Living Standards and the Urban Environment

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Few topics in economic history generate more controversy than the British Industrial Revolution – and arguably no debate in economic history is more famous than the "standard-of-living debate". In the post-war period, the question whether the early stages of modern capitalism led to an improvement or decline in workers' living standards became as hotly contested as many of the Cold War's other theatres. Marxist historians argued that, in exchange for ever longer hours of grinding toil in the factories, the working classes had little to show by 1850 in terms of living standards except for a few cotton goods (Hobsbawm 1972). Optimists such as Max Hartwell pointed to gains in real wages and life expectancy, and to the move to the cities as the escape from the "idiocy of rural life" (Karl Marx).

When O'Brien and Engerman (1981) discussed the issue in the first volume of *The Economic History of Britain*, they emphasized that future research would most likely have to focus on three topics: improvements in the measurement of real wages, of inequality, and of the changes in welfare not measured by income. Twenty years on, it appears that their intuition was remarkably prescient – two of these areas have contributed most to our reassessment of changes in living standards between 1760 and 1850. The issue of inequality, however, is too controversial to permit firm conclusions (Williamson 1985, Feinstein 1988). Consistent wage series by skill category

have proven extremely difficult to compile, and there is no conclusive evidence that the capital share of total income moved significantly; the issue will therefore not be covered in this essay.

I will examine the remaining two research themes in greater detail below. The task of giving a coherent overview is complicated by the great number of indicators that can and have been used to shed light on trends in living standards. Nor do the different variables suggest a uniform direction of change. Much of the difficulty in synthesizing the state of the debate arises from conflicting trends, with different variables moving in opposite directions. Even where they converge, sizeable subgroups of the population (as distinguished by class, gender, age or location) may have experienced substantially different changes, either in terms of magnitude or direction. The echoes of economic change 250 years ago resemble the dissonant tones of a Hindemith or Schönberg concert, not the harmonies of classical symphony. To discern patterns at all requires more than just active listening.

As a first introduction to the trends I discuss in greater detail below, consider the overview of a few indicators in Table 1. GDP per capita in 1760 was a mere 1803 dollars, measured in 1992 purchasing power – Britain was marginally richer than India and Bolivia are in 2000, but a little poorer than Armenia and Indonesia. If the Britain of 1760 were an independent country today, it would rank 149th out of 208 countries (World Bank 2001). Thus, Britons in the past were even poorer relative to contemporaries today that have the same "real" income. Some 90 years later, per capita income had grown substantially – today, Britain's GDP per capita in 1850 would give it a rank ahead of China, but behind Lebanon and the Philippines. Wages apparently improved substantially less than production per head, rising by only four percent over the sixty years between 1760 and 1820, and by less than a quarter for the period 1760-1850 as a whole. Yet to compare across time using 1992 dollars is to ignore radical changes in the range of goods and services that money can buy today – from anesthesia to better lighting, radios, telephones, education and airtravel.[1] Alternative measures may provide a more intuitive guide to living standards.

Heights were very low by modern standards, a measure often used as an indicator of the "biological" quality of life. More than eighty percent of males in Britain in 1966 would have been

taller than their average ancestor 200 years earlier – and the first century of industrialization probably brought little or no improvement, depending on the height series we use. Even the highest levels recorded in the most optimistic series only reach the 25th percentile of modern heights (Floud, Wachter and Gregory 1990: 10). Height differences between the classes were astoundingly high, indicating that children from the lower classes rarely enjoyed adequate nutrition. Sandhurst recruits, normally drawn from the upper strata of society, towered over their peers from London slums. In 1790, for example, the average 14-year-old boy at the Royal Military Academy was a full 14 cm taller than his contemporary from a disadvantaged background (Floud, Wachter and Gregory 1990: 197).

Workloads were high by any standard, even before the Industrial Revolution. While developed countries today often have working years of 1500 to 2000 hours, England may well have had substantially longer hours as early as 1760. The data are hardly more than tentative, and comparisons of absolute levels are highly problematic. Yet the trend, which may be a little easier to establish, also points upwards. By the middle of the nineteenth century, working hours had reached levels that were probably higher than ever before or since.

A life expectancy of 34.2 years appears very short by modern standards. In 1999, even Sub-Saharan Africa recorded average life expectancies of 48 years. Inadequate nutrition as well as ineffective medical intervention combined to keep death rates high. Nor was progress rapid over the following 90 years. By 1850, Englishmen and –women could expect to live five more years at birth. This increase is less than the one seen in the Middle East and North Africa between 1990 and 1999 (9 years) and the same as in Latin America over the same period. Similar conclusions apply to infant mortality. With the exception of Sierra Leone, no country in 1999 had higher death rates than Britain in 1850 or in 1760.

Literacy rates improved during the first century of industrialization – even if the standard used is relatively low, measuring the percentage of bridegrooms who could sign their names (Schofield 1973). This is still less than in Sub-Saharan Africa today, but higher than in a number of Third World countries. By the middle of the 18th century, this rate had grown by 13 percent, putting Britain ahead of present-day Senegal and Pakistan, and on par with Morocco.

Most social scientists would agree that civil and political rights are important aspects of the standard of living. Compiling comprehensive indicators is difficult, as it requires judgements about the indicators included as well as their calibration. One familiar scale, applied to Britain by Crafts (1997), measures progress in these two dimensions on a scale from 1 to 7, with 1 the best possible score. Universal suffrage remained a long way off during the Industrial Revolution. At the same time, there were clear constitutional limits on the king's powers, and the Glorious Revolution had established the sovereignty of parliament. A score of 3 appears appropriate. Civil rights such as the right to a fair trial, an independent judiciary, freedom of speech and the right to form associations are also crucial facets of human progress. Compared to many European countries at the time, Britons enjoyed a relatively high degree of civil liberties. At the same time, political repression grew at the time of the Napoleonic wars and thereafter, with the government using increasingly repressive measures to crack down on Luddites and "Captain Swing" riots. The tide turned from the 1830s onwards. Greater press freedom and greater opportunities for forming civic organizations and assemblies did much to reverse the earlier decline in civic liberties, and by 1850, most of the important human rights in this regard were respected (Crafts 1997: 624).

decade	Y	W	H1	H2	WK	E	M	L	R1	R2
1760	1803	(109)	167.4	171.1	2576	34.2	174	48.5	3	3
1780	1787	100	168	164.6	2952	34.7	173	49.5	3	3
1800	1936	103	168.9	164.6	3328	35.9	145	52.5	3	4
1820	2099	113	170.7	167.2	3342	39.2	154	54.5	3	4
1830	2209	120	170.7	165.6	3356	40.8	149	57.5	3	3
1850	2846	135	165.3	164.7	3185	39.5	156	61.5	3	1
% change 1760-1820	16.4%	4.1%	2.0%	-0.9%	29.7%	14.6%	-11.5%	6%	0.0%	33.3%
% change 1760-1850	57.8%	23.9%	-1.3%	-1.3%	23.6%	15.5%	-10.3%	13%	0.0%	-66.7%

Table 1: Selected indicators of the standard of living, 1760-1850

Note: % change relative to starting level for all variables except literacy, where the figure stated is the gain in percentage points.

Sources:
- Y income per capita in 1992 ppp-adjusted US-$; Crafts 1997: 623.
- W 1780=100; full-employment real earnings; Feinstein 1998a: 652-3 except for 1760, which is based on Lindert and Williamson 1983, spliced to the Feinstein series.
- H1 average height of recruits aged 20-23, by decade of birth; Floud, Wachter and Gregory 1990: 142-7.
- H2 average height of recruits aged 20-23, by decade of birth; Komlos 1993, Komlos 1998, private communication.
- WK number of working hours per year; Voth 2001.
- E life expectancy at birth; Wrigley et al. 1997: 614.
- M infant mortality rate; Wrigley et al. 1997: 224
- L literacy rate; Schofield 1973.
- R1 political rights index (range from 1 to 7, with 1 being the best score); Crafts 1997.
- R2 civil rights index (range from 1 to 7, with 1 being the best score); Crafts 1997.

