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New estimates of average earnings in the United Kingdom, 1880-1913[1]

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The object of this paper is to provide a detailed description of the sources and methods used to construct a new index of average money earnings for the years 1880-1913. Some of the wider implications of the new index, and its consequences for the interpretation of trends in nominal and real wages in late Victorian and Edwardian Britain, were discussed in a companion paper in the last issue of this journal.[2]

The two national indices of money wages normally used for this period are those published by Bowley in 1937 and by Wood in 1909.[3] Most scholars have accepted the former as the best available measure for the years 1880-1913, if only because it appeared to have the advantage of being compiled some 30 years later. In my earlier study of money national income I considered the possibility of attempting to construct a new index but concluded that, although it would be relatively easy to put together an alternative series which might show different results, there was: 'very little reason to believe that any new index which could now be constructed would be an improvement on Bowley's'.[4] This view was based on Bowley's immense statistical expertise and experience, his deep knowledge of all the relevant sources of information, and his close association over many years with the trade unions and government departments responsible for collection and compilation of much of the data on wages.

In order to appreciate why I now believe this view to be mistaken it is helpful to begin in section I with a brief account of the relevant historiography. The record with respect to the earlier work is generally well known, but the history of subsequent developments is less familiar and turns out to be of considerable importance. Section II is devoted to a summary of the statistical basis and the weights employed in the compilation of the new indices; and section III to a definition of the series used and a brief general comment on their reliability. A full description of the sources for the indicators of wage movements in each of the separate sectors is given in the appendix. The final results are presented in section IV, and compared with Bowley's index.

[1] This paper was started while I was a Visiting Scholar at Harvard University in 1987 and completed while I was a Fellow of Nuffield College, Oxford. I am grateful to both institutions for allowing me to use their magnificent library collections, and to Anne Digby for her customary constructive comments on an early draft.

[2] Feinstein, 'What really happened to real wages?'.

[3] Bowley, *Wages and income*, p. 6 and Wood, 'Real wages', pp. 102-3. Wood's published index ends in 1902 but he gave Bowley (ibid., p. 5) a continuation to 1910. (Both these additional estimates, and the others required to complete the columns of the appendix table to his 1909 article, are entered in manuscript in Wood's copy of an offprint of his article; see G.H. Wood papers, Huddersfield Polytechnic Library, CB 29).

[4] Feinstein, *National income*, p. 14.

I

Bowley's earliest paper on movements in money wages was written as a postgraduate student at Cambridge in 1894, and published in the following year.[5] The paper contains the first statement of the correct statistical and methodological basis for the construction of an index number of average wages. It also gives the results of Bowley's first attempt to construct an overall weighted average, combining provisional indices for 11 industries.[6] For the next 12 years he worked intensively—initially on his own, later in collaboration with Wood—to improve these pioneering estimates. Detailed wage statistics were laboriously collected from employers, trade unions, and government records. Systematic and comprehensive annual indices were compiled for four leading industries: agriculture, building, engineering and shipbuilding, and cotton.[7] Less complete series were published for compositors, and for selected workers in the wool and worsted industries;[8] and estimates with little or no supporting detail were given by Wood for iron, coal, jute, furniture, and gas supply.[9] Whatever criticisms might now be made of their work from a present-day perspective, these substantial studies are a remarkable contribution to scholarship, and remain the indispensable foundation for all modern research on wage movements.

Wood worked for five years in the Labour Department of the Board of Trade, but resigned in 1908 on his appointment as statistician and secretary to the Huddersfield Woollen Manufacturers' and Spinners' Association.[10] The material he had gathered on wages and prices was brought together in his famous paper of 1909 on real wages over the previous 60 years; and in the following year he published the superb study of cotton wages on which he had been working for many years.[11] Thereafter he made no further contributions to the history of wage movements.[12] Bowley was also at one stage in the Labour Department, working with Wood on the wage enquiry of 1906; but then moved to a post at the London School of Economics, and from there continued for the rest of his life to investigate numerous aspects of wages, prices, incomes, and poverty, producing a continuous stream of influential books, papers, and memoranda. However, although Bowley's work has been of enormous value to economic and social historians, his own principal interest appears always to have been in contemporary rather than historical issues. Immediately after World War I he did return briefly to the subject of prewar incomes, and published two important studies: on the

[5] Bowley, 'Changes in average wages'.

[6] The industries covered were agriculture, building, cotton, wool, jute, flax, iron, engineering, gas, shipping, and coal mining. The results were given for nine benchmark years between 1860 and 1891.

[7] Bowley, 'Statistics of wages', I-IV and VI-VIII; Bowley and Wood, 'Statistics of wages', X-XIV; Wood, 'Statistics of wages', XV-XIX.

[8] Bowley and Wood, 'Statistics of wages', V and IX; Wood, 'Real wages'. See also *idem*, 'Tests of progress', p. 75.

[9] Wood, 'Tests of progress', p. 93; *idem*, *Cotton trade*, p. 147; *idem*, 'Women's wages', pp. 257-308.

[10] See the two obituary notices by Bowley and E.C.R.[hodes] in *J.R.S.S.*, 108 (1945), pp. 485-7; also Leybourn, 'The George Henry Wood collection', pp. 47-9.

[11] Wood, 'Real wages'; and *idem*, *Cotton trade*.

[12] His unpublished papers include a detailed analysis of the 1906 returns for the woollen and worsted industry and a comparison with the 1886 enquiry; G.H. Wood papers, Huddersfield Polytechnic Library, CB 84, pp. 932-58.

division of income in 1911, and on the changes in the distribution of income from 1880 to 1914.[13] But from then onwards his work was primarily devoted to urgent questions of the interwar years.

Bowley's last major work on wages was published in 1937. He stated that this was 'an attempt to bring into a coherent whole the investigations that I have made on the subjects of wages and income . . . during the past forty years'; and described the index number of wages as his: '*final* estimate of the course of average earnings . . . of all wage-earners in the United Kingdom.'[14] Unfortunately, he explicitly declined to describe in detail the basis on which this crucial index was constructed:

> The preliminary material is to be found . . . in the books and articles listed [in the bibliography]; but it would not be possible for a reader of those to work out completely by any formula the final series. The material is too extensive to print in full, and the compilation of the final series with the various adjustments of weights used is too complicated for exhibition in a simple form.[15]

We thus have no clear statement about which industries were actually included in his calculation of the average index, what the precise sources were for these constituent indices, or how they were combined. Despite this lack of a clear description of the sources and methods, I had previously taken it for granted that this reference to 'final estimate' meant that the index had been revised for publication in 1937, and so had been able to take full account, both of his own work and that of others, up to this date.

It is now certain that this was not the case. In 1910, in the first edition of what is today a largely forgotten textbook on elementary statistics, Bowley published a general index number of average wages based on the individual industry series which he and Wood had compiled.[16] The years covered were 1880-1908, and in presenting the index he explicitly stated: 'All results are tentative till checked by the wage census of 1906'.[17] In a subsequent edition the same series was given, but extended to 1914 with a note that: 'figures subsequent to 1908 . . . are rather roughly interpolated, on the basis of the Labour Department's index numbers.'[18] It is this series which was reproduced, absolutely unchanged, in 1937.[19]

Does this matter? I think it does for three reasons. First, it means that the results of the *Enquiry into earnings and hours in 1906* cannot have been utilized in the actual construction of the indices. This was the first full-scale investigation of actual earnings, and covered a large and representative

[13] Bowley, *Division of the product of industry*; *idem*, *Distribution of the national income*.

[14] Bowley, *Wages and income*, pp. vii and 5, italics added.

[15] Ibid., pp. 4-5.

[16] Bowley, *Elementary manual*; the preface to this first edition is dated December 1909.

[17] Ibid., p. 145.

[18] Ibid., 3rd edn., p. 190.

[19] Bowley, *Wages and income*, p. 6. In addition to this overall index, Bowley also published in 1937 a number of indices for individual industries. For cotton this is Wood's revised index of 1910, not the earlier index, which was the one actually used by Bowley in constructing his overall index; cf. ibid., p. 8 and *Elementary manual*, 1st ed., p. 147; see also n. 28. The index for coal showed only the changes in the standard rates and would not have been used in that form as a component of the overall average; cf. Bowley's explicit statement to this effect, 'Changes in average wages', p. 270. The engineering and shipbuilding index is an unfortunate misprint, and simply repeats the series for agriculture.

sample of wage-earners in all major sections of the economy except mining. The official volumes appeared in stages over the period 1909-13, and the final results cannot have been available to him in time for his index of 1909. This means that he would not have been able to check the movement of his constituent indices against the change recorded between 1906 and the previous census, *Rates of wages in 1886*, for those industries for which comparable data are available in the two enquiries.[20]

Secondly, Bowley was unable to take account of the vital information about earnings per shift in coal mining in 1914 which was collected for the 1919 Sankey Commission. Without an appropriate benchmark, such as that provided by the 1914 data, it is effectively impossible to translate the movements in piece-rates, based on the sliding scales, into an accurate estimate of earnings. For precisely this reason Bowley had himself criticized the available statistics on this important industry as 'hopelessly inadequate'.[21] Shortly after he wrote this, the data from the Sankey Commission and the earlier 1886 census were used by one of his former pupils to construct the first reliable estimates of movements in earnings for coal mining.[22] In the light of the work by Rowe and later scholars it is clear that whatever estimate Bowley included in his general index for coal mining in 1909 must have been seriously defective.[23]

Finally, his reliance on the Ministry of Labour indices to cover the last years of the prewar period is unsatisfactory. For example, for the important engineering and shipbuilding industries the Ministry's series simply recorded the changes in minimum weekly time rates. It thus fails to capture either the shift towards increasing piecework which occurred in these years, or the extent to which the strong boom of 1911-3 raised earnings above wage rates by facilitating both more overtime and increased output per worker.[24] Similarly, for textiles, the Ministry's index measured only the formal changes in agreed piece rates; it took no account of the increased divergence of earnings from rates, generated by rising output per worker in the boom years enjoyed by the industry immediately before the war.[25] This problem would not apply to building or agriculture, but comparable discrepancies between rates and earnings might occur in wool and worsted, and any other manufacturing industries covered by Bowley's index.

In assessing Bowley's index it is perhaps also relevant to note that in his

[20] After receiving an advance copy of Wood's new index, Bowley wrote to Wood in June 1908: 'On first sight what difference there is between our computations comes in the period 1886-1900, when I get a greater rise than you. *I am not prepared to go into this till we have the '06 census.*' (G.H. Wood papers, Huddersfield Polytechnic Library, CB 29, italics added). Bowley did, however, make an *ex post* check, see *Wages and income*, p. 5.

[21] *Idem*, *Division of the product of industry*, p. 34.

[22] Rowe, *Wages in the coal industry*.

[23] For the period to 1891, Bowley, *Wages in the United Kingdom*, p. 109, gives an index of earnings in coal mining for selected years which agrees reasonably well with the index of hewers' earnings compiled by Mitchell, *British coal industry*, pp. 194-5 and 202-3. However, Bowley's calculation for the later period considerably underestimates the increases which miners attained after 1890; Bowley, *Distribution of the national income*, pp. 33-4. Much the same is true for the index in Wood, 'Real wages', p. 93, where large discrepancies emerge between his estimate and Mitchell's after 1896.

[24] Yates, *Wages in British engineering*, p. 97.

[25] Rowe, *Wages in practice and theory*, pp. 113-9; Jewkes and Gray, *Wages and labour in Lancashire*, pp. 18-20; Sandberg, *Lancashire in decline*, pp. 103-4.

1920 study he printed his own index alongside Wood's, commented that they differed slightly, and added: 'it is quite possible that when [the estimates] are reworked in the light of additional knowledge, Mr Wood's will be found to be the more correct.'[26] In subsequent calculations he adopted Wood's index to measure the change in money wages between 1880 and 1913. Similarly, in a number of pieces published in the next few years, it was Wood's index, rather than his own, which he used to describe the general course of wage rates. This applied, for example, to an article for a revised edition of *Palgrave's dictionary of political economy* in 1926.[27] No reason was given by Bowley for reverting to his earlier index in 1937.

All this suggests that it might be sufficient to replace Bowley's index by Wood's. That would be an improvement in certain respects, but Wood's index also suffers from some of the defects listed above. It, too, was completed before the publication of the results of the *Enquiry into earnings and hours in 1906*;[28] and was also unable to take account of the later data on coalmining. It does not cover the last few prewar years, and so cannot provide a measure of the growth of earnings in that period. Finally, Wood, like Bowley, covered only certain sectors of the economy. Both omitted a number of important manufacturing industries, particularly steel, clothing, and footwear, and the whole range of services, including distribution, domestic service, road and rail transport, central and local government, and the armed forces.

For all these reasons it seems clear that it would now be desirable to construct a new index of average money earnings.[29] This should incorporate all necessary revisions to the original series, and cover as many additional sectors as possible. It is likely that the patterns of growth and fluctuation in the constituent elements of the new series will be partly self-cancelling with, for example, more rapid and more volatile changes in some industries compensating for slower growth and more stable patterns elsewhere. However, the objective is not only to derive a new series for average earnings but also to obtain a more complete picture of the differences between various sectors. The new index covers the years 1880-1913. I intend at a later date to carry it back to 1850, but it will probably not be possible to include all the components of the present index. The basis on which the new index is compiled is explained in the two following sections.

[26] Bowley, *Distribution of the national income*, p. 14.

[27] *Idem*, 'Wages, nominal and real', p. 801. See also *Encyclopaedia Britannica*, 14th ed., 23, 'Wages', p. 270.

[28] A significant illustration of this point is to be seen in Wood's own work on the cotton industry. The series for cotton included in his overall wage index was completed before the 1906 data became available, and shows a rise of only 23 per cent between 1886 and 1906; Wood, 'Real wages', p. 93. In his final index for cotton, based on the two *Enquiries*, this was increased to a rise of 29 per cent; *idem*, *Cotton trade*, pp. 117 and 128. The overall wage index should, of course, be amended to allow for this change, but this was never done.

[29] Greasley, 'Paradox of the 1880s', has recently constructed a new index of nominal wages, but this too has very limited coverage and inadequate indices, and the basic statistical procedure is flawed. The basis for these criticisms is set out in Feinstein, 'Wages and the paradox of the 1880s'.

