

2 | *The high-wage economy of pre-industrial Britain*

The working manufacturing people of England eat the fat, and drink the sweet, live better, and fare better, than the working poor of any other nation in Europe; they make better wages of their work, and spend more of the money upon their backs and bellies, than in any other country.

Daniel Defoe, *The Complete English Tradesman*, 1726, Chapter XXII

One of the most distinctive features of the British economy in the eighteenth century was the high level of wages. This finding is unexpected in view of the literature on the standard of living during the Industrial Revolution, much of which emphasizes the poverty of the period. British workers certainly were poor by today's standards; however, the main point of this chapter is that British workers were more prosperous than their counterparts in most of continental Europe and Asia during the eighteenth century. While British workers did not share fully in the economic expansion of the Industrial Revolution,¹ they had already reached a high income position in international terms.

The view that British workers were extremely poor during the Industrial Revolution runs back to the fierce nineteenth-century debates about 'the poor', and, in particular, to the views of the classical economists. Their language is part of the problem, for they usually spoke of wages being at 'subsistence'. The term is loose and misleading. To the modern ear, it suggests that wages were only enough to buy a physiologically minimum diet, rags for clothes and a bit of thatch for

¹ This is the view of Feinstein (1998). It has recently been challenged by Clark (2005) on the basis of a new consumer price index. Clark's index, however, places far too little weight on carbohydrates and uses a wheat price series as a proxy for bread prices even though there is abundant evidence respecting the latter. Eliminating these procedures produces a pessimistic real wage series along the lines of Feinstein's. See Allen (2007b, 2007c)

a roof. If all wages were at this 'subsistence', then workers around the globe led a uniformly miserable existence. In fact, classical views were more nuanced because 'subsistence' was an elastic term. Sometimes, it meant the physiological minimum that barely kept a family alive; sometimes, it was 'socially determined' and meant a higher standard of comfort.

Rather than seeing everybody at the bare bones minimum needed for survival, the classical economists saw the world in terms of a wage ladder on which workers in northwestern Europe had the highest standard of living and workers in Asia had the lowest. Adam Smith (1776, pp. 74–5, 91, 187, 206) put it like this: 'In Great Britain the wages of labour seem, in the present times, to be evidently more than what is precisely necessary to enable the labourer to bring up a family.' Workers' living standards were even a bit better in the Low Countries: 'The wages of labour are said to be higher in Holland than in England.' Within Britain, England was above Scotland: 'Grain, the food of the common people, is dearer in Scotland than in England . . . The price of labour on the contrary, is dearer in England than in Scotland.' Hence, a day's work bought more food in England than north of the border. However, in Scotland, 'labour is somewhat better rewarded than in France'. Asia lagged far behind Europe: 'The real price of labour, the real quantity of the necessities of life which is given to the labourer . . . is lower both in China and Indostan . . . than it is through the greater part of Europe.' Smith saw the maritime centres of southern England and the Low Countries as having the highest real wages. Real wages were lower on Britain's Celtic fringe. Most of continental Europe also lagged behind the mercantile leaders, and Asia was at the bottom of the wage ladder. That was where wages were at the physiological minimum in the classical view.

During the nineteenth century, the mainstream explanation of these facts was demographic. Malthus believed that population expanded until birth and death rates were equal. The wage that corresponded to that outcome was the 'subsistence' wage since it was just enough to allow parents to raise children, and for the population to reproduce itself without expanding. In the original, positive check version of his theory, the birth rate was always at its maximum while mortality declined as wages rose. Under these circumstances, the subsistence wage had to be low enough to push mortality up to equal the high birth rate. In the later, preventive check version of the theory, fertility

also declined as income dropped, and this modification meant that births and deaths equalled each other at a higher 'subsistence' wage. The wage in a society, therefore, depended on whether the positive or the preventive check predominated. That was a question of marriage customs, law, and what Malthus called 'habit'.

Malthus (1803, pp. 116, 124, 251–2) applied the model by arguing that 'habits' differed between Europe (in particular England) and Asia. In England, 'the preventive check to population operates with considerable force throughout all the classes of the community'. The sons of farmers and tradesmen deferred marriage 'till they are settled in some business or farm, which may enable them to support a family'. Even the labourer 'will hesitate a little before he divides that pittance [of a wage] among four or five' family members. Late marriage restrained fertility and kept the English wage high. In Asia, on the other hand, several customs led to early and universal marriage, and that practice meant that the positive check reigned, and wages were lower than in Europe. Ancestor worship, the expectation that children would support their parents in old age, and infanticide all meant that China was 'more populous, in proportion to its means of subsistence, than perhaps any other country in the world'. Malthus entertained the possibility that Hindu asceticism depressed fertility (a preventive check) but concluded, 'from the prevailing habits and opinions of the people there is reason to believe that the tendency to early marriages was still always predominant'. As a result, 'the lower classes of people were reduced to extreme poverty . . . The population would thus be pressed hard against the limits of the means of subsistence, and the food of the country would be meted out to the major part of the people in the smallest shares that could support life'. Disaster was never far away. 'India, as might be expected, has in all ages been subject to the most dreadful famines.'²

The generalizations of Smith and Malthus about European and Asian wages are supported by the reports of contemporary travellers and by

² Malthus' view of China has been challenged by Lee, Campbell and Tan (1992), Laveley and Wong (1998), Lee and Wang (1999) and others. Lee and Wang propose that infanticide in China was the functional equivalent of the preventive check in Europe. This interpretation, however, presupposes that Chinese living standards were on a par with those in Europe. The evidence in Allen, Bassino and Ma *et al.* (2007) calls that assumption into question, for it shows that real wages in the advanced parts of Europe (England and the Netherlands) were higher than those in the advanced part of China (the Yangtze Delta).

historians who have reviewed the evidence on diet and consumption. We are particularly concerned with people who were regularly employed and at the bottom of the earnings distribution – peasants and unskilled labourers. Skilled workers, of course, did better everywhere. The aged, the disabled, the ill and infirm all fared worse, but their circumstances depended on public welfare, private charity and the church rather than the labour market. Travellers' accounts suggest that it was Chinese, Indian, French and Italian workers who were at rock bottom subsistence, while English workers enjoyed a far higher standard of living.

We need a standard to interpret this evidence, which becomes very detailed. A key benchmark is the subsistence income defined as the 'physiological minimum'. A family with that income spends virtually all its resources on food. The diet has to be nutritionally adequate in the sense that it supplies enough calories and protein for the family to survive – but no more. The cheapest way to get that level of nutrition is generally to buy the least expensive grain and boil it into a gruel. Bread (especially wheat bread) is usually avoided as too expensive, and, if any bread is taken, it is usually made with inferior grains that are often ground at home to avoid the loss entailed by commercial milling. Some legumes are also eaten for protein. Meat is a rare treat and is often obtained from some natural source like fishing rather than animal husbandry. Small amounts of butter or oil are eaten for their fat. The physiological minimum diet is, thus, a quasi-vegetarian diet based mainly on the cheapest grain prepared in the way that minimizes the loss of food value in milling and cooking. The physiological minimum diet lacks wheat bread, meat, alcohol and many dairy products. These are all expensive ways to get nutrients. In addition, very little else is purchased.

It is important to distinguish the 'physiologically minimum' standard from a pleasing or a respectable standard of living. While people can, by definition, survive on the physiological minimum diet, they generally prefer more food and a greater variety of highly processed foods (as well, of course, as more non-food items). Meat was an important preferred food. Engels (1845, p. 85), for instance, described how 'the normal diet of the individual worker . . . varies according to his wages'.³ The best-off workers 'have meat every day and bacon

³ Somerville (1843, pp. 12–13) provides a numerical summary of similar consumption patterns.

and cheese for the evening meal'. Less well-off are workers who 'have meat only two or three times a week, and sometimes only on Sundays'. They substituted potatoes and bread for meat. Below these workers are those 'who can afford no meat at all and they eat cheese, bread, porridge and potatoes'. Finally, there were 'the Irish for whom potatoes are the staple diet'. The emphasis on potatoes as the cheapest food marks this as a nineteenth-century hierarchy, for potatoes came into wide consumption only around 1800. Before that, the cheaper grains like rye, barley, and especially oats, played that role. Meat, however, was always a food with a high income elasticity of demand, and so the amount of meat consumed was an important dimension along which working-class living standards varied.

