What Were the U.K. Earnings Rate and Retail Price Index Then? A Data Study

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I. Methodology

A. Objective

The objective of **What Were the U.K. Earnings Rate and Retail Price Index Then?** is to generate, for Britain or the United Kingdom, continuous annual series of (1) the nominal-earnings rate (meaning weekly earnings, or, absent such data, daily earnings), (2) the retail price index, and (3) the real-earnings rate, from as far back as data permit (whence "long-run" series) to the present *official* series (thus permitting each series to be updated in the future). In fact, the series is generated for the time period 1264 to 2002. The term "earnings rate" rather than "wage rate" is used advisedly, though the two concepts are clearly related and may be identical under certain circumstances (see section II.A.3). The expression "retail price index" ("retail price," for short) is preferred to the commonly used "cost-of-living index," because the latter expression *in practice* is a misnomer (see section III.A.1). The "nominal earnings rate" is also termed the "money earnings" rate or simply "money earnings" or even, when the context is clear, "earnings;" while the "real-earnings rate" may be called "real earnings" or "deflated earnings," as it is "money earnings" deflated by the "retail price index." So "real earnings" is a derivative variable, essentially the ratio of "money earnings" to the "retail price index."

B. Technique

The technique is to generate consistent annual long-run series of nominal earnings and retail price separately, then take their ratio for real earnings. This procedure achieves consistency both within and among the series, but generally gives results different from obtaining real earnings directly from sources (see section C.1). The basic data come from the work of previous authors (rather than the present author generating new data from hitherto untapped archives or other sources); the originality lies in the appropriate selection and synthesis of existing series.

C. Limitations of Series

1. Composition

There is no single series of nominal earnings or retail price for the entire period. Rather, the nominal-earnings and retail-price series are separately composed of a set of component series, with each component specific to a given subperiod. Two implications follow:

First, the component series (of nominal earnings or retail price) must be linked subperiod-by-subperiod. This is done, as is customary, by one-year (one-observation) overlaps, sometimes called "ratio-linking." The result is a series (for nominal earnings or retail price) that is consistent from subperiod to subperiod in its level, but not generally in its methodology. In particular, *relative* year-to-year fluctuations within a subperiod are component-specific. A single-component long-run series would be consistent in both senses; but the needed data are lacking.

Second, the real-earnings series could be constructed symmetrically with nominal earnings and retail price, that is, directly subperiod-by-subperiod from the component sources and ratio-linked. Intuitively, such a generated series would have the virtue of full respect for the component sources and therefore might have greater reliability (given confidence in the sources) than the indirect construction adopted here. However, independent (albeit uniform) construction of the three desired series would generally result in inconsistency among the series: the theoretical identity "nominal earnings" divided by "retail price" equals "real earnings" would not be satisfied. Fulfillment of the identity is deemed more important than full respect for the component sources.[1] Again, the issue would not arise under the circumstance of a single-component long-run series.

A third limitation in composition arises from the annual nature of the long-run series. Some existing nominal-earnings or retail-price series have unit of observation only greater than a year, often a decade. Such decennial (or other multiyear-observation) series of necessity are excluded from consideration as potential component series, even though their methodology and/or reliability might be superior to available annual series for the given subperiod.[2]

2. Territory

Britain changed its territory several times over the period 1264-2002. If only data, permitted, one could have a choice as to the geographic area to which the series pertain. One option would be a uniform territory throughout, which could be England alone, England and Wales, Great Britain (England, Wales, and Scotland), or the United Kingdom (Great Britain plus either all Ireland or Northern Ireland). A second possibility would be the geographic area pertaining to the political unit at the time. That would be (1) England alone to 1536, (2) England and Wales for 1536-1707, (3) Great Britain for 1707-1800, (4) Great Britain and Ireland ("United Kingdom") for 1801-1922, and (5) Great Britain and Northern Ireland (again "United Kingdom") for 1923 onward.[3] A third option would be to alter the pertinent territory based on analytical consideration. For example, for the period of the Industrial Revolution (approximately 1770-1830), historians have made the case both for the inclusion and the exclusion of Ireland in the area of interest.[4]

However, the data richness permitting such luxury of choice does not exist. In general, the maximum territory (up to the existing political unit) permitted by available data is adopted, except for subperiods for which superior data quality exists only for a smaller area—providing that the smaller area is at least a national unit (that is, not below England). Nevertheless, as one enters the distant past, available data pertain only to regions of England, and are perforce adopted.

3. Worker-Orientation

Earnings (nominal and real) data refer to a single worker, and in early subperiods that worker is generally the adult male. Yet retail price series usually pertain to household expenditure—whence an inconsistency. Also, it is reasonable, from the standpoint of standard of living, that the focal point be the household rather than the individual worker. On both these grounds, household earnings, incorporating the contributions of all household members (spouse and children, the latter especially important in early subperiods) is a logical, and perhaps analytically superior, alternative to single-worker earnings; but existing data on that basis are limited, and insufficient to construct the desired series.[5] Daunton (1995, p. 428) states this limitation well: "A further crucial flaw in the measurement of money wage rates or earnings is that they refer to individuals and predominantly men. Of course, relatively few people [in the period 1700-1850] were self-supporting individuals or dependent upon a male bread-winner, and the yearly income of the family is more significant than the daily wage rate of an individual man."