In the context of numerous indicators that show gradual change, sometimes of varying tendency, only one variable stands out – demographic growth. Population surged at an unprecedented rate during the classic period of the Industrial Revolution (Wrigley and Schofield 1981, Wrigley et al. 1997). Few other variables show radical discontinuities (Clark 2001b). The apparent lack of a clear, strong trend in living standards is nothing short of remarkable in this context. Earlier episodes of demographic expansion and contraction had strong effects on economic well-being, as Malthus predicted. It can be argued that the most remarkable feature of the period 1750-1850 is the absence of a sharp collapse in per capita income (Mokyr 1999).

REAL WAGES

The oldest – and, in some ways, most narrow – of all the indicators of the standard of living has been most important in changing our understanding of the Industrial Revolution. The quality of real wage indices has improved markedly in the last 20 years. Instead of reworking the same old data, collected by Bowley and Wood at the end of the nineteenth century, recent research has at last expanded the number of professions covered in the nominal wage series (Feinstein 1998a). Even more importantly, a new cost of living index now includes information on a much wider range of household items. This momentous effort in data collection has strongly reinforced pessimistic interpretations of the course of living standards during the Industrial Revolution.

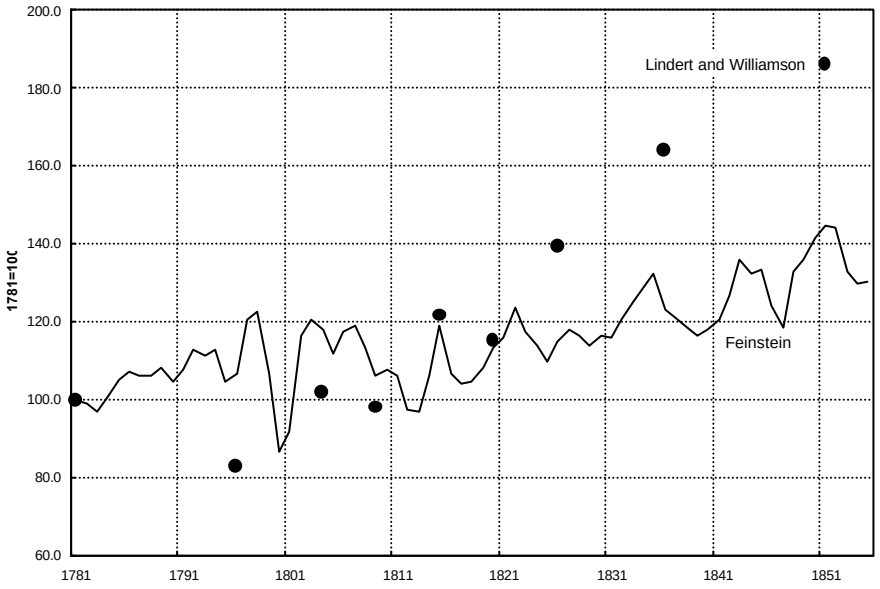

Figure 1: Real earnings in Great Britain, 1781-1855

Source: Feinstein 1998a : 643

Twenty years ago, optimists could point to the course of real wages as their strongest piece of evidence, declaring confidently that "the debate should be over" (Lindert and Williamson 1983). The most sanguine estimates implied that real wages for adult men increased by over 80 percent between 1820 and 1850. Some revisions by later authors reduced this figure to 62 percent (Crafts 1985b). Also, other authors found that wages of skilled workers surged between 1770 and 1815 (Botham and Hunt 1987), and that the income of clerks in banks and the East India Company

increased drastically (Boot 1999, Boot 1991). One of the first pieces of evidence that contradicted these results was new information from budget surveys. Horrell and Humphries (1992) showed that total family income probably failed to keep up with prices over the period 1791-5 to 1816-20. Declining opportunities for female employment drove a wedge between family budgets and the wage gains of males.

What overturned the optimistic verdicts, however, was not a fundamentally new view of trends in nominal wages, but of prices. While the new Feinstein series differs from the Lindert and Williamson nominal wage index in some respects, it follows a broadly similar trend over time. Prices of consumer goods, however, fell markedly less after the end of the Napoleonic wars than earlier authors appreciated. The new consumer price index contains information on 12 food items plus beer, as well as data on candles, coal, and clothing. It also uses a more accurate rent series. In addition to using improved and additional series, Feinstein also changes the base year and expenditure weights in his index series. Every single one of his corrections diminishes the extent of the price decline after the end of the Napoleonic wars. While most adjustments are relatively small – adding series for potatoes, milk and cheese reduces the total fall in prices by 3.2 percent – the cumulative effect is substantial. While Lindert and Williamson had concluded that the cost of living declined by 51 percent between 1810/14 and 1849/51, the new figure is 37 percent (Feinstein 1998a: 640-642). The new index covers most of the commodities bought by working class households. In particular, the new series on the price of clothing – and evidence on its robustness – as well as the collection of good data on rents strongly suggest that future revisions are likely to be small.

As a result of these revisions, the overall increase in real full time earnings is reduced to a little over thirty percent. Also, Feinstein was one of the first to derive confidence intervals for his estimates of real wage increases. Consequently, the often-invoked “uncertainty arising from incomplete historical data” can finally be quantified. He calculates that real full-time money earnings may have increased by as little as 19 percent, or by as much as 55 percent between 1778/82 and 1848/52. This rules out stagnation, but even the upper bound is markedly below the earlier estimates by more optimistic authors. Further research has tended to reinforce these conclusions by, for example, showing that Feinstein’s estimates of real wages may be too

sanguine for the period 1790-1820 (Clark 2001a). Taking unemployment and short-time work into account further reduces real wage growth to a less than 30 percent increase over the period 1780 to 1850 as a whole. Since wages probably fell between the 1760s and 1780s, the overall gain in purchasing power was even more limited. These figures may still convey too optimistic an image of living standards once changes in a wider range of indicators is considered, as the following sections argue.

HEIGHTS AND PHYSICAL WELL-BEING

Over the last few decades, income as a measure of living standards has been much criticized (Tobin and Nordhaus 1973). The main objection is that it represents an input in the production of well-being, not an output. To the extent that wages rise because they compensate for urban disamenities or the riskiness of particular kinds of work, measuring income may seriously overstate gains in the standard of living. Also, while income at low levels of development is essential for purchasing additional food, housing, or health care, it is also often associated with the purchase of products that harm physical well-being, such as alcohol and tobacco.

Few research programs created more enthusiasm at their inception than the use of body measurements to establish trends in living standards. The stature of children and adults has become the focus of numerous studies during the last twenty years. Height is a measure of net nutritional status from birth to age 25. In most populations today, growth ceases at age 18 or even earlier. The amount of nutrients consumed, as well as their composition, is crucial for growth. So are the claims on nutrient intake – calories used up to cope with heat, cold, or disease, or to withstand the rigours of work. What matters is the net nutritional balance: the amount of calories and protein available for growth. Children deprived of adequate nutrition can experience “catch-up” growth. If adequate food becomes available at some stage up to age 25, growth resumes. Height gains at such relatively late stages in life can be dramatic – on American plantations, slaves went from being severely stunted in childhood to terminal heights that were an easy match for European populations (Steckel 1986). Also, there is increasing evidence that the nutritional status of mothers affects children for most of their lives.

Height seemed an attractive indicator of physical well-being because it is not an “input” measure, such as income. Instead, it captures net outcomes (Komlos 1989, Fogel 1984). Despite the collection of enormous amounts of data, however, firm conclusions from this research program are few and far between. The original intention was to cast light on living standards for periods when data on incomes was scarce or unavailable. Indeed, some scholars tried to derive estimates of per capita income based on the co-movement of heights and income in later periods (Brinkman, Drukker and Slot 1988). However, it appears that height and income are not highly correlated, at least during the eighteenth and nineteenth centuries; some of the correlations used to extrapolate income per capita backwards were spurious (Crafts 1997; Mandemakers and Van Zanden 1993). Anthropometric history abounds in examples showing that poorer populations were often taller, and that economic development often proceeded side-by-side with falls in average heights (Steckel 1986, Nicholas and Steckel 1991). The fact that recruits from rural areas – which often had relatively low per capita incomes – were markedly taller strongly suggests that the disease environment and the relative price of food may have been more important than total income (Steckel 1995). The relationship is further complicated by the fact that inequality has an impact on average stature that is several orders of magnitude larger than that of GDP (Steckel 1983). Most scholars working in the field now accept that stature and per capita income may not be highly correlated over significant periods of time and in cross-sections, and that one cannot serve as a proxy for the other. Also, there appears to be no systematic association between industrialization and a decline in heights (Steckel and Floud 1997).