Budget studies from the Industrial Revolution confirm the high standard of living that Engels described. The high grain prices of the 1790s prompted Sir Frederick Eden's famous three-volume inquiry into *The State of the Poor*, in which he detailed the income and consumption of many working families across the country. By the middle-class standards of the day, the people were poor, but their circumstances look better than those of many of their counterparts across Europe and Asia, as we will see. A typical example is the forty-year-old gardener living in Ealing (at the time just outside London) with a wife and four young children (Eden 1797, II, pp. 433–5). By combining several jobs, he managed to earn about 30d per day, which was a labourer's wage in London in the 1790s. On this income, the family could afford per day: one quatern loaf of wheat bread, about one half pound of meat, a few ounces of cheese, a pint of beer, tea and sugar. The family bought new shoes and clothes and sent the eldest two children to school. They bought coal in the winter for heat and paid rent for a house and garden, which doubtless provided them with vegetables and perhaps some animal foods. This family was living towards the top of Engel's meat scale and far above bare bones subsistence.

The representativeness of budgets like this is, of course, a question. We will address this later by calculating what people could afford to buy with the incomes they earned. The calculations confirm that the lifestyle of the Ealing gardener was within the reach of many Brits.

Was life as good across the Channel? The situation depends on where we land. The diet in the Low Countries looks prosperous. De Vries and van der Woude (1997, pp. 621–7) reviewed the history of orphanage diets, which, they contend, are representative of consumers as a whole.

From the sixteenth century through the eighteenth, most of the money spent on orphans' food went for rye bread, meat and beer. In the eighteenth century, average consumption was about 140 kg of bread per orphan per year, 20 kg of meat and 14 kg of butter. These figures compare well with the English diets discussed, especially bearing in mind that the orphans were children. The main difference between the orphanage diets and the consumption of the general public was in the type of bread consumed – the general public ate more wheat bread.

When we look to France rather than the Low Countries, conditions look worse. Hufton (1974, pp. 44–8) summarized many studies of eighteenth-century worker and peasant diets. They were restricted to a narrow range of foodstuffs of which at least 95 per cent were cereals. These were eaten either as bread or 'some kind of liquid broth or gruel'. Generally, the cereals were 'rye, barley, oats, buckwheat, maize, or chestnuts' rather than the wheat eaten by English agricultural labourers. The cereal was supplemented with vegetable soup made from 'cabbages and turnips, onions, carrots, and greenery from the hedgerows', and it might be thickened with more grain. Milk was added if the family had a cow. In fact, milk, an occasional egg, scraping of cheese, a little pork fat and fish along the sea coast were the only sources of animal protein. They had meat only if they were in a position to raise their own stock. Not surprisingly, nutritional deficiency diseases were widespread. Hufton concluded that, 'if outright starvation vanished with the seventeenth century, permanent undernourishment was the lot of the poor'. If this was, indeed, the norm for French labourers, their standard of living was certainly lower than the English or the Dutch, and the French were consuming a diet like the physiologically minimum subsistence wage.

The situation was similarly grim in Italy where living standards declined to a very low ebb in the late eighteenth and early nineteenth centuries. This was marked by the spread of maize cultivation, which provided a much cheaper source of calories than wheat bread, which had been the medieval norm. Bread gave way to polenta as the staple food.

In short, a labourer, a countryman who only ate two pounds of bread during the day would still need a soup in the evening: whereas, for the same price as two pounds of bread, he could buy at least six to seven pounds of polenta, which takes the place of both soup and bread and is more than enough for a man's sustenance.

Quoted by Wolf 1986, p. 59

'Meat had vanished from the peasant diet' (Wolf 1986, p. 59). Tobias Smollett, in his *Travels through France and Italy*, 1766, remarked: 'The nourishment of these poor creatures consists of a kind of meal called Polenta, made of Indian corn, which is very nourishing and agreeable' (quoted by Langer 1975, p. 59). In fact, polenta lacks niacin, so the all-maize diet led to endemic pellagra and chronic diarrhoea. Wolf (1986, p. 58) concluded that 'during the eighteenth century the frontier between subsistence and poverty was shifting, in both city and countryside, to the detriment of the former'. Not only was the trend downward, but the level was far below that of workers in England.

What about the other end of Eurasia? The common diet in most of Asia was based on the cheapest available grain. It appears from contemporary accounts that the articles in the diet of the common people in most parts of India consisted chiefly of rice, millets and pulses' (Raychaudhuri and Habib 1982, vol. 1, p. 164). Palsart, who visited India in the early seventeenth century, called the Indian diet 'monotonous'. In the Delhi–Agra region, the people 'have nothing but a little kirchery [kedgerree] made of green pulse mixed with rice . . . eaten with butter in the evening, in the day time they munch a little parched pulse or other grain'. The workmen 'know little of the taste of meat'. Indeed, pigs, cattle, chickens and eggs were all taboo. Where available, fish was the only source of animal protein. It was a similar story in western India. Wheat was not eaten by the labouring population, whose main source of carbohydrates was millet. This was ground into a coarse flour and fried up as chapatis that were eaten with pulses and vegetables. Charles Lockyer (1711, p. 258), who toured Asia in the early eighteenth century on the East India Company ship, *Streatham*, observed of the Arab sailors in the Indian Ocean: 'They serve for small Wages, and are Victual'd at a much cheaper Rate than our Ship's Companies: Salt-fish, Rice, Gee, and Doll, with a few Fowls, being all the Provisions they care for. Doll is a small Grain, less than Fetches, contains a Substance like our white Peas, and being boil'd with Rice makes Kutcheree.'

The restricted character of consumption was also pronounced in other areas. Generally, Indians went barefoot. Contemporary accounts emphasized 'the scantiness of clothing'. For much of the year, men wore little more than a loin cloth and women a sari. Houses were mud huts with thatched roofs. The peasants and workers had few furnishings besides bamboo mats and cots. Metal pots and utensils were rare,

and much cooking was done in earthen pots (Raychaudhuri and Habib 1982, vol. I, pp. 459–62). It was hard to spend less money on your lifestyle than this.

As with India, travellers to China described a quasi-vegetarian diet. Sir George Staunton (1798, vol. II, pp. 55, 213), in his account of the famous Macartney expedition, observed that 'the labouring poor' of Beijing 'are reduced to the use of vegetable food, with a very rare and scanty relish of animal substance'. (Minimalism in consumption extended beyond food: 'The inhabitants along the Pei-ho bore strong marks of poverty in their dwellings and apparel.') Lockyer (1711, p. 173) gave a more enthusiastic account of the same diet as consumed by the more prosperous in Canton. 'Rice is the general Diet.' The Chinese also have 'a Cup of Shamshoo, Pouchoo, or other Liquor at Meals, to sup off when their Chops are full.' They ate little meat. 'It is not brought to the Table in Joints, or large Pieces, as with us, but minced, and served up in Cups, or Small Bowls; whence they take it very dextrously with a couple of small Chop-sticks . . . They are great lovers of Broth, and will drink even the Liquor their Fish is boil'd in.' Historians of China accept that 'Europeans certainly ate more meat and far more dairy products than most peoples in Asia' (Pomeranz 2000, p. 35). In his reconstruction of agricultural output in the Yangtze, Li (1998, p. 111) reviewed the uses of farm goods. 'For food, rice was basic.' In addition, wheat, which was boiled up as porridge, 'was also used in the lean summer seasons to survive rice shortages'. Some beans were consumed, as was rice wine. Scarcely any animal products were produced. Since the diet consisted mainly of rice, the standard methodology used by historians of China to assess living standards is to estimate per capita rice consumption.