II

By definition an index of average money wages is:

$$\frac{\Sigma Wi_t Ni_t}{\Sigma Ni_t} \div \frac{\Sigma Wi_r Ni_r}{\Sigma Ni_r} \tag{1}$$

where Wi = the average wage in each sector (industry or occupation), and Ni = the number occupied in that sector; and the comparison is between any given year (t) within the period covered by the index, and a reference year (r). In this form the numerator in the left-hand term requires estimates of W for each sector for every year of the period. It is generally more convenient to replace these by a set of wage *relatives* for each sector, derived from indicators of the change in wages from year to year. Such indicators are both more readily available, and more reliable, than estimates of actual money wages in successive years. These relatives must then be scaled by actual wages in the reference year. The end result is identical to (1), but the formula becomes:

$$\frac{\Sigma\left(\frac{Wi_t}{Wi_r} Wi_r\right) Ni_t}{\Sigma Ni_t} \div \frac{\Sigma Wi_r Ni_r}{\Sigma Ni_r} \tag{2}$$

As is evident from formula (1), the result obtained by application of formula (2) is neither a price nor a quantity series, and thus is not an index number in the formal sense. It is simply a comparison of a series of averages, each of which could be expressed in straightforward money terms if all the necessary data were available. The wage relatives for each year are effectively weighted by the number occupied in each sector each year, and the resulting series is scaled by the earnings (Wi's) in each sector in the *reference* year. This scaling is an essential element in the calculation, but the particular year chosen for this purpose has no effect on the result. Exactly the same series for annual average wages would emerge if any other year was chosen, provided only that a corresponding adjustment was made in the choice of reference year for the wage relatives.

The change in average wages can, however, be decomposed into two further series which *are* index numbers, one measuring intra-sectoral wage movements and the other inter-sectoral structural shifts. The former shows the extent to which average money wages would change if the sectoral structure was always the same as in a base year; the latter shows the additional change due to movements between sectors with different levels of pay. Both these indices are proper index numbers and so, in the usual way, if one is a Laspeyres index, the other must be a Paasche, and vice versa. The normal convention is to measure the overall wage-movement effect by a Laspeyres (fixed weight) index. This is given by an index of the wage relatives, weighted by the wage bill in a base year (b). The formula (with the sector term omitted) is:

$$\frac{\Sigma\left(\frac{W_t}{W_b}\right) W_b N_b}{\Sigma W_b N_b} = \frac{\Sigma W_t N_b}{\Sigma W_b N_b} \tag{3}$$

The inter-sectoral structural effect of the shift in numbers is then measured by an index of the sectoral relatives for the numbers occupied, weighted by the wage bill for the current year (t) and multiplied by the ratio of the total number occupied in the base year to the total in the given year. The formula, in the reciprocal form appropriate for a Paasche (current-weight) index, is:

$$1 \Big/ \left[\frac{\Sigma \left(\frac{N_b}{N_t} \right) W_t N_t}{\Sigma W_t N_t} \right] \times \frac{\Sigma N_b}{\Sigma N_t} = \frac{\Sigma W_t N_t}{\Sigma W_t N_b} \times \frac{\Sigma N_b}{\Sigma N_t} \qquad (4)$$

Given the interrelationship between the three indices, we can proceed by compiling indices (2) and (3), and then derive (4) by dividing (2) by (3). Unlike the choice of reference year for equation (2), the particular base year chosen will affect the movement shown by the Laspeyres index in (3) and thus also the Paasche index in (4).[30]

As formula (2) indicates, construction of the index of average wages requires three sets of data: an annual wages relative for each sector (Wi_t/Wi_r); an annual series for the number of wage-earners occupied in each sector (Ni_t); and an estimate of average wages in each sector in the reference year (Wi_r). The wage relatives are discussed in section III and in the appendix; the remainder of this section describes the sources used to obtain the two other components.

The starting point for estimates of the numbers occupied was a set of benchmark estimates from the population census for the total labour force at each of the four census years from 1881 to 1911.[31] An estimate of the total number of wage earners at each census was then obtained by making a detailed analysis of the returns so as to distinguish wage-earners from salary-earners. The basis for this distinction is somewhat arbitrary, and the particular classification used here simply follows that adopted in an earlier study.[32] In particular, shop assistants, police, and domestic servants are treated as wage-earners; clerks, nurses, and teachers as salary-earners. The result of this exercise is shown in table 1.[33]

To complete the estimation a detailed sectoral classification of wage-earners was then made for each of these four benchmark totals for census years. The term sectoral is deliberately ambiguous, and is used because the classification combines occupations and industries. For the most part the estimates cover the main wage-earners in each industry, and to that extent the classification is on an industrial basis. However, some general categories, for example, carters and messengers, are classified separately on an occupational basis. Each allocation was decided in order to achieve the best correspondence with the data available

[30] If the base year chosen for equation (3) is the same as the reference year for equation (2), the numerator in the second term of (2) and the denominator in (3) will cancel out to give the formula exactly as in (4). If the base and reference years are not the same, the effect of obtaining (4) by division of (2) by (3) is to multiply the index by the ratio of the wage bill in the base year to the wage bill in the reference year. Since this is a constant it has no effect on the movement of the index.

[31] Census of Population, England and Wales, 1911, *General report with appendices*, app. C, pp. 268-80.

[32] Feinstein, *National income*, p. 31.

[33] A preliminary version of these estimates was given in *idem*, 'Wages and the paradox of the 1880s', tab. 2.

Table 1. *Classification of the occupied population, United Kingdom, 1881-1911 ('000s)*

	1881	*1891*	*1901*	*1911*
1. Occupied population	15,100	16,660	18,680	20,380
2. Employers & own account				
Farmers	740	720	710	700
Shopkeepers	330	410	490	615
Other	770	870	1,010	1,145
Total	1,840	2,000	2,210	2,460
3. Salaried				
Teachers	210	240	280	315
Nurses	50	70	90	115
Clerks	340	460	680	940
Other	390	480	560	670
Total	990	1,250	1,610	2,040
4. Total non-manual (2 + 3)	2,830	3,250	3,820	4,500
5. Wage-earners (1 − 4)	12,270	13,410	14,860	15,880

Sources: row 1: Census of Population, England and Wales, 1911, *General report with appendices*, app. C, pp. 268-80. rows 2-3: see text.

for calculation of the earnings relatives. The series numbers in column 1 of table 2 identify the 35 sectors for which a separate relative was compiled; these are described in the appendix. The corresponding estimates of the number of wage-earners are given in absolute and percentage terms for the first and last of the four census years in columns 2 to 5 of the table; this information also serves to indicate the broad pattern of change in the composition of the labour force over the period. The corresponding details for the manufacturing sector are shown separately in table 3. As the two tables show, the 35 separate relatives incorporated in the present index cover in total over 85 per cent of all wage-earners.

Except for a few cases where reliable annual series are available, the intercensal years were obtained by simple logarithmic interpolation. The problematic character of many aspects of the occupation tables of the census are well known, and the classification and interpolation required for the present purposes add a further degree of error. However, the figures are only required as a means of weighting the component wage relatives and it would take very substantial adjustments to the employment series derived from tables 2 and 3 to make any appreciable difference to the final indices of earnings.

For the wages component of the formula, 1911 was taken as the reference year, and average earnings were obtained for each industry or occupation, building up from separate estimates for men, women, boys, and girls. As already noted, the series derived from equation (2) is not an index number, and the choice of reference year has no effect on the result. For agriculture,

Table 2. *Number of wage-earners, United Kingdom, 1881 and 1911, and average annual full-employment earnings, 1911*

Sector	Series number (1)	1881 Wage-earners ('000s) (2)	1881 % (3)	1911 Wage-earners ('000s) (4)	1911 % (5)	1911 average earnings (£s) (6)
Agriculture						
England and Wales	1	1,025	8.3	887	5.6	44.1
Scotland	2	175	1.4	129	0.8	47.3
Ireland	3	670	5.5	524	3.3	28.3
Total	1-3	1,870	15.2	1,540	9.7	39.0
Fishing	—	60	0.5	65	0.4	72.1
Mining and quarrying						
Coal	4	430	3.5	1,010	6.4	85.6
Iron ore	5	35	0.3	25	0.2	75.9
Other ore, stone, etc.	—	100	0.8	100	0.6	60.9
Total	4-5	565	4.6	1,135	7.2	83.2
Building	6	735	6.0	920	5.8	71.7
Manufacturing	7-20	3,985	32.5	5,440	34.3	56.7
Gas	21	20	0.15	55	0.3	80.0
Electricity and water	—	5	0.05	30	0.2	76.9
Transport						
Railways	22	180	1.5	375	2.4	67.5
Road	23	255	2.1	510	3.2	63.4
Ships	24	200	1.6	210	1.3	66.3
Canals, etc.	—	40	0.3	45	0.3	67.9
Docks	25	50	0.4	135	0.9	85.2
Messengers, etc.	—	210	1.7	320	2.0	36.1
Total	22-5	935	7.6	1,595	10.1	61.3
Distribution	26	655	5.3	1,240	7.8	67.5
Domestic service						
Females	27	1,720	14.0	1,855	11.7	44.8
Males	28	245	2.0	435	2.7	74.3
Catering, laundries, etc.	—	295	2.4	420	2.6	47.6
Government and defence						
Central	29	10	0.1	25	0.15	68.3
Post office	30	35	0.3	90	0.55	65.6
Police	31	50	0.4	70	0.45	96.0
Local authorities	32	25	0.2	85	0.55	64.5
Army	33	170	1.4	240	1.5	61.2
Navy	34	60	0.5	130	0.8	76.8
Total	29-34	350	2.9	640	4.0	70.0
Unclassified labour						
General labour	35	750	6.1	390	2.4	50.7
Other	—	80	0.7	120	0.8	71.8
TOTAL ALL SECTORS[a]		12,270	100.0	15,880	100.0	58.6

Note: [a] in calculating the overall index the weights used for the constituent sectors are only those for which wage series are available. For example, the weight for messengers is not imputed to the index for transport calculated from series 22-5.

Sources: see tab. 1 and text.

Table 3. *Manufacturing: number of wage-earners, United Kingdom, 1881 and 1911 and average annual full-employment earnings, 1911*

Sector	Series number (1)	1881 Wage-earners ('000s) (2)	1881 % (3)	1911 Wage-earners ('000s) (4)	1911 % (5)	1911 average earnings (£s) (6)
Metals, engineering, vehicles, etc.						
Engineering, etc.	7	755	19.0	1,465	26.9	73.9
Shipbuilding	8	75	1.9	155	2.9	84.1
Pig iron	9	25	0.6	35	0.6	80.1
Manufactured iron and steel	10	125	3.1	160	3.0	94.2
Total	7-10	980	24.6	1,815	33.4	76.6
Textiles						
Cotton	11	520	13.0	620	11.4	50.2
Wool and worsted	12	260	6.5	250	4.6	44.4
Jute	13	45	1.1	80	1.5	39.3
Linen, silk, hosiery	14	230	5.8	195	3.6	37.5
Other textiles	—	230	5.8	210	3.8	48.1
Total	11-4	1,285	32.2	1,355	24.9	46.4
Clothing and footwear						
Clothing—males	15	145	3.7	160	2.9	73.6
Clothing—females	16	595	14.9	630	11.6	29.3
Boots and shoes	17	175	4.4	185	3.4	54.6
Total	15-7	915	23.0	975	17.9	41.1
Printing	18	80	2.0	175	3.2	64.2
Glass	19	25	0.6	35	0.6	70.1
Furniture	20	180	4.5	245	4.5	66.2
Food, drink & tobacco	—	180	4.5	275	5.1	53.1
Chemicals	—	50	1.2	120	2.2	60.8
Paper & stationery	—	70	1.8	130	2.4	44.1
Bricks, pottery, etc.	—	115	2.9	160	2.9	59.0
Leather, fur, etc.	—	75	1.9	85	1.6	61.4
Other manufacturing	—	30	0.8	70	1.3	50.6
TOTAL MANUFACTURING	7-20	3,985	100.0	5,440	100.0	58.5

Sources: see tab. 2 and text.

building, the individual manufacturing industries, railways, and a few other sectors the main source was the wage *Enquiry* for 1906 (or 1907).[34] The relative numbers of men, women, boys, and girls given in the *Enquiry* were checked against the population census data, and where they differed the respective earnings figures were weighted on the basis of the more comprehensive census data. The figure for average full-time weekly earnings was adjusted to 1911 levels by means of the wage relatives described below. Information in the *Enquiry* on the number of days allowed for holidays was then used to convert this to an estimate of annual earnings. For all other sectors a wide range of literary and statistical sources was consulted, typically

[34] For manufacturing a further small addition was required to allow for the fact that the average *Enquiry* figure for earnings in each industry is pulled down slightly by the inclusion of carters, messengers, etc. who are allowed for elsewhere in the present estimates.

those used to compile the wage relatives. For seamen, domestic servants, shop assistants, the armed forces, and a few other groups an allowance is included for payments in kind. The resulting estimates are set out in column 6 of tables 2 and 3.

III

We turn now to the core of the new series, the separate relatives or indicators of wage changes. Each of these relatives is defined, in principle, as a measure of full-time weekly earnings, and thus has three crucial features. First, each is designed to capture changes in average *earnings*, not wage-rates, and so attempts to make allowance for such factors as changes in the composition of the manual labour force by age, sex, and skill, and the effect of variations in remuneration under piece rates and other systems of payment by results. Where relevant, the relatives also cover changes in the cost of board and lodging and other payments in kind. Secondly, each measures *weekly*, not hourly, earnings. If—as often happened—a reduction in standard hours worked was offset by a rise in hourly rates, this would not be reflected in the present index as a rise in earnings. Thirdly, the estimates attempt to measure the changes in earnings for a worker in *full-time* employment; they are not adjusted for time lost by whatever cause other than any unpaid annual leave. I hope at a later date to publish a further index, adjusted for unemployment, short-time working, and casual labour.[35]

These indicators can be grouped in three broad categories. The first covers sectors which were also included in the Bowley or Wood indices, though amendments and extensions have been made for the present index. These indicators are all based on annual observations from good sources, and are likely to be of a relatively high order of reliability. They include six major and four minor sectors: agriculture, building, coal, engineering, shipbuilding, and cotton; and printing, furniture, gas, and shipping. In terms of the standards used in a previous study, these series might be assigned to reliability grade B, with a probable margin of error of ± 5 per cent to 15 per cent.[36] This judgement refers both to the absolute level of the annual estimates (represented by the combination of the figure for average earnings in 1911 and the wage relative for 1880-1913) and to the year-to-year changes in each series, though the margin of error in the latter is likely to be somewhat lower.

The second set contains relatives which are also based on reasonably comprehensive and reliable sources, generally available on an annual basis, but were not included by Bowley or Wood. They cover iron ore mining, iron and steel, glass, railways, central and local government, the Post Office, the police service, the armed forces, and general unskilled labourers. These series might also be classified as grade B, except for iron and steel which

[35] In a few cases, notably building and agriculture, the underlying data distinguish between summer and winter earnings, and to that extent seasonal variation is allowed for. Elsewhere no allowance is made; the implicit assumption is that this would be a relatively constant factor and so would not affect the year-to-year changes indicated by the relatives.