Historians of height have tried to side-step the issue, arguing that stature represents a more comprehensive indicator of the "biological standard of living" (Komlos 1993, Baten and Komlos 1998). Deviations of trends in height from those for income would then have to be indicative of broader changes in physical well-being. This is because the *direct* benefits of greater stature are extremely limited. While greater life expectancy for adults and lower infant mortality rates are beneficial in themselves, greater heights are not. Stature is useful only insofar as it has indicator value for other characteristics that are associated with a higher standard of living. More immediately useful measures of health outcomes include life expectancy and mortality, as well as proxies for human capital such as education and literacy that may facilitate better hygiene etc.

Unfortunately, while more comprehensive indicators of living standards that incorporate information on infant mortality, life expectancy, and literacy appear highly correlated with stature in the 20th century as well as over the very long run, the same is not true during earlier periods. Periods with increasing life-expectancy and falling infant mortality sometimes witnessed declining heights (Crafts 1997). This is all the more surprising since modern cross-sectional data from Norway shows that gains in stature are normally associated with reductions in mortality (Waaler 1984) – a pattern also found among Union army recruits during the U.S. civil war (Costa 1993). It is because of divergent trends in average heights and life expectancy that, during specific historical periods such as in Britain 1760-1850, changes in height can be poor indicators of physical well-being.

Conceptual issues therefore often make it difficult to map from stature to the standard of living in general (Crafts 1987), especially when trends over time are concerned. Even if these were resolved, heights would have relatively little to say about the evolution of living standards in Britain during the Industrial Revolution. This is for two reasons. First, the direction of change has proved difficult to establish. Second, the magnitude of observed changes is too small to suggest meaningful differences in living standards. The most commonly used dataset contains information on the heights of 108,000 recruits for the British Army and Royal Marines, and of boys entering the Marine Society in London as well as Sandhurst. While Floud et al. argue that heights increased over the period, Komlos finds evidence of a decline in the same data (Komlos 1993, Floud, Wachter and Gregory 1990). The cause of this peculiar divergence of views is that all of the data from military sources is affected by left-hand truncation of the underlying height distribution. Armies imposed minimum heights standards. Recruits below a certain height were routinely rejected. To adjust to the fluctuating demands of the armed forces, standards varied over time. Also, they were enforced to a varying degree. While it is possible to correct these biases with quantitative techniques, few of the data actually fulfil the requirements for their use (Wachter and Trussell 1982). Data on the stature of transported convicts do not suffer from truncation, and the results obtained from this source appear more stable. They show a decline in average heights (Nicholas and Steckel 1991).

Even if results were unambiguous in their direction, the magnitudes involved are too small to inspire much confidence in any conclusions based on anthropometric data. Floud et al. find that average heights increased by 3.3 cm, from 167.4 cm to 170.7 cm between 1760 and 1830, and that they then fell to 165.3 cm. Even without the reversal in the last two decades, increases of 0.47 cm per decade would hardly be sufficient as a basis for strong claims about changes in living standards – overall, average heights increased by 1.97 percent between 1760 and 1830, according to Floud et al. (or 0.28 percent per decade). Komlos (1993) found a decline of 1.3 percent. Nicholas and Steckel (1991) also calculate that convict heights fell between 1780 and 1815 by approximately one percent of the starting level.

These are small differences, compared to changes in heights during other periods. Between 1900 and 1950, average male heights in Britain increased by 8 cm, or 1.6 cm per decade (Steckel 1995). This represents a rate of change that is more than five times higher than the one observed during the most favourable episode of the Industrial Revolution (using the optimistic results by Floud et al.). Moreover, interpretation of trends in heights – even if their direction could be established unambiguously – is complicated by the considerable variability of estimates over short periods. The overall decline between 1760 and 1850 according to Floud et al. is 2 cm. However, estimated heights appear to change very markedly within a few years. For example, the Floud data shows a decline by 3.1 cm over a five-year period, from 1832 to 1837, followed by a 2.2 cm gain in the next five years. Estimated heights change so much from decade to decade that, over the period as a whole, 95 percent of all observations lie within a 8 cm interval between 164.6 cm and 172.6 cm – four times larger than the overall change between 1760 and 1850. Independent of the statistical significance of these results, it would be hard to argue that a historically meaningful difference exists once sampling biases, problems with truncation because of minimum height standards, and the deficiencies of historical data in general are taken into account.

WORKING HOURS

Ever since the writings of William Blake and Karl Marx, the Industrial Revolution has been synonymous with long hours of arduous toil, often by children and women, under dangerous and unhealthy conditions. Europe's "dark satanic mills" producing cotton textiles saw the longest working years recorded in human history – around 65 to 70 hours per week, or some 3,500 hours per year. Compared to these figures, the working week in the Third World today is relatively short, averaging 40-50 hours (Acemoglu, Johnson and Robinson 2001: 27). Did such long hours exist before the Industrial Revolution? Or did the great shift of labour out of agriculture and into industry coincide with a move towards much longer working hours? Changes in the hours of work would have strong implications for the standard of living debate – if money incomes rose only because of more work, it becomes much harder to argue that living standards improved (O'Brien and Engerman 1981). A comprehensive view of welfare implications would have to take into account the value of leisure lost (Crafts 1985a, Usher 1980). To do so would be particularly useful since the potential magnitudes of change involved are substantial.

Data on working hours before the Industrial Revolution is very rare. What little there is can only shed light in an indirect way, and may be of questionable reliability. A considerable degree of variation by region, occupation, gender and age aggravates problems of representativeness for any particular source. Despite the weaknesses of the data, many historians have argued that average working hours for males of prime working age between 1750 and 1850 increased, by between 20 and 35 percent (Crafts 1985a, Freudenberger and Cummins 1976, Tranter 1981).

Research in the last 15 years offers some qualified support for this belief. Hours in agriculture were probably already long before the Industrial Revolution, and may not have changed much (Clark and van der Werf 1998, Voth 2001). Outside agriculture, there is some evidence that people in 1830 and 1850 worked longer than their great-grandparents did in 1760. Using witnesses' accounts from the courtroom, new estimates of the length of the working year in London and in the industrializing North of England have been compiled (Voth 1998, Voth 2001). The main factor responsible for longer hours, according to these results, was not a longer working day. Instead, work was performed on many more days in the year. What had curtailed total labour

input in pre-industrial times was a large number of festivals and holy days, both religious and political in nature. Also, when workers set their own schedules, they were prone to take Monday off – a practice know as “Saint Monday” (Thompson 1967).

The courtroom evidence strongly suggests that Mondays and holy days were indeed days of leisure during the middle of the eighteenth century, and that they had become days of regular work by the first decades of the nineteenth century. Yet the persistence of practices such as St. Monday is controversial (Reid 1976, Reid 1996), and a considerable degree of regional variation may make it more difficult to ascertain national trends (Hopkins 1982). At the moment, it appears that the balance of evidence favours increases in total workloads during the Industrial Revolution for males of prime working age. The direction of change is much more clearly established than the magnitudes involved. Despite numerous efforts over the last two decades, it appears unlikely that the quality of the data will match that on wages, mortality, or literacy any time soon.

Using witnesses’ data to construct tentative estimates of annual labour input, we can compare total annual working hours before and after the Industrial Revolution. They suggest a relatively rapid increase during the second half of the eighteenth century, and then stagnation or a slight decline from a peak around 1830. If the findings are even broadly correct – and can be compared with the data derived from very different sources for later periods – then total hours before the onset of full industrialization were approximately as “short” as they were around 1900.