The history of diet suggests that there really was a range of living standards around the globe. Northwest Europe stands out as having the highest standard of living in view of the apparent widespread consumption of expensive and highly refined foods like white bread, meat, dairy products and beer. In contrast, workers and peasants in France, Italy, India and China ate a quasi-vegetarian diet of grain, often boiled, with scarcely any animal protein. Diets like these were consumed only by the poorest people in Britain or the Low Countries. The contemporary accounts on which these conclusions are based are not as abundant as one would like, and are necessarily generalized in their descriptions. How representative were the accounts of eighteenth-century travellers?

Fortunately, we can address the questions with different evidence that points to the same conclusion.

Wages and prices

We can be more systematic in the comparison of living standards by asking what people could afford to buy with their wages. Our calculations require databases of wages and prices. Since the mid-nineteenth century, historians of Europe have been writing price histories of cities, and these provide the necessary raw material. Typically, the historian finds an institution like a college, hospital or monastery that has existed for centuries. The historian then searches its financial records abstracting the price of everything it purchased. The results are time series of the prices of foodstuffs, textiles and building materials, as well as the wages of people like masons, carpenters and labourers who worked for the institution. Comparable work for Asia has barely begun, and the available data do not yet run as far back into the past. Nonetheless, enough is at hand to assess pre-industrial living standards around the globe.

The study of wages and prices shows that Britain was a high wage economy. This is true in at least four senses:

1. At the exchange rate, British wages were among the highest in the world.
2. British wages were high relative to the cost of consumer goods, i.e. British workers could buy more with their money than workers in many other countries, so living standards were higher in Britain than elsewhere.
3. Wages were higher relative to the price of capital in Britain than elsewhere.
4. Wages were higher relative to the price of energy in Britain than elsewhere.

The third and fourth points are particularly relevant for the incentive to invent coal-powered, mechanized technologies and will be considered when we come to those topics. Here, we will take up the first two points.

Figure 2.1 shows the wage rates of building labourers in leading cities in Europe and Asia from the middle ages to the nineteenth century. The original sources record wages in the monetary units of the countries concerned, and these have been converted to the weight

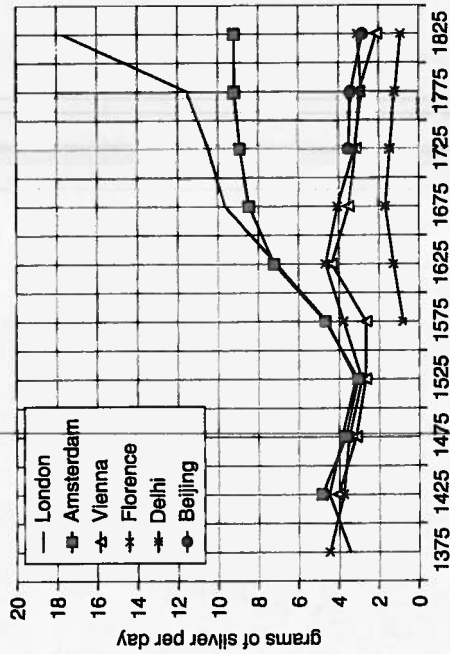


Figure 2.1. Labourers' wages around the world

of silver they could buy. Since silver coins were the principal medium of exchange for most countries in this period, this procedure amounts to comparing wages at the exchange rate.

Figure 2.1 shows that wages were similar across Europe in the late middle ages. Whatever the currency, labourers earned about 3.5 grams of silver per day. This uniformity broke down during the sixteenth century when European wages and prices inflated as silver was imported from the Americas. The inflation in wages was greater in northwestern Europe, however, than in eastern Europe or even in Spain, where most of the silver arrived. The history of wages has been studied for many cities on the continent, and they were uniformly like those in Vienna and Florence. By the end of the seventeenth century, wage inflation ceased in the Low Countries but continued unabated in London. The result was that London wages were the highest in the world during the eighteenth century.

Asian wages were very much lower. The history of Asian wages has not yet been pushed back before the late sixteenth century, but from then onwards Asian wages were consistently below European wages. The gap between northwestern Europe and Asia was very large. Continental wages were probably marginally above Asian wages, but the differential was less. Asia, in other words, looks a lot like the lagging parts of Europe.

Did the high wages earned in northwestern Europe translate into a high standard of living? The answer depends on the prices of consumer goods. It is unrealistic to assume that there was only one consumer good (for instance, bread), so instead we specify 'baskets of goods' that correspond to different lifestyles. The basket must be complete and specified in terms of goods whose prices can be measured or inferred, so that its cost can be worked out around the globe. Taking the earlier discussion of diets and subsistence wages as a guide, I define two baskets of goods. The more expensive is a 'European respectability' basket,⁴ and is inspired by budgets that Eden and other observers report for 'respectable' labourers in Britain and the Low Countries. Table 2.1 shows that budget. It is replete with meat, bread, cheese and beer. The respectability budget provided 2,500 calories and a whopping 112 grams of protein per day.

The respectability budget was not the kind of diet that workers in most of Europe and Asia were consuming – as we will see, it was just too expensive. Instead, they got their calories and protein in the least costly way from the cheapest available cereal. Since maize was eaten in Italy and rice in Bengal, different diets have been specified for different regions, but they have all been tailored to yield a bit over 1,900 calories per person per day. This was about the level of calories available in many poor countries in the 1950s before the Green Revolution increased their food supplies. 1,900 calories is not enough sustenance for a full day of hard work. These subsistence spending patterns are shown in Tables 2.2 and 2.3.

Protein supply varied considerably among the subsistence diets. The oat-based diet of northwestern Europe gave more protein (84 grams per day) than the Asian rice diet, which supplied the least (45 grams per day). However, even that was enough to meet modern nutritional norms. The US recommended daily allowance of protein is 0.8 grams per day per kilogram of ideal body weight. A man of average height in the early modern period (about 165 cm) with a body-mass index of 20 (in the ideal range) would have weighed 54 kg and required 44 grams

⁴ This basket is a variant on the basket used in Allen (2001). The main difference is that bread consumption has been increased from 182 kg to 234 kg per year to boost the calorie content from 1,914 calories to 2,500 calories. This seems more appropriate for 'respectability'. Increasing bread consumption raises the cost of the basket 5–10 per cent depending on relative prices. These adjustments lower the welfare ratios (now called respectability ratios) by 5–10 per cent everywhere and so have a negligible impact on relative living standards or their trends.

Table 2.1 The respectable lifestyle: basket of goods

	Quantity per person per year	Price, grams of silver per unit	Spending share	Nutrients/day	
				Calories	Grams of protein
Bread	234 kg	0.693	36.0%	1,571	64
Beans/peas	52 l	0.477	5.5%	370	28
Meat	26 kg	2.213	12.8%	178	14
Butter	5.2 kg	3.470	4.0%	104	0
Cheese	5.2 kg	2.843	3.3%	54	3
Eggs	52 each	0.010	1.1%	11	1
Beer	182 l	0.470	20.0%	212	2
Soap	2.6 kg	2.880	1.7%	-	-
Linen	5 m	4.369	4.8%	-	-
Candles	2.6 kg	4.980	2.9%	-	-
Lamp oil	2.6 l	7.545	4.3%	-	-
Fuel	5.0 M BTU	4.164	4.6%	-	-
Total		450.956	100.0%	2,500	112

Notes:

- ¹ Where oil and wine were consumed instead of butter and beer, 5.2 litres of olive oil were substituted for the butter and 68.25 litres of wine for the beer. 5.2 litres of olive oil yields 116 calories per day and no protein; 68.25 litres of wine gives 159 calories per day and no protein. In Strasbourg, the average prices 1745-54 were 7.545 grams of silver for olive oil and 0.965 grams of silver for wine.
- ² M BTU = millions of BTUs
- ³ Prices are in grams of silver per unit. Prices are averages for Strasbourg in 1745-54. The total shown in the price column is the total cost of the basket at the prices shown.
- ⁴ Nutrients are computed assuming the following composition: bread: 2,450 calories per kg, 100 grams of protein per kg; beans/peas: 2,592 calories per litre, 199 grams of protein per litre; meat: 2,500 calories per kg, 200 grams of protein per kg; butter: 7,286 calories per kg, 7 grams of protein per kg; cheese: 3,750 calories per kg, 214 grams of protein per kg; eggs: 79 calories each, 6.25 grams of protein each; beer: 426 calories per litre, 3 grams of protein per litre; wine: 850 calories per litre, 0 grams of protein per litre.

of protein per day according to the US recommended daily allowance. The contrast between the 44 grams required for health and the 112 grams supplied by the European respectable diet highlights the extravagant consumption of protein by English labourers.