[36] The judgement underlying each of the reliability grades is that there is a 90 per cent probability that the true value for the item lies within the limits given for the grade. See further Feinstein, *National income*, pp. 20-2.

should be assigned to grade C, with a probable margin of error of ± 15 per cent to 25 per cent.

The third and least reliable category covers a number of manufacturing industries, including wool, jute and other textiles, dressmaking, tailoring, and footwear; domestic service; shop assistants; and workers in road transport and the docks. By 1911 these sectors included over 6 million wage-earners, more than half of them women and girls. They accounted for almost 40 per cent of the wage-earning labour force, most of them working under conditions where trade unions were weak or non-existent. There was neither centralized bargaining nor regular adjustments to wages. For this and other reasons very little systematic evidence of changes in earnings is available. In most cases all that can be found are isolated (and so not properly comparable) statements for widely separated years, leaving much to be filled in by arbitrary guesswork and interpolation. I would put the two series for clothing in grade D, with a margin of error of more than ± 25 per cent, and all the other series in grade C.

Crude indicators have nevertheless been included for these sectors, because it seems clear from the limited evidence which could be found that wages in many of these sectors behaved rather differently from those for the sectors (such as cotton, mining, engineering, and building) which dominate the Bowley-Wood indices. Thus a crucial premise underlying the construction of the present index is that it is better to include even very rough indicators for these sectors, than to assume—as would be implied by their omission—that their movements parallel those for the sectors for which reliable annual data are available. Some consequences of this crucial decision are explored in section IV below.[37]

The overall index of earnings is assigned to reliability grade B. This judgement allows both for the relative weight of the various components and for the likelihood of offsetting errors. The present index is still in certain respects provisional, but it is to be hoped that publication of this version will stimulate other scholars to suggest amendments and improvements and to indicate further sources which might be exploited, especially for the more speculative series.

A brief description of each of the individual relatives is given in the appendix.

IV

The indices for weekly full-time earnings for each of the main sectors are set out in table 4, and those for the main manufacturing industries in table 5.

The final index for the whole economy is given in column 1 of table 6. This is decomposed in columns 2 and 3 to show to what extent the overall change was the result of movements in earnings within each sector (using 1880 weights with the Laspeyres formula shown in equation (3) in section II above), and how far it was the outcome of changes in the sectoral structure of the labour force (represented by a Paasche index corresponding to formula

[37] I also hope shortly to publish a further article devoted to a detailed discussion of differences in growth and volatility, and other features of the component indices.

(4) above). To test the sensitivity of the indices to the choice of base year in formula (3), an alternative index was constructed with 1911 weights. The difference between the two indices is very slight.[38]

The data in table 6 suggest that the increase of 41 per cent in average earnings between 1880 and 1913 was the joint outcome of an increase of 27.5 per cent as a result of changes in earnings within sectors, and of 10.6 per cent as a result of changes in the sectoral structure of the labour force. However, the above calculation does not provide a complete separation of the two processes of change. There is a further effect of structural change *within* some of the component indices which has not been separately calculated. For example, no allowance is made for the effect on the index for cotton of shifting proportions of men, women, and children, or on the index for engineering of changes in the relative numbers of skilled and unskilled workers. In some cases the changes which occurred had the effect of reducing the long-run rise in average earnings shown by the index; for example, where there was an increase in the proportion of women (as in weaving and warping of wool) or of younger workers (as in the Post Office). In other cases the changes raised the average (as with the increase in the average age of domestic servants). Without further investigation it is thus not possible to say whether the present estimate that approximately one-quarter of the rise in average earnings over the whole period was a result of structural changes is an upper or a lower bound.

In figure 1 the present index for average full-time earnings is compared with the corresponding estimate compiled by Bowley. Two major differences stand out: Bowley's index is far more volatile and it shows an appreciably different pattern of growth over the period. His series shows wages surging upward in 1889, 1900, and 1907, and the last two peaks are quickly followed by a steep descent. In the present index the movements are much less volatile, and growth continues immediately after each surge, albeit at a slower pace. However, the pattern alters for the final upswing to 1913, where Bowley shows only a rather weak increase. Over the period as a whole the two indices record broadly the same increase, but the timing of the gains is very different, with the present index rising less rapidly in the 1880s (8 per cent compared with Bowley's 14 per cent) and more rapidly from 1900 to 1913 (16 per cent against 5 per cent).

In figure 2 an attempt is made to distinguish between the two sources for these differences: changes made for the present index to sectors which are also included in Bowley's index (for example, the revisions to engineering and coal mining), and the addition of series for sectors not covered by Bowley (for example, dressmakers and domestic servants). As already noted, Bowley declined to specify precisely how his index was constructed, but from what we know of his earlier work, and the estimates available at the time his index was compiled, it seems highly likely that his index was based on the following eight sectors: agriculture, building, coal mining, engineering

[38] The growth from 1880 to 1913 is 27.5 per cent with 1880 weights and 26.5 per cent with 1911 weights.

Table 4. *Indices of average full-time money earnings by sector, 1880-1913 (1911 = 100)*

	Agriculture (1)	*Mining* (2)	*Building* (3)	*Manufacturing* (4)	*Transport* (5)	*Distribution* (6)	*Domestic service* (7)	*Government* (8)	*General labour* (9)	*All sectors* (10)
1880	85.3	59.1	87.0	76.0	82.1	81.6	80.4	75.9	83.5	74.8
1881	85.2	59.7	87.0	76.3	83.8	82.0	80.1	75.7	83.9	75.1
1882	85.9	60.8	87.0	77.7	84.1	82.4	80.6	75.9	84.5	75.9
1883	86.3	62.8	87.0	77.8	84.3	82.7	81.0	76.0	85.2	76.4
1884	86.0	64.5	87.0	76.8	83.7	83.1	79.9	76.9	84.9	76.1
1885	85.3	60.3	87.0	76.2	82.9	83.5	78.7	77.9	84.6	75.4
1886	85.0	57.6	87.0	75.0	82.9	83.8	78.7	76.4	84.3	74.9
1887	84.5	60.5	87.8	75.6	82.7	84.2	78.3	79.3	83.9	75.3
1888	84.7	62.1	87.8	77.6	83.6	84.6	78.5	79.8	84.7	76.4
1889	85.1	69.4	89.6	79.4	85.5	84.9	79.3	79.9	85.1	78.0
1890	86.5	90.4	81.7	87.7	85.3	79.9	80.7	88.3	80.7	
1891	87.8	90.4	82.3	88.0	85.7	80.8	85.0	89.1	81.8	
1892	88.2	91.3	82.5	88.1	86.0	81.4	86.6	89.6	82.2	
1893	87.6	93.0	82.3	87.6	86.4	81.0	86.5	89.5	82.0	
1894	87.7	93.0	82.7	88.0	86.8	80.4	85.8	90.4	82.6	

1895	87.8	93.9	83.3	88.7	87.1	80.6	84.7	90.5	82.7	
1896	88.3	94.8	85.4	89.7	87.5	81.3	84.9	91.2	83.8	
1897	89.2	96.5	86.7	91.0	87.9	82.8	85.7	91.9	85.2	
1898	90.1	97.4	88.6	92.0	88.2	84.3	85.8	93.0	86.9	
1899	91.6	98.3	90.4	93.6	89.1	84.9	81.1	93.8	88.4	
1900	93.6	98.5	100.0	92.9	94.0	90.0	87.3	78.4	94.8	91.2
1901	94.2	104.0	100.0	92.8	94.4	90.8	88.1	77.8	95.3	92.2
1902	94.9	97.2	100.0	92.6	94.5	91.7	89.0	83.4	95.5	92.3
1903	95.5	94.1	100.0	92.9	94.6	92.6	90.3	87.3	95.7	92.7
1904	95.8	91.1	100.0	93.2	94.8	93.5	91.0	89.2	95.9	92.8
1905	96.5	89.0	100.0	94.0	95.2	94.4	92.1	92.1	96.2	93.4
1906	96.9	90.6	100.0	95.5	95.5	95.3	93.0	94.8	97.9	94.6
1907	97.4	99.3	100.0	97.3	96.3	96.2	94.6	97.0	98.4	96.7
1908	97.8	104.8	100.0	96.1	95.6	97.2	96.0	98.9	98.5	97.4
1909	98.3	100.2	100.0	96.5	96.1	98.1	97.0	98.8	98.7	97.5
1910	99.1	99.6	100.0	97.6	97.0	99.0	98.8	99.3	99.1	98.4
1911	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1912	101.9	101.5	100.9	102.3	104.3	101.0	102.4	101.0	103.9	102.2
1913	105.6	110.3	103.5	105.0	107.0	101.9	104.3	102.2	106.7	105.5

Note: gas is included with manufacturing.
Source: see text.

Table 5. *Indices of average full-time earnings, manufacturing, 1880-1913 (1911 = 100)*

	Engineering (1)	*Shipbuilding* (2)	*Iron and steel* (3)	*Cotton* (4)	*Wool and worsted* (5)	*Other textiles* (6)	*Clothing* (7)	*Boots and shoes* (8)	*Printing* (9)	*Furniture* (10)	*Glass* (11)
1880	74.5	78.2	76.1	75.1	87.2	92.4	89.6	97.7	85.1	92.0	83.4
1881	76.5	82.0	69.8	75.9	86.2	92.3	89.8	95.9	85.4	92.2	83.4
1882	79.1	84.0	77.6	76.3	85.2	92.4	90.1	94.2	85.6	92.1	81.8
1883	79.8	85.9	75.2	77.2	84.2	91.7	90.3	92.4	85.8	92.0	81.8
1884	78.5	80.8	70.7	77.6	83.5	88.2	90.6	90.4	86.0	91.7	83.9
1885	77.8	80.1	69.8	76.3	82.9	84.9	90.8	88.4	86.3	91.4	83.9
1886	75.8	78.2	65.9	75.5	82.2	82.8	91.1	86.4	86.5	91.0	82.9
1887	76.0	78.8	66.9	76.8	82.4	83.7	91.4	87.3	86.8	90.8	82.9
1888	80.1	82.7	68.0	79.7	82.5	84.8	91.6	88.2	87.0	90.5	82.9
1889	82.3	87.8	76.7	80.5	82.6	87.4	91.9	89.1	87.2	90.3	82.9
1890	84.5	89.7	90.3	81.7	82.8	89.3	92.2	90.0	89.0	93.6	82.9
1891	84.7	89.7	82.9	84.7	82.9	90.9	92.4	91.0	90.9	94.0	96.6
1892	84.2	87.8	79.8	85.9	83.2	90.8	92.8	91.9	91.1	94.0	96.6
1893	83.0	85.9	76.6	85.5	83.4	91.4	93.1	92.8	92.1	94.0	96.6
1894	83.1	85.9	76.3	85.5	83.9	92.5	93.4	93.8	92.4	94.3	95.5

1895	84.0	85.9	74.8	85.5	84.4	93.0	93.7	93.8	92.6	94.7	86.8
1896	88.3	89.1	76.0	86.3	84.9	93.1	94.1	94.9	92.9	95.1	86.8
1897	89.2	91.7	79.4	86.7	85.6	93.1	94.4	94.9	93.1	96.0	96.6
1898	92.3	94.2	81.0	87.5	86.3	93.3	94.8	94.9	93.4	97.9	96.6
1899	93.3	95.5	89.8	88.8	87.0	94.7	95.1	94.9	93.7	98.5	96.6
1900	93.7	96.1	112.6	90.9	87.8	95.9	95.5	95.1	94.9	100.0	94.8
1901	93.9	96.1	100.8	91.3	88.7	95.3	95.8	96.1	95.7	100.2	107.5
1902	94.2	95.5	93.2	90.9	89.7	95.0	96.2	96.1	95.9	100.2	107.5
1903	93.8	94.9	95.0	90.5	90.7	94.9	96.7	96.3	96.2	100.4	104.2
1904	94.1	94.9	92.6	91.3	91.7	94.9	97.1	96.8	96.4	100.4	94.4
1905	94.5	94.9	92.8	93.8	92.8	95.1	97.5	97.1	96.6	100.0	94.4
1906	95.5	95.5	98.0	97.6	93.7	96.2	97.9	97.1	96.9	100.0	94.4
1907	97.0	97.0	105.2	98.4	95.2	98.8	98.3	97.7	97.9	100.0	96.7
1908	97.0	97.0	102.2	92.6	92.6	93.8	98.6	96.0	98.6	100.0	97.3
1909	96.9	96.9	96.8	92.4	96.1	99.1	99.1	96.0	99.2	100.0	97.0
1910	98.0	98.0	97.9	91.5	99.1	100.5	99.5	97.8	99.6	100.0	99.2
1911	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1912	102.0	102.0	107.2	103.2	100.3	102.8	100.5	102.6	100.4	100.4	101.1
1913	104.1	104.1	122.2	103.2	102.5	109.1	100.9	103.3	101.3	100.5	104.2

Source: see text.

Table 6. *Indices of average full-time money earnings (1911 = 100)*

	Index of average earnings (1)	*Index of changes in earnings within sectors* (2)	*Index of changes in earnings between sectors* (3)
1880	74.8	82.2	91.0
1881	75.1	82.2	91.4
1882	75.9	82.9	91.6
1883	76.4	83.3	91.7
1884	76.1	82.8	91.9
1885	75.4	82.0	92.0
1886	74.9	81.3	92.1
1887	75.3	81.6	92.3
1888	76.4	82.6	92.5
1889	78.0	84.2	92.7
1890	80.7	86.7	93.1
1891	81.8	87.5	93.5
1892	82.2	87.6	93.9
1893	82.0	87.1	94.2
1894	82.6	87.3	94.6
1895	82.7	87.2	94.9
1896	83.8	88.0	95.2
1897	85.2	89.1	95.6
1898	86.9	90.4	96.1
1899	88.4	91.7	96.4
1900	91.2	94.3	96.8
1901	92.2	94.8	97.2
1902	92.3	94.4	97.7
1903	92.7	94.6	97.9
1904	92.8	94.7	98.1
1905	93.4	95.1	98.2
1906	94.6	96.2	98.4
1907	96.7	97.7	98.9
1908	97.4	97.8	99.5
1909	97.5	97.9	99.6
1910	98.4	98.6	99.8
1911	100.0	100.0	100.0
1912	102.2	102.0	100.2
1913	105.5	104.8	100.6

Note: the index in col. 2 is calculated with 1880 weights.
Source: see text.

and shipbuilding, cotton, wool and worsted, printing, and shipping.[39] I have taken the present indices for these sectors and combined them by means of the corresponding estimates for their respective weights. The resulting series is shown as the solid line in figure 2. The broken line is Bowley's index. All the 'new' components of the present index are shown as a dotted line.

Four interesting observations can be made on the basis of this exercise. First, from 1880 to 1900 the present index for the eight sectors tracks Bowley's index very closely. This suggests that the assumed composition of his index is correct (and that any differences between his weights and mine are of little consequence). It also reveals that the discrepancies in the overall index are

[39] Other possible candidates are jute, flax, and gas, but each of these is too small to have any noticeable effect on the overall average..

