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Pessimism Perpetuated: Real Wages and the Standard of Living in Britain during and after the Industrial Revolution

CHARLES H. FEINSTEIN

New estimates of nominal earnings and the cost of living are presented and used to make a fresh assessment of changes in the real earnings of male and female manual workers in Britain from 1770 to 1870. Workers' average real earnings are then adjusted for factors such as unemployment, the number of their dependants, and the costs of urbanization. The main finding is that the standard of living of the average working-class family improved by less than 15 percent between the 1780s and 1850s. This long plateau is shown to be consistent with other economic, political, and demographic indicators.

> *... in our opinion, it would be rash to attempt to draw a general price curve on the basis of such approximate figures, as it could only be done at the expense of scientific honesty; and a fortiori an attempt to make any mathematical comparison between the movements of prices and wages could only result in mystification.*
>
> Paul Mantoux[1]

Very few questions in economic history have been the focus of such prominent and persistent attention as the controversy about the impact of early industrialization and capitalism on the standard of living of the British working class. From contemporary discussions of the "condition of England" in the 1830s to the modern writing of economic and social historians, the issues have been vigorously contested, stimulating both fuller clarification of the economic and philosophical concepts and greater ingenuity

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Charles H. Feinstein is Chichele Professor of Economic History, University of Oxford, and Fellow of All Souls College, Oxford, OX1 4AL, United Kingdom.

I have benefited greatly from illuminating discussions of this article with Mark Thomas. Earlier versions were given at a conference at the Huntingdon Library and at seminars in Oxford, Cambridge, Groningen, Madrid, UCLA, and Berkeley. I am grateful to participants in those discussions, and to Paul David, Anne Digby, Stan Engerman, John Komlos, Beverly Lemire, Peter Lindert, Patrick O'Brien, and Keith Snell for their helpful suggestions and comments, and to Philip Grover for his admirable research assistance.

[1] Paul Mantoux's opinion of this exercise was expressed in his *Industrial Revolution*, p. 439.

in the search for new sources of information.[2] But a consensus still remains elusive.

The present article is yet one more attempt to resolve these issues, using recently compiled estimates of wages and the cost of living as the basis for a fresh assessment of the trends in real earnings during and after the Industrial Revolution. It begins with a review of the principal issues involved in quantitative attempts to define and measure changes in the standard of living and a brief reference to some of the recent contributions to the debate. This is followed by an account of new series for average nominal full-employment earnings and the cost of living. The next section brings these indices together to measure the trends in real earnings, compares the result with previous indices, and assesses the margins of error in the present estimates. Workers' average real earnings are then adjusted for unemployment and for the inclusion of Ireland and for other factors such as the rise in the number of their dependants and the costs of urbanization. The outcome is then reviewed and evaluated in relation both to other types of evidence and to the long history of the debate.

ISSUES AND ANSWERS IN THE STANDARD-OF-LIVING DEBATE

Many different approaches have been adopted in the attempt to determine what happened to the standard of living of British workers: qualitative evidence and quantitative series; economic, demographic, and anthropometric indicators; local, regional, and national studies. Some authors have focused primarily on material aspects of well-being, others have attached more importance to the quality of life.

This mix of methods and procedures has inevitably yielded a medley of conflicting verdicts. Clearly, we should not expect to find a single answer to the large query "what happened to the standard of living of the British working class?"[3] But if we explicitly specify a number of crucial conceptual and statistical issues we should at least be able to maximize the possibilities for agreement and understanding.

What is the Question?

The present article starts from a narrow interpretation of the standard of living relating to real wages and the potential private consumption of mater-

[2] See Taylor, *Standard of Living*, for an excellent introduction to the initial stages of the debate and reprints of the major contributions by Hobsbawm, Hartwell, and others. The current state of the controversy was reviewed more recently by Engerman, "Reflections," with perceptive observations on the many empirical and conceptual issues it has raised.

[3] It is only this superficially simple factual question with which this article is concerned. It is, of course, also possible to raise intriguing counterfactual questions; for example, whether some alternative distribution of income could have yielded a higher standard of living for the working class within the same pattern of overall economic growth; see, for example, von Tunzelmann, "Standard of Living Debate."

ial goods and services. Comparable services provided by the state, notably public health, are omitted from the reckoning. Such trends in real wages take no account of improvements in the range of goods available or of very important but less tangible "quality of life" factors. These may be positive or negative. Urban living provides better access to education and other amenities but may also mean slum housing, disease, and crime. The gains from industrialization may be paid for by increased intensity of work or adverse consequences for family life.

There is no serious dispute that those who experienced the initial phase in the process of industrial transformation also incurred significant costs in many of these qualitative aspects. Thus, if an investigation shows a substantial improvement in real wages, this optimistic outcome must be qualified to allow for any offsetting disutilities of factory work and urban living. If, however, the estimates reveal little or no gain in material consumption, then the pessimistic conclusion may stand, in the knowledge that it would only be reinforced by appropriate correction for the deterioration in the quality of life.

The estimates relate to manual (blue-collar) wage earners and exclude salaried (white-collar) workers. There are inevitably some groups on the borderline between these two categories (for example, shop assistants), but in general the basis for the distinction is clear enough. The more important problem, emphasized by many writers, is the diversity of experience *within* the manual working class, by occupation, region, skill, and gender. To some extent inequalities within the working class can be assessed by looking at the component indices for particular occupations. For this purpose it would also be desirable to have separate indices for skilled and unskilled workers and for males and females, and this remains a subject for further research.

Ultimately, however, if we are to reach any broad conclusions about the outcome for the working class as a whole, we must resort to some form of comprehensive national measure. For this purpose an index of the type compiled for the present article is appropriate: a weighted average of a representative array of component indices which effectively gives equal importance to the movements in the earnings of each individual worker. This focus on average wages, rather than per capita income or consumption, also precludes any possibility that the measurement of living standards may be distorted by changes in the distribution of income between workers and the middle and upper classes.

It is also necessary to specify the relevant geographical area. In the period covered the political entity was the United Kingdom of Great Britain and Ireland. There was substantial migration of Irish workers to England, both seasonally and on a permanent basis, and Irish farms were a major source of food for Britain's rapidly expanding urban population. On the other hand, the Industrial Revolution was essentially a British phenomenon and, except

for isolated pockets of activity in places such as Belfast, the mass of the Irish population were not directly affected. It is thus possible to argue either that the flows of labor and of farm products justify the treatment of the United Kingdom as a single integrated economy, or that the assessment should be confined to Great Britain. The article provides estimates on both bases so that the effects of omitting or including Ireland can be directly ascertained.[4]

Finally, we need to be clear whether our concern is specifically with the effects of early industrialization or, more broadly, with the experience of the working class, irrespective of what determined this. The years from 1770 to 1830 witnessed not only the first stages of industrialization and urbanization but also an unprecedented doubling of the population of England and Wales and a succession of harvest failures caused by abnormal weather conditions.[5] In addition, there was the massive impact of the wars with France. From 1793 to 1815 the intensive hostilities and Napoleon's continental blockade created inflationary financial conditions, stimulated some sectors and disrupted others, and withdrew thousands of men from the civilian labor market.[6] It is difficult to distinguish accurately between the effects of all these powerful forces, and the main concern of this article is with the net outcome resulting from their interaction, but the presence of these different features of the period must be recognized in any analysis of the trends in earnings and prices.

Recent Answers

The most important modern contribution to the debate was made by Peter Lindert and Jeffrey Williamson (hereafter LW).[7] In 1983 they presented new data indicating that the average real wages of adult males "nearly doubled" between 1820 and 1850 and claimed that this was a large enough increase "to resolve most of the debate over whether real wages improved during the Industrial Revolution." They also considered the extent to which this finding might need correction for unemployment, the inclusion of women and children, and the disamenities of urban areas, and then reaffirmed their view that the great standard-of-living controversy had finally been settled. The pessimists, they argued, could sustain their case only by shifting to the

[4] The case for the inclusion of Ireland is argued in Mokyr and Ó Gráda, "Poor and Getting Poorer?" pp. 209–10.

[5] The unusual severity of the harvest failures and their impact on grain prices are analyzed in Chambers and Mingay, *Agricultural Revolution*, pp. 109–17; and Holderness, "Prices," pp. 97–100.

[6] The relative impact of the wars and of other factors on British economic growth over these years was discussed by Mokyr and Savin, "Stagflation," and more recently by Williamson, "Why was British Growth so Slow?" and "Debating the British Industrial Revolution"; Crafts, "British Economic Growth"; and Mokyr, "Has the Industrial Revolution been Crowded Out?"

[7] Lindert and Williamson, "English Workers' Living Standards." All the main quantitative estimates of wages and prices available before this were surveyed in Flinn, "Trends." There is further analysis of these series in von Tunzelmann, "Trends."

period before 1820; after that "the average worker was *much* better off in any decade from the 1830s on than in any decade before 1820."[8]

N. F. R. Crafts criticized some features of the LW cost-of-living index and stimulated its authors to construct a revised series.[9] This reduced the improvement in average real wages between 1819 and 1851 from 84 percent ("nearly doubled") to 62 percent. However, Crafts's own index of real consumption per head, derived from an independent output-based index of real GDP, also increased by roughly 50 percent over these three decades, and so essentially supported the view that living standards had improved strongly after the end of the Napoleonic Wars.