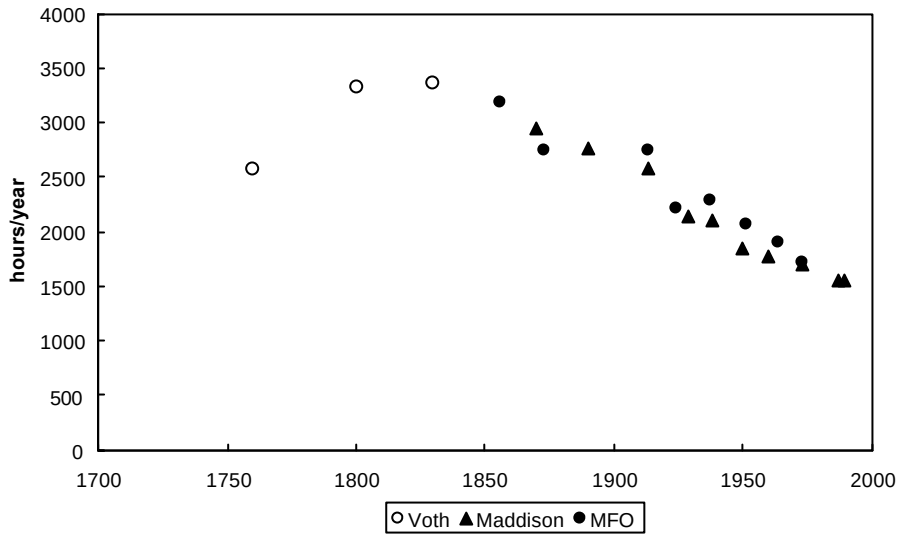

Figure 2: Working hours in Britain in the long run

Sources: Matthews, Feinstein and Oddling-Smee 1982, Maddison 1991, Voth 2001.
Notes: MFO is the series by Matthews, Feinstein and Oddling-Smee 1982.

Increases in the length of the working year may have been mitigated by declining work opportunities for women, and less child labour. Earnings data show that females may have participated in paid work to a considerable extent. In the late eighteenth century, 65 percent of married women had either non-zero earnings or a recorded occupation. Household budgets suggest that the earnings opportunities of women declined as industrialization spread. Many of the old cottage-shop industries were more compatible with the skills of women, and their preferred modes of working than the factory-based system of production (Horrell and Humphries 1995). The story differs somewhat for different occupations, and is complicated by an apparent increase in female contributions to family income in the second quarter of the nineteenth century. Nonetheless, by the middle of the eighteenth century, women's participation rates had fallen to 45.3 percent, and their share of total family earnings was often below its peak (Horrell and Humphries 1995: 98-107).

Child labour may have begun to decline during this period. It is possible that the reduction began before the Factory Acts (Nardinelli 1980), over the period 1815-1835. However, other scholars using the same sources find that child labour was and remained high in many industries,

including cotton (Tuttle 1999). Therefore, the idea that child labour was a necessary but transitory phase of industrial development that enabled the formation of a disciplined workforce appears questionable (Galbi 1997). What is also unclear is the extent to which an increase or a decline in the prevalence of child labour occurred between 1750 and 1810. Child labour was common enough in agriculture (Kussmaul 1981, Humphries 2001) – it is not obvious that increasing employment outside the primary sector would have necessarily led to greater employment of children and adolescents. The data from Parliamentary Papers do not suggest a substantial decline in child labour before the 1830s. At the moment, the potentially more important issue of employment shares during the middle of the eighteenth century remains largely unresolved because of substantial data problems.

Child labour matters because it is one of the key characteristics of the British Industrial Revolution (Humphries 2001), and because the welfare implications of changes are less ambiguous than, for example, in the case of women. The increasing dependence of women on male earnings was likely to reinforce patriarchal patterns of behaviour – even if more time spent in the home could also have been used for the production of non-market goods. Less child labour may have led to a reduction in family earnings, but would normally be seen as welfare-improving nonetheless. Early work, especially in mines and factories, often led to injuries and disabilities. Even those who were not maimed or afflicted by debilitating disease as a result of early work – often from the ages of 9 or earlier – were left permanently stunted (Humphries 1997). Also, their chances to acquire greater skills, either through schooling or apprenticeships, was often reduced dramatically. The normal premises of utility-maximization do not apply when economic agents cannot chose "freely" – as is the case with children (Humphries 2000). While the trend may or may not have been downwards, the extent of child labour remained relatively high throughout the Industrial Revolution. As late as 1851, the census suggests that 36 percent of children aged 10-14 worked – and the rates based on autobiographies are even higher (Humphries 2001: 17). This implies that child labour in industrializing Britain was broadly as common as in Africa and Asia in 1950, and more frequent than in India and Brazil at that time.

Evidence on working hours among children and women suggests that the increases in male hours may have been balanced to a certain extent by declining work for women and (possibly) children,

at least in classic paid employment. Magnitudes are hard to establish at the aggregate level, since most of the evidence is highly concentrated at the regional or sectoral level. To the extent that total hours worked in the British economy grew net of these countervailing forces, estimates of consumption and income growth need to be corrected. Calculating the value of leisure lost is not straightforward. However, if the average wage rate is used as the opportunity cost of leisure (Usher 1980), then most of the relatively modest gains that traditional accounting methods used to show disappear (Voth 2001). Instead of growing by 0.38 percent per year between 1760 and 1830 (equivalent to a total gain of 30 percent), consumption may only have increased by 0.04-0.05 percent per year (a total increase of 3 percent).

This argument would be further reinforced if work intensity increased. Evidence on this is very patchy indeed. What there is largely compares piece-rates with weekly wages. Dividing the former by the latter yields an index of physical output per week (Clark 1987, Clark 1991). Much of this work documents that levels of work effort in Britain during industrialization were high, that the move to factories increased them, and that they may have risen over time. Clark finds that workers in factories may have worked up to one third harder (Clark 1994). He also finds that work intensity in English agriculture may have increased by 38-89 percent (Clark 1987: 427).

If some of the observed rise in output was not just bought by longer hours, but by harder toil, the overall productivity gains would be even less impressive than is currently thought. In welfare terms, however, the implications may well be ambiguous. Clark (1994) argues that factory discipline functioned as an effective pre-commitment device, enabling workers to overcome short-sighted preferences for leisure. The underlying assumption is that, in a competitive labour market, firms that do not offer adequate compensation for extra work intensity would have found themselves without workers eventually. Given that much of the recent evidence, especially in terms of real wage trends, shows that the Lewis model of surplus labour may describe the situation of industrializing Britain more adequately (Feinstein 1998a), this interpretation will remain highly controversial.[2]

CONSUMPTION AND HOUSEHOLD BUDGETS

The old optimist case quickly ran into one problem – if incomes grew, what were they spent on? Further work on purchases of basic foodstuffs, as well as luxury items such as sugar, coffee, tobacco and tea has demonstrated that the history of consumption offers little support for the view that living standards improved markedly. These findings are largely corroborated by household budgets.

Joel Mokyr (1988) was among the first to wonder whether luxury consumption supported optimistic interpretations of the Industrial Revolution. He examined commodities that were not produced domestically, such as tea, coffee, sugar and tobacco. Because they were imported, it is relatively straightforward to establish total volumes consumed. Spending on these goods probably represented only a small share of total expenditure (Figure 3). Nonetheless, since they are generally regarded as superior goods, their consumption should have risen by more than one percent for every percentage point gain of income, thus making them a particularly sensitive indicator of trends in incomes.

					standard of living indicator, based on		
	Sugar	Tea	Tobacco	Borda ranking	Sugar	Tea	Tobacco
1794-96	16.03	1.6	1.12	6			
1795-99					15.96	16.09	8.78
1804-06	22.86	1.74	1.14	2			
1805-09					17.03	16.04	9.32
1814-16	17.35	1.57	0.97	7			
1815-19					15.54	15.29	8.58
1824-26	21.64	1.61	0.91	6			
1825-29					16.64	15.49	10.9
1834-36	20.72	1.88	0.98	4			
1835-39					16.51	15.88	14.12
1844-46	22.26	1.85	1.03	3			
1845-49					17.79	16.20	16.84
1854-56	33.11	2.43	1.2	1			

Table 2: Consumption of luxury goods (in pounds of weight), standard-of-living indicator (in pound sterling)

Source: Mokyr 1988

Instead of rising rapidly, however, rates of increase remained modest for most luxury commodities. Tobacco imports per inhabitant were broadly stagnant, while sugar and tea consumption began to rise after the end of the Napoleonic wars. Yet not all of the increase can be seen as a sign of increasing riches – prices of some of these goods declined in relative terms, making them easier to purchase. By adjusting for these changes, Mokyr constructs an index of "latent" purchasing power, revealed by the pattern of imports (Table 2, final three columns). Consumption of sugar, adjusted for price changes, only rose by 14 percent between the 1790s and the second half of the 1840s (Mokyr 1988). The respective figure for tea is 2.3 percent. In the case of tobacco, this indicator stagnates until the 1820s, but then doubles. We can rank periods by the amount of each commodity available per head of the English population and aggregate these rankings into a single score per time period according to the "Borda rule".[3] This shows that 1804-6 recorded relatively high levels of luxury consumption. The 1820s, on the other hand, marked a low point. Despite improvement in the 1830s, it was not before the 1850s that consumption of luxury products exceeded levels seen in the 1800s. With the exception of tobacco, there is therefore no sign of people spending much more money on the kind of goods that would have been most likely to attract additional purchases, had living standard indeed improved substantially.