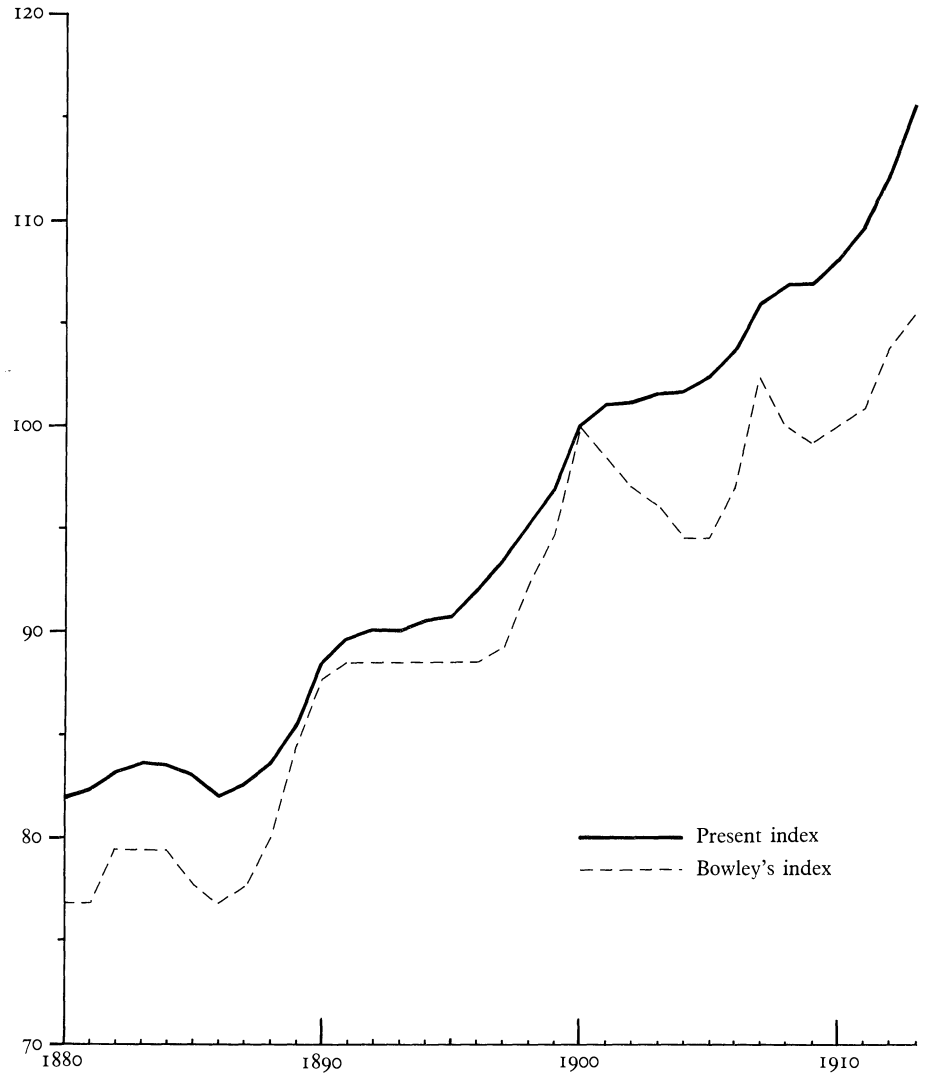

Figure 1. *Comparison of present index of average earnings with Bowley's index (1900 = 100)*

Sources: Bowley, *Wages and income*, p. 6 and tab. 6, opposite.

primarily explained by the addition of new sectors, not by revisions to the series for the old sectors. The index for the former starts at a considerably higher level (relative to 1900) and makes appreciably less progress in the 1880s. This seems plausible given the predominance of unskilled labour and the low level of union organization of most of the workers in this group.

Secondly, the agreement between the two indices for the eight sectors common to both exercises is much less satisfactory after 1900. This confirms the suggestion made earlier (see section I) that the procedures used by Bowley to extrapolate his index to 1913 would fail to reflect the full extent of the increase in earnings in the final upswing. I also suggested that Bowley's index had been compiled too early to take account of crucial information on the change in earnings after 1886, available from the 1906 *Enquiry* and the comparable data for 1914 for coal mining. As the graphs show, there is an appreciable difference between the two indices over the period spanning the two wage enquiries. Bowley's index shows a rise of 26 per cent over this period, whereas the present index for the same sectors increases by 32 per cent. The major reason for this difference is that the series for miners' wages included in the present index shows a much greater increase over this period than Bowley reckoned. There are also differences in several other series, including cotton, wool, and engineering; these are discussed in the appendix.

Thirdly, over the final period 1900-13 the indices for the new sectors show a considerable improvement in their relative performance, and actually outpace the other sectors by a small margin. There are a number of factors responsible for this, two of which are particularly important because of the size of the sectors concerned. The growth rate of the sectors covered by Bowley is pulled down by the very limited progress of building wages in the face of the severe downturn in housebuilding over the Edwardian period. Conversely, the growth rate of the new sectors is enhanced after 1900 by the strong rise in the remuneration of domestic servants, a well-attested market response to steadily increasing demand and diminishing supply.

The final observation arising from figure 2 relates to the differences in the amplitude of fluctuation shown by the indices. Comparison of the three graphs shows that the major source of the difference in the overall indices evident in figure 1 arises from the much greater stability of the index for the additional sectors. The most volatile of all the sectors is coal mining, and even though some components of the new series (iron ore mining, and iron and steel production) also reflect the operation of a sliding scale linked to fluctuations in prices, they do not have the same weight as mining. Inclusion of the new series effectively reduces the importance of coal mining in the overall index and thus damps down the fluctuations in the index.

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APPENDIX

1–3. Agriculture

This index combines three separate series for ordinary adult male labourers in England and Wales, Scotland, and Ireland. The source for each is the information

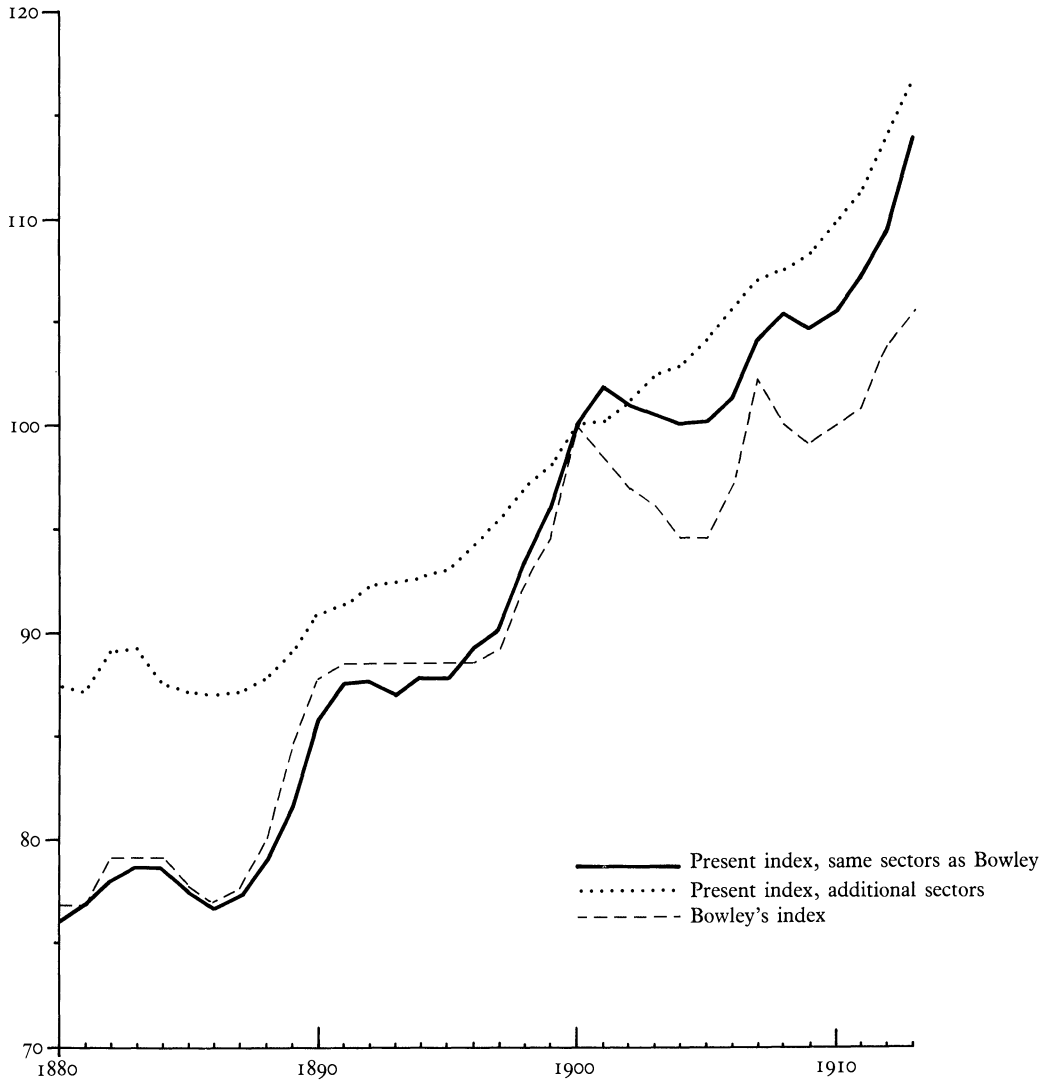

Figure 2. *Comparison of Bowley's index of average earnings with present index for same sectors and for additional sectors (1900 = 100)*

Source: Bowley, *Wages and income*, p. 6. For division of the present index, see above, p. 612.

collected from a small sample of farms (156 in England and Wales, 98 in Scotland, and 27 in Ireland) by the Labour Department of the Board of Trade.[40] For Scotland extra earnings and allowances in kind are covered by the index, but for the other regions the indices measure only cash wages. However, after consideration of all the evidence available on this point, Bowley argued that: 'There seems no reason to suppose that the ratio of earnings to wages has changed to any great extent on the average since Arthur Young's time.'[41]

This series can be compared with an alternative index constructed by Bowley. For years until 1895 this was based on cross-section surveys of farm wages at various dates, with interpolation by means of 'all the scattered information as to changes in wages' which he could find.[42] Bowley subsequently extended this index from 1896 to 1914, but the basis for this was not stated.[43] The Wilson Fox/Board of Trade indices were preferred on the grounds that information collected on a consistent annual basis from a sample of farms was more likely to provide an accurate record of changes over time (even though the sample was small).[44] By contrast, the benchmark estimates underpinning Bowley's index were taken from different and independent studies, each using slightly different procedures for defining, collecting and averaging the data; and the procedure for interpolation between these benchmarks was fairly arbitrary. However, it is reassuring to note that where the two methods can be compared they show broadly comparable results for the long-run growth of wages.[45]

4. Coal mining

This index of money wages per shift of piece-work hewers was compiled by Church, building on the earlier work of Mitchell, who in turn developed a procedure first suggested by Rowe.[46] The Church index is slightly lower than Mitchell's in the 1880s (relative to 1911), but from 1890 the two move almost exactly in step. The index covers only coal-hewers, but the limited evidence on wages of other colliery workers relative to those of hewers suggests that there was little change in differentials over our period.[47] No adjustment is made at this stage for changes in the number of days worked per week, but this will be dealt with subsequently as part of the correction for unemployment and short-time working.

5. Iron ore mining

This series was kindly made available to me by Peter Wardley. It was extracted by him from the records of the Cleveland Mine Owners' Association, and measures the average net earnings per week of ironstone miners employed by firms in the Association. The large fluctuations reflect the operation of the sliding scale in force in this industry.

6. Building

This is the index compiled by Bowley.[48] It is based on series covering the main

[40] Board of Trade (hereafter BT), 17th *Abstract of labour statistics*, p. 67; see also Fox, 'Agricultural wages' and BT, *Second report by Mr Wilson Fox*, for further discussion of these indices.

[41] Bowley, 'Statistics of wages, IV. Agriculture', p. 556.

[42] *Idem*, 'Notes on Mr Wilson Fox's paper', p. 598.

[43] *Idem*, *Wages and income*, pp. 8-9.

[44] In making this choice in favour of the Wilson Fox index I follow both Wood, 'Real wages', p. 92, and Bellerby, 'Distribution of farm income', p. 268.

[45] Cf. Fox, 'Agricultural wages', p. 132. But see Bowley, 'Notes on Mr Wilson Fox's paper', p. 598, for comment on some significant variations in the short-run movements, particularly in the 1870s.

[46] Church, *History of the British coal industry*, p. 561; Mitchell, *British coal industry*, pp. 195 and 202; Rowe, *Wages in the coal industry*.

[47] Church, *History of the British coal industry*, pp. 564-5; Mitchell, *British coal industry*, pp. 198-207.

[48] Bowley, 'Statistics of wages, VIII. Building trades', p. 112; *idem*, *Wages and income*, p. 8.

occupations for both skilled workers and labourers, and represents the rates agreed by trade unions and/or employers' associations in a number of large towns.

7-20. Manufacturing

7-8. *Engineering, shipbuilding, and allied industries.* Bowley collaborated with Wood to compile an index for this important and complex sector.[49] Their basic data related mainly to negotiated time rates from 1850 to 1904 for adult males, and they presented this information classified both by localities, distinguishing inland and maritime districts; and by occupation, distinguishing engineering and shipbuilding. For the final, overall index they also attempted to allow for the various factors which would be needed to convert their series to a measure of average earnings. Bowley later extrapolated this index to 1914 by means of the Board of Trade index of weekly time rates for engineering.[50]

The index increases by 19 per cent between 1886 and 1906, whereas the *Earnings enquiries* show earnings in the relevant industries rising over the same period by about 25 per cent. It thus seems clear that Bowley and Wood underestimated the extent to which earnings drifted away from wage rates over this period. This can readily be explained by the lack of any hard data with which to gauge the effect of such factors as the changing balance between skilled, semi-skilled, and unskilled labour; the increasing tendency for actual rates in all areas to come more closely into line with the negotiated trade union minimum rates; and the growing movement towards piece-rates. Bowley's reliance on agreed time rates for 1906-14 would also have caused some additional understatement of the growth of earnings over the subsequent period.

For the purpose of compiling a revised series it seemed best to treat engineering and shipbuilding separately. The starting point for the former was the unweighted average of 15 engineering occupations given by Bowley and Wood.[51] This was then extrapolated to 1913 by means of the Board of Trade index of weekly time rates and for four major engineering occupations.[52] Two corrections were then made to the linked index. For 1880-1906 it was adjusted upwards to reflect the rise of 26 per cent between 1886 and 1906 recorded by the wage *Enquiries* for full-time earnings of all males in engineering and boilermaking, and in railway carriage and wagon building.[53] The assumption made in interpolating between these dates was that the major part of the unrecorded drift had occurred during the upswing from the mid-1890s.