LW's super-optimistic verdict was quickly challenged by Joel Mokyr, who questioned whether it could be reconciled with evidence from trade statistics on the per capita consumption of imported sugar, tea, and tobacco.[10] Sara Horrell and Jane Humphries compiled new estimates of real family earnings that appeared to confirm the broad pattern of a long-run increase, but since they relied on the LW cost-of-living index for the deflation of their new income series this was not entirely an independent corroboration.[11] Two investigations of specific industries yielded conflicting verdicts, as tends to happen with such partial evidence. E. H. Hunt and F. W. Botham entered the debate on the optimists' side and demonstrated that skilled workers in the potteries did achieve a marked increase in their real earnings between 1770 and 1815.[12] John Brown constructed estimates of earnings and prices for factory workers and handloom weavers in the textile areas of northwest England and adjusted these to allow for the additional costs of urban living. His results showed "virtually no improvement in living standards in cotton textiles until the 1840s and for perhaps the entire first half of the nineteenth century."[13]

Recent years have also seen a major research effort to assemble and analyze a new body of data on height. Stature was initially seen as a highly promising alternative to income or consumption because it was a *net* measure that captured both the supply of inputs to health from food and other sources and also the demands on those inputs made by factors such as work effort and disease. However, the large range of potentially relevant factors, and uncertainty regarding the precise timing and method of their impact, have created severe problems in the interpretation of the evidence on

[8] Lindert and Williamson, "English Workers' Living Standards," pp. 2, 12; italics added.

[9] Crafts, "English Workers' Living Standards"; and Lindert and Williamson, "English Workers' Real Wages."

[10] Mokyr, "Is there Still Life?"

[11] Horrell and Humphries, "Old Questions."

[12] Hunt and Botham, "Wages."

[13] Brown, "Condition."

height. It is now generally accepted that no simple or monotonic association between income and height should be expected in comparisons over time.[14]

The most substantial set of data collected for Britain, by Roderick Floud, Kenneth Wachter, and Annabel Gregory, showed that the attained height of successive birth cohorts was rising from the late 1780s to the early 1820s, then declined for those born between the 1820s and 1840s, was stable at this lower level for two further decades, and finally commenced to rise again for the birth cohorts of the 1860s and later decades.[15] These results are paradoxical in relation to the LW real wage series because they suggest that heights were rising while real wages were stagnant during the early phase of the Industrial Revolution and then declined or remained steady when real incomes were increasing.

The former conflict was effectively removed when Floud et al.'s optimistic results for the initial period were challenged by a number of different authors and contradicted by evidence from other sources.[16] However, the subsequent downward trend in heights from the early nineteenth century has been confirmed by independent data derived from records of the height of male and female habitual criminals born in Britain between 1812 and 1857. This showed a fall from the end of the Napoleonic Wars until the middle of the century, with the most rapid decline occurring in the 1840s.[17] It is difficult to reconcile this trend with a sharp improvement in real wages.

Mortality offers a more familiar biological variable, and a number of recent studies concur in tracing adverse trends in the second quarter of the nineteenth century. Paul Huck found that infant mortality in a sample of nine urban parishes in the North of England had increased between 1813 and 1846. As he noted, his results "provide no support for the view that living standards were substantially rising in the industrial towns of the parish sample during the first half of the century."[18] The wider estimates of expectation of life at birth compiled by E. A. Wrigley and Roger Schofield for England increased from about 37 years in the 1790s to 40 years in the mid-1820s and then showed no further change for some 50 years. Their family reconstitution studies similarly "suggest the possibility of a substantial worsening of mortality in infancy and childhood" in the early nineteenth century.[19] Simon

[14] For a recent survey of the issues see Steckel, "Stature."

[15] Floud, Wachter, and Gregory, *Height*, pp. 148–49.

[16] Methodological issues were raised by Komlos, "Secular Trend"; and by Voth and Leunig, "Did Smallpox Reduce Height?" Alternative evidence was assembled by Nicholas and Steckel, "Heights," pp. 948–49; and Nicholas and Oxley, "Living Standards of Women during the Industrial Revolution," p. 734, but see also Jackson, "Heights"; and Nicholas and Oxley, "Living Standards of Women in England and Wales."

[17] Johnson and Nicholas, "Male and Female Living Standards," pp. 476–77.

[18] Huck, "Infant Mortality."

[19] Wrigley and Schofield, *Population History*, pp. 230–36; and Wrigley et al., *English Population History*, p. 256. The latter study also notes similar upward trends in London and Scotland.

Szreter and Graham Mooney compiled new estimates of the mortality experience of the entire urban and industrial population, and these showed a "sharp deterioration" in the second quarter of the nineteenth century that was not finally made good until the 1870s.[20] All these studies would thus be consistent with a significant deterioration in the standard of living of the urban industrial working population.

Crafts has advanced the methodological approach to the standard-of-living issue by adopting more comprehensive measures, combining estimates of per capita real income with other variables such as mortality, literacy, education, political rights, and gender differentials. For example, in his human development index, a rise in per capita incomes is augmented by improvements in literacy, schooling, and life expectancy and thus support a broadly optimistic assessment of aggregate trends in well-being between 1780 and 1850. However, as Crafts shows, the results are very sensitive to the procedures used to weight these disparate elements, and on some alternative schemes one "might conclude that the quality of life fell between 1830 and 1850."[21]

Many of these studies may thus engender a degree of scepticism about the scale of the improvement in earnings after 1820, but the broad scope and authoritative character of the LW series for real wages still stands as a massive obstacle in the face of any challenge to the optimistic interpretation. If it is to be overturned, it will only be by more reliable and more comprehensive series for earnings and prices.

NEW ESTIMATES OF NOMINAL FULL-EMPLOYMENT EARNINGS

The index of average annual earnings used for the present article was constructed as part of a larger project on economic growth during the Industrial Revolution. It is fully described in another article, and only a few brief comments will be made here to indicate the general character of this index.[22] It covers all manual workers, male and female, from 1770 to 1880. Some of the component series rely for all or most of the period on well-known estimates compiled by previous writers, notably A. L. Bowley and G. H. Wood, and these rest on relatively secure foundations. Over a period of some two decades at the turn of the nineteenth century, these two distinguished scholars energetically extracted and exploited all the then available sources of information on wage rates and earnings, and their main estimates are based on a vast quantity of material, carefully analyzed and expertly synthesized.

[20] Szreter and Mooney, "Urbanization," p. 107.

[21] Crafts, "Some Dimensions," pp. 622–27.

[22] See Feinstein, "Wage-Earnings," for a full account of the sources and methods used to compile this index and for detailed comparison with previous indices. Some very minor changes have been made to take account of the effect of the latest revisions to the cost-of-living index on a few series for which the value of payments in kind is extrapolated by the movement in prices.

Little new information has emerged since then.[23] In many sectors the necessary data were seldom collected and even more rarely preserved. For the most part it is only possible to include indices for additional categories, or to extend the series further back into the past, if we are willing to tolerate lower standards of reliability than Bowley and Wood thought acceptable. Where reputable records are silent, estimates have to be conjured from sparse remnants and linked by risky conjectures.

The first stage was the construction of separate estimates of the male and female occupied population of Great Britain at decennial intervals from 1771 to 1881. Each of these totals was classified by sector (or occupation), and the estimates for each sector were then further subdivided to distinguish three categories of income earners: employers and the self-employed, salaried employees, and manual wage earners. Annual estimates of the number of male and female wage earners in each sector were obtained by interpolation between these benchmarks and provide one element in the weighting of the component wage series.[24]

The other element required is the absolute value of average annual earnings in each sector in any one year. This was generally taken from the estimates for 1881 obtained in an earlier study.[25] A crucial implicit assumption is thus that all dimensions of the composition of the wage earners in 1881 are reflected accurately in the level of average earnings at that date, and that the effects of any changes in skill, gender, age or other dimensions as we move back to 1771 are fully incorporated in the earnings indices. This is undoubtedly a heroic assumption, given the sweeping changes that occurred during this period. However, it seemed best to proceed in this way so that it would be possible both to specify clearly the basis on which the indices were constructed and to test the extrapolated level of average earnings at various dates against independent benchmarks for those years.[26] Each separate earnings series is thus weighted annually by the corresponding wage bill.

Annual estimates of the movements in earnings were then compiled for more than 20 separate occupations or industries, accounting for some 80 percent of all wage earners in Great Britain in 1851. A number of the existing indices, notably those for cotton spinning and weaving, building, and engineering and shipbuilding, were extended to 1770 from their later starting point in Bowley or Wood. Additional series were compiled for female agricultural laborers, workers in the wool and worsted industries, tailors, boot

[23] The one important exception is the data on earnings in coal mining collected by Mitchell, *Economic Development*; and Church, *History*.

[24] These benchmark estimates are given in Appendix 2, together with a brief description of the sources and methods used to construct them.