This interpretation is indirectly vindicated by the so-called "food puzzle" that some researchers have identified in industrializing Britain (Clark, Huberman and Lindert 1995), based on the premise of rapid income growth. They extend Mokyr's question to food consumption in general. The sum of domestic food production plus imports may well have failed to keep up with population growth during the period (Holderness 1989). Clark, Huberman and Lindert try to resolve the puzzle by assuming changes in the relationship between final food consumption and the value added by agriculture and imports. However, the markedly more pessimistic estimates of income growth due to Feinstein imply that the food puzzle no longer exists – food consumption barely changed, and may have fallen on a per capita basis, because purchasing power was largely stagnant.

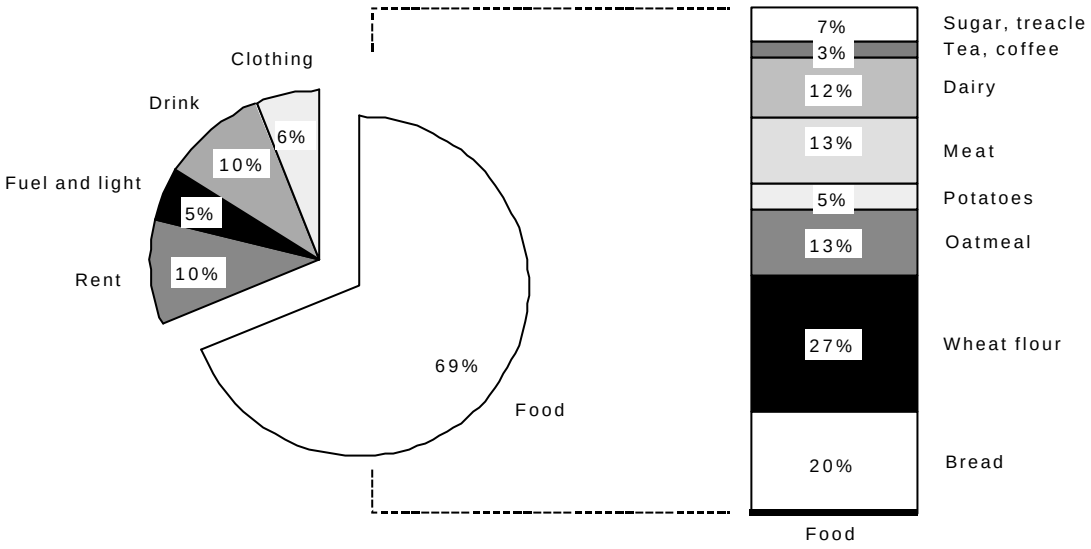

Figure 3: Composition of working-class expenditures, 1788/92

Source: Feinstein 1998a

There is one part of household budgets that probably saw rising real expenditure – the purchases of durables and semi-durables. While clothing isn't customarily classified as a durable good, it provides a stream of services for an extended period. A number of indirect indicators suggest that Englishmen and –women were accumulating clothing and other (semi-) durables at a higher rate. First, probate inventories show that, during the second half of the eighteenth century at least, even the poor were dying in possession of a larger number of goods than they had half a century before (King 1997). Second, workers were devoting a greater share of their budgets to the purchase of clothes – possibly rising by as much as one third between 1788/92 and 1858/62, from 6 to 9 percent of the total (Feinstein 1998a: 635). This was, to a large extent, a response to a shift in relative prices. The nominal price of clothing goods probably declined by one third between the 1770s and the 1850s, at a time when the prices of almost all other commodities in the Feinstein cost-of-living index was rising (Feinstein 1998a: 640). Household budgets show that, while total household spending grew by 43 percent between 1789-96 and 1830-9 in nominal terms, total expenditure on non-essential items increased by 137 percent (Horrell 1996). In the absence of

growing riches, such a shift was predominantly driven by the relatively lower price of these goods, especially cotton clothing. In contrast to the assertions of those who detect a "consumer revolution" unfolding in eighteenth century England (McKendrick, Brewer and Plumb 1982), changes in material life did not necessarily require substantial income growth.

URBANIZATION, MORTALITY, AND THE VALUE OF LIFE

Average life expectancy at birth in England rose between 1760 and 1850. Despite this improvement, the history of mortality does not provide unanimous support for an optimistic interpretation of the Industrial Revolution. First, the levels reached were unimpressive by the standards of England's own demographic history. Second, the experience of important sub-groups and regions shows a decline in life expectancy. Third, compared with other industrializing countries at the same level of income per capita, English life expectancy was disappointingly low.

In the very long run, the age of Elizabeth I stands out for the long lives that Shakespeare and his contemporaries could expect. From a peak of 42.7 years in 1581, life expectancy at birth fell for the following century and a half, reaching a nadir of 25.3 years in 1726 (Wrigley et al. 1997: 614). By 1826, it had recovered to almost the same level as the one seen 250 years earlier – 41.3 years, before falling back to 39.5 in 1850. The experience of subgroups was often much less favourable.

Housing conditions in Britain during the Industrial Revolution were dismal. In the *Inquiry into the Sanitary Conditions of the Labouring Population* in 1842, Edwin Chadwick argued that

> various forms of epidemic, endemic, and other disease [are] caused… chiefly amongst the labouring classes … by decomposing animal and vegetable substances, by damp and filth, and close and overcrowded dwellings [that] prevail amongst the population in every part of the kingdom, whether dwelling in separate houses, in rural villages, in small towns, in the larger towns--as they have been found to prevail in the lowest districts of the metropolis (Chadwick 1842).

In early modern Europe, towns in general could exist only because of a steady influx of migrants from the countryside – death rates almost never fell below birth rates. Crowding, unsanitary

conditions, difficult access to fresh drinking water and fresh food as well as lack of immunity from infectious disease for many of the new migrants from the more isolated areas all conspired to drive up mortality rates. These difficulties were compounded when a very large proportion of the population began to move to the cities over a relatively short period. Few places apart from Devil's island inspired quite the same horror as did Britain's industrial cities – which is why Friedrich Engels's description of conditions as "social murder" is particularly appropriate. Nonetheless, it is worth noting that, by the 1840s, the great cities of industrializing Britain were no longer in danger of disappearing without inmigration – because of strong demographic growth, birth rates actually exceeded death rates (Williamson 1990: 222). Dreadful as conditions were, especially in the industrializing cities of the North – the period between 1750 and 1850 also saw major improvements in the urban environment, at least in part. Many of the main streets were paved, and gas lighting, street names and house numbers became more common (Reed 2000). Wooden structures with thatched roofs were replaced by brick buildings with tiled roofs, reducing the risk of fires and infection from rats (Appleby 1980); the gradually growing separation of residential areas from the place of work reinforced these benign tendencies. New suburbs began to grow near the major metropolitan centres, while museums, public libraries, and government offices were built (Clark 2000).

The great shift out of agriculture and into industry, now seen as the defining characteristic of the Industrial Revolution, also implied a reallocation of labourers from rural areas and small towns to the cities (Williamson 1990, Crafts and Harley 1992). New industrial cities changed the urban hierarchy. The proportion of the population living in cities approximately doubled over the period, rising from 26 percent in 1776 to 56.4 percent eighty years later. Not only did the move to Britain's cities occur earlier than in most other European countries. For any given level of per capita income, British urbanization was also markedly higher than on the continent (Crafts 1985a: 62). While, for example, other countries showed an urbanization rate of 23 percent at the level of per capita income reached by England in 1800, her figure was 33.9 percent. Nor did the gap decline over time. Forty years later, when almost every second Englishman and –woman lived in an urban area, the European norm suggested that fewer than one in three should have been living in cities.