Table 2.2 Subsistence lifestyle: baskets of goods

	Quantity per person per year	Indian rice		Indian millet	
		Nutrients/day	Quantity per person per year	Nutrients/day	Quantity per person per year
		Calories	Grams of protein	Calories	Grams of protein
Rice	162 kg	1,607	33		
Millet				205 kg	1,698
Beans/peas	20 kg	199	11	10 kg	100
Meat	3 kg	21	1	3 kg	21
Butter/ghi	3 kg	72	0	3 kg	72
Sugar	2 kg	21	0	2 kg	21
Cotton	3 m			3 m	
Total		1,920	45	1,912	68

Table 2.3 Subsistence incomes: baskets of goods

	Quantity per person per year	European oats		Beijing sorghum	
		Nutrients/day	Quantity per person per year	Nutrients/day	Quantity per person per year
		Calories	Protein	Calories	Protein
Sorghum				179 kg	1,667
Oats	155 kg	1,657	72		55
Beans/peas	20 kg	187	14	20 kg	187
Meat	5 kg	34	3	3 kg	21
Butter/oil	3 kg	60	0	3 kg	67
Soap	1.3 kg			1.3 kg	0
Cotton/Linen	3 m			3 m	
Candles	1.3 kg			1.3 kg	
Lamp oil	1.3 l			1.3 l	
Fuel	2.0 M BTU			2.0 M BTU	
Total		1,938	89	1,942	71

The spending patterns in Tables 2.1 to 2.3 apply to a single adult male. To analyze subsistence income, we need to inflate them to include the living expenses of wives and children. Since the recommended caloric intake of a woman is less than that of a man, and since, of course, children need even fewer calories, we can say – reasoning rather loosely – that three ‘baskets’ like those in Tables 2.1 to 2.3 were needed to support a family with a father, a mother and some children. In addition, the reader will have noticed that none of those baskets includes the cost of renting housing. This, however, amounted to only about 5 per cent of spending. With these considerations in mind, we can estimate the annual cost of supporting a family as $3.15 (= 3 \times 1.05)$ times the cost of the subsistence baskets shown in Tables 2.1 to 2.3.

We can check the balance of income and expenditure by computing the ratio of full-time annual income to annual subsistence cost. The latter is 3.15 times the cost of the baskets in Tables 2.1 to 2.3, while the former is the wage rate multiplied by the time employed. In Europe, most of the wage information refers to daily wages, and we assume that a full year was 250 days – the balance was accounted for by Sundays, religious holidays, illness and slack time. In India, many of the wage contracts we know of were monthly, so we take annual earnings to be twelve times the monthly figure. Dividing income by the cost of the respectability budget gives the ‘respectability ratio’, while dividing income by the cost of a subsistence budget gives the ‘subsistence ratio’. In either case, a value greater than one indicates that the worker had enough money to buy the lifestyle in question with something to spare; values less than one indicate that the lifestyle was beyond his reach on the maintained assumptions.

Figure 2.2 shows the history of living standards in leading European cities from the late middle ages to the nineteenth century and in Delhi and Beijing from the seventeenth or eighteenth century into the nineteenth. Figure 2.2 uses the European respectability basket as the standard. The fifteenth century was a peak for labourers across Europe. If they worked 250 days per year, they earned about 50 per cent more than the cost of the respectability basket (i.e. the respectability ratio equalled 1.5). Wages sagged everywhere in the sixteenth century as population grew (Rappaport 1989), but there was a rebound in London and Amsterdam, so workers in those cities maintained high living standards with full-time earnings that were ample enough to

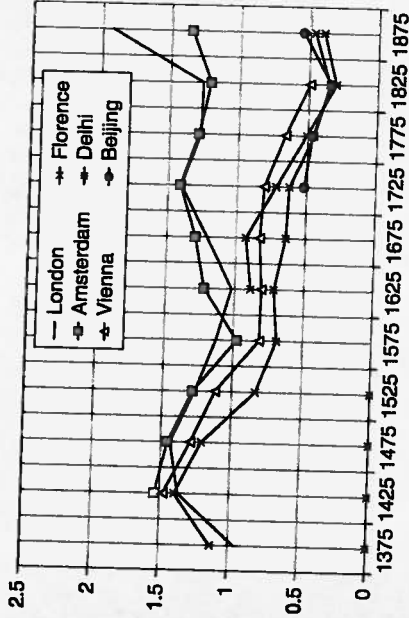


Figure 2.2 Respectability ratio for labourers: income/cost of respectable basket

buy the respectability basket (Schwartz 1985, 1992). It was a different story for workers in Vienna and Florence, and, indeed, their experience was the norm for most European workers. The real income slide continued steadily, so that, by the mid-nineteenth century, full-time annual earnings amounted to half or less of the cost of the northwestern respectability lifestyle.

Starting in the seventeenth century, we can add Asian wages to the comparison. The experience of India and Beijing looks like the pattern in Vienna and Florence. In the seventeenth century, wages in Delhi were almost enough to buy the European respectability basket. Would Indian workers have done even better if we could look further back in time? At the moment, we do not know. What we do know is that, by the eighteenth century, Asian workers did not earn enough to buy a respectable European standard of living. They earned only 30–40 per cent of that cost.

How did Asian and European workers survive when they only earned 30–40 per cent of the cost of a respectable lifestyle? Could they buy enough to eat? Figure 2.3 sheds light on this question by summarizing subsistence ratios (full-time annual earnings divided by a family's cost of the subsistence lifestyle). The rankings and basic patterns are the same as in Figure 2.2, although there are some interesting differences. Basing the diet on oats means that workers in Amsterdam generally had greater – as well as less volatile – purchasing power than

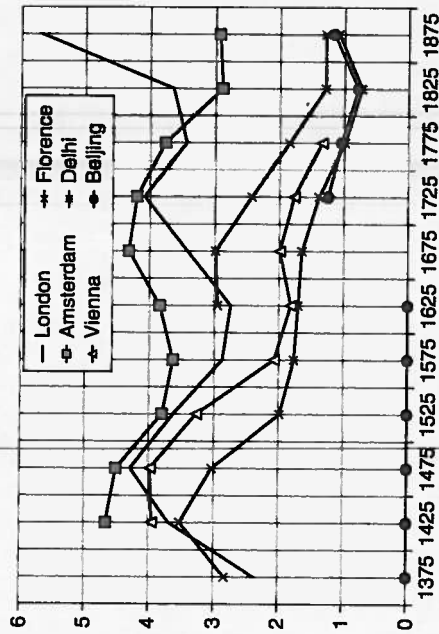


Figure 2.3 Subsistence ratio for labourers: income/costs of subsistence basket

their counterparts in London.⁵ But both groups of workers were very well off, by this measure, earning three to four times the cost of a bare bones subsistence income. In the late middle ages, workers in Vienna and Florence – indeed in other continental cities – enjoyed that high standard of living, but their good fortune did not last, for their incomes in the nineteenth century were barely enough to purchase the physiological minimum. Indeed, the wages of Italian and Chinese men were not quite enough to buy even that – the meagre earnings of the wife or the garden produce of a scrap of land were necessary for family survival. Lefebvre (1962, I, pp. 216–19) came to the same conclusion in an early study of men's wages in France: 'The wife's earnings must have been barely enough to keep the family from starving.' The income and expenditure calculations confirm the observations of the nineteenth-century observers of the 'polenta economy'.