The second correction relates to the period 1906-14. An enquiry by the Engineering and Allied Employers National Federation into average earnings of some 215,000 workers in July 1914 shows an increase over the 1906 level of 7.5 per cent.[54] The corresponding increase in the Board of Trade wage-rate index was 5.5 per cent. The discrepancy is explained partly by the continued drive by employers to substitute piece for time rates, and partly by the buoyancy of earnings during the prewar

[49] Bowley and Wood, 'Statistics of wages, XIV. Engineering and shipbuilding', pp. 154-93.

[50] Bowley, *Elementary manual*, 3rd edn., p. 190.

[51] Bowley and Wood, 'Statistics of wages, XIV', pp. 160-1. This average excludes labourers, but the stability of the relationships between the different occupations is so strong that their inclusion would have no perceptible effect on the index. It may also be noted that the adjustments made by Bowley and Wood in moving to their final overall index of earnings applied only to the period before 1870. Thus no additional errors are introduced by relying on their component indices for 1880 onwards.

[52] BT, 18th *Abstract of labour statistics*, p. 120.

[53] BT, *Earnings and hours in 1906*, VI. *Metal, engineering and shipbuilding trades*, pp. xv and xxxiii. The recorded earnings of juveniles and apprentices were approximately the same at the two enquiries, but the effect of this on the average increase for all men was more than offset by a small rise in the proportion of adult males.

[54] Spicer, *British engineering wages*, p. 25; Yates, *Wages and labour conditions*, pp. 121-4.

boom. The linked index for engineering was accordingly revised upwards to reflect these trends.

The procedure followed in compiling the index for shipbuilding was broadly the same as for engineering. The starting point was the unweighted average given by Bowley and Wood for 10 occupations, and only a very small adjustment was required to reflect the increase of 22 per cent between 1886 and 1906 shown by the two earnings *Enquiries* for shipbuilding The extrapolation to 1913 was based on the present index for engineering.

9-10. *Iron and steel.* This index covers both blast-furnace men producing pig iron, and the numerous types of work involved in manufacture of iron and steel. Wages in both sectors of the industry were covered for all or most of the period by sliding scales linking wages to product prices, and data on the main scales are readily available. These typically specified the required adjustment to a *standard* tonnage or piece rate. However, actual earnings could vary not only with these published movements relative to the standard, but also with (unstated) changes in the standard itself, and with improvements in output and productivity as a result of technical progress. There is widespread agreement among commentators that earnings did indeed rise more rapidly than the tonnage rates would suggest. For example, Burn writes:

> The percentage additions (based on sliding scales) . . . show impressively the violent short-period fluctuations . . . But they understate the long-period upward trend of wages, both because there were changes in the basic rates on which the percentage additions were paid, and because the introduction of new equipment tended in several ways to raise wages. Both these processes are obscure, but almost certainly important. The most direct way in which the introduction of new plant tended to raise the average level of wages was by elimination of low-paid unskilled manual work.[55]

Unfortunately, however, there is a singular lack of data with which to estimate the extent of such changes. Only the pig iron sector was covered by the 1886 *Enquiry*, and even that permits comparison with 1906 for just one region.[56] Where other evidence on earnings is available it is rarely given with sufficiently detailed specification to provide a basis for long-term comparisons. The complicating factors include the great diversity of products and conditions in the industry, the regional variations in earnings, the frequent changes in earnings during the course of a single year because of the operation of the sliding scales, the complex systems of piece rates and bonuses, the extensive use of various forms of sub-contracting and group payments, and the wide range of workers employed.

In the face of these difficulties I have proceeded as follows. For pig iron production a weighted average was compiled of the movement in shift wages indicated by sliding scales for Cleveland and Cumberland blast-furnace men.[57] This shows an increase of 31 per cent between these dates. Comparison of the census data for 1886 and 1906 for the Durham and Cleveland blast furnaces points to an increase in average earnings for full-time workers of 30 per cent. The index based on the sliding scales was accordingly adopted without any further correction.

For the various forms of manufactured iron and steel the tonnage scales for

[55] Burn, *Economic history of steelmaking*, p. 134. For similar testimony see Carr and Taplin, *British steel industry*, p. 147; Pool, *Wage policy*, pp. 167-75; Porter, 'Wage bargaining under conciliation agreements', p. 469; and Elbaum, 'Steel industry', p. 70.

[56] BT, *Earnings and hours in 1906*, VI. *Metal, engineering and shipbuilding trades*, p. xx.

[57] The Cleveland scale operated from Nov. 1879 and the Cumberland scale from April 1888; for 1880-1904 see the unpublished collection of wage data assembled by Wood for the Labour Department of the Board of Trade, *Rates of wages and hours of labour*, pp. 89-90; thereafter *idem*, *Annual report on changes in rates of wages*. The *standard* shift rates, to which the scales were applied, were unchanged from 1880 to 1919; see Jones, *Increasing return*, p. 127.

puddlers set the basis for a wide range of other wage payments in the industry.[58] As the starting point for an index, a weighted average was constructed of the movements in three of these scales: for the midlands, the north of England, and (from 1893) the west of Scotland.[59] There are a number of very imperfect yardsticks against which this index can be assessed, of which two appear to be the most helpful. The first is an official return giving detailed statistics of the earnings of all relevant categories of labour in puddling, bar rolling, and sheet and plate rolling in two midlands and two north of England districts. From this an overall average for earnings was derived, adjusted to relate to 1877.[60] If this is compared with the corresponding UK average for all manufactured iron and steel in 1906 the increase between the two dates is 39 per cent. By contrast, the tonnage scales show a rise of only 8 per cent, pointing to an understatement of the growth of earnings over almost three decades of close to 30 per cent, an annual rate of almost 0.9 per cent. If the same sources are used to make a corresponding calculation for iron puddling only, the understatement is slightly lower: a little under 0.7 per cent per annum. This difference may reflect the additional boost to earnings from changes in the structure of output: in particular, the rise of the steel sector at the expense of manufactured iron, and within that the rapidly increasing importance of open-hearth steel, in which earnings were higher than for the older Bessemer process.

A second comparison which can be made is based on the figure for average earnings in 1888 extracted by Burn from the records of one steelworks. He estimated the average shift wage for all workers, including those not engaged in direct manufacture, as 4s. 8d. (equivalent to 25s. 8d. per week), and thought this might be broadly representative of the national average for steelworkers.[61] By 1906 the *Enquiry* indicated a corresponding figure of 36s., a rise of 40 per cent. The average of the sliding scales increased by 29 per cent over the same period, an understatement at a rate of roughly 0.5 per cent per annum. This again would include no allowance for the shift from iron to steelmaking.

These calculations obviously constitute a very uncertain foundation for adjustment of the tonnage rates, but do confirm the qualitative views noted above. As a very approximate correction, the average of the three sliding scales was increased by a factor rising steadily by 0.75 per cent per annum from 1880 to 1913.

11-14. *Textiles*. Four separate indices were compiled for this sector: for cotton; wool and worsted; jute; and linen, silk, and hosiery. The index for cotton is considerably more reliable than the others. However, they follow markedly different patterns over the period, reflecting both differences in the shifting balance of male and female labour, and the varying fortunes and technological developments of each industry. Inclusion of series for wool and worsteds, and for the minor textile trades, thus gives an appreciably better indication of changes in earnings in the textile

[58] For example, the wages of millmen and forgemen in the midlands always rose by 2.5 per cent for every 3d. added to the puddlers' tonnage rates.

[59] For 1880-1905 BT, *Rates of wages and hours of labour*, pp. 91-5; thereafter *idem*, *Annual report on changes in rates of wages*.

[60] BT, *Returns of wages*, pp. 148-55. The districts are north Staffordshire (for 1877), Wolverhampton (1880), Darlington (1877), and Cleveland (1883). The information given normally relates to the average weekly (full-time) wage and the relative numbers employed, for the skilled craftsmen (e.g. puddlers, rollers, and bloomers), for their helpers or underhands, and for others directly involved in the manufacturing process, including labourers. Wages are also reported for 'non-manufacturing' labour such as fitters, joiners, and enginemen. It is thus possible to calculate the weighted average wage for each activity in each district, and to adjust these to a common 1877 level by means of the relevant scale. The overall average for all activities, including the indirect labour, works out at approximately 26s.

[61] Burn, *Economic history of steelmaking*, pp. 126-8. The company was Bolckow Vaughan and the information relates to their Cleveland steelworks, which had its own scale.

sector as a whole, even if some of the component indices are rather approximate.

For cotton the final index compiled by Wood was used for 1880-1906.[62] This was extrapolated from 1906 to 1913 by means of an annual series for average earnings derived from statistics of total weekly earnings and total numbers employed, collected monthly by the Board of Trade for a large sample of cotton firms.[63]

The index for the wool and worsted industries is itself a weighted average of separate indices for the two component sectors. For wool a preliminary version of the index for 1880-1906 was based on three series compiled by Bowley and/or Wood for male and female workers in areas in the West Riding of Yorkshire specializing in the woollen trades: Huddersfield, Leeds, and Batley and Dewsbury. It was continued to 1913 by means of the *Labour Gazette* data on average monthly earnings. For worsteds a preliminary version of the index was based on Wood's two series for Bradford and Halifax for 1880-1906, and this was extrapolated to 1913 in the same way as for wool.[64]

The combined preliminary index shows an increase from 1886 to 1906 of only 10 per cent, whereas the 1906 earnings *Enquiry* gave the rise in earnings in the woollen and worsted trades as 14 per cent (counting each half-timer as one person). A proportionate correction to the preliminary index was made for this, starting from 1886 and rising in equal steps to reach the required level in 1906.

The indices for jute and the other minor textile trades were compiled in similar fashion, using the comparison of earnings in 1886 and 1906 to correct the movement shown by various incomplete and imperfect indicators, and extrapolating from 1906 to 1913 on the basis of the relevant monthly earnings series in the *Labour Gazette*.[65]

15-17. *Clothing and footwear.* The relatives which can be compiled for the clothing and footwear industries provide, at best, only a very rough guide to the broad trends in wages in this large and important sector of the economy. The justification for their inclusion is that their movements differ appreciably from those in sectors which were better documented, usually because the workers there were more successfully organized. The overall index is a weighted average of three series: one each for women and for men in the clothing industry; one for all workers in the boot and shoe industry.

Over 600,000 women and girls were employed as dressmakers, milliners, tailors, and seamstresses, making numerous items of clothing from heavy mantles to flimsy straw bonnets. This figure excludes a further large number, predominantly working in their own homes, who were either small employers or self-employed workers, and thus not part of the present estimate which relates only to wage-earners. Even among the hired workers there was an enormous diversity. They worked with steam-powered machinery in large factories; with sewing machines in workshops of all sizes; and alone, with needle and thread, in their own homes. Some earned surprisingly high wages as skilled designers and cutters in the bespoke sections of the trade, others suffered the worst features of sweated labour in the mass-production of cheap ready-made articles. Neither the fluctuating balance of factory and outwork,

[62] Wood, *Cotton trade*, p. 128; see also n. 28 above.

[63] The detailed figures are given monthly in BT, *Labour Gazette*. For a discussion of the movements in earnings as opposed to wage rates see Jewkes and Gray, *Wages and labour in Lancashire*, pp. 18-9 and 198-9; also Rowe, *Wages in practice and theory*, pp. 118-9.

[64] Bowley, 'Statistics of wages, IX. Worsted and woollen manufactures', pp. 117 and 125; Wood, *Real wages*, p. 93; and *idem*, 'Tests of progress', pp. 75-6; see also *idem*, 'Women's wages', pp. 278-9. All these series were compiled before the results of the 1906 enquiry were available; cf. *idem*, 'Tests of progress', p. 64.

[65] BT, *Earnings and hours in 1906*, I. *Textile trades*, pp. xxi-xxii for the 1886-1906 comparison. For the indicators see Bowley, 'Changes in average wages', pp. 263-4; Wood, *Cotton trade*, p. 147; and *idem*, 'Women's wages', pp. 272-9.

nor the true levels of earnings in either part of the industry were ever accurately recorded, and they cannot now be determined with any degree of precision. It is also more than usually difficult to obtain estimates of the 'normal' wage for a full-time worker, as the amount of employment available varied greatly according to the fluctuating effects of climate, fashion, and demand. Nevertheless, there is a broad measure of agreement in the various independent sources, and this makes it possible to chart at least the main trends over the period.

We have several estimates for the mid-1880s and early 1890s, all pointing to roughly the same average level of earnings. All the following figures are averages of weekly earnings for both women and girls, either given explicitly in the sources, or calculated from the separate estimates given for different categories of milliners, dressmakers, tailors, hatters, and so forth. The average of Levi's estimates for 1884 was approximately 12s., and was intended to cover all wage-earners, so that it should have included outworkers as well as those in factories.[66] The 1886 wage *Census* obtained returns covering 1,500 women and girls, and this gave an average cash wage of some 12s., but did not include any outworkers.[67] In 1888, as part of Booth's first investigation, Clara Collet collected data on earnings of women engaged in many different parts of the clothing industry in the East End of London, and these typically lay within a range of 10s. to 14s.[68] Finally, the 1891 Royal Commission on Labour calculated a simple average of all the separate figures it was given for each of four types of work, and a weighted average of those estimates comes to 12s. 6d., again covering all categories of work.[69] It thus appears that the average earnings for women and girls might be put with some degree of confidence at between 11s. and 12s. in the 1880s.

For 1906 we have the more extensive returns from the Board of Trade *Enquiry* for 110,000 women and girls, giving an average of 11s. 6d. This covered both factories and workshops.[70] An enquiry in Birmingham at the same date broadly corroborates this.[71] The evidence thus suggests that earnings of women and girls in the clothing trades were at best stable and may even have declined slightly, over a period when those of most other workers, male and female, were rising by 20 per cent or more.[72] It is clearly desirable to reflect this very different pattern in the aggregate index, and in the absence of a more precise indicator the wages of women and girls in clothing were assumed to have remained constant from 1880 to 1913. There will undoubtedly have been small fluctuations from year to year, but a stable level over the whole period seems to be broadly representative of the unfortunate experience of this large group of workers.[73]

For the smaller number of men in the clothing industry information is available from similar sources. The diversity of employment conditions again makes generalization particularly hazardous, but the evidence does suggest that the men's

[66] Levi, *Wages and earnings*, 2nd edn., pp. 18-21.

[67] BT, *Rates of wages in 1886, General report*, pp. xv-xvi and 124-5. The average given in the text was calculated on the basis of the ratio of women to girls shown by the 1881 census, rather than the much higher ratio given in the 1886 sample.