[25] Feinstein, "New Estimates."

[26] The test is made—and passed—in Feinstein, "Wage-Earnings," p. 199.

and shoemakers, merchant seamen, railwaymen, other transport workers, male and female domestic servants, general laborers, and the army and navy.

All the series are intended to measure weekly earnings (not wage rates), assuming full employment. In principle, they should thus capture relevant changes in the composition of the labor force and should allow for the effect on earnings of overtime and piece rates. They include an addition for the value of board and lodging or other payments in kind in agriculture, domestic service, the merchant navy, and the armed forces, but more minor perquisites and allowances in other sectors are not included. A few of the indices cover the whole of the United Kingdom, but the Irish wages in these sectors are too small to have any appreciable effect, and the initial indices can be regarded as relating essentially to Great Britain.[27]

The annual index of nominal full-employment earnings for all wage earners is given in full in Appendix Table 1. It is shown with 1778/82 as 100, but this is simply a convenient reference point, not the base year. Movements in the overall index measure the combined impact of changes in full-employment nominal wages within each sector or group of workers, and of movements between sectors or between groups.

This index can be compared with the one constructed by Williamson and used by LW for their standard-of-living calculations.[28] His series was initially compiled for another purpose and differs from the present index in definition and scope. In particular, it relates only to England and Wales, covers only adult males, makes no allowance for changes in the composition of the labor force within individual industries, and has a narrower coverage. Nevertheless, both indices incorporate the major Bowley and Wood series, including those for agriculture, building, engineering, and shipbuilding, and the weight of these shared series (over 50 percent of the present index in 1770 and more than 40 percent in 1850) is sufficient to ensure that the general trends indicated by the two indices are very similar (see Figure 1).

A NEW COST-OF-LIVING INDEX

The new cost-of-living index constructed for this article measures changes in the prices of 12 types of food, as well as beer, coal, candles, clothing, footwear, and rent. A preliminary version published in 1995 is now superseded.[29] The present version uses different expenditure shares and different base years for weighting the index, incorporates some improvements to the

[27] In a later section of this article the index is extended to cover the United Kingdom by the inclusion of a series for Irish agricultural earnings.

[28] Williamson, "Structure."

[29] Feinstein, "Changes." Some parts of that article are, however, still relevant; particularly the detailed discussion of, and comparison with, a number of earlier indices, and the general comments on the available price data and the appropriate weighting and composition of cost-of-living indices.

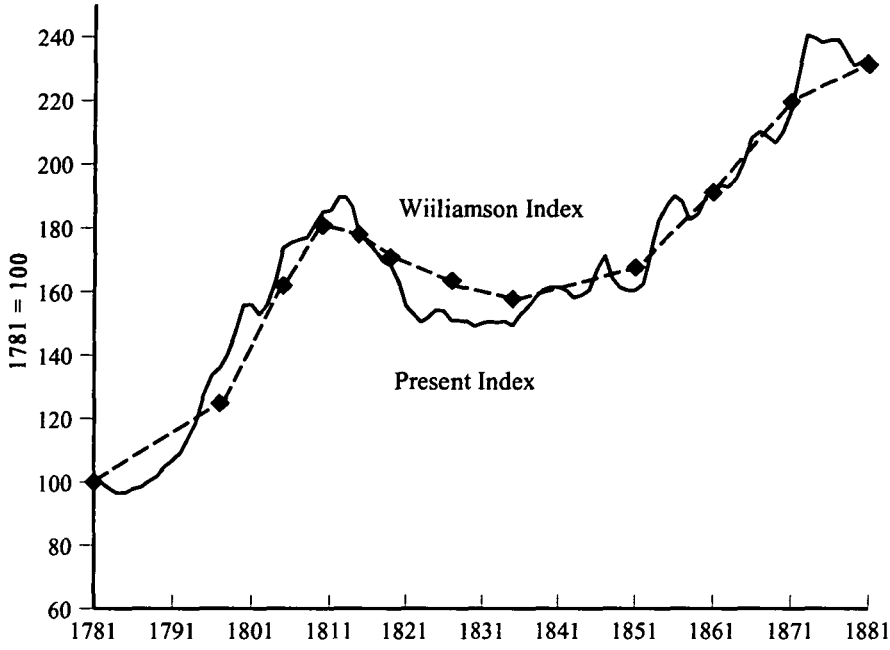

Figure 1
INDICES OF MONEY EARNINGS, GREAT BRITAIN, 1781–1881

Sources: Williamson, "Structure." For the present index, see the text.

price indicators, notably for food, clothing, and rent, and starts a decade earlier, in 1770.[30]

A fixed-weight (Laspeyres) index is taken to be the most suitable procedure for measuring long-run changes in workers' cost of living.[31] Separate indices were compiled for three short subperiods, with three sets of quantity weights to reflect the changes in the pattern of consumption. The date of these overlapping subperiods are 1770 to 1812, 1808 to 1852, and 1848 to 1870; with 1788/92, 1828/32, and 1858/62 as the respective base years. These fall towards the middle of their periods and are thus a compromise between early or late base years. The three indices were then spliced to form a single index.

The actual weights selected for the base periods are shown in Table 1. They were derived from information on the allocation of expenditure by

[30] It is also continued forward to 1880 by means of the cost-of-living index in Feinstein, "New Look," p. 170.

[31] A theoretical justification for the Laspeyres index was given by David and Solar, "Bicentenary Contribution," pp. 4–14; and accepted by Crafts, "Regional Price Variations," p. 57; and by Williamson, *Did British Capitalism*, p. 209. The practical reasons for adopting a fixed weight index are also very powerful, since the alternative Paasche index requires information on expenditure shares for every year of the period.

TABLE 1
WORKING-CLASS EXPENDITURE SHARES USED TO DERIVE WEIGHTS FOR THE COST OF LIVING INDEX
(percentage)

	(1) 1788/92		(2) 1828/32		(3) 1858/62	
Items	Food	Total	Food	Total	Food	Total
		A. Allocation of Total Expenditure				
Food		69		65		61
Rent		10		11		13
Fuel		4		4		4
Light		1		1		1
Drink		10		11		12
Clothing		6		8		9
Total		100		100		100
		B. Allocation of Expenditure on Food				
Bread	20	13.80	25	16.25	30	18.30
Wheat flour	27	18.63	21	13.65	15	9.15
Oatmeal	13	8.97	7	4.55	3	1.83
Potatoes	5	3.45	7	4.55	10	6.10
Beef	3	2.07	4	2.60	5	3.05
Mutton and lamb	3	2.07	4	2.60	4	2.44
Pork and bacon	7	4.83	8	5.20	8	4.88
Milk	5	3.45	7	4.55	7	4.27
Butter	4	2.76	4	2.60	5	3.05
Cheese	3	2.07	3	1.95	3	1.83
Tea, coffee	3	2.07	3	1.95	3	1.83
Sugar, treacle	7	4.83	7	4.55	7	4.27
Total food	100	69.00	100	65.00	100	61.00

Source: See the text.

working-class households, in particular the budget data assembled by F. M. Eden and D. Davies for the late eighteenth century, and the estimates of expenditure made by W. A. Mackenzie for the mid-nineteenth century.[32] The estimates were made after consideration of Horrell's systematic survey of household budgets and of the weights used by previous authors, notably Elizabeth Gilboy, George Wood, Henry Phelps Brown and Sheila Hopkins, and LW.[33] They also take account of other evidence such as estimates of cereal consumption and meat output.[34]

The next issue to consider is the choice of price indicators. Like its predecessors, the new index relies heavily on institutional and wholesale prices. These were severely criticized by T. S. Ashton, and almost all later

[32] Eden, *State*; Davies, *Case*; and Mackenzie, "Changes."

[33] For further details of the information on expenditure patterns underlying the present estimates, see Feinstein, "Changes," pp. 19, 21–22; and Horrell, "Home Demand," pp. 568–69, 580. Some degree of estimation is essential because none of the available sources can be accepted exactly as they stand. Some items, notably expenditure on drink and clothing, are omitted or greatly understated, and Horrell's sample is not sufficiently representative of the main urban centers to provide a reliable figure for the share of rent.

[34] Collins, "Dietary Change," p. 114; and Holderness, "Prices," pp. 147–59.

writers have repeated or added to his strictures.[35] The alleged deficiencies are said to include possible divergence in the movements of wholesale and retail prices over time, the stickiness of institutional prices fixed by contracts, the unrepresentative nature of wholesale and contract prices based largely on London or other specific locations, and the use of prices for the raw material rather than the finished product (for example, tallow used as a proxy for candles).

These issues were explored at some length in my earlier article on the cost of living. For the price indicators used for food, coal, and candles, though not for clothing, the conclusion drawn was that these criticisms were generally not well founded. There are certainly some institutional and contract series to which they are applicable, and each series needs to be carefully scrutinized before being accepted for inclusion in the index. It is not difficult, however, to find a large range of wholesale and institutional prices that are highly sensitive to short-term variations, and which mirror closely what is known of the fluctuations in retail prices.[36] It can also be shown that the London series accurately reflect national movements in prices.[37]

The detailed sources chosen for each item of food and for beer, coal, and candles are set out in Appendix 3. In constructing the food component of this new index I deliberately did not use the few available scraps of information about actual retail prices, thus leaving open the possibility of a comparison of the new series with one constructed from retail prices recorded by contemporaries for Oldham, Manchester, and Staffordshire.[38] The result is shown in Figure 2 and gives some additional reassurance that the index provides a reasonable measure of the changing prices actually paid by working-class households.