India does better in comparisons using subsistence standards of living. In the seventeenth century, workers in north India could earn three times the cost of the subsistence basket if they worked full time for the full year. This income was on a par with the prosperity of their

⁵ Basing the bare bones diet in northwestern Europe on oats probably understates the subsistence ratio for workers in those countries during the late eighteenth and early nineteenth centuries, for potatoes were a cheap source of calories and consumption was growing. However, oatmeal still remained common.

counterparts in London (at its trough) but below that of Amsterdam. In this respect, the calculations provide some support for the revisionist historians who see little difference between pre-industrial Europe and Asia (Parthasarathi 1998, 2001, Pomeranz 2000). By the nineteenth century, however, this prosperity had slipped away, and north Indian workers were barely able to purchase the subsistence basket. Our information about wages in Beijing only begins in 1738, and, for the next two centuries, average earnings hovered around the cost of the subsistence basket just as they did in Delhi, Florence and Vienna. In this period, there was little difference in real income between Asia and the backward parts of Europe.

Aside from the advanced parts of Europe, there was one region in the world where living standards exceeded these rock bottom levels, and that was the east coast of North America. Figure 2.4 shows the subsistence ratio for labourers in Massachusetts at decade intervals between the 1750s and the 1840s.⁶ In the mid-eighteenth century, the ratio was just over three, i.e. below the London level but above that in most English provincial towns. The western periphery of the Atlantic economy was booming, and that prosperity attracted immigrants from Europe and drew slaves from Africa. The comparative advantage of the future United States lay in primary products, and the country exported agricultural goods and imported manufactures. In 1790, 95 per cent of the American population was rural, and the largest city was New York with a population of 33,000 – less than that of London in 1500. High real wages in the eighteenth century were indicative of the dynamism of the Atlantic economy, which was transforming Britain, but had little immediate import for the evolution of industrial technology, for there was little industry in America. As the United States expanded in the nineteenth century, however, American wages pulled ahead of those in Britain and took on great significance by prompting the invention of labour-saving technology. America's ascendancy stands out in Figure 2.4. Real wages grew very little in Britain during the Industrial

⁶ The basket used to compute the Massachusetts cost of living is identical to those shown in Table 2.2 except that the grain is 165 kg of maize (American corn). Wages and prices are ultimately from Wright (1885) but were taken from the tabulation by Lindert and Deitch and posted on the website (<http://gpih.ucdavis.edu>) of the Global Price and Income History Group at the University of California, Davis. Some gaps were interpolated. The price of firewood was assumed to be a price per cord despite Wright's indicating the unit was the 'ft'.

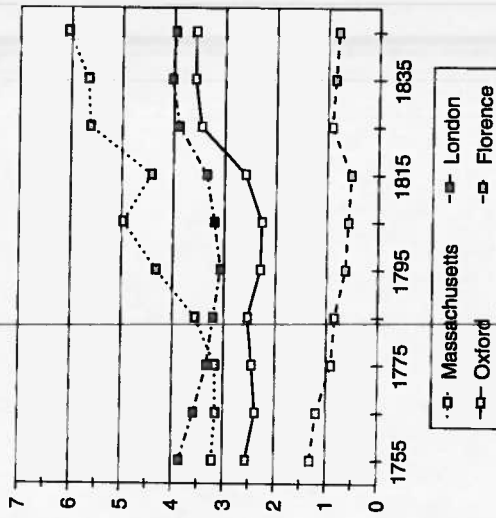


Figure 2.4 Subsistence ratio for labourers in Europe and the United States: annual earnings relative to the cost of the subsistence basket

Revolution, but they increased sharply in America after independence,⁷ and American real wages exceeded British wages by about 50 per cent. By the nineteenth century, the American high wage economy, which was the impetus to Habakkuk's theorizing, had emerged. In the mid-eighteenth century, however, it was the high wages in Britain, in the core of the Atlantic economy, that played the important role of imparting a labour-saving bias to technical change.

Wage convergence in Britain

Within Britain, the geographical boundary of the high wage economy shifted over time. In the fifteenth century, real wages were high in all parts of the country. This was a legacy of the Black Death in 1348–9. So many people died that there was a labour shortage everywhere until population growth resumed in the mid-sixteenth century. After 1550,

⁷ The literature on the history of US real wages is very large. Recent contributions include Williamson (1976), David and Solar (1977), Williamson and Lindert (1980), Margo and Villafior (1987), Goldin and Margo (1992), Sokoloff and Villafior (1992) and Margo (2000).

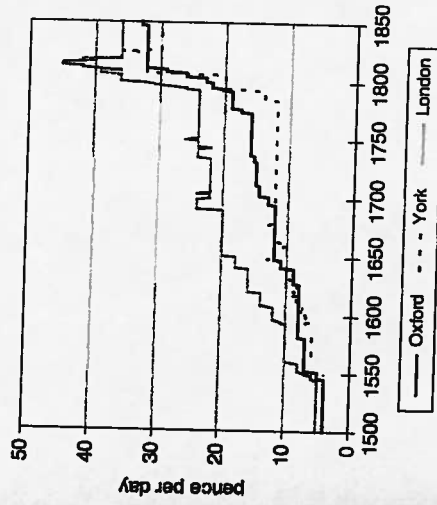


Figure 2.5 Labourers' wage across England

real wages fell everywhere. The drop was attenuated in London whose population exploded from 50,000 in 1500 to 200,000 a century later. The rapid growth of the city's economy led to tight labour markets and rising wages that attracted a flood of migrants from adjoining counties. This is manifest in Figure 2.5 as London's wages pulled above wages in Oxford and York after 1550: by the early seventeenth century, the earnings of fully employed unskilled workers in rural England dropped to only 60 per cent of the respectability budget. Geographical differentials were then at their greatest, and the high wage economy was confined to London.

By the late seventeenth century, the high wage economy began to spread north as provincial wages began to close the gap with London. Figure 2.5 shows the daily wage in Oxford rising towards the London level from the late seventeenth century. Throughout the eighteenth century, fully employed labourers in Oxford were earning enough to buy the respectability budget. Incomes also rose in the North, but less rapidly. In York, labourers earned only 80 per cent of the respectability budget in the eighteenth century. This gap was not closed until the Industrial Revolution when northern wages and southern provincial wages again approached London levels. It was only after 1800 that unskilled workers in York earned enough to buy the respectability budget.⁸

⁸ This issue was first addressed by Gilboy (1934).

The northern spread of the high wage economy was matched by a corresponding spread of the consumption of white bread. In the early eighteenth century, the predominant carbohydrate in northern Britain was oats, eaten as both bread and porridge (Smith 1776). Dr Johnson exaggerated only a little when he remarked that oats were 'a grain which in England is generally given to horses but in Scotland supports the people'. Petersen (1995, pp. 220–35, 284–316) calculated that wheat accounted for 60 per cent of the value of British bread in the 1770s, 81 per cent in the first decade of the nineteenth century, and 90 per cent in the middle of the century. Much of the growth took place in northern manufacturing towns where more and more workers shifted from oats to wheat bread.