[68] Booth, *Life and labour*, 2nd edn., IV, pp. 257-77 and 317-8. See also the chapter on the tailoring trade by Potter, ibid., IV, pp. 50-1.

[69] R. C. on Labour, *Reports and summaries of evidence, Final report*, pt. II, app. C, p. 476.

[70] BT, *Earnings and hours in 1906*, II. *Clothing trades*, pp. 6-9.

[71] Cadbury, Matheson, and Shann, *Women's work and wages*, pp. 319-20.

[72] According to one writer in 1912: 'general wages in millinery are said to have gradually decreased of late years'; Saunders, 'Millinery trade', p. 221. See also Bythell, *Sweated trades*, pp. 65-97; and Schmiechen, *Sweated industries*, pp. 62-6.

[73] For wages in the 1890s see further Hicks, 'Dressmakers and tailoresses', pp. 17-24; for 1905, Howarth and Wilson, *West Ham*, pp. 174 and 271-96; and for conditions immediately before the war, Barton, 'Course of women's wages', pp. 529-33; and Dobbs, *Clothing workers*, pp. 172-82.

pattern was rather different, with wages rising from about 25s. for adult men in the early 1880s to about 33s. in 1906.[74] In the absence of any more detailed information it was assumed that this rise occurred steadily over the period and continued at the same rate down to 1913.

At the beginning of the period the footwear industry had many features in common with the clothing trades, including the diversity in type and quality of product, and an uncertain and changing relationship between factory and outwork. However, the manufacture of boots and shoes was dramatically transformed by mechanization during the 1890s, and by the end of that decade it was predominantly a factory industry.[75] For 1880-1906 a rough index was based partly on sources similar to those used for clothing, including the wage *Enquiries* of 1886 and 1906; and partly on annual figures available from the early 1890s for the minimum time rates of adult men in three of the main occupations (clickers, lasters, and finishers) in towns where the footwear industry was principally located.[76] For 1906-13 the *Labour Gazette* provided a measure of average monthly earnings for a large sample of boot and shoe workers.

18. *Printing.* Construction of a wage index for printing and bookbinding is relatively straightforward and there is an abundance of information on an annual basis for compositors, lithographers, and bookbinders. The starting point for the present index was an annual index derived from a weighted average of separate indices for compositors and lithographers. This was based on series compiled by Bowley and Wood, and extended by means of information on standard time-rates of wages in a large sample of towns, selected to give representative sizes and locations.[77] This gave a somewhat smaller rise between 1886 and 1906 than the increase of 12 per cent indicated by the returns for printers in the wage *Enquiries*.[78] The difference presumably reflects a number of factors, including changes in the structure of the industry, such as the growth of better-paid newspaper work and the introduction of the linotype; the levelling-up created by the spread of work done at the trade union minimum rates; and the effect of piece-rates. The preliminary index was adjusted to allow for this, with the correction extended at the same annual rate for 1880-6 and 1906-13.

[74] See particularly, Levi, *Wages and earnings*, 1st edn., p. 90, 2nd edn., pp. 18-21; BT, *Rates of wages in 1886, General report*, pp. 122-3; BT, *Earnings and hours in 1906*, II. *Clothing trades*, pp. 6-9; Dobbs, *Clothing workers*, p. 109; Tawney, *Tailoring industry*, p. 83.

[75] Fox, *National Union of Boot and Shoe Operatives*, pp. 244-7, 260-4, and 274-5; Head, 'Boots and shoes', pp. 162-84; Bythell, *Sweated trades*, pp. 106-19.

[76] See particularly, Levi, *Wages and earnings*, 1st edn., pp. 86-7, 2nd edn., pp. 18-21; BT, *Returns of wages*, pp. 253-60; BT, *Rates of wages in 1886, General report*, pp. 105-6 (this covers only indoor factory workers); Booth, *Life and labour*, IV, ch. by D.F. Schloss, 'Bootmaking', pp. 69-137; R. C. on Labour, *Reports and summaries of evidence*, Group C, pp. 324-5; Wood, 'Women's wages', pp. 278-9; BT, *Earnings and hours in 1906*, II. *Clothing trades*, pp. 6-9; BT, *Rates of wages and hours of labour*, pp. 198-201; and *idem*, *Annual report on changes in rates of wages*. See also Fox, *National Union of Boot and Shoe Operatives*, pp. 265-74 and 279-89.

[77] The index for compositors was based on Bowley and Wood, 'Statistics of wages, v. Printers', pp. 711-5; and Wood, 'Real wages', p. 93. It was extended to 1913 by means of information for 25 towns, weighted according to their relative size, from BT, *Annual report on changes in rates of wages*. The index for lithographers covers only 8 towns in 1880, but this increases to 17 by 1885 and to 22 by 1888; see BT, *Rates of wages and hours of labour*, pp. 208-11. A further index was constructed for selected years for bookbinders in 10 towns, but it moves very closely in line with the corrected series for printers, and no adjustment was necessary for this group of workers to be included in the final index; ibid, pp. 212-5.

[78] BT, *Rates of wages in 1886, General report*, pp. 117-20; BT, *Earnings and hours in 1906*, VIII. *Paper, printing, etc., trades*, pp. 6-9. The estimate for 1886 is a weighted average of the three separate categories given in the report, for large printing works, small works, and newspapers. It is not possible to check whether the numbers returned in the three sections are representative of the national pattern of employment, and the larger (better-paid) sectors may be over-represented.

19. *Glass.* This index is based on standard nominal weekly rates of wages for glass bottle makers in the north of England, Yorkshire, and Lancashire. For each region three series are given: for makers, blowers, and gatherers. The rates relate to a guaranteed minimum wage, and additional payments were made for overwork, but no information is available on how this varied from year to year. The average of these rates was taken as representative of the movement in wages for all glassworkers, but there is no means of judging whether this is a valid assumption.[79]

20. *Furniture.* An index for this trade was compiled on the basis of the estimate given by Wood for selected years from 1880 to 1906. Interpolation and extrapolation to 1913 was based on annual data for the standard rates of wages paid to cabinet makers and upholsterers in a representative sample of towns.[80]

21. Gas

The starting point for this index is the rise of 17.7 per cent from 1886 to 1906 given by the wage *Enquiries*. This is consistent with the index given for selected years by Wood.[81] Interpolation and extrapolation was based on the annual *Report on changes in rates of wages*, and a series for unskilled gas workers (main layers' labourers and yard labourers) given by the Board of Trade.[82]

22-25. Transport

22. *Railways.* From 1896 an annual series of average weekly earnings is available.[83] The extrapolation from there back to 1886 was based on the trends shown by the censuses of railway wage rates and earnings in 1886, 1891, and 1907.[84] The further extrapolation to 1880 was based on detailed figures of earnings for 1881 and 1891 given for the London and North Western Railway Company.[85] Although this covers employees of only one company it is some reassurance to note that when a weighted average was calculated for their earnings in 1891 it came to within 2d. of the average for all companies.

23. *Carters and carriers.* This index covers all drivers of non-farm carts and vans, cabs, and coaches. It is again an extremely rough estimate, and the justification for its inclusion is similar to that given above for clothing and footwear: its behaviour appears to be appreciably different from that for the more highly organized sectors. In Glasgow, for example, the carters had struck in 1889 to advance their wages from 24s. to 26s. and for the payment of overtime after 6 p.m. Only some of the employers conceded the claims; and it was said that: 'in 1910, the carters had no fixed hours, no entitlement to overtime, and wages well below those of their fathers.'

[79] BT, *Rates of wages and hours of labour*, pp. 241-3. See also Hopkins, 'Small town aristocrats of labour', p. 242.

[80] Wood, 'Real wages', p. 93; BT, *Rates of wages and hours of labour*, pp. 220-5 for cabinet makers (using a sample of 15 towns) and pp. 230-1 and 303 for upholsterers (7 towns); BT, *Annual report on changes in rates of wages*. Where hourly wage rates were quoted, weekly wages were calculated on the basis of hours worked; BT, *Rates of wages and hours of labour*, pp. 236 and 239.

[81] BT, *Earnings and hours in 1906*, IV. *Public utility services*, p. 242; Wood, 'Real wages', p. 93.

[82] S.C. on Post Office servants, *Evidence*, app. XI, p. 29.

[83] BT, *Annual report on changes in rates of wages*.

[84] There is a very helpful discussion of the three sets of data in Rowe, *Wages in practice and theory*, pp. 62 and 245-8. See also BT, *Rates of wages in 1886, General report*, pp. xvi-xx; and BT, *Enquiry into earnings and hours in 1906*, VII. *Railway service*.

[85] R.C. on Labour, *Minutes of evidence with appendices, Group B*, Q.26,003 and app. CLXIV, pp. 586-8; evidence of Sir George Findlay, general manager. I weighted the average wage for each category of worker covered by Findlay on the basis of figures for the corresponding numbers employed in England and Wales in 1886, BT, *Rates of wages in 1886, General report*, pp. 266-7. The only other information I have found for this period is an annual series for the ratio of wages to gross revenue given for 1870-1912 for one company by Irving, *North Eastern Railway Company*, p. 303.

In 1912 an arbitration award finally provided for a minimum wage of 25s. for general carters, and in 1913 a strike brought a further advance to 27s.[86]

Rates in Glasgow were generally recognized to be higher than elsewhere.[87] For the country as a whole, the broad pattern appears to start with an average wage of about 21s. 6d. in the 1880s, rising only very slowly to approximately 24s. by 1906. After a succession of strikes there was a further rise, to a little over 25s. by 1912.[88] For carters and vanmen employed by retail cooperative societies in Great Britain the average minimum rate for adult males was 24s. 8d. at the beginning of 1910.[89] In July 1914 the average of the recognized rates for one-horse carters in 12 large towns was 25s. 7d.[90] A very approximate index was constructed on the basis of these indications of the change over the period.

24. *Seamen.* This index is a combination of two series, one for cash wages and the other for the value of food provided. The former is, in turn, a current-weighted average of the annual estimates of the monthly cash wages of seamen on sailing vessels and on steamships. It thus allows for the increasing proportion of seamen paid at the higher level of wages on steamships. For 1880-92 the estimate for steamships is an unweighted average of the predominant rates paid to able seamen on 11 voyages, starting from London, Liverpool, Newcastle, and Glasgow. For the sailing vessels the series covers 10 voyages (including Bristol but not Newcastle). From 1892 to 1913 corresponding averages are given by the Board of Trade, but for steamships separate series are given for firemen and trimmers and for A.B.s, and the present index is an unweighted average of the two series.[91]

The value of the food provided for the seamen was taken as £24 per annum in 1911, and assumed to have improved very slightly over the period in real terms.[92] The equivalent in current prices each year was then derived by revaluing this series by means of a cost of living index.[93]

25. *Dockers and stevedores.* The basic story of dockworkers' wages is well-known: a rate of 5d. per hour was introduced in London in the early 1870s. This was raised to 6d. following the great strike of 1889, and then held unchanged at that rate until the dispute of 1911-2 brought an advance to 7d. per hour.[94] Liverpool was already

[86] Tuckett, *Scottish carter*, pp. 103-24; see also pp. 31-6, 45-6, and 89-93.

[87] Ibid, p. 113.

[88] These estimates are based on information on the wages of carters and carriers employed by railway companies, general haulage contractors and local authorities, and by a wide variety of other industries. For the early 1880s, Levi, *Wages and earnings*, 1st edn., p. 30, 2nd edn., pp. 17-9 and 83; for 1886 and 1891, BT, *Rates of wages in 1886, General report*, pp. 24 (engineering), 108 (breweries), 272-3 (railways), 146-7 and 168-9 (building trades); and R. C. on Labour, *Fifth and final report, Part II, Summaries of evidence, Group B: Transport by land*, p. 198. For the mid-1890s, Booth, *Life and labour*, VII, pp. 323-32. For 1906 numerous rates are given in BT, *Earnings and hours in 1906, passim.* For the changes made in 1911-2, BT, *Annual report on changes in rates of wages*; and for the beginning of 1912, Tuckett, *The Scottish carter*, p. 113.

[89] BT, *Report on cooperative societies*, 1912, pp. 18-9.

[90] BT, 76th *Statistical abstract*, p. 117.

[91] For 1880-92, BT, *Rates of wages and hours of labour*, pp. 288-91 and *idem, Tables showing the progress of British merchant shipping*; for 1892-1913, *idem, Annual report on changes in rates of wages.* For the numbers employed on sailing and steam ships, *idem, Tables showing the progress of British merchant shipping.* See also Bowley, 'Changes in average wages', pp. 266-9 and *idem, Wages in the United Kingdom*, pp. 77-80; and the data collected by Giffen for 1886 and 1892, BT, *Rates of wages in 1886, General report*, pp. xx-xxii.

[92] See Bowley, *Wages in the United Kingdom*, p. 79; and BT, *Rates of wages in 1886, General report*, p. xxii. The only purpose of the absolute value taken for the payment in kind is to serve as a weight for the movement in the current price series given by the cost of living index, relative to the movement in the cash wage.

[93] Feinstein, 'A new look at the cost of living'.

[94] For the full story see Lovell, *Stevedores and dockers.*

paying a standard rate of 6d. in the 1880s and although there was a strike in 1890 there was no change in the basic rate. When Rathbone reported on the position in Liverpool in 1903 she noted that the main rates had been unchanged since 1871.[95] Rates in the other major ports appear to have moved broadly in step with London, though with some paying higher, and some lower, rates. By July 1914 the minimum rate for dock labourers was 5s. 10d. for a full day in London, and the average of the corresponding rates for 10 large ports was 6s. 1d.[96] However, before we can use this information to construct an index we must consider the possible complications created by the rapid move during the 1890s from time to piece-rates, and by the inclusion in earnings of substantial additional payments for overtime and other extras. To avoid the severe problems caused by the exceptionally widespread use of casual labour, the following estimates relate only to the weekly earnings of dockers assuming full-time employment. The average weekly pay of all dockers would, of course, have been significantly lower than this.[97]

In the 1880s the basic wage for London dockers working full-time for six eight-hour days was about 21s., and additional payments would have raised this by approximately 4s. or 5s.[98] For 1891-2 Booth collected very detailed information on earnings for all the London docks and wharves. Taking only the 9,000 permanent men (including stevedores) the average of his estimates comes to 30s. 9d. By 1905, when Howarth and Wilson conducted their enquiry in West Ham, the average for regular labour was about 32s. 8d. For the same year Beveridge quotes an estimate of 31s. 3d. for the permanent staff of a London dock.[99] For Liverpool, the daily earnings for porters in 1903 averaged 5s. 10d. at one large firm and 5s. 7d. at another, compared with a standard rate of 5s.[100] In 1913 the average earnings of 600 'high preference men' was approximately 30s., equivalent to 5s. per day.[101]

In the light of this evidence it was estimated that earnings rose by 20 per cent in London in 1890 (the first full year after the introduction of the 6d. hourly rate) but, after allowing for the absence of any increase in Liverpool, by only about 12 per cent for the country as a whole. For the subsequent period it seems reasonable to assume that the increase between 1890 and 1911 was relatively modest, and I have allowed a rise of only 7 per cent over this long period. In 1912 earnings are assumed to have increased roughly in proportion to the change in the hourly rates. The resulting index is necessarily very approximate, but again serves to incorporate the experience of a particular group whose wages behaved rather differently from those of most other workers.