Measurement of the changes in the price of clothing presents more difficult problems and has already been the subject of some debate. For the present article I have constructed a new index that differs in several respects from both the previous version and the revised LW index. Full details of the sources and methods are given in Appendix 4, but there are a few points that deserve mention here. The index is constructed by splicing separate indices for four subperiods each weighted to reflect the gradual rise in the importance of cotton fabrics relative to those made of wool and linen. It makes no

[35] Ashton, "Standard."

[36] A similar distinction between different types of contract price was noted in 1938 by Elizabeth Schumpeter: contracts for many of the common textiles "were frequently renewed again and again without any change of price" whereas "the prices of food, fuel and imported raw materials changed considerably and frequently;" "English Prices," p. 33.

[37] This conclusion is broadly supported by the results obtained by Crafts, "Regional Price Variations." His cross-section study of a large collection of local prices in 1842 suggested that there was a national market for bread, flour, meat, sugar, tea, soap, and candles.

[38] The main sources for this series are Ashton "Standard of Life" pp. 34-7; and Brassey, *On Work*, p.164; for full details see Feinstein, "Changes," fn. 18, p.34.

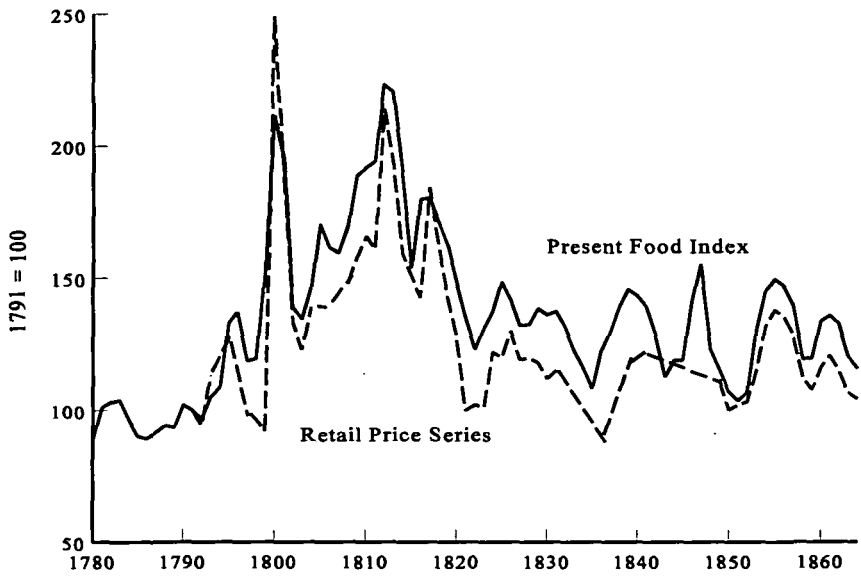

FIGURE 2
INDICES OF FOOD PRICES, 1780–1870

Sources: See the text.

use of the index constructed by R. S. Tucker on the basis of unspecified institutional prices; as noted earlier these are among the least satisfactory of the contract prices.[39]

For the important woollen component I have included a number of additional series to supplement Albert Imlah's index of the average export value of woollen cloth, available from 1814. This export series falls more steeply than a variety of alternative series measuring domestic prices for cloth or for specific garments, and it is likely that a significant part of this decline may be explained by changes in the composition of exports, rather than a fall in prices for given qualities of cloth. In particular, the decline in the export series from the late 1830s coincides with the switch to cheaper mixed cloths made with cotton warps, particularly for worsteds; and the share of high quality cloth in total exports may have been reduced under the impact of French competition.[40]

In the absence of further information on the domestic price of woollen cloth, I also tried to find some other means of judging the reliability of the present series. I chose trousers as a standard, well-defined garment, which remained essentially the same over the whole period, so that it is possible to be reasonably certain that any changes in price reflect changes in costs rather

[39] Tucker, "Real Wages." For 1770–1815 Tucker's clothing index appears to be based on only four items purchased by Greenwich Hospital.

[40] See Jenkins and Ponting, *British Wool Textile Industry*, pp. 130–35, and Sigsworth, *Black Dyke Mills*, pp. 52–55.

than in specification. I then assembled all the information I could find on the actual prices paid for laborer's woollen trousers or for comparable trousers purchased for the army and navy. If the resulting information on the price of this one item can be taken as representative, it seems clear that the export series does appreciably overstate the decline in the domestic price, and the present series is nearer the mark. Further details of the comparison are given in Appendix 4.

The final component is an index for rent, always one of the most difficult items to measure. The present index was constructed by dividing the estimated aggregate rent of dwellings in Great Britain by the corresponding number of inhabited houses. The starting point for the aggregate rent estimate is the assessment of income from buildings made for Schedule A of the income tax. Details of this assessment are available for six years from 1803 to 1814/15, and then annually from 1842/43.[41] In the intervening period there was no income tax, but a fundamentally similar assessment of annual rentals was made for the poor rate levied in each parish.[42] No figures were compiled to show the aggregate rental on which these rates were levied, but on three occasions figures were collected from which the relative size of the assessments on land and buildings can be calculated, and these ratios can be used to derive the required estimates.[43]

As a first step, an annual series for the aggregate rental of land was obtained for 1803 to 1842 by interpolating between the Schedule A assessments of land by means of an index of the rent of farm land.[44] An annual series for the rent of buildings relative to the rent of land was then obtained by interpolation between the benchmark ratios given by Schedule A and by the three intervening years for which the poor rate proportions are available. The annual series for the aggregate rent of land was then multiplied by these annual ratios to obtain the aggregate rent of buildings.[45] This covers all buildings, and a further adjustment was made to exclude factories and other trade premises.[46]

[41] The assessments for 1803, 1805, and 1806 were raised by 7.5 percent, 4 percent and 2 percent respectively to allow for some undervaluation in the initial surveys, relative to those for later years. This should provide a broadly consistent series for the period 1800–1850, even though all the valuations for this period may have been slightly too low. See Stamp, *British Incomes*, pp. 38, 50, 515–56.

[42] The poor rate assessment was significantly too low, but for the first half of the nineteenth century the undervaluation was fairly constant at about 25 percent of the corresponding Schedule A valuation; Goschen, *Reports*, p. 18.

[43] The figures for England and Wales for 1825/26, 1832/33, and 1840/41 were reported in U.K. *Ninth Annual Report of the Poor Law Commissioners*, p. 8; and were also reproduced by Goschen, *Reports*, p.76.

[44] Thompson, "Enquiry," pp. 623–24.

[45] The advantage of this roundabout route is that the amount of land was effectively constant and the changes in rental relatively small. By contrast the stock of buildings was increasing rapidly, and the total rental climbed from 39 percent of that for land in 1814 to 85 percent in 1840.

[46] This was again based on the information given for the three years covered by the poor rate assessments, together with the allocation made for 1850 and later years in Feinstein and Pollard, *Studies*, p. 415.

Division of this rent series by the number of houses gives the estimated average rental of all houses in each year from 1800 to 1850.[47] A final adjustment was made to eliminate that part of the movement in rent due to improvements in the size and quality of working-class houses. This was based on estimates of the rate of improvement in *new* dwellings from 1810 onwards, and on the share of these successive vintages in the stock of houses at ten-year intervals from 1810 to 1850.[48] A previously constructed index was then used to continue the series to 1870.[49] It was not possible to find similar comprehensive sources for the three decades before 1800, and the extrapolation to 1770 is very uncertain.[50]

The major components and the final linked index for the hundred years from 1770 to 1870 are summarized in the form of five-year averages in Table 2, and the annual index for all items is given in Appendix Table 1. In each case the figures are given with 1778/82 as 100, but the actual base years are as stated above.

Given that price series can be combined by a variety of different index number procedures, all equally valid in principle, it is desirable to examine the sensitivity of the results to the particular formula adopted. For this purpose it was assumed that the expenditure shares for 1770/74 and 1810/14 were the same as in 1778/92; and those for 1849/51 the same as in 1858/62. This yields quantity weights for three further base years, and it was thus possible to construct six Laspeyres and six Paasche indices, as well as a number of linked or cross-weight variants.

These alternative indices are all legitimate measures of the movements in prices, and are all based on identical price indicators. The comparisons can thus demonstrate the extent to which the estimates are affected by the choice of different types of index number and base years. The broad conclusion drawn from this exercise was that the effects were not large. The variant with the strongest theoretical case for consideration as an alternative to the present index is the Fisher "ideal index." For the period of steeply rising prices to 1810/14, substitution of the ideal index changes the measure of the cost of living (with 1788/92 =100) from 188 to 181, a difference of 4 percent. In the subsequent downswing to 1849/51 the difference is again very small, with the two indices showing reductions of 37 and 40 percent respectively.

