproductive behavior ceased to be constrained by the fear of the Malthusian trap. The manufacturing economy was certainly capable of producing relatively simple goods for a world market through its myriad of workshops. But it was not equipped to produce the typical

<sup>31</sup> John Styles, “Manufacturing, Consumption and Design in Eighteenth-Century England,” in Brewer and Porter, *Consumption and the World of Goods*, pp. 537–38; Holmes, *Making of a Great Power*, pp. 52–53.

<sup>32</sup> McKendrick et al., *Birth of a Consumer Society*, pp. 23, 29, 31; Daunton, *Progress and Poverty*, pp. 437–39; Mokyr, “Is There Still Life in the Pessimist Case?”; Lori Anne Loeb, *Consuming Angels: Advertising and Victorian Women* (New York, 1994).

products of a mass consumption economy where sophisticated technical devices have to be produced in large numbers. It was hardly a historical coincidence that the shift to a modern demographic regime after 1870 overlapped both with the arrival of a mass consumption market, and the transition from a mode of production dominated by the workshop sector to one that was dominated by the large-scale factory unit.

I have already referred to the way production in the age of manufacture contained both factory and workshop organization. There is a continual tendency among historians to represent these different forms of economic organization as competing alternatives. Thus, there is a tendency to place both in a process of linear development which sees the big progressively moving to displace the small. This is not a helpful perspective for our period. Both the large and small, mechanized and hand-labor sectors were integral to the productive process of the period. It is the functional relationship between the two that is the key to understanding how production was organized in the age of manufacture.

Factory and workshop were locked in a relationship of close interdependence. Mechanization and larger-scale units complemented rather than displaced small-scale production. Many of the machines were ancillary to hand labor, rather than its substitute. But machines were also usually relevant only to one part of the manufacturing process; they tended to have the effect, therefore, of increasing the demand for those parts of the work performed in the domestic setting where hand labor was the sole source of productive energies. When production was concentrated into the factory, it tended to cause an expansion of the domestic sector, not its demise. As early as the 1730s, Birmingham and Sheffield were dotted with workplaces that employed hundreds of people in one place and were surrounded by satellite congeries of small workshops. These cities presented the characteristic profile of production processes, therefore, before the shock cities (like Manchester) of the purely factory towns began to occupy industrial geography from the early nineteenth century. At the heart of manufacturing lay a combination of small and large units of production bound together by many layers of subcontracting with labor processes that were highly subdivided and dominated by hand technology.<sup>33</sup>

<sup>33</sup> Clive Behagg, *Politics and Production in the Early Nineteenth Century* (London, 1990), pp. 40–43; Berg, “Small Producer Capitalism,” p. 23; Eric Hopkins, *Birmingham: The First Manufacturing Town in the World 1760–1840* (London, 1988), p. 10. In Birmingham, for example, Alcock and Kempson’s toy works employed between 300 and 400 people in one place. John Taylor’s button factory gave work to 500 in 1755. And the famous Solo mills built by Matthew Boulton in the early 1770s opened with 700 employees, and within a year later advertised itself as the largest hardware manufactory in the world with 1,000 workers.

The heart of industrial change in the period 1680–1880 was the shifting equilibrium between the small and large sectors of the economy. The significance of the growth of the factory sector of production was that it altered the balance of interdependency between the small and large units in favor of the latter. This process is common to the whole period, and sweeps well into the middle of the nineteenth century – which in fact was likely *the* crucial period for the final subordination of the small-scale units to their larger partners. In textiles the advantage tilted to the large-scale sector in silk in the 1720s, flax in the 1780s, cotton in the 1790s, lace in the 1810s and hosiery in the 1860s. The shoe industry, for example, moved from a proto-industrial form to a factory-industry form in the 1860s and 1870s.

Framework knitting is a particularly well-known example of the manufacturing form of industrial change because of the chronically depressed conditions of the trade in the later eighteenth and early nineteenth centuries. From around the 1680s it assumed the characteristic form of a domestic industry where the frames were rented to the workers by middlemen who controlled the distribution of the raw material and the finished product. A large percentage of the workers were women and children. These features intensified over the period, most notably in the 1830s, and were not finally displaced by mechanization until the 1850s. Even then, the mechanization of knitting followed the pattern familiar to the age of manufacture. The knitting section of the production process was concentrated into centralized factories staffed by men. This created a heightened demand for hand labor to seam and stitch the hosiery; these tasks were performed by women in domestic workshops. The experience of framework knitting was by no means unique. It was an experience that would be replicated many times over during the period.<sup>34</sup>

The story of economic change in this period is a story of a tightening web that drew the small into a greater dependency upon the large. Technology was by no means the only agent in this process; it was not even the major one. Changes in the credit structure, for example, were another common nexus of dependency. Economic downturns pulled the

<sup>34</sup> Berg, “Small Producer Capitalism”; Blythell, *Sweated Trades*, pp. 31–33; Marie Rowland, *Masters and Men in the West Midland Metalware Trade Before the Industrial Revolution* (Manchester, 1975), pp. 150–52; Sonya Rose, “Proto-Industry, Women’s Work, and the Household Economy in the Transition to Industrial Capitalism,” *Journal of Family History*, 13, 2 (1988), pp. 181–93; Nancy Osterud, “Gender Divisions and the Organization of Work in the Leicester Hosiery Industry,” in Angela John (ed.), *Unequal Opportunities: Women’s Employment in England 1800–1918* (Oxford, 1986), pp. 48–49, 63–64; F. A. Wells, *The British Hosiery Trade: Its History and Organization* (London, 1935), esp. chs. 5 and 8; A. F. Moseley, “The Nailmakers,” *Journal of West Midlands Regional Studies*, 2 (1968), p. 6; Alan Fox, *The National Union of Boot and Shoe Operatives 1874–1957* (Oxford, 1958), pp. 12–16.