Skilled workers

Thus far, we have spoken only of unskilled workers, people generally described as 'labourers'. Skilled workers always earned more. In Europe, the wage of a carpenter or a mason was about 60 per cent higher than the wage of a labourer. Our information about Asian wages is fragmentary and not entirely consistent. Some information for early modern India suggests that the skill premium was about 100 per cent; fuller information for eighteenth-century China points to a skill premium of 60 per cent as in Europe (van Zanden 2004a). For the moment, I will concentrate on the European pattern, which is better established and helps delineate the high wage district on the continent.

Figure 2.6 shows respectability ratios for building craftsmen across Europe. These ratios were all higher than the corresponding ratios for labourers. Indeed, in most cases, the ratios were greater than one indicating that carpenters and masons who were employed full time could purchase the respectable lifestyle with some money to spare. There were important differences in trend, however. In London and the Low Countries, the real incomes of craftsmen remained high throughout the early modern period, while living standards fell on the rest of the continent. In contrast, by the second half of the eighteenth century, the real incomes of craftsmen in Valencia and Florence had dropped just below one. They had no surplus income (indeed, a slight deficit) if they bought the respectable lifestyle. This was a common pattern in Europe. The situation in Paris and Vienna was not quite as dire, although the respectability ratio for Viennese craftsmen dropped below one in the

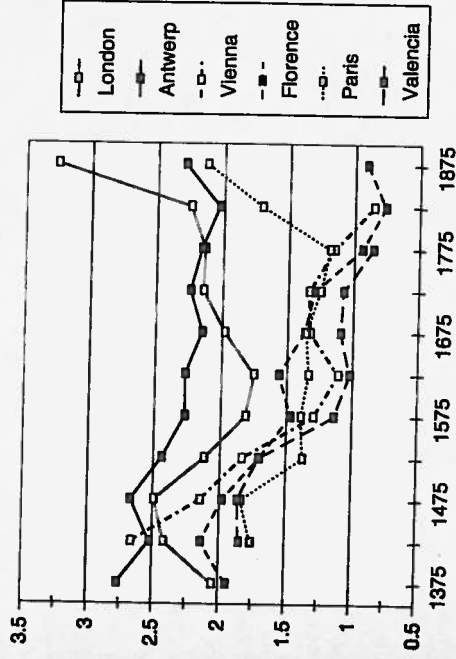


Figure 2.6 Respectability ratio for masons: income/cost of respectable basket

first half of the nineteenth century. In eighteenth-century Paris and Vienna, masons and carpenters could buy the respectable lifestyle with a little left over.

We can now see the boundaries of the high wage economy. Its core was always the maritime ports – London and the cities of the Low Countries. In the core, even unskilled workers always earned enough to buy the respectable budget. Skilled workers, of course, did better. In the course of the seventeenth and eighteenth centuries, the high wage economy advanced north through England, so that unskilled workers in northern cities could buy the respectability lifestyle early in the nineteenth century. On the continent, there was no evidence of geographical spread, but there were pockets of moderately high incomes in cities like Paris and Vienna. In Paris, for instance, skilled workers certainly earned enough to buy the respectable lifestyle, and the earnings of the unskilled came close, although they were noticeably less than in London or Amsterdam. As a result, some of the consequences of the high wage economy extended to Paris in attenuated form.

What the high wage economy meant for the quality of life

One reason that high wages and high subsistence ratios were important is because they indicate the presence of purchasing power beyond that

required for basic needs. There were many ways to spend that surplus, and the choices people made had a big impact on the quality of their lives and the growth of their economies. Here are five aspects of life that were influenced by real incomes:

Food quantity

People living at bare bones subsistence were usually hungry, so the usual response to rising incomes was increased food consumption. Table 2.4 summarizes budgets of workers in northern England compiled by Alexander Somerville (1843).⁹ The highest wage corresponded to skilled tradesmen like masons or carpenters. The next highest (186d per week or 31d per day) corresponds to building labourers. The third highest (120d per week) represents the average earnings of a cotton mill operative. The lowest income corresponds to the intermittently employed. Calories consumed per adult male rose from 1,605 per day in the poorest paid job, a rate which barely sustains basal metabolism, to 3,937 calories among the skilled trades. This is a twenty-first-century level of intake. With more money, people ate more food.¹⁰

The patterns in Table 2.4 apply internationally and, thus, highlight the connections between wages and diets that we discussed earlier. The low consumption of meat by French and Italian workers was the result of their low wages. More broadly, Fogel (1991, p. 45) has estimated the average caloric consumption in England and France in the late eighteenth century, and his results are consistent with these patterns. He found that the average Englishman consumed 2,700 calories per day, while the average Frenchman had only 2,290. Forty per cent of the French population received less than 1,958 calories, while only 20 per cent of the English were in a similar situation. While Fogel's calculations are founded on a high ratio of assumptions to reliable data, the tenor of the results is consistent with the differences in consumer purchasing power in the two countries.

⁹ Horrell and Humphries (1992) provide a statistical analysis of many budgets spanning the Industrial Revolution. Their work focuses on spending categories rather than food quantities and, in that regard, supports the conclusions from the Somerville budgets.

¹⁰ Budgets collected by social investigators often look stylized or censored – in this case by under-reporting alcohol consumption.

Table 2.4 How food consumption varied with income: Somerville's budgets

	Weekly income		
	66d	120d	180d
Pounds of food and pints of milk consumed per week			318d
Flour	8.54	12.20	17.08
Oatmeal	7.50	13.75	11.25
Potatoes	17.39	34.78	36.52
Milk	7.33	4.00	6.00
Butter	0.00	0.00	0.80
Meat	0.00	0.00	1.09
Bacon	0.29	1.14	0.57
Cheese	0.00	0.00	0.56
Sugar	0.00	0.57	1.26
Tea	0.00	0.00	0.12
Percentage of income spent on food	85%	76%	74%
Calories per day per adult male	1,605	2,806	3,219
Grams of protein per day per adult male	64	106	119
Index of food cost per calorie	1.00	0.92	1.23

Notes:

¹ The income class of 318d is also shown consuming 6d per week of beer. I have ignored this.

² The calculations of calories per day and protein per day per adult male assume that the family consisted of three adult male equivalents, the same assumption used in the subsistence and respectability ratios.

³ The index of food cost per calorie is based on the cost of food divided by the calories it contained.

⁴ The food quantities were obtained by dividing the expenditure on each item by their prices.

Source: Somerville (1843, pp. 12–3).

Food quality

Not only did people in the high wage economy eat more food, they ate more expensive food. During the fifteenth century, when real wages were very high, desirable diets emphasized bread, meat

and alcohol (Dyer 1989, pp. 158–9). During the seventeenth and eighteenth centuries, imported commodities like sugar and tea were added to the list of preferred foods. Potatoes came to be widely consumed by workers, but the spud was regarded as an inferior source of calories.

The preference for these foods is shown by the increased expenditure on them shown in Table 2.4. The poorest workers did not consume the tropical goods like tea and sugar. Protein consumption increased from 64 grams per day for the poorest men to a staggering 147 grams per day for the best paid. An index of the shift in preferences is the rise in the cost of a calorie shown in Table 2.4. As food consumption was tilted towards expensive sources of nutrition like meat, the cost per calorie rose almost 50 per cent.

Physical well-being, health and stature

The higher level of food consumption in northwestern Europe led to better health, longer life and a more productive workforce. A prime indicator is stature. Historians have followed its history by analyzing military recruitment records. In the late eighteenth century, the heights of British army recruits imply an average height of about 172 cm for the male population (Floud, Wachter and Gregory 1990, pp. 140–9, Cinnirella 2007). French records indicate that Frenchmen were only 162 cm tall in the seventeenth century. Their average height jumped to 168 cm in the 1740s and dropped again to 165 cm in the 1760s (Komlos 2003, p. 168). The heights of men in Lombardy dropped from 167 cm in the 1730s to 164 cm in the early nineteenth century. In the late eighteenth and early nineteenth centuries, men in the Austrian empire were even shorter – about 162 cm (A'Hearn 2003, pp. 370–1). Heights are determined by net nutritional intake during childhood. To the degree that low real wages implied restricted food consumption, one would expect Frenchmen and Italians to be shorter than their English counterparts, as they were.