[47] The Schedule A definition of dwellings include residential shops, pubs, and hotels but not farmhouses, and the number of houses was defined in the same way; the data are taken from Feinstein and Pollard, *Studies,* pp. 385–86.

[48] Ibid., pp. 381–87, 405–07.

[49] Ibid., p. 409; the effect of improvements is excluded from this index.

[50] I have relied primarily on Caird, *English Agriculture*, p. 474; and Lowe, *Present State*, app. to Chap. 3, p. 9.

TABLE 2
COST OF LIVING INDEX, 1770–1870
(Five-year averages, 1778/1782 = 100)

	(1) Food	(2) Rent	(3) Fuel	(4) Light	(5) Drink	(6) Clothing	(7) All items
1770/1772	97	100	90	96	100	98	97.4
1773/1777	100	100	92	96	100	99	99.3
1778/1782	100	100	100	100	100	100	100.0
1783/1787	99	100	92	101	100	99	99.1
1788/1792	102	101	98	102	100	96	101.4
1793/1797	127	107	105	113	100	96	119.2
1798/1802	172	117	118	131	116	102	153.7
1803/1807	163	122	134	141	141	100	151.1
1808/1812	204	141	148	164	143	102	181.8
1813/1817	195	146	147	151	154	105	178.6
1818/1822	156	139	130	123	154	93	150.9
1823/1827	146	128	124	91	140	81	139.2
1828/1832	142	141	117	88	126	71	135.1
1833/1837	126	164	108	83	114	75	126.2
1838/1842	147	186	101	90	114	70	140.2
1843/1847	136	192	105	82	114	64	133.4
1848/1852	117	201	95	79	114	60	121.5
1853/1857	150	213	116	104	120	66	146.6
1858/1862	135	228	112	99	129	73	140.4
1863/1867	134	250	129	87	129	90	144.7
1868/1870	137	268	126	90	129	76	145.8

Sources: See the text.

To conclude this presentation of the new cost-of-living index it is compared with the LW index.[51] Over the initial period to the war-time peak the two series trace very much the same upward path, but they diverge in their measurement of the extent of the decline from that peak to midcentury. According to the present index, prices fell by 37 percent (1.2 percent per annum) between the peak of 1810/14 and the trough of 1849/51, a markedly slower decline than the reduction of 51 percent (1.9 percent per annum) estimated by LW. The proportionate discrepancy is most marked over the final two decades of that period, with the present index falling by only 11 percent (0.6 percent per annum) rather than 24 percent (1.4 percent per annum). A number of separate factors account for this disagreement. Each is quite modest, but almost all tend in the same direction and are thus collectively sufficient to have a significant impact on the estimates of real wages. The main constituents of the differences are itemized in Table 3.

First, there are differences both in the procedure used to weight the indices and in the expenditure shares from which the weights are derived. As noted above, the present series is a chained index derived from separate indices covering three shorter periods of up to 40 years, with 1828/32 as the

[51] The reference is to the revised version of their index; Lindert and Williamson, "English Workers' Real Wages."

TABLE 3
COMPARISON OF LINDERT AND WILLIAMSON WITH PRESENT COST OF LIVING INDEX, PERCENTAGE FALL IN PRICES, 1810/14 TO 1849/51

	1810/14 to 1849/51	1810/14 to 1828/32	1828/32 to 1849/51
1. Lindert and Williamson index	51.0	35.3	24.3
2. Substitute present weights and base year	47.8	32.9	22.2
3. *Add* Potatoes, milk and cheese	43.7	31.0	18.4
4. *Add* Oatmeal	42.9	30.5	17.8
5. Substitute present series for other food items	43.5	31.4	17.6
6. *Add* Drink	41.8	30.1	16.7
7. Substitute present series for Clothing	39.6	28.4	15.7
8. Substitute present series for Rent *Equals* Present index	37.4	29.5	11.2

Sources: See the text.

base year for the period covered by Table 3. By contrast, LW used a single base for the whole period 1781 to 1851, and although some of the information on which they based their expenditure shares was derived from the late eighteenth or early nineteenth century, the actual base year used was 1851. Their effective quantity weights thus relate to a year at the very end of their period, and during a period of falling prices the resulting index will show a more rapid decline than one with early weights.

This effect is further exaggerated by their use of the budget data collected by Davies in the 1790s for the main categories of food. This gives bread and wheat flour a share of 44 percent in total expenditure, reflecting the consumption of basic necessities by some of the poorest rural households at a particular period of great hardship.[52] The application of an abnormally high expenditure share to a later base year when prices were much lower means that a disproportionately large quantity weight is given to the exceptionally steep postwar fall in the price of wheat.

Secondly, the new index includes potatoes, oatmeal, and other items which were omitted by LW, and these slow down the pace of the decline (see rows 3, 4, and 6 of Table 3).[53] The initial fall in potato prices from the war-time peak was relatively small, and the blight of the mid-1840s subsequently drove prices sharply upwards at a time when the costs of most other foods were declining. The introduction of oatmeal into the index—with a corresponding reduction in the weight for wheat flour—moderates the decline because the relative price of oats was rising from the beginning of the

[52] Davies, *Case*; Williamson, *Did British Capitalism*, pp. 209–10; and compare Horrell, "Home Demand."

[53] Potatoes and oats were included in LW's northern indices but not in their preferred southern variant. Moreover for the crucial period after 1829 they have no independent series for potato prices and assumed that they moved together with all other food prices; Williamson, *Did British Capitalism*, p. 211. The series used for the present index is based on farm sale prices in Lancaster and Preston; the pattern is the same for wholesale prices in the Manchester potato market; Scola, *Feeding*, pp. 113-16.

nineteenth century as increased demand for feed for horses and livestock more than compensated for the fall in human consumption.[54] The addition of a series for beer has a similar, though weaker, effect because the price was broadly constant for the first half of the nineteenth century, except for one reduction in 1830 when the duty on beer was repealed. The inclusion of two other items, milk and cheese, makes very little difference. The substitution of alternative indicators for some of the items of food common to both indices, notably wheat flour, beef, and mutton, goes in the opposite direction to all the other changes and slightly increases the fall in prices (row 5).

The incorporation of new series for clothing and rent (rows 7 and 8) has a significant impact. In particular, the present series for rent derived from national tax data has a pattern of change markedly different from that shown by the very small sample of houses on the Trentham estate in Staffordshire on which the LW index was based. In the early postwar decades the present rent series falls more sharply, and so accentuates the general decline in prices. In the 1830s and 1840s, by contrast, it rises much more strongly, and this significantly dampens the overall decline in prices.

TRENDS IN REAL WAGES

The new indices of full employment nominal earnings and the cost of living can now be brought together to derive a measure of the trends in real earnings for manual workers in Great Britain.[55] The index is given in the form of five-year averages in column 1 of Table 5, and for all years in Appendix Table 1.

The dominant feature of the present results is the very moderate rate of improvement in full-employment real earnings. From the 1780s to the end of the Napoleonic Wars, average nominal earnings kept roughly in step with the cost of living, and there was almost no increase in average real earnings. After 1815 there was slow progress, but by the mid-1850s the new index was still less than 30 percent ahead of the level in the early 1780s. On this new evidence it was only from the late 1850s that the average British worker enjoyed substantial *and sustained* advances in real wages.

This picture of a long plateau in material standards is thus considerably less optimistic than the corresponding estimate by LW. As can be seen in Figure 3, the two series are in reasonable agreement with respect to the overall change from 1781 to the end of the war, though they follow somewhat different paths between these points. But thereafter their hare sharply outpaces my

[54] See Holderness, "Prices," pp. 108–09.

[55] In principle, it would be desirable to use separate cost-of-living indices for particular groups of workers, but I have not attempted to add this refinement. LW examined the effect of constructing four separate indices, distinguishing urban from rural, and northern from southern areas but concluded that "the choice of weights mattered very little." See Lindert and Williamson, "English Workers' Living Standards," p. 10; and Williamson, *Did British Capitalism*, pp. 211–17.