To put things into perspective, comparisons with the urbanization experience in the Third World are instructive. Williamson (1990: 220-3) finds that Britain's cities grew more slowly than their counterparts in the less developed countries today. Also, cities and rural areas in poorer parts of the world show very similar mortality and birth rates. In contrast, in Britain the crude rate of natural increase was markedly higher in the countryside than in the cities. In 1842, Chadwick had guessed "[t]hat of the 43,000 cases of widowhood, and 112,000 cases of destitute orphanage relieved from the poor's rates in England and Wales alone", the majority was attributable to unsanitary living conditions, and that at least 13 years of productive life were lost in each case. The full extent to which life expectancy suffered in the industrial centres of North England has only been confirmed in recent years. It appears that, in a number of cities at least, Chadwick's number is even an underestimate of the mortality penalty in the cities where conditions were worst.

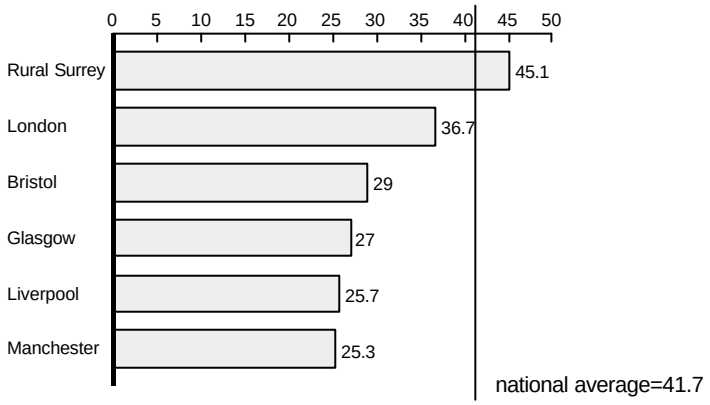

Figure 4: Life expectancy at birth (in years) in selected cities and areas, 1841

Source: Szreter and Mooney 1998: 93, Wrigley et al. 1997: 614.

While life expectancy in the largest city of Europe, London, in 1841 was not far below the national average – though considerably below that of rural areas such as Surrey – the rapidly growing industrial cities of the North experienced very high levels of mortality. Children born in Manchester suffered a penalty of 16.4 years compared to the average for England as a whole. Szreter and Mooney (1998: 105) demonstrate the extent to which the move to the cities extracted a high and growing price in the first half of the nineteenth century. Based on the unusually good

data in Glasgow, and the general similarity in the mortality experience of English provincial cities with more than 100,000 inhabitants and Glasgow's, they calculate that average life expectancy possibly fell by six years between the 1820s and 1830s. Improvements beyond that low level were not visible before the 1850s, but it took until the 1870s to reach the same low mortality levels as in the 1820s.

Also, there is growing evidence that the second quarter of the nineteenth century saw a general rise in childhood mortality. Death rates during childhood reached a high point of 348 per 1000 in the second quarter of the seventeenth century. Some 75 years later, it was 25 percent lower, at 263. After reaching this low point, it started to increase again, reaching 287 in the period 1825-37, and 315 in 1837-54. This trend is apparent in the Cambridge Group's reconstitution study, which relies on parishes that were predominantly in relatively small market towns. In the aggregate, infant mortality increased after the period immediately after the Napoleonic wars, registering an increase of by 10 percent between the 1810s and the 1820s, and a rise of 11 percent between the 1810s and the 1850s. It was worse in industrializing areas. Even in relatively small towns with around 15,000 to 20,000 inhabitants, those that had a high share of labour employed in agriculture saw a worsening of infant mortality (Huck 1995). In a sample of nine parishes with substantial employment in mining, the cotton industry, and iron manufacturing, infant mortality rose from a low of 151 per 1000 in 1813-18 to 172 in 1831-36.

What is the value of changes in life expectancy? Usher (1980) suggested an innovative method to adjust real income per capita for changes in mortality. The value of an increase in life expectancy will be equivalent to the extra future consumption that it makes possible – assuming that the gain in life expectancy is not driven by higher income itself. This method has been refined and applied to industrializing England (Williamson 1984). To make such an adjustment, we need assumptions about the extent to which people discount future increases in consumption, and how much they value consumption in their utility function. Depending on the assumptions used, Williamson calculated the growth of lifetime income over the period 1781-1851 would have to be revised upwards by 0.01-0.16 percent per year. Even the highest of these figures is relatively low compared to the "pessimistic" estimates of earnings growth by Feinstein, who calculates that full-

time earnings grew by 0.43 over the period. The value of changes in life expectancy was small because the gains themselves were relatively small, too.

The great move to the cities normally led to wage gains, even after adjusting for the higher cost of housing and much else (Williamson 1990). At the same time, the penalty in terms of higher mortality rates was anything but trivial (Figure 4). Was one sufficient to compensate for the other? In a cross-section of English towns, those with higher infant mortality and population density also recorded higher wages. Based on these observations, we can calculate the proportion of the urban wage premium that was simply compensating for urban disamenities. Williamson (1990: 255-56) finds that, relative to rural wages, premia of 10 to 30 percent were necessary to compensate workers for moving to the cities of industrializing England. For the South of England, this implies that there were still gains in living standards for those workers making the transition, whereas in the North, the gain might be slim indeed, with the disamenity premium accounting for 28 and 83 percent of the nominal wage gain (Williamson 1990: 186). Once the higher cost of living is taken into account, the increase in living standards seems relatively small. Also, the national figures for wage gains must be adjusted for the fact that some of the apparent real wage gains simply compensated for urban disamenities. In the aggregate, real wage gains need to be reduced by 3 to 8 percentage points (Feinstein 1998a: 650).

An alternative method is to use the observed premia for risky jobs, and to calculate the proportion of the wage gain that simply compensates for higher mortality risk (Costa and Steckel 1997: 76). In the US, the risk premium for dangerous jobs in 1969 was about 5 percent, and surveys show that workers are willing to pay 2 to 4 percent of annual income for a reduction in job-related mortality risk from 0.1 percent per year to zero. Costa and Steckel also find that similar or even larger magnitudes prevailed in the 19th century. Of course, the use of risk premia from the 20th century is not without conceptual difficulties. If we use the figures employed by Costa and Steckel, what does this methodology imply for urban disamenities in industrializing Britain? I use the Princeton life table "North" to translate life expectancies into mortality rates. The average 25-year-old man in England in 1841 had a 49.4 percent chance of living to the age of 65. By moving to Bristol (by no means the worst of the industrial cities, cf. Figure 4), his chances would decline to 34.9 percent. A 15.5 percentage point higher chance of death by age 65 is the "physical price"

of moving – for every seven Englishmen per cohort dying in rural areas, nine would be dead by age 65 in the cities. What is the monetary value of this penalty? If the risk premium is between 2 and 5 percent, this would imply that he should have demanded a wage premium of 16 percent to 41 percent per year to be compensated for the higher risk of early death.[4] Since real wage premia ranged from 26 percent in the North to 96 percent in the South, this would imply that migrants may have shown a net gain in the North, depending on the risk premium used, and that a sizeable advantage was likely in the South. In the North, men in the cities had to last to age 56 to enjoy the same cumulative earnings as their rural peers between age 25 to 65. Less than 40 percent of each cohort of 25-year olds did, which suggests a certain degree of "irrational exuberance". In the South, they only had to live to age 43; approximately 64 percent managed. In cities with lower life expectancy than Bristol, such as Manchester, even smaller fractions of each cohorts lived to "break even". The welfare implications therefore depend on the extent to which we take revealed preferences at face value. If we assume that, by moving to the cities, people made an informed choice, we rule out the possibility that their standard of living may have deteriorated as a result. If we allow for some degree of myopia and less than perfect information, and use reasonable figures for the value of years lost, urban disamenities may easily have been large enough to cancel out any increase in living standards for the majority of migrants.