The income and diet differences may have had implications for economic performance. One was work intensity. People subsisting on low calorie diets had less energy to work. On the basis of his calorie estimates, Fogel (1991, p. 46) claimed that 20 per cent of the French population could do no more than three hours of light work per day. The corresponding proportion was smaller in England. Many jobs

in the eighteenth century entailed a full day of hard labour – building work or mining, for instance. People doing this work had to be well nourished. Other jobs – spinning, framework knitting or tending machines – required much less physical effort. Whether differences in average nutrition affected aggregate economic performance, therefore, depended on the distribution of job requirements.

Consumer revolution

The 'consumer revolution' has been an important theme in recent writing on the eighteenth century.¹¹ McKendrick, Brewer and Plumb (1982, p. 1) first proclaimed: 'There was a consumer revolution in eighteenth-century England.' Two sorts of evidence point to the change (Shammas 1990, Brewer and Porter 1993). One is contemporary discussions of trade and 'luxury' consumption; the second is statistical evidence of the increased consumption of 'luxuries' and novelties. These goods included tropical foodstuffs (tea, sugar, coffee and chocolate), imported Asian manufactures (cotton textiles, silk and Chinese porcelain) and British manufactures (imitations of the Asian imports and a wide range of other items like clothing, books, furniture, clocks, glassware, crockery and metal products). While the consumer revolution was regarded by contemporaries as a British phenomenon (Berg 2005, pp. 7–8), it also characterized the Low Countries and extended to cosmopolitan centres like Paris (de Vries 1993, Fairchild 1993).

Who was buying these consumer goods? There is no doubt that the upper and middle classes were major purchasers, but workers were also an important source of demand. Table 2.5, which is a reworking of Gregory King's famous social table of England in 1688, shows the potential for non-subsistence spending for broad social groups. King assigned an income of £2 per person per year to vagrants, paupers and cottagers, the poorest 18 per cent of the population. As it happens, the bare bones subsistence basket including rent cost £2.07 when valued in the average prices of 1683–94. The correspondence both validates King's £2 and shows what it implied for consumption. Evidently, cottagers and paupers had no surplus income for the consumer revolution.

¹¹ Kowaleski (2006) has argued that many features of the early modern consumer revolution were anticipated in fifteenth-century England when real wages had also been high in most parts of the country.

Table 2.5 *England in 1688*

Number in class	Percentage of population	Income per head	Income relative to subsistence above	Percentage income above subsistence
Landed classes	200,358	£46.4	23.2	21%
Bourgeoisie	262,704	£40.2	20.1	23%
Commercial	1,190,552	£9.0	4.5	19%
Farmers	1,023,480	£10.4	5.2	20%
Workers	1,970,895	£5.6	2.8	17%
Cottagers,	1,041,344	£2.0	1.0	0%
poor				
Total/	5,689,322	£9.6	4.8	
average				

Note: I have altered Lindert and Williamson's figures in one way. When King reported a household with more than 4.5 people, I assume the excess were servants and tally them among the workers. I also assign £9 income to each servant and deduct it from the income of the person they worked for. This is along the lines of calculations made by Lindert on his website.

Subsistence income is taken to be £2 per head. A direct calculation of the bare bones subsistence income of an adult man using 1680s prices is £2.07. Women and children could survive on a somewhat lower amount, and that refinement is not included here. Income above subsistence is computed for each group by multiplying the number of people by income per head less £2. Summing this for all groups gives the total, and the 'Percentage of income above subsistence' for each group is computed accordingly.

Landed classes includes the various lords, gentlemen, clergy and practitioners of sciences and the arts.

Bourgeoisie includes merchants, office-holders, lawyers, artisans with incomes of at least £200 per year, and naval and military officers.

Commercial includes shopkeepers, tradesmen and manufacturers.

Farmers includes farmers and freeholders.

Workers includes labourers, the building trades, miners, domestic servants, common seamen and soldiers.

Cottagers, poor includes cottagers, paupers and vagrants.

Source: Lindert and Williamson (1982).

All other social groups, however, did have some surplus purchasing power. Setting subsistence at £2 per year implies that the gentry, aristocracy, rich merchants, lawyers and other members of the richest two groups had 43 per cent of the surplus purchasing power, although they comprised only 8 per cent of the population. The middle strata of shopkeepers, proto-industrialists and workers made up almost three-quarters of the population and had command over 57 per cent of the income beyond subsistence. This group did, indeed, comprise a large market for consumer goods.

Their purchases show up in probate inventories, which list possessions at the time of death. Weatherill (1996, pp. 76, 78, 168) has studied the ownership of seventeen manufactured goods in English inventories between 1675 and 1725. Some are traditional (tables, cooking pots, pewter plates and dishes, silver or gold), and some were novel like saucepans, earthenware, books, clocks, pictures, looking glasses, window curtains, table linen, china, knives and forks, and utensils for hot beverages. Not unexpectedly, Weatherill finds that people with more money and status were more likely to own these items. Nonetheless, the English market for imported and novel consumer goods extended down to the working class. The skilled workers earning the highest wages were the most active buyers, and their purchases extended to many new and imported goods. Less well paid labourers were more modest buyers, but even they were purchasing some of the British products. Many working people bought stylish clothing (Lemire 1991, 1997, Styles 2007). Unlike India, almost everyone had a table, cooking pots and some pewter. In his tours of England in the late 1760s, Arthur Young (e.g. 1771b, vol. III, p. 276) frequently reported that the poor 'All drink tea'. Inventory evidence for the Low Countries and eighteenth-century Paris suggests a similar pattern. Outside of these areas, there is not much evidence of working-class purchases of these kinds of goods.

These patterns make very good sense in terms of the wage history developed here. The high wage economy was centred on England and the Low Countries with some lesser offshoots in capital cities like Paris and Vienna. These, indeed, were the places where the consumer revolution occurred. Desire for consumer goods may have been more widespread, but it was the high wage economy that gave the workers, shopkeepers and proto-industrialists the cash to turn their dreams into reality.

Education and learning, skill differentials

Workers in northwestern Europe could enjoy their new-found affluence in ways other than eating or consuming; in particular, they could acquire learning and skills. Sometimes this was done for pleasure and sometimes for gain. Economists usually assume the second motivation was primary and call education 'human capital' since schooling involves expending resources at one time in order to realize a higher income at a later date. Three aspects of 'human capital formation' were literacy, numeracy, and trade skills.

Start with literacy. Its spread has been studied by measuring the proportion of people who could sign their names (rather than make a mark) to marriage registers and other official documents. The ability to sign one's name is an imperfect indicator both because it does not indicate great skill and because many people learned to read without learning to write. Nonetheless, signing can be observed for many people over long periods and – historians presume – was correlated with a wider range of literacy skills.

The signature information indicates that literacy increased dramatically during the early modern period especially in the high wage economies of northwestern Europe. In the late middle ages, literacy was mainly confined to the cities. In Venice, for instance, 33 per cent of the men and 13 per cent of the women were literate in 1587 (Grendler 1989, p. 46), and other cities were similar. Only about 5 per cent of the rural population could read. Based on these proportions and the urban-rural breakdown of the population, the literacy rates for 1500 have been estimated (Table 2.6). At that time, literacy was very low in England – about 6 per cent.

By 1800, literacy had increased everywhere. It was highest in northwestern Europe – the Low Countries, the Rhine Valley in Germany, northeastern France, and England where over half of the population could sign their names. These districts were high wage regions or ones linked to them by migration. In the poorer parts of Europe, only about one-fifth of the population was literate.