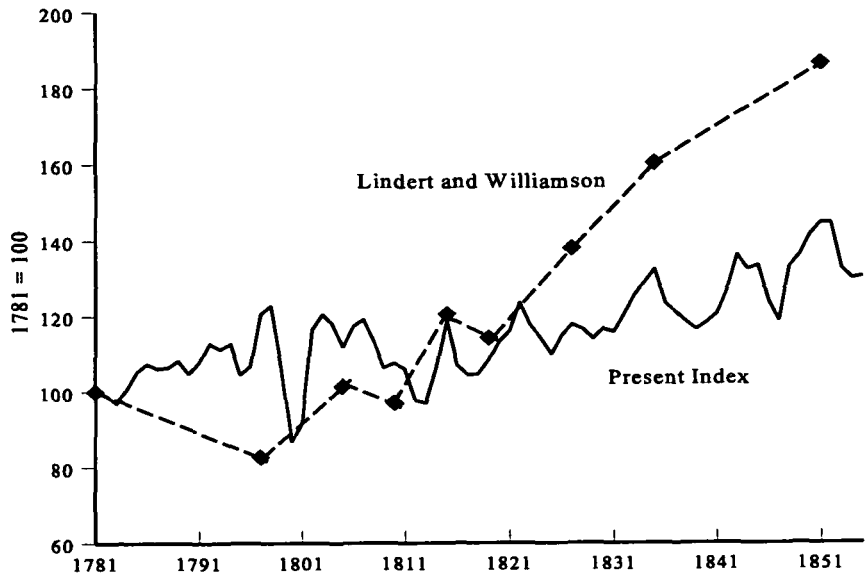

FIGURE 3
INDICES OF REAL EARNINGS, GREAT BRITAIN, 1781–1855

Sources: See the text.

tortoise. By midcentury their estimate of average real earnings has increased by some 75 percent above the level in 1810; a strikingly greater advance than the 32 percent shown by the present estimate. Moreover, prices were lower in midcentury than at any other time until the great depression of the 1880s, and this end-point thus represents an exceptionally favorable outcome; in the following five-year period the advance on 1810 was only 24 percent.

This marked contrast between the two estimates of real earnings arises almost entirely from the differences in the underlying cost-of-living indices discussed above. Contrary to several recent suggestions, it is not the result of the inclusion of the incomes of women and children in a previously patriarchal earnings index.[56]

The crucial points at issue thus concern both the timing and the scale of the improvement in average real earnings. First, did progress begin as early as 1810 or was it deferred until after the middle of the century? In the long sweep of history a difference of 40 years does not count for much, but in the standard-of-living context it exceeds the span of a working life. Secondly, how substantial were the gains? A rise of 75 percent by midcentury can easily cover the additional costs of urban disamenities and other adverse factors and still leave a handsome improvement in welfare. One of 30 percent or less will look quite modest after any downward correction, and

[56] See, for example, Szreter and Mooney, "Urbanization," p. 110.

leave the possibility of actual deterioration for many who failed to achieve even the limited average gain.

Margins of Error

Before we explore these issues, we should ask how robust are the present estimates? The many imperfections in the component earnings and price series, and in the weights used to combine them, have been stressed repeatedly. Given these various sources of error it would clearly be desirable to have some assessment of the overall margins of measurement error in the two series. It is not possible to calculate exact confidence intervals for these estimates since they are not derived from sample data by standard statistical procedures. However, rough subjective assessments can be made of the likely margins of error in each of the components, and the compiler of the series is in the best position to do this.

I have done this for earnings at three pivotal dates, 1778/82, 1808/12, and 1848/52, and for the change in prices between these dates. Subjective margins of error, assumed to apply with 95 percent confidence intervals, were assigned to each of the component series for earnings and prices using the following error classes:

A.	Firm figures	less than 5 percent
B.	Good estimates	5 to 15 percent
C.	Rough estimates	15 to 25 percent
D.	Conjectures	more than 25 percent

For the earnings series, C predominates at first, with a handful of D grades, but by midcentury D drops out and B becomes the most common. For the cost of living, the changes are predominantly assessed as C for the first period and as B for the second with a sprinkling of A grades. The corresponding margins of error for the employment weights at the three dates are taken as 20, 15, and 10 percent, and for the expenditure weights in the two periods as 20 and 15 percent.

These component errors were then combined by a procedure which is in essence a development of that used by previous authors for the simpler case of the errors in a single component of the national accounts at a benchmark date.[57] The estimated margins of error in the three original series and in the derived estimate of real earnings are set out in the two panels of Table 4 for 1848/52 relative both to 1778/82 and to 1808/12.

[57] See, for example, Chapman, *Wages*, pp. 230–36. I am greatly indebted to Mark Thomas for developing the more complex version of this approach required when it is applied to a ratio and for helping me to understand it. We plan to discuss the issues and to explain and apply the method, in a forthcoming article, "A Plea for Errors."

TABLE 4
STANDARD ERRORS AND MARGINS OF ERROR IN ESTIMATES, 1780–1850

	(1) Index	(2) Standard Error	(3) Margins of Error (percentage)	(4) Range for Index	
	A. 1778/82 to 1848/52 (1778/82 = 100)				
Full-time money earnings	166	8.2	9.9	150	183
Cost of living	121	4.0	6.6	113	130
Real earnings	137	9.1	13.4	119	155
	B. 1808/12 to 1848/52 (1808/12 = 100)				
Full-time money earnings	88	3.2	7.2	82	94
Cost of living	67	2.1	6.3	63	71
Real earnings	132	3.8	5.8	124	139

Note: The margins of error are twice the standard errors and are expressed as a percentage of the corresponding indices. The standard errors are derived by the procedure noted in the text.

For the late eighteenth century there is considerable uncertainty about the estimates for many of the component indices, and consequently there is an uncomfortably large margin of error in any comparison with that period. The statement that full-employment real earnings in Great Britain at midcentury had increased to 137 percent of the level in 1778/82 is subject to a margin of error of about 13 percent (18 points) in either direction. However, for the more critical and controversial period from the end of the Napoleonic Wars to midcentury, the uncertainty is considerably diminished. The margin of error for the central finding that real wages increased by about 32 percent over this later period is only 6 percent (8 points). We can thus conclude with 95 percent confidence limits, that the increase over these critical decades from 1810 to 1850 falls within an upper limit of 39 percent and a lower limit of 24 percent.

ADJUSTMENTS TO REAL WAGES FOR UNEMPLOYMENT AND FOR IRELAND

There are three potentially important qualifications and adjustments that must now be addressed.

Unemployment and Short-Time Working

The estimates so far discussed all relate to earnings on the basis of full employment; it is now time to drop that assumption. Two adjustments are incorporated, intended to allow both for cyclical fluctuations in unemploy-

ment (including short-time working) and for the special problem of seasonal unemployment in agriculture.[58]

Employment in agriculture, domestic service, and the armed forces is assumed to be broadly stable so that the former adjustment is required only for building, mining, manufacturing, and transport. In the absence of any trustworthy direct information on unemployment in this period, any measure necessarily must be very rough. The starting point was an index of the pattern of cyclical fluctuations between 1790 and 1850 in which each year is graded from 0 (deep depression) to 5 (major cycle peak).[59] This was extended to cover the years 1770 to 1790 and 1850 to 1860.[60] These grades were then used as the basis for an estimate of the percentage of wage earners out of work or on short time each year.[61]

The grades are reasonably reliable as an indication of the relative state of the labor market each year, but the conversion to absolute unemployment percentages is more problematic. The levels assigned were based largely on what is known about unemployment in the later nineteenth century. Ad hoc adjustments to particular years were then made in the light of observations and comments in the business-cycle literature on the character of the various cycles.[62] A special correction was made to the percentages for 1815/17 to allow for the rise in unemployment that followed the large postwar demobilization.[63]

The estimated rate of unemployment ranges from 17 percent in the postwar depression of 1816 to 1 or 2 percent in boom years such as 1825, 1836, and 1845. The average rate is about 5 percent over the period from 1770 to the end of the Napoleonic Wars, and then rises to about 8 percent from 1815 to midcentury, reflecting the greater importance of more volatile industries in the later period. Its effect on earnings is further enhanced as the higher percentage is applied to a progressively larger proportion of the labor force because of the expansion of the industrial sector.

The second adjustment applies only to agriculture. The problem of winter unemployment during the agricultural depression that followed the end of

[58] It is assumed that any further loss of income as a result of sickness or persistent casual labor was a broadly constant proportion of earnings each year and so would not affect the long-term trend in real earnings.

[59] Gayer, Rostow and Schwartz, *Growth*, p. 356.

[60] The extrapolation was based on Ashton, *Economic Fluctuations*; Hoppit, *Risk;* and Hughes, *Fluctuations*.

[61] I prefer this impressionistic approach to the alternative of applying a regression model based on unemployment data for later years because it allows consideration of the individual circumstances of each year but recognize that this is a minority taste.

[62] For example, Gayer et al. averred that "There had been some unemployment in 1793, 1797, 1803 and 1807-8; but that of 1811 was, so far as one can judge from the qualitative evidence available, on a much larger scale than on previous occasions within our period." See *Growth*, p. 109; other helpful comments were found at pp. 169, 210, 240, 275, 339–40. See also Matthews, *Study*, pp. 164, 220; and the sources listed in note 60. I also took some slight account of other cyclical indicators; for example, the index compiled by Beveridge, "Trade Cycle," pp. 66–68.

[63] Acworth, *Financial Reconstruction*, p. 23.

the wars against France is well recognized.[64] However, it is again extremely difficult to get any direct indication of the quantitative magnitudes. I have assumed that it affected only hired laborers (not farmers' relatives or farm servants hired by the year) in those counties with predominantly arable farming. The excess of winter unemployment over the prevailing summer rate was taken as 10 percent of the number of hired agricultural laborers in these counties.[65] This additional rate was assumed to apply for the five months November to March in each year from 1815 to 1850, and then to have diminished gradually until by 1870 it was no longer significant. In the worst period this removes the annual equivalent of some 24,000 laborers from the labor force, corresponding to an actual level of winter unemployment in the arable counties of roughly 100,000. The combined effect of the two adjustments for unemployment on real wages in Great Britain is shown for five-year periods in column 2 of Table 5.