COMPOSITE MEASURES OF WELFARE

As the discussion in this essay has tried to emphasize, the standard of living is notoriously hard to define. No single variable provides a reliable, comprehensive view. At the same time, policymakers and historians are keen to be able to compare trends over time, nations with each other, or the differential fates of sub-groups. In response to these needs, a variety of composite indices that weight a number of indicators have been compiled in recent years. The first attempt of this kind was made in the late 1970, using a weighted average of infant mortality, life expectancy, and adult literacy (Morris 1997). The United Nations Development Programme later developed more advanced versions of this index. In its most commonly used form, it contains normalized indices of national income per capita, life expectancy, and educational attainment. The level of each variable is compared to the minimum (the dollar value of a subsistence diet in the case of per capita income, for example) and the maximum values (maximum life expectancy in a human population, e.g. 85 years). For a country that has reached complete literacy, the individual component of the index would, for example, record a 1.0 score. A country with a life expectancy of 60 years (assuming a minimum of 25 years) would receive a score of $\frac{60-25}{85-25}=\frac{35}{60}=0.583$. HDI is simply the weighted average of the three sub-indices.

The choice of indicators included in the index is, however, not compelling. Dasgupta and Weale offer an alternative index, which also includes information on political and civil rights. Their aim is to compare ordinal measures of well-being, not to provide cardinal measurement (Dasgupta and Weale 1992). They therefore use the "Borda rule" to aggregate their sub-indices into their broader measure of well-being (DW-index).

Applying these composite indices to the case of Britain during the Industrial Revolution is attractive for a number of reasons. First, it permits an explicit approach to the vexed question of weighting the importance of different indices. Second, the HDI approach allows us to calibrate differences over time, and to compare levels of overall well-being between countries. Third, these indices can serve as a basis for further refinements, taking gender differences or the inequality of income into account (Crafts 1997, Costa and Steckel 1997).

Crafts (1997) was among the first to apply these aggregation methods to the economic history of the Industrial Revolution. His findings suggest cautious support for the optimistic case – HDI grew in every period he examined, by a total of 49.6 percent. The DW-index also suggests the same uniform pattern of improvement, and so do the indices taking gender differences and income inequality into account. These conclusions are, however, not compelling. A wider set of indicators can be incorporated into a measure of well-being along the lines of the DW-index. Arguably, work effort necessary to produce income should be included. In a similar spirit, the new wage figures by Feinstein should be incorporated in the index. Also, new data on life expectancy has become available (Wrigley et al. 1997). Finally, numerous authors have computed "Pseudo-HDI" for a number of countries, choosing stature to replace life expectancy (Costa and Steckel 1997, Sandberg and Steckel 1997, Twarog 1997). Since evidence from convict data show declines in average stature, the Komlos estimate of trends in height time series may be more reliable than the Floud series. Any one of these changes in the series used, or the type of measure included, undermines Crafts's optimistic conclusions somewhat.

	HDI (Crafts)	HDI (new life expectancy)	pseudo-HDI (Floud heights)	pseudo-HDI (Komlos heights)	DW (Crafts)	DW (+working hours)	DW (+ heights*)
1760	0.272	0.254	0.37	0.37	6	6	4
1780	0.277	0.262	0.38	0.35	5	6	6
1800	0.302	0.290	0.41	0.36	4	4	6
1820	0.337	0.307	0.45	0.38	3	3	3
1830	0.361	0.320	0.46	0.40	2	2	2
1850	0.407	0.371	0.44	0.44	1	1	1

Table 3: Alternative Indices of Living Standards in Britain, 1760-1850

Sources: Crafts 1997, own calculations
Note: * based on Komlos's heights

Use of the new life expectancy figures reduces estimates of the level of human development uniformly, but by a greater amount in the 1850s than in the 1760s. Gains in the standard of living therefore appear somewhat smaller than initially assumed, but improvement over the period now proceeds more steadily. The same is not true of pseudo-HDI, calculated on the basis of Komlos's height series. Here, there is no improvement until 1800, but a quicker acceleration thereafter.

The DW rankings, once we incorporate additional indicators, also reduce the optimistic implications of Crafts's findings somewhat. Replacing the GDP figures with real wages by itself does not change the rankings. Incorporating additional working hours suggests stagnation for the first twenty years of the Industrial Revolution. If heights are added to this, the index first falls, and overall conditions do not improve relative to the starting level before the end of the Napoleonic wars.

How do living standard in Britain compare with those in other industrializing countries? Britain was by far the richest country by the middle of the nineteenth century in terms of per capita income. International comparisons of composite welfare measures give a mixed impression. If the DW index is used, Britain and Denmark tie for first place in 1860, and Britain is considerably ahead of other European countries and North America based on the human development index. Comparisons using pseudo-HDI, on the other hand, suggest that Britain was doing markedly worse than other countries. There may have been a drastic decline in the second half of the eighteenth century (Komlos 1993, 1998); using the alternative height data, the standard achieved by 1850 was below its peak in 1830 (Figure 5).

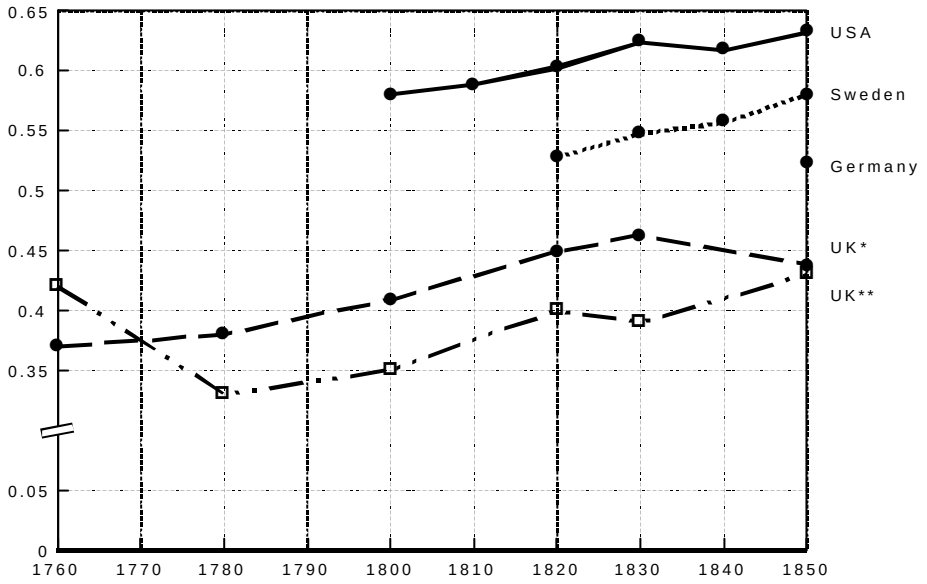

Figure 5: Pseudo-HDI for Britain, the US, Sweden, and Germany

Sources: Sandberg and Steckel 1997, Costa and Steckel 1997, Komlos 1998; Twarog 1997, Crafts 1997, own calculations (see text).

Notes: * based on Floud et al.'s heights
** based on Komlos's heights

These results are exclusively driven by the use of heights instead of life expectancy. For those scholars who believe that heights measure physical well-being in a more useful way than life expectancy, Britain's relative performance in terms of physical well-being was extremely disappointing. If life expectancy is used instead, Britain emerges as the world leader by 1860. We already questioned the extent to which stature is a more important indicator of the "biological standard of living". Unless the utility of heights can be established more directly, the weight of the evidence from HDI and the DW indices suggests that Britain was ahead of its peers by the middle of the eighteenth century. The extent to which the early phases of the industrial revolution saw a decline in overall living standards is still open to debate. The composite indices cannot answer this question conclusively, since results are sensitive to the set of indicators included in the calculations. If additional measures such as working hours are used, the steady march of

progress apparent in Crafts' calculations no longer exists. Instead, it appears that no turning point was reached until the 1820s or 1830s.