26. Shop assistants

Information for this rapidly expanding occupation is far from adequate, but there is sufficient to obtain at least a broad guide to changes over the period. The index is based largely on interpolation between four benchmarks, with an allowance for board and lodging included in each case.

[95] Rathbone, 'Conditions of labour at the Liverpool docks', pp. 23-5.

[96] Bowley, *Prices and wages*, pp. 167-8 and BT, 76th *Statistical abstract*, p. 117.

[97] The extent of such lost earnings, and the question of how far, if at all, the relative importance of casual labour diminished over the period, is left for later investigation.

[98] See the chapter by Potter on the docks (first published in 1887) in Booth, *Life and labour*, IV, pp. 20-5.

[99] For 1891, Booth, *Life and labour*, VII, pp. 418-9, 425, and 429; see also R.C. on Labour, *Fifth and final report, Part* II, *Summaries of evidence, Group B: Transport by water*, pp. 144-5. For 1905, Howarth and Wilson, *West Ham*, pp. 204-6 and Charity Organization Society, *Report on unskilled labour*, quoted in Beveridge, *Unemployment*, p. 90.

[100] Rathbone, 'Liverpool docks', p. 44. This is an average for all those engaged each day during the year; few, if any, individual dockers would have averaged this rate over the year.

[101] Williams, *Liverpool docks scheme*, p. 103.

The most extensive collection of data is that obtained by Bowley for the British Association enquiry into earnings below the tax limit.[102] With allowance for payments in kind this yields an estimate of £67 per annum for 1909. This figure was extrapolated back to 1898 by means of a series for the average earnings of workers in retail cooperative societies, calculated from returns of the number of their employees and the total amount paid in wages and salaries.[103] This puts the estimate for 1898 at £60. For 1894 detailed information collected by Booth for drapers' assistants in London was the basis for a benchmark of £59.[104] The fourth benchmark is more uncertain, but estimates given for 1891 by the R.C. on Labour point to an average annual wage of about £58.[105]

In the absence of any further information it was assumed that the pre-1891 rate of change was equally slow, and the series was extrapolated back to 1880 on the basis of a rise of £1 every four years. Some part of the limited rise over the whole period can be explained by the increase in the proportion of female assistants from 27 per cent in 1881 to 34 per cent in 1911.

27-28. Domestic service

For this sector separate indices were compiled for female and male domestic servants, with the latter in turn based on separate series for indoor and outdoor workers. The first index covers the very large number of female domestic servants, working in both private service and institutions. The index combines separate estimates for the changes in cash wages and in the value of board and lodging provided in kind. The starting point for the former was the extensive enquiry conducted for the Board of Trade by Clara Collet in 1894.[106] By combining the information given in the report for London, the rest of England and Wales, and Scotland, with the age distribution of female domestic servants given in the 1891 census, it was possible to compile the benchmark estimates shown in column 3 of table 7. This gives the average 1894 wage for Great Britain for eight age ranges, with an overall (age-weighted) average cash wage at this date of £16.

The next step was the construction of corresponding benchmarks for 1907. For the younger age groups (19 and under) the most reliable source of information is the comparison of the average cash wage for girls placed in 1894 by the Metropolitan Association for Befriending Young Servants (M.A.B.Y.S.) with 'precisely similar'

[102] British Association, 'Committee on the amount and distribution of income', pp. 61-2. For other useful data on earnings of shop assistants immediately before the war see Departmental Committee on the Truck Acts, *Minutes of evidence, passim*; see also Bulley and Whitley, *Women's work*, pp. 50-8; Barton, 'Course of women's wages', pp. 522-4; Hallsworth and Davies, *Working life of shop assistants*, pp. 19-57; Hoffman, *They also serve*, p. 78; Routh, *Occupation and pay*, pp. 91-5.

[103] BT, 17th *Abstract of labour statistics*, pp. 230-1. Although this refers mainly to earnings of shop assistants and managers, it does also include other workers such as carters and warehousemen; see BT, *Report on cooperative societies*, pp. 18-9.

[104] Booth, *Life and labour*, VII, pp. 83-6. In calculating the averages, a small number of payments of over £100 per annum were excluded on the grounds that they applied to salaried managers not to wage-earners. The estimates cover the total remuneration, including premiums, lodgings, and meals. They were reduced to allow for the lower level outside London, and the averages for male and female assistants were weighted 70:30. Earnings of drapers' assistants appear to have been broadly representative of those of all shop assistants; see Hallsworth and Davies, *Working life of shop assistants*, pp. 47-9 and the detailed scales recommended by the National Union of Shop Assistants, Warehousemen, and Clerks, quoted in War Cabinet Committee on women in industry, *Appendices*, pp. 744-5.

[105] For women, R.C. on Labour, *Fifth and final report, app.* III, *Employment of women*, pp. 495-6. If the abnormally low figure for Scotland is excluded the average is 20s. per week, about £50 per annum. For men, the average given was 23s. 11d. per week, or about £60 per annum; *idem, Part* II, *Summaries of evidence, Group C: miscellaneous trades*, p. 291.

[106] BT, *Money wages of indoor domestic servants*, pp. 2-11.

Table 7. *Age distribution and average cash wages of female domestic servants, 1894 and 1907*

Age	*Relative numbers in 1891* (%) (1)	*Relative numbers in 1911* (%) (2)	*Average wages in 1894* (£s) (3)	*Increase 1894-1907* (%) (4)	*Average wages in 1907* (£s) (5)
13-5	14.2	9.0	7.3	12.5	8.2
16-8	19.4	17.2	10.8	15.0	12.4
19	6.5	5.7	13.0	16.0	15.1
20	4.9	5.1	14.7	17.0	17.2
21-24	19.7	20.3	16.8	17.5	19.7
25-34	18.8	22.1	20.7	18.0	24.5
35-39	3.7	5.0	23.6	19.0	28.2
40+	12.8	15.6	25.0	20.0	30.0
Total	100.0	100.0	16.0	25.0	20.0

Sources: cols. 1 and 2: Census of Population; col. 3: BT, *Money wages of indoor domestic servants*, pp. 2-11; col. 4: see text; col. 5: col. 3 plus % increase in col. 4.

data obtained by Layton for 1907.[107] It is evident from these data, and consistent with other evidence on the difficulties in recruiting domestic servants at this time, that the proportionate rise in wages increased with age. A number of alternative assumptions regarding the increase in cash wages for female domestic servants aged 20 and over were considered, and the resulting estimates of wages in 1907 were compared with independent information on wages at that date and—after extrapolation to 1913—with estimates of wages immediately before the war.[108] This exercise indicated that the increases suggested by the M.A.B.Y.S. data should be shaded downwards. Two possible reasons for this would be that wages for those in post had not risen fully in step with those for newly recruited domestic servants, and that provincial wages had risen less than those in London. The percentage increases finally adopted are shown in column 4 of table 7, leading to the age-related estimates in column 5.

Finally, a weighted average was calculated on the basis of the age distribution indicated by the 1911 census. This gives an average of £20, approximately 25s. above what it would have been with the 1891 age composition. This allowance for the increase in average age of domestic servants thus accounts for most of the discrepancy between the present estimate of a 25 per cent increase from 1894 to 1907, and the much smaller rise suggested by the estimates compiled by Layton on the basis of newspaper advertisements and the records of one large household.[109]

[107] Layton, 'Wages of domestic servants', p. 519; I have adjusted two of the figures in the table (for girls aged 19 and over 20) on the basis suggested by Layton, ibid., p. 520. The 1894 data were first given in Collet's report, BT, *Money wages of indoor domestic servants*, p. 4, and were quoted by Booth, *Life and labour*, VIII, p. 217.

[108] In 1907 Flux put the total cash wages of some 2.4 million domestic servants at £50 million, an average of £20.8; 1907 Census of Production, *Final report*, p. 33. The average for females only would be slightly lower. For other information on the period 1900-13 see Rowntree, *Poverty*, p. 380; R.C. on the Poor Laws, *Appendices*, XXI (E), *Board of Trade memorandum*, pp. 666-7, and XVII, *Report on the effect of outdoor relief*, pp. 79 (for York), 117 (for Taunton), and 203 (for Shrewsbury); War Cabinet Committee on women in industry, *Report*, pp. 312 and 396-7, and *Summaries of evidence*, pp. 742-3; Butler, *Domestic service*, *passim*; and Prest, *Consumers' expenditure*, p. 118.

[109] Cf. Layton, 'Wages of domestic servants', p. 520. It should also be noted that the increase of 16 per cent calculated by Layton from his M.A.B.Y.S. figures for 'all ages' is a considerable understatement. The weighted average of the figures for 1894 should be £8.75 not £9.05, and with the adjustments suggested by Layton (see n. 107) the average for 1907 should be £11.10, making an increase for this age group of 27 per cent.

The rate of increase between 1894 and 1907 averaged 1.73 per cent per annum, and it was assumed that the increase had occurred at a steady pace between these dates, and continued at that rate to 1913. For the earlier period a benchmark of £14 was taken for 1880 on the basis of the estimates given by Levi, and the institutional data for 1886 collected by Giffen.[110]

The allowance for board and lodging was taken as 10s. per week in 1911, and was assumed to have been constant in real terms.[111] It was converted to current prices for each year by means of a cost of living index.[112] The final index for female domestic servants combines this series with the estimate of the changes in cash wages.

The second index constructed was for male servants. For indoor workers the movements in cash wages and in payments in kind were assumed to be the same as for females, but the weighted average of the two series is different because of the higher average cash wage of the males. For gardeners, grooms, gamekeepers, and others employed in outdoor service, earnings were assumed to have moved in line with those for agricultural workers.

29-34. Central and local government and defence

29. *Central government.* An index of the earnings of government messengers and porters compiled by Greasley was taken to represent the small number of wage-earners employed by the central government.[113] The main group of employees, civil servants, are classified as salaried workers and so are excluded from the present index.

30. *Post Office.* This index covers postmen, sorters, messengers, and other manual workers employed by the Post Office. Supervisors, counter clerks, and telegraph and telephone operators are classified as salaried workers and omitted. Annual estimates of average earnings (including boot allowances and good conduct stripes) were calculated from information on total wages and numbers employed, given annually for various categories of staff in the Post Office *Estimates*.[114] The relevant data were extracted for five groups, two for London (postmen and sorters), one each for all workers in the rest of England and Wales, in Scotland, and in Ireland.

The final estimate of average earnings is a current weighted average of these series. It thus allows for such factors as the rapid expansion of the provincial service in the 1890s, which involved the recruitment of large numbers at the lower points of the scales, and for the decline in the relative proportion of higher-paid London workers. The present index can be compared with an index of wage rates compiled by Routh.[115] The series for earnings does reflect the successive increments in wage rates, but because of changes in the composition of the postal labour force it rises much less over the period. By 1913 average earnings were only 26 per cent above

[110] Levi, *Wages and earnings*, 1st edn., pp. 24-5, 2nd edn., pp. 17-9 and 80; BT, *Rates of wages in 1886, General report*, pp. xxiv-vi. See also Baxter, *National income*, p. 94.

[111] The value of the payment in kind was based on generally consistent estimates given in a large number of sources. See, for example, War Cabinet Committee on women in industry, *Report*, p. 312; Barton, 'Course of women's wages', p. 516; figures for shop assistants quoted in the Departmental Committee on the Truck Acts, *Reports*, pp. 75-6 and *Minutes of evidence*, *passim*; Collet, 'Cost of food', pp. 302 and 306. See also n. 92 above.

[112] Feinstein, 'A new look at the cost of living'.

[113] Greasley, 'Wages and the paradox of the 1880s', pp. 431 and 434-5. His index was based on data reported in the *Estimates* for the civil service.

[114] Treasury, *Estimates* for revenue departments, annual. For purposes of comparison the estimates are always given on the same basis for both the current and preceding year, and it was thus possible to splice the series on the few occasions where there were changes in the presentation of the data.

[115] Routh, 'Civil service pay', p. 216. See also BT, *Rates of wages in 1886, General report*, pp. xxvi-vii and 278-83; and S.C. on Post Office servants (wages and conditions of employment), *Evidence*, *passim*.

the 1880 level, whereas the increase in wage rates was 38 per cent.

31. *Police.* This index combines two separate series, one for England and Wales, the other for Ireland. For the former, the average earnings of all policemen were calculated annually from 1892 onwards from data for the established strength of the police and for their total pay and clothing allowances.[116] For 1880-92 a more approximate estimate was constructed on the basis of the data for 1886 and the comments on changes between that date and 1892 given in the Board of Trade *Enquiry*; and the detailed figures on minimum and maximum rates for police constables in a large sample of counties.[117]

The index for Ireland was extracted from the annual data for the Royal Irish Constabulary in the Civil Service *Estimates*.[118] This gives the pay of sergeants and constables and the corresponding numbers in the force. Wage rates for the Irish force were largely unchanged throughout the period, and average earnings were barely higher in 1913 than they had been in 1880.[119] However, the overall UK index is a current weighted average of the two series, and the stagnation of the Irish component is offset by the increase in the relative number of higher-paid police in England and Wales.

32. *Local government.* This index covers manual workers, mainly unskilled road workers and sanitary labourers. It was based on the average earnings shown in the wage *Enquiries* of 1886 and 1906, the index for such labourers compiled by the Board of Trade for 1891-1911, and the figure given for the average rate for labourers in local authority non-trading services in 28 large towns in July 1914.[120]

33-34. *Army and navy.* Annual estimates of average pay and provisions for the army, and of average wages, victualling, and clothing for the navy, were obtained from information published for the two services in their respective annual *Estimates*. These give the gross payments for wages and allowances for which parliament was asked to vote finance, and the corresponding numbers of soldiers and seamen.[121]

35. Unskilled labourers

This index is required to cover the diminishing residual group of general labourers not allocated in successive censuses to specific industries or occupations. The series constructed to represent the change in their earnings is an unweighted average of indices for six categories of rural and urban labourers: in agriculture, building, engineering and shipbuilding, docks, gas works, and local authority road and sanitary services.[122]

[116] H.M. Inspectors of Constabulary, *Annual report on the county and borough police forces.*

[117] BT, *Rates of wages in 1886, police, roads, etc.*, pp. 732-5 and 756; BT, *Rates of wages and hours of labour*, pp. 250-79.