The Inclusion of Ireland

The general case for inclusion of Ireland was discussed above. Agriculture was the major sector in which Ireland had both large numbers of wage earners and a pattern of changes in earnings appreciably different from that in Britain. A very rough estimate of the earnings of Irish agricultural laborers can be incorporated using the index compiled by Bowley allowing for "want of work."[66] The resulting series for real wages in the United Kingdom is summarized in column 3 of Table 5.[67]

The effect of this adjustment on the index for Great Britain reflects the combined effect of two factors: the respective weights (determined by the size of the Irish farm labor force relative to the number of all wage earners in Britain and their corresponding levels of earnings) and differences in the movements of the two series over time. From 1770 to the mid-1830s, the effect is negative: the stagnation (or worse) of Irish farm earnings pulls down the United Kingdom series relative to the index for Great Britain, though this is offset to a limited extent by the steadily diminishing weight of the Irish

[64] See for example, Gash, "Rural Unemployment"; Pollard, "Labour"; and Snell, *Annals*.

[65] See Boyer, *Economic History*, pp. 89, 132. The actual rate during the winter months was roughly 17 percent.

[66] Bowley, "Statistics," pp. 565–67. In this estimate Bowley attempted to cover not only the earnings (allowing for unemployment) in cash and kind of full-time and casual hired laborers but also those of farm servants, of cottiers (who obtained part of their earnings in the form of a house and an area of land at a reduced rent), and of those who worked for their landowners as the means of paying rent for their land under the con-acre system.

[67] The cost-of-living index is not adjusted to allow for the inclusion of Ireland; the main change would presumably be an increase in the weight allocated to potatoes. Given the rise in their relative price noted earlier, this would mean a marginally smaller rise in real earnings after 1815.

TABLE 5
REAL WAGES ADJUSTED FOR UNEMPLOYMENT, GREAT BRITAIN AND THE UNITED KINGDOM, 1770–1882
(Five-year averages, 1778/82 = 100)

	(1) Full-Employment Real Earnings (Great Britain)	(2) Real Earnings Adjusted for Unemployment (Great Britain)	(3) Real Earnings Adjusted for Unemployment (United Kingdom)
1770/72	95	96	97
1773/77	95	96	96
1778/82	100	100	100
1783/87	101	102	101
1788/92	106	106	105
1793/97	109	108	105
1798/02	103	103	99
1803/07	115	114	109
1808/12	104	103	98
1813/17	105	102	97
1818/22	111	108	102
1823/27	113	111	104
1828/32	114	111	104
1833/37	124	121	113
1838/42	118	114	107
1843/47	126	124	118
1848/52	137	133	129
1853/57	129	129	128
1858/62	138	137	139
1863/67	143	143	146
1868/72	149	149	154
1873/77	167	168	176
1878/82	176	173	183

Sources: See the text.

component. The net result is an increase in United Kingdom real earnings over 1778/82 of only 13 percent, compared to 21 percent for Great Britain.[68]

After the mid-1830s this trend is reversed, with both factors contributing to a positive effect on the United Kingdom series. Initially this reflects the continuing fall in the relative weight of the Irish component, so that their lower level has progressively less of a dampening effect on the United Kingdom average. Then in the postfamine period a marked reduction in unemployment produces a steep increase in Irish farm earnings, hugely outstripping the pace of the overall average in Great Britain. As a result average real earnings in the United Kingdom rise by 62 percent between the mid-1830s and 1878/82, surging ahead of the 43 percent increase in Great Britain.

[68] The exceptionally high level of unemployment and underemployment had a massive influence on farm earnings in Ireland, and Bowley's allowance for this is inevitably extremely rough. The trends seem broadly in line with recent discussions though there must be great uncertainty about the precise levels. See Mokyr, *Why Ireland Starved*, pp. 213–17, Ó Gráda, *Ireland before and after the Famine*, fn. 40, p. 41 and *Ireland*, pp. 80–97, 236–39.

Hours Worked

The above estimates are all based on weekly earnings. Would it change the picture if they were adjusted to an hourly basis? The evidence on actual total hours worked is very inadequate. It seems that there was some reduction in hours per day, from perhaps 12 or slightly longer at the beginning of the period to something nearer 10 by the 1850s. However, this was approximately offset by an increase in days worked per week because of diminishing observance of old holy days and of St. Monday, as more and more workers lost their independence, and with it the ability to choose their working hours. It is possible, therefore, that the net result was little change in the total number of hours worked each week, and in the absence of more precise information I have assumed that weekly and hourly earnings were broadly comparable at the beginning and end of the period.[69]

IMPLICATIONS FOR THE STANDARD-OF-LIVING DEBATE

The main conclusion of the present estimates is thus that over the 75 years from 1778/82 to 1853/57 the increase in real weekly earnings, allowing for unemployment and short-time working, was less than 30 percent, irrespective of whether or not Ireland is included with Great Britain (see columns 2 and 3 of Table 5). Wage earners' average real incomes were broadly stagnant for 50 years until the early 1830s, despite the fact that in many parts of the country they were starting from a very low level, having been falling in the second half of the eighteenth century.[70] Some slight progress was made in the mid-1830s, but earnings then fell back again in the cyclical depression during 1838/42, and it was not until the mid-1840s that they at last started an ascent to a new height. More substantial gains were not achieved until the 1860s, and it was only after the post-1873 downturn in prices that average real earnings finally accelerated.

The picture looks even more bleak when we take account of a number of other features of the period which would have had an adverse effect on living standards. One such factor is the increasing adulteration of the food and drink purchased by the working class, though it is not possible to form a reliable estimate of the extent of this practice.[71] A second is the increase in the number of dependants each worker had to support. With rising fertil-

[69] Bienefeld, *Working Hours*; Reid, "Decline," and "Weddings"; Rule, *Experience*, pp. 57–61; and Hopkins, "Working Hours." I have also benefited from Voth, "Time-Use". The rise in days per week may to some extent have preceded the fall in daily hours, so that total hours probably varied during the period.

[70] Gilboy, "Cost," pp. 139–42; Phelps Brown and Hopkins, *Perspective*, p. 30; and Schwarz, *London*, p. 172.

[71] Burnett, *Plenty*, pp. 72–90, describes the rapid deterioration in the quality of many foods from the closing decades of the eighteenth century.

ity, the ratio of the dependent population of Great Britain to the number occupied increased from about 2.61 in 1771 to 3.06 in 1821, and was then stable until the 1860s. The impact of this rise on an estimate of required consumption per family would depend partly on the composition of households at the two dates and partly on the particular adult equivalence scales adopted. A crude calculation suggests that allowance for this demographic change might have reduced the standard of living of the average family by roughly 10 percent, or about one-third of the measured improvement in average real earnings by midcentury.

The next factor which must be considered is the deleterious effects of poor housing, inadequate public health, and other features of urban life and work noted earlier. Attempts to quantify the effect on living standards of these urban disamenities have recently been made both by Williamson and by Brown.[72] Their calculations suggest that between 10 and 25 percent of the urban wage might be regarded as the premium required to compensate city workers for the costs in terms of health. If a reduction of this magnitude is applied to the one-third of the population living in towns of more than 20,000 in 1851, average real earnings at that date would be cut by 3 to 8 percentage points.

Finally, it is necessary to bring into the reckoning the decline in relief expenditure following the introduction of the Poor Law Amendment Act of 1834.[73] Relief payments per wage earner declined in real terms by 40 percent between 1828/32 and 1838/42 and remained at that lower level; this is equivalent to a decline in average real incomes of roughly 2 percentage points.[74]

The combined effect of these three factors would thus reduce any improvement in the standard of living of the average working class-family in the United Kingdom between the 1780s and the 1850s from about 30 percent to somewhere in the range of 10 to 15 percent.

The Result in Context

How plausible is the picture of a long plateau and subsequent slow improvement which has emerged from these new estimates? Quantitative disagreements cannot be directly settled by appeals to other sources of information, but qualitative evidence may help to corroborate or discredit a spe-

[72] Williamson, "Did English Factor Markets," pp. 653–54 is his latest estimate; see also Lindert and Williamson, "English Workers' Living Standards," pp. 21-24. An alternative measure is given by Brown, "Condition," pp. 605–10. For a highly critical comment on this approach see Pollard, "Sheffield."

[73] Allowance for other aspects of government expenditure would not affect the outcome significantly either way. Changes on the revenue side through alterations to indirect taxation were important for working-class living standards but are already allowed for in the price indices.

[74] Williams, *From Pauperism*, pp. 59–90. The reduction in relief may have been offset by the payment of higher wages to farm laborers, but to the extent that this occurred it is already allowed for in the estimates of money earnings. For conflicting views on this see Boyer, *Economic History*, pp. 193–232; and Snell, *Annals*, pp. 114–37.

cific statistical result. In my view, the new findings conform appreciably better than the more optimistic assessments with historical accounts of conditions in both rural and urban areas, as well as with a range of alternative economic, political, and demographic indicators.