THE STANDARD OF LIVING AND MACROECONOMIC PERFORMANCE

For a long time, the standard-of-living debate has been strangely divorced from research on macroeconomic performance as a whole. Yet what output the economy generated ended up in the pockets of one group or other – abstracting from terms-of-trade effects and taxes, high rates of output growth would have had to drive up the remuneration of the factors of production (or at least one of them). And if growth was low, and inequality changed little, then the standard of living for the bulk of the population cannot have increased rapidly. The substantive downward revisions of growth rates introduced by Crafts and Harley have largely withstood a wide range of criticism (Berg and Hudson 1994, Jackson 1992, Cuenca Esteban 1994, Crafts and Harley 1992), even if some of the implications for productivity growth remain puzzling (Temin 1997, Temin 2000). Output per capita growth was modest at best for most of the first hundred years of the Industrial Revolution, ranging from 0.2 percent to 0.5 percent per year from 1760 to 1830, before accelerating to a still modest 1.1 percent for the period 1830-60 (Harley 1999).

Some critics of the current "slow growth" orthodoxy that combine a belief in rapid technological change and productivity advances with a pessimistic view of changes in living standards (Berg and Hudson 1994). These are contradictory positions. What the last twenty years of vigorous debate have shown is that the "slow growth" view and the pessimist case for only gradual and tentative increases in living standards reinforce each other.

Productivity growth cannot be higher than the weighted average of rates of increase in the real remuneration of factors of production (McCloskey 1985, Antràs and Voth 2001). A doubling of the real rate of return on capital and of real wages at the level of the economy as a whole implies that productivity doubled, too – each factor of production must be generating output at the twice the rate attained before. To use such logic, we need standard assumptions such as that factors of production receive the value of their marginal product. Daunting as these seem, they are no

different from the assumptions necessary to derive productivity estimates from quantity data (Hsieh 1999).

	change in % p.a.				
	r	**w**	**q**	**gov**	**TFP**
Antràs and Voth (2001)					
1770-1801	-0.29	0.35	0.26	2.60	0.31
1801-1831	0.71	0.25	0.76	1.46	0.57
1831-1860	0.49	0.68	0.48	-0.04	0.53
	Y	**K**	**L**	**T**	**TFP**
Harley (1999)					
1760-1800	1	1	0.8	0.2	0.19
1801-1831	1.9	1.7	1.4	0.4	0.50
1831-1860*	2.5	2.0	1.4	0.6	1.0

Table 4: Estimates of Productivity Growth in England, 1770-1860

Sources: Antràs and Voth 2001, Harley 1999: 183.
Notes: r – rental rate of capital, w – real wage, q – rental cost of land, gov – government sector (taxes)
Y – output growth, K – capital, L – labour, T – land
Antràs and Voth 2001 use an elasticity of 0.32 for capital, 0.14 for land, 0.08 for government, and 0.46 for labour.

Estimates of slow TFP growth, derived from quantity-based productivity measures, broadly provides support for the "slow growth" view. Table 4 compares the productivity growth estimates from both sources. The upper half of the table shows the growth in the real return to each factor. Neither land, nor labour, nor capital became vastly more valuable during the Industrial Revolution. Output-based TFP estimates coincide almost exactly with the factor price evidence for the second period, 1801-31. For the first and the third period, there is a somewhat larger difference; for the first century of the Industrial Revolution as a whole, both methods strongly suggest that productivity growth was not rapid. To restore credibility to the optimist case, either real wages would need to be revised upwards very substantially – or we would need clear evidence that inequality increased markedly. Thus, the quantity-based productivity estimates derived from national accounting exercises, and the standard-of-living evidence on real wages mutually reinforce each other. The cumulating evidence that output growth was slow implies that productivity increased only marginally. And the failure of real wages, rental rates of capital, and land rents to rise markedly supports this view. Alternative estimates using the same approach arrive at even smaller numbers (Clark 2001b). Slow growth and a relatively pessimistic view of the course of living standards during the Industrial Revolution are simply two sides of the same

coin, as dual productivity measurements make clear. The same logic also suggests that, to the extent that real wages actually grew even more slowly than output per capita, inequality may have become worse over time (Feinstein 1998b).

O'Brien and Engerman pointed out in their essay that demographic change may also provide important clues about the course of living standards. The number of Britons surged from the middle of the eighteenth century onwards, largely as a result of increased fertility (Wrigley et al. 1997, Wrigley 1983). If this was a response to better living conditions, it would represent a powerful "smoking gun" in favour of increasing well-being. However, fertility apparently only responded weakly (and belatedly) to changes in wages (Wrigley and Schofield 1981). According to more recent work, the relationship may be even weaker than originally thought (Lee and Anderson 1999). Also, temporary shocks to the demographic-economic system (such as a sudden drop in mortality because of mild winters etc.) took a long time to "die out", reverberating in the system for up to a century. Under conditions such as these, it is hard to infer much about the course of living standards from changes in fertility.

CONCLUSIONS

The standard of living debate has remained active for so long because neither side could marshal evidence of a marked and important shift (Feinstein 1998a). Over the last twenty years, most new research findings have lent increasing but not unambiguous support to pessimistic views. Crucially, real wages did not increase at anywhere near the rate suggested by earlier estimates. Overall gains between 1760 and 1830 were modest, and included periods of decline. Even by 1850, real wages had only risen by small amounts. What gains there were probably had been bought by longer hours of more intensive work, performed in more dangerous and unhealthy workplaces, by Englishmen and -women many of whom lived in the unhygienic, disease-ridden, dark, damp and crowded conditions of British cities during the middle of the nineteenth century. The horrors portrayed by Dickens and his contemporaries were not figments of the imagination; they were real enough. The consequences of these desperate conditions were that infant mortality remained stubbornly high, and even increased in some places; that life expectancy in the industrializing cities of the North was very low, and falling; and that heights probably stagnated or declined as the Industrial Revolution wore on.

That life was markedly better for the working classes by the 1820s and 1830s than it had been in the 1760s is hard to argue. Wage increases were probably insufficient to compensate for urban disamenities, additional workloads, and the decline in infant and child mortality (Feinstein 1998a). From the 1850s onwards, however, real wages were beginning to pull ahead of prices substantially, and life expectancy was marginally higher than in 1750s (but not than in the 1570s and 1580s). Working hours may have been somewhat shorter than they had been in the 1830s; child labour was on the wane; and heights began their long-term increase. In the very long run, it is difficult not to be an optimist in the standard of living debate – the years 1750-1850 allowed Britain to escape Malthusian constraints, and to make the transition to modern economic growth.

None of this answers the question what would have happened to living standards without an Industrial Revolution (O'Brien and Engerman 1981). Population growth surged after 1750, and it is hard to imagine that, in the absence of fast structural change, England's economy could have avoided rapidly declining marginal returns to labour (Mokyr 1999: 115). Under plausible

assumptions, per capita income might well have fallen by 8 to 18 percent without an Industrial Revolution. The principal effect of the mass migration from the countryside to the cities, and from agriculture to industry was therefore to allow the great demographic expansion to continue unchecked. What actual gains in terms of living standards there were appear small, tenuous, and often interspersed with extended periods of stagnation or decline. Yet compared to what might have happened, living conditions held up remarkably well. As Ashton put it: “The central problem of the age was how to feed and clothe and employ generations of children that outnumbering by far those of any earlier time. There are to-day, on the plains of India and China men and women, plague-ridden and hungry, living lives little better … than those of the cattle that toil with them… Such Asiatic standards, and such unmechanized horrors, are the lot of those who increase their numbers without first passing through an industrial revolution.”

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[1] There is some evidence that the value of new goods is substantially underestimated in cost-of-living-indices (Nordhaus 1997).

[2] The Lewis model builds on the concept of a dual economy, composed of a traditional and a modern sector. Because labor is abundant in the traditional sector (agriculture), its reallocation to the modern sector does not cause a fall in agricultural output – the marginal product of labor in the traditional sector is essentially zero. This implies that wages may only rise above subsistence levels once the modern sector becomes sufficiently large to affect agricultural wages.

[3] The Borda rule facilitates the compilation of composite indices, especially where we aggregate across conceptually very different individual indicators. For each variable, the observations (or time periods) are ranked. In our case, we assign a lower rank to a more favourable outcome. Next, we calculate the sum of these scores for each observation (or time period) across all indicators, and again rank them. The outcome is a Borda ranking.

[4] Because of continuous compounding, the death rates per year would be 1.76% for national average, and 2.6% for Glasgow.