[118] Treasury, *Civil service estimates*, annual.

[119] Royal Irish Constabulary and Dublin Metropolitan Police, *Report of the committee of enquiry*, p. 252. For constables with less than seven years' service there was no change in wage rates from 1872 to 1914; some other grades were given small increases in 1883 and 1908.

[120] BT, *Rates of wages in 1886, police, roads, etc.*, pp. 735-9 and 757-8; BT, *Enquiry into earnings and hours in 1906*, IV. *Public utility services*, p. 242; S.C. on Post Office servants, *Appendices to evidence*, XI, p. 29; BT, 76th *Statistical abstract*, p. 117.

[121] Treasury, *Army estimates*, annual; *idem*, *Navy estimates*, annual. Because of the disruption caused by the rapid recruitment and demobilization of troops for the war in South Africa, a special adjustment was made to the average derived from the *Estimates* for 1898-1902. See also n. 114 for the procedure for dealing with occasional discontinuities in the data given in the *Estimates*.

[122] For agricultural labourers in England and Wales, BT, 17th *Abstract of labour statistics*, p. 67; for bricklayers' labourers in London, Manchester, Birmingham, and Glasgow, BT, *British and foreign trade and industry*, 1st ser., p. 262 and Department of Employment, *British labour statistics*, pp. 32-3; for engineering, Bowley and Wood, 'Statistics of wages, XIV. Engineering and shipbuilding', pp. 160-1, and Yates, *Wages and labour conditions*, pp. 100 and 124; for gas, S.C. on Post Office servants, *Evidence*, app. XI, p. 29; for docks and local authorities, the present indices.

Footnote references

Official publications

Board of Trade, *Labour Gazette*, monthly from 1894.

Board of Trade, *Tables showing the progress of British merchant shipping*, annual.

Board of Trade, *Returns of wages published between 1830 and 1886* (P.P. 1887, LXXXIX).

Board of Trade, *Rates of wages paid in the United Kingdom in 1886. Principal textile trades* (P.P. 1889, LXX); *Minor textile trades* (P.P. 1890, LXVIII); *Mines and quarries* (P.P. 1890-1, LXXVIII); *Police, roads, etc., gas and water works* (P.P. 1893, LXVIII); and *General report* [by R. Giffen] *on the wages of the manual labour classes in the United Kingdom in 1886* (P.P. 1893-4, LXXXIII, pt. II).

Board of Trade, *Report by Miss Collet on the money wages of indoor domestic servants* (P.P. 1899, XCII).

Board of Trade, *British and foreign trade and industry. First series of memoranda, statistical tables and charts* (P.P. 1903, LXVII).

Board of Trade, *Second report by Mr Wilson Fox on the wages, earnings and conditions of employment of agricultural labourers in the United Kingdom* (P.P. 1905, XCVII).

Board of Trade, *Rates of wages and hours of labour in various industries in the United Kingdom for a series of years* (unpub., 1908; copies in Department of Employment library and in G.H. Wood collection).

Board of Trade, *Report of an enquiry into earnings and hours of workpeople in the United Kingdom in 1906.* I, *Textile trades* (P.P. 1909, LXXX); II, *Clothing* (P.P. 1909, LXXX); III, *Building and woodworking* (P.P. 1910, LXXXIV); IV, *Public utilities and services* (P.P. 1910, LXXXIV); V, *Agriculture* (P.P. 1910, LXXXIV); VI, *Metals, engineering and shipbuilding* (P.P. 1911, LXXXVIII); VII, *Railway service* (P.P. 1912-3, CVIII); and VIII, *Miscellaneous trades* (P.P. 1912-3, CVIII).

Board of Trade, *Report on industrial and agricultural cooperative societies in the United Kingdom* (P.P. 1912-3, LXXV).

Board of Trade, *Annual report on changes in rates of wages and hours of labour in the United Kingdom, with comparative statistics* (esp. *Twenty-first*, 1914 (P.P. 1914-6, LXI)).

Board of Trade, *Standard time rates of wages in the United Kingdom at 1 October 1913* (P.P. 1914, LXXX).

Board of Trade, *Abstract of labour statistics of the United Kingdom* (esp. 17th, 1915 (P.P. 1914-6, LXI); 18th, 1926 (P.P. 1926, XXIX)).

Board of Trade, *Statistical abstract for the United Kingdom, 1913, 1918-31* (1933).

Census of population, England and Wales, 1911, *General report* (P.P. 1917-8, XXXV.

Census of production 1907, *Final report* (P.P. 1912-3, CIX).

Department of Employment and Productivity, *British labour statistics, historical abstract, 1886-1968* (H.M.S.O., 1971).

Departmental Committee on the truck acts, *Reports* and *minutes of evidence* (P.P. 1908, LIX).

H.M. Inspectors of Constabulary, *Annual report on the county and borough police forces*, annual.

Royal Irish Constabulary and Dublin Metropolitan Police, *Report of the Committee of Enquiry, 1914* (P.P. 1914-6, XXXII).

Royal Commission on Labour, *Fifth and final report, and summaries of evidence with appendices* (P.P. 1894, XXXV); *Evidence before Group B*, III (P.P. 1893-4, XXXIII); *Reports on employment of women* (P.P. 1893-4, XXXVII, pt. I); *Evidence before commission sitting as a whole, minutes and appendix* (P.P. 1893-4, XXXIX, pt. I).

Royal Commission on the Poor Laws and Relief of Distress, *Report and minority report* (P.P. 1909, XXXVII); *Report* by C. Williams and T. Jones on *The effect of outdoor relief on wages and conditions of employment* (P.P. 1909, XLIII); and *Minutes of evidence relating to unemployment with appendices* (P.P. 1910, XLVIII).

Select Committee on Post Office servants (wages and conditions of employment), *Appendices to evidence* (P.P. 1913, XII).

Treasury, *Appropriation accounts, for the army, navy, civil services and revenue department*, annual.

Treasury, *Estimates*, for the army, navy, civil services and revenue departments.

War Cabinet Committee, *Report on women in industry* and *Appendices and summaries of evidence* (P.P. 1919, XXXI).

Secondary sources

Barton, D.M., 'The course of women's wages', *J.R.S.S.*, 82 (1919), pp. 508-53.

Baxter, R.D., *National income, the United Kingdom* (1868).

Bellerby, J.R., 'Distribution of farm income in the United Kingdom, 1867-1938', *J. Proc. Agric. Econ. Soc.*, X (1953); reprinted with additions in W.E. Minchinton, ed., *Essays in agrarian history*, II (Newton Abbot, 1968), pp. 261-79.

Beveridge, W., *Unemployment* (1909).

Bythell, D., *The sweated trades; outwork in nineteenth-century Britain* (1978).

Booth, C., *Life and labour of the people in London*, I-IX (2nd ed., 1893-7).

Bowley, A.L., 'Changes in average wages in the United Kingdom between 1880 and 1891', *J.R.S.S.*, 58 (1895), pp. 223-85.
Bowley, A.L., 'The statistics of wages in the United Kingdom during the last hundred years. IV. Agricultural wages, earnings and general averages', *J.R.S.S.*, 63 (1899), pp. 555-70; VIII, 'Wages in the building trades', *J.R.S.S.*, 64 (1901), pp. 102-12; IX, 'Wages in the worsted and woollen manufactures of the West Riding of Yorkshire', *J.R.S.S.*, 65 (1902), pp. 102-26.
Bowley, A.L. and Wood, G.H., 'The statistics of wages in the United Kingdom during the last hundred year, V. Printers', *J.R.S.S.*, 63 (1900), pp. 708-15; 'XIV. Engineering and shipbuilding. E. Averages, index numbers and general results', *J.R.S.S.*, 69 (1906), pp. 148-93.
Bowley, A.L., *Wages in the United Kingdom in the nineteenth century* (Cambridge, 1900).
Bowley, A.L., 'Notes on Mr Wilson Fox's paper', *J.R.S.S.*, 66 (1903), pp. 598-601.
Bowley, A.L., *An elementary manual of statistics* (1st edn., 1910; 3rd edn., 1920).
Bowley, A.L., *The division of the product of industry* (Oxford, 1919).
Bowley, A.L., *The change in the distribution of the national income, 1880-1913* (Oxford, 1920).
Bowley, A.L., *Prices and wages in the United Kingdom, 1914-1920* (Oxford, 1921).
Bowley, A.L., 'Wages, nominal and real', in H. Higgs, ed., *Palgrave's dictionary of political economy*, III (1926), pp. 797-803.
Bowley, A.L., 'Wages', in *Encyclopaedia Britannica*, 23 (1929), p. 270.
Bowley, A.L., *Wages and income in the United Kingdom since 1860* (Cambridge, 1937).
British Association, 'Report of the committee (A.L. Bowley, secretary) on the amount and distribution of income (other than wages) below the income tax exemption limit in the United Kingdom', *J.R.S.S.*, 74 (1910-1), pp. 37-66.
Bulley, A.A. and Whitley, M., *Women's work* (1894).
Burn, D., *Economic history of steelmaking, 1867-1939* (Cambridge, 1940).
Butler, C.V., *Domestic service* (1916).
Cadbury, E., Matheson, M.C., and Shann, G., *Women's work and wages* (1906).
Carr, J.C. and Taplin, W., *History of the British steel industry* (Oxford, 1962).
Church, R., *The history of the British coal industry, 3, 1830-1913: Victorian pre-eminence* (Oxford, 1986).
Collet, C.E., 'Cost of food for an adult woman', *J.R.S.S.*, 79 (1916), pp. 302-6.
Dobbs, S.P., *The clothing workers of Great Britain* (1928).
Elbaum, B., 'The steel industry before World War I', in W. Lazonick and B. Elbaum, eds., *The decline of the British economy* (1986), pp. 51-81.
Feinstein, C.H., *National income, expenditure and output of the United Kingdom, 1855-1965* (Cambridge, 1972).
Feinstein, C.H., 'Wages and the paradox of the 1880s: a comment', *Exp. Econ. Hist.*, 26 (1989), pp. 237-47.
Feinstein, C.H., 'What really happened to real wages?', *Econ. Hist. Rev.*, 2nd ser., XLIII (1989), pp. 329-55.
Feinstein, C.H., 'A new look at the cost of living', in J. Foreman-Peck, ed., *Reinterpreting the Victorian economy: essays in quantitative economic history* (Cambridge, 1990), pp. 151-79.
Fox, A. Wilson, 'Agricultural wages in England and Wales during the last half century', *J.R.S.S.*, 66 (1903), pp. 273-359.
Fox, A., *A history of the National Union of Boot and Shoe Operatives* (Oxford, 1958).
Greasley, D., 'British economic growth: the paradox of the 1880s and the timing of the climacteric', *Exp. Econ. Hist.*, 23 (1986), pp. 416-44.
Hallsworth, J. and Davies, R.J., *The working life of shop assistants* (Manchester, 1910).
Head, P., 'Boots and shoes', in D.H. Aldcroft, ed., *The development of British industry and foreign competition, 1875-1914* (1968), pp. 158-85.
Hicks, F., 'Dressmakers and tailoresses', in F.W. Galton, ed., *Workers on their industries* (1895), pp. 13-51.
Hoffmann, P.C., *They also serve* (1949).
Hopkins, E., 'Small town aristocrats and their standard of living', *Econ. Hist. Rev.*, 2nd ser., XXVIII (1975), pp. 222-42.
Howarth, E.G. and Wilson, M., *West Ham, a study in social and industrial problems* (1907).
Irving, R.J., *The North Eastern Railway Company, 1870-1914, an economic history* (Leicester, 1976).
Jewkes, J. and Gray, E.M., *Wages and labour in the Lancashire cotton spinning industry* (Manchester, 1935).
Jones, G.T., *Increasing returns* (Cambridge, 1933).
Layton, W.T., 'Changes in the wages of domestic servants during fifty years', *J.R.S.S.*, 71 (1908), pp. 515-24.
Levi, L., *Wages and earnings of the working classes* (1st edn., 1867; 2nd edn., 1885).
Leybourn, K., 'The George Henry Wood collection', *Bull. Soc. Study Lab. Hist.*, 40 (1980), pp. 47-9.

Lovell, J., *Stevedores and dockers, a study of trade unionism in the port of London, 1870-1914* (1969).
Mitchell, B.R., *Economic development of the British coal industry, 1800-1914* (Cambridge, 1984).
Pool, A.G., *Wages policy in relation to industrial fluctuations* (1938).
Porter, J.H., 'Wage bargaining under conciliation agreements, 1860-1914', *Econ. Hist. Rev.*, 2nd ser., XXIII (1970), pp. 460-75.
Prest, A.R. assisted by Adams, A., *Consumers' expenditure in the United Kingdom, 1900-1919* (Cambridge, 1954).
Rathbone, E., 'Report on the results of a special enquiry into the conditions of labour at the Liverpool docks', *Trans. Liverpool Econ. & Stat. Soc.*, I (1903-4), pp. 17-57.
Routh, G., 'Civil service pay, 1875 to 1950', *Economica*, new ser., 21 (1954), pp. 201-23.
Routh, G., *Occupation and pay in Great Britain, 1906-60* (Cambridge, 1965).
Rowntree, B.S., *Poverty: a study of town life* (1901).
Rowe, J.W.F., *Wages in the coal industry* (1923).
Rowe, J.W.F., *Wages in practice and theory* (1928).
Sandberg, L.G., *Lancashire in decline* (Columbus, Ohio, 1974).
Saunders, C.K., 'The London millinery trade', in S. Webb and A. Freeman, eds., *Seasonal trades* (1912), pp. 210-42.
Schmiechen, J.A., *Sweated industries and sweated labour: the London clothing trades, 1860-1914* (1984).
Spicer, R.S., *British engineering wages* (1928).
Tawney, R.H., *The establishment of minimum rates in the tailoring industry* (1915).
Tuckett, A., *The Scottish carter* (1967).
Williams, R., *The first year's working of the Liverpool docks scheme* (Liverpool, 1914).
Wood, G.H., 'The course of women's wages during the nineteenth century', app. A in B.L. Hutchins and A. Harrison, *A history of factory legislation* (1903), pp. 257-316.
Wood, G.H., 'Tests of progress applied to the woollen trade', *Huddersfield Technical College, Text. Soc. J.*, 6th session (1908-9), pp. 64-77.
Wood, G.H., 'Real wages and the standard of comfort since 1850', *J.R.S.S.*, 72 (1909), pp. 91-103.
Wood, G.H., *The history of wages in the cotton trade during the past hundred years* (1910). First published as 'The statistics of wages in the United Kingdom during the last hundred years, XV-XIX. Cotton industry', *J.R.S.S.*, 73 (1910).
Yates, M.L., *Wages and labour conditions in British engineering* (1937).