The existence of an abundant supply of labor in the first half of the nineteenth century was the central feature in H. J. Habakkuk's analysis of factor supplies, with the first signs of a tightening located only in the 1850s. Similarly, Eric Jones noted that in the rural areas it was not until the 1850s and 1860s that changes in farming were sufficient, combined with migration and emigration, to "disperse the glut of farm labour."[75] One telling indicator of conditions before 1850 was the ease and speed with which huge numbers of navvies could be hired during the railway construction boom of the 1840s.[76]

A slow improvement in real wages fits with the outcome that economic theory would predict for such a labor market, in which extremely rapid population growth was supplemented by a vast reservoir of labor in rural Ireland, with opportunities for external emigration relatively limited until the 1840s.[77] In the rural areas, an excess supply of labor, in conjunction with the postwar collapse of farm prices, the gradual introduction of threshing machines, and innovations in the hand-tools used for harvesting wheat meant that agricultural earnings dropped steeply until the end of the 1820s and were subsequently unable to advance by more than a very modest amount.[78] In the towns, migration and the natural increase in population helped to maintain an elastic supply of labor. The resulting pressure on industrial wages was exacerbated in many sectors as skilled male craftsmen were displaced or challenged by the introduction of machinery, by changes in the organization of production which undermined their traditional position, and by employment of female workers in traditional male occupations such as weaving of woollen cloth.

A turning point in living standards in midcentury rather than 1820 is also more obviously consistent with the extent of industrial and political unrest among workers from the 1810s to the 1840s, so far as that can be explained by their economic circumstances. It was this period that experienced the unrest and radicalism of Luddism, the Captain Swing protests, "collective bargaining by riot," and Chartism. Only from the 1850s did this give way to the greater sense of harmony, safety and social stability that prevailed in the mid-Victorian "age of equipoise."[79]

[75] Jones, "Agricultural Labour Market," p. 218.

[76] Mitchell, "Coming," pp. 322–23.

[77] See Lewis, "Economic Development," and the application of a broadly similar model to the early economic development of the Netherlands and Belgium in Mokyr, *Industrialization*, pp. 133–64. The relevance of the Lewis model to early nineteenth-century Britain was first suggested by Kindleberger, *Europe's Postwar Growth*, pp. 18–20.

[78] See, for example, Jones, "Agricultural Labour Market"; and Collins, "Harvest Technology."

[79] Briggs, *Age*, pp. 394–412; Hobsbawm, *Age*, pp. 15 and 43–47; and Hunt, *British Labour History*, pp. 237–49, 275–78. See also the discussion of the transformation of "the legal, and in certain respects

The present account of trends in living standards also seems more plausible in relation to other indicators of well-being. It accords better with the evidence of a sharp deterioration in infant and child mortality. It eliminates the paradox of the decline in nutritional status indicated by the early nineteenth-century height data occurring at a time of an allegedly swift advance in living standards. It goes a long way to resolve the recently discovered "food puzzle" created by the apparent coincidence of large gains in per capita income with stagnant or declining per capita supplies of foodstuffs.[80]

Finally, it might be suggested that the present estimates make more sense of the persistence of the standard-of-living controversy itself. The debate would surely have been neither so lively nor so protracted if the outcome had been as unambiguously favorable to the workers after the 1820s as the super-optimists have suggested. By contrast, the present estimates leave plentiful scope for the experience of that large group of workers below the average whose position has constantly sustained the case of both contemporary and modern pessimists, while still providing enough progress from the 1820s onwards for the above-average advances of the most fortunate workers who supported the case of moderate optimists.

Most British workers and their families did not experience an actual deterioration in their standard of living during and after the Industrial Revolution. But neither did they enjoy the rapid progress which the super-optimists have discerned. For the majority of the working class the historical reality was that they had to endure almost a century of hard toil with little or no advance from a low base before they really began to share in any of the benefits of the economic transformation they had helped to create.

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the social, political and industrial situation of organised labour" which had occurred by the mid-1870s, in Fox, *History*, p. 124.

[80] Clark, Huberman, and Lindert, "British Food Puzzle."

APPENDIX TABLE 1
ANNUAL INDICES OF MONEY EARNINGS, THE COST OF LIVING, AND REAL EARNINGS, GREAT BRITAIN, 1770–1882
(1778/82 = 100)

Year	(1) Average Full-Employment Money Earnings	(2) Cost of Living Index	(3) Average Full-Employment Real Earnings	Year	(1) Average Full-Employment Money Earnings	(2) Cost of Living Index	(3) Average Full-Employment Real Earnings
1770	91.7	92.2	99.4	1778	97.6	99.6	98.1
1771	92.7	97.7	94.8	1779	98.0	94.5	103.7
1772	93.5	102.4	91.3	1780	99.1	95.5	103.7
1773	93.5	102.8	91.0	1781	102.8	104.9	98.0
1774	93.9	101.3	92.6	1782	102.5	105.6	97.1
1775	93.8	100.4	93.4	1783	100.7	105.9	95.1
1776	93.8	94.0	99.8	1784	99.2	100.6	98.6
1777	96.2	98.1	98.1	1785	99.3	96.2	103.2

APPENDIX TABLE 1—continued

Year	(1) Average Full-Employment Money Earnings	(2) Cost of Living Index	(3) Average Full-Employment Real Earnings	Year	(1) Average Full-Employment Money Earnings	(2) Cost of Living Index	(3) Average Full-Employment Real Earnings
1786	100.6	95.6	105.2	1835	153.6	118.3	129.8
1787	101.2	97.3	104.0	1836	157.0	129.8	120.9
1788	103.1	98.8	104.4	1837	159.6	134.5	118.6
1789	104.5	98.5	106.1	1838	162.6	140.0	116.1
1790	107.8	104.9	102.7	1839	165.1	144.6	114.2
1791	109.7	103.7	105.7	1840	166.0	143.2	115.9
1792	112.0	101.3	110.6	1841	166.0	140.6	118.1
1793	117.3	107.5	109.1	1842	165.0	132.6	124.4
1794	122.5	110.8	110.5	1843	162.6	121.9	133.4
1795	131.3	128.2	102.4	1844	163.4	125.9	129.8
1796	137.3	131.3	104.6	1845	165.1	126.3	130.7
1797	139.6	118.2	118.2	1846	171.8	141.3	121.6
1798	144.3	119.8	120.4	1847	176.2	151.4	116.4
1799	151.3	144.9	104.4	1848	168.8	129.6	130.3
1800	160.0	188.4	84.9	1849	165.8	124.3	133.4
1801	160.3	178.2	90.0	1850	165.0	119.0	138.6
1802	157.1	137.5	114.3	1851	165.0	116.5	141.7
1803	160.0	135.6	118.0	1852	167.2	118.1	141.6
1804	167.4	145.0	115.5	1853	177.6	136.6	130.0
1805	178.6	162.8	109.7	1854	187.7	147.4	127.3
1806	180.3	156.6	115.1	1855	192.3	150.3	127.9
1807	181.2	155.3	116.7	1856	195.4	151.1	129.3
1808	181.8	163.6	111.2	1857	193.6	147.6	131.2
1809	186.0	178.3	104.3	1858	187.9	132.6	141.8
1810	190.2	180.4	105.4	1859	189.6	133.9	141.6
1811	190.7	183.3	104.0	1860	195.0	144.4	135.1
1812	195.0	203.5	95.8	1861	197.4	146.1	135.1
1813	194.8	204.8	95.1	1862	198.9	145.2	137.0
1814	192.0	184.0	104.3	1863	198.5	139.4	142.4
1815	183.6	157.5	116.5	1864	200.9	137.8	145.8
1816	180.9	172.5	104.8	1865	206.8	140.2	147.5
1817	178.2	174.2	102.3	1866	214.2	149.1	143.6
1818	174.3	170.0	102.5	1867	216.2	157.0	137.7
1819	173.0	163.0	106.2	1868	214.6	152.3	141.0
1820	168.0	151.4	110.9	1869	212.6	142.3	149.4
1821	159.8	140.5	113.7	1870	216.2	142.9	151.3
1822	157.3	129.7	121.3	1871	223.1	146.9	151.8
1823	154.7	134.1	115.3	1872	235.2	153.1	153.6
1824	156.2	139.7	111.8	1873	247.5	154.3	160.4
1825	158.6	147.2	107.7	1874	246.5	147.3	167.3
1826	158.4	140.8	112.5	1875	245.0	145.1	168.9
1827	155.3	134.4	115.5	1876	245.7	145.4	168.9
1828	155.1	135.7	114.3	1877	245.7	145.3	169.1
1829	154.8	138.6	111.7	1878	241.9	140.9	171.7
1830	153.4	134.2	114.3	1879	237.6	134.6	176.5
1831	154.3	135.9	113.5	1880	238.7	137.3	173.8
1832	154.8	131.1	118.0	1881	240.9	135.6	177.7
1833	154.5	125.7	122.9	1882	243.4	135.8	179.2
1834	154.9	122.6	126.4				

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