People probably learned to read for two reasons – economics and pleasure. Literacy was much more valuable in trade and business than in small-scale farming – at least during the middle ages – which is why literacy was higher in medieval cities than in the countryside. This motive persisted through the early modern period. Some of the

Table 2.6 Adult literacy, 1500–1800

	Proportion of the adult population that could sign its name	
	1500	1800
England	0.06	0.53
Netherlands	0.10	0.68
Belgium	0.10	0.49
Germany	0.06	0.35
France	0.07	0.37
Austria/Hungary	0.06	0.21
Poland	0.06	0.21
Italy	0.09	0.22
Spain	0.09	0.20

Note: Data for 1500 are estimated from rural-urban breakdown.

Rural population assumed to be 5 per cent literate. This is suggested by later data from Nalle (1989, p. 71) and Houston (1988, pp. 140–1, 152–3) for Spain, Wyczanski (1974, p. 713) for Poland, Le Roy Ladurie (1974, pp. 161–4) for Languedoc, and Graff (1987, p. 106) for England.

Urban population assumed to be 23 per cent literate generalizing from Grendler's (1989, p. 46) estimate for Venice in 1587 that 33 per cent of the men and 12.2–13.2 per cent of the women were literate for an overall average of 23 per cent. The proportion was of the same order in Valencia (Nalle 1989, p. 71), among the nobles and bourgeoisie of Poland (Wyczanski 1974, p. 713), and perhaps a bit lower in fifteenth-century London (Graff 1987, p. 106). The small urban shares in countries besides Spain and Italy at this time mean that the urban literacy rate had no discernible impact on the national average.

Data for 1800 are fuller for the seventeenth and eighteenth centuries and include: Nalle (1989), Houston (1988), Graff (1987), Cressy (1980, 1981), Fraga (1990), Grendler (1989), Ruwet and Wellems (1978), Wyczanski (1974), Francois (1989), Furet and Ozouf (1977), Gelabert (1987), de Vries and van der Woude (1997), Park (1980), Chartier (1987), Cipolla (1969), Kuijpers (1997) and Largaue (1987).

rise in literacy in northwestern Europe reflected the urbanization of the period. But urbanization was not enough to explain the upsurge in literacy after 1500, for more people were reading in both town and country in the eighteenth century. Gutenberg's invention of printing with movable type quickly cut the real price of a book by two-thirds. Declines continued, so by 1800 the real price of a book had dropped to

10 per cent of its 1450 value, and books were within the reach of many more people (van Zanden 2004b, p. 13). Protestantism put a premium on reading God's word, and that may have played a role. Catholics in northwestern Europe, however, learned to read and write just like Protestants. The agrarian world was transformed by the legalistically justified reorganization of private estates and by state-sponsored reforms like the enclosure movement, both of which put a premium on being able to navigate through written documents. Economic change raised the value of reading and writing; and, indeed, many eighteenth-century books were legal, technical or otherwise functional. Religion and work were not the only inducements to reading: the early modern period saw the publication of cheap scatological tracts on religion and politics. Irreverence may have been a motive as well as religion (Reis 2005).

Greater numeracy was another aspect of human capital formation. The proportion of people with command of arithmetic and geometry is more difficult to gauge than the proportion who were literate since there was no analogue to marriage registers where a broad swath of the population had to sign their names. Thomas (1987, p. 128) has reviewed much impressionistic evidence and concluded that 'there can be little doubt that numerical skills were more widely dispersed' in England 'in 1700 than they had been two centuries earlier'. Landed gentlemen in 1500 could rarely add or subtract, while their successors two centuries later generally could. By the eighteenth century, there was a voluminous trade in arithmetic books, which suggests that many people were learning the skills. Arithmetic, indeed, had become more powerful: arabic numerals had replaced Roman, while logarithms and slide rules sped calculation. Unlike reading, where pleasure may have been a motive, very few people learn maths for fun: the incentive was instrumental. Geometry was necessary for navigation and surveying that grew in demand as England's merchant marine expanded and its agriculture was reorganized. The examples in the arithmetic texts were drawn from trade and commerce, which must have been the main application of these skills. It was the growth of the urban, commercial economy that generated the demand for mathematical skills that prompted their acquisition.

Craft skills were the third aspect of human capital, and they were usually acquired by apprenticeship. Apprenticeships were contracts in which the master agreed to house and feed the apprentice and to

teach him the trade. The apprentice agreed to work for the master, usually without any pay beyond the room and board, for the duration of the contract. In addition, the apprentice gave the master a payment at the beginning of the apprenticeship. Successful completion of the apprenticeship allowed the apprentice to practise the trade and, in England, conferred important social benefits such as a settlement under the Poor Law. We do not know how common apprenticeship was in the low wage parts of Europe, but it was high in England where two-thirds of the boys in the seventeenth and eighteenth centuries completed apprenticeships (Humphries 2009). The accumulation of these craft skills was an important contributor to the Industrial Revolution.

Masters did not take on apprentices gratuitously. The master charged the apprentice's parents a large sum at the beginning of the apprenticeship. They had to save the money themselves or raise it from relatives. The capital requirements did not end there. To become a master, a boy had to raise the capital to start a business even after he completed the apprenticeship, and that usually required saving part of his pay as a journeyman.

These financial considerations highlight the importance of the high wage economy, which underpinned all three types of human capital accumulation. Charitable support aside, parents had to pay for schooling and apprenticeships. The Ealing gardener we met earlier was spending 6d per week to educate his two children – as much as he spent on beer. Had he been poorer, he might have found school 'too expensive'. Literacy and numeracy were everywhere highest among the wealthy. It was only in England and the Low Countries that a majority of workers could sign their names. In the low wage parts of Europe, peasants and labourers were little more literate than they had been in the late middle ages (Reis 2005, pp. 206–7). A similar situation probably applied to numeracy. High wages facilitated all forms of skill acquisition: the ability of parents to come up with the cash to pay the master for taking on their son was eased if they were in receipt of high wages, and the ease with which a journeyman could save the money to start a business was helped if journeymen earned more than it cost to survive. Widespread literacy, numeracy and craft competence reflected the demand for skills in the advanced economies, and the high wages those economies generated gave workers the money to pay for schooling and apprenticeships.

High wages and economic growth

High wages were a remarkable feature of English life in the seventeenth and eighteenth centuries. They led to high levels of consumption and education. High wages were a consequence of the vigorous economic growth of the period and led to further growth as new technologies were invented to economize on expensive English labour.

3 The agricultural revolution

The English are still imbued with that doctrine, which is at least debatable, that great properties are necessary for the improvement of agriculture.

Alexis de Tocqueville, *Journey to England*, 1833, p. 72

Agriculture played an important role in the expansion of northwestern Europe. In the successful economies of England and the Low Countries, the share of the workforce in farming dropped from about 75 to 35–40 per cent. Since the British and the Dutch were being fed mainly with domestically grown food, each farm worker in these countries had to raise his productivity enough to feed more mouths than before. Not only that – in Chapter 2 we saw that British and Dutch farmers put more food on the table than farmers in other parts of Europe. How and why did they do it?

There is a well-established answer to this question, at least in so far as English agriculture is concerned, and it not only explains the agricultural transformation but also the development surge of the English economy as a whole (e.g. Brenner 1976, Cohen and Weitzman 1975, Earle 1912, Marx 1867, McCloskey 1972, Overton 1996, Shaw-Taylor 2001, Young 1774, etc.). This theory is summarized in Figure 3.1. In this model, the modernization of agrarian institutions – the enclosure of the open fields and the replacement of peasant cultivators with large-scale capitalist farms operated by wage labour – was the prime mover that drove the economy forward (box one). Large-scale enclosed farms are supposed to have produced more food and – in some accounts – employed fewer people per acre than peasants (box two). Greater food production and lower farm employment led to an expanded urban population (box three). The result was greater manufacturing production and economic growth (box four).

This chapter agrees with the established model in affirming the reality and importance of the agricultural revolution. The chapter