4. Non-Wage Income

If the real wage is considered a measure (however imprecise) of the standard of living for a household, then it is incomplete: because two income sources are omitted. First, there is unearned income. For example, for the 18th and 19th centuries, such income sources include "gifts, relief, Poor Law payments, and aids from neighbors and kin" (Engerman, 1994, p. 57). Also, as noted by Daunton (1995, p. 423), "entitlements [in the 18th century] came from employers, gleaning after harvest, foraging on commons and woods, the Church, charity, poor law, friends, and neighbours." Today, welfare and unemployment-insurance payments, as well as aid from private charities, are of importance. Second, in earlier centuries, there was household production. The neglect of such production, "in an age of largely self-sufficient subsistence farming," is emphasized by Loschky (1992, pp. 175-180) as a serious deficiency of a real-wage series from the 13th to the end of the 19th century. As observed by Nef (1937, p. 170): "Men lived closer to the earth in the sixteenth century than to-day. Most labourers—particularly the multitudes who spun or wove or forged metal wares in their cottages under the putting-out system, and even many of those who found work in the new mines and metallurgical plants—held a plot of land capable of furnishing them with a part of what they needed to live."

5. Quality of Life

Over time, as the structure of the work environment and related home environment change, workers and their families experience changes in the quality of life. The Industrial Revolution is generally viewed as the most important case of this phenomenon. With migration from the countryside to the cities, some improvements in the quality of life occurred: for example, easier access to education, entertainment, and a wider variety of goods than in the countryside. There were also detrimental changes in the quality of life: for example, submission to the rigidity and monotony of factory work, increased pollution and crime, and the breakdown of traditional family life. The extent to which the real wage requires adjustment to account for quality-of-life changes, that is, the

size of a "compensatory component" representing net deterioration in the quality of life, is unknown and perhaps unknowable, and is a point of contention among historians.[6]

II. Nominal-Earnings Series

A. Methodology

1. Industry Coverage

The earnings series is an average. Therefore, ideally, workers in all industries should have their earnings enter the series; but the data are generally not so giving. For the most-representative figures, maximum industry coverage is desired to the limit of feasibility. As expected, such coverage is worse in the early compared to the later part of the period.

2. Occupation Coverage

The same argument could be made for occupational coverage being the feasible maximum. Conventionally, the basic occupational distinction is manual ("blue-collar," wage-earning) workers versus non-manual ("white-collar," salary-earning) workers. For the most-representative average-earnings series, the workers in both categories should be covered. The period of the Industrial Revolution can be considered a special case, in which the earnings of manual workers alone are of specific interest. For the series derived here, highest-quality data in some subperiods (including the Industrial Revolution) pertain to manual rather than all workers, and these data are chosen as component series for these subperiods.

3. Earnings versus Wage Rates

The earnings series is properly named; for the concept is an earnings-rate rather than wage rate. A (say, weekly) wage rate is generally contractual, usually considered to be exclusively a cash payment, and pertains to a "normal" number of hours worked during the week. In contrast, the earnings rate for the week is the wage rate *plus* (1) overtime pay, for actual hours in excess of normal hours worked, (2) bonuses, commissions, and piece-rate payments (that is, remuneration directly based on output rather than input), and (3) in-kind payments.

Category (3), non-cash payments, warrants some discussion. Such payments, to be covered thoroughly and properly, require precise valuation of the board and lodging, food, drink, and other perquisites provided by the employer. In-kind remuneration was more prevalent in earlier centuries than it is today.[7] In principle, all in-kind compensations received by a worker should be valued appropriately and entered into the earnings figure. However, compilers of earnings series differ in the extent to which in-kind payments are incorporated, in part because of varying, ambiguous, or partial information on the practice.

In contrast, category (1), overtime payments, has become of increased importance. Prior to World War I, the practice of overtime was less common than today (albeit the normal working day or week was longer). "Thus many early writers did not bother to distinguish between wage rates and earnings, but referred indiscriminately to 'wages'."—*British Labour Statistics, Historical Abstract, 1886-1868*, p. 7.

4. Full Employment

The earnings series (and the component series on which it is based) involve the assumption of full employment. As stated by Feinstein (1990, p. 605), "the estimates attempt to measure the change in earnings for a worker in full-time employment." Unemployment of any kind—seasonal, cyclical, structural, or voluntary—is not reflected in the earnings series. Schwarz (1992, p. 169) is not alone in judging that "[one of] the notorious technical drawbacks of wage-rate statistics..[is that] they make no allowance for unemployment or underemployment."[8] It is possible to adjust an earnings series so that it incorporates unemployment, as is done by Feinstein (1998b, pp. 645-648), but data on unemployment are sparse or non-existent prior to the 20th century.

5. Index Number

This presentation makes heavy use of Feinstein (1989, pp. 238-239; 1990, p. 600). Consider the following notation:

E_{it} = average earnings rate in sector (industry or occupation) i in year t, number of units of currency per week
N_{it} = employment in sector i in year t, number of workers
$w_{it} = Ni_t/\sum N_{it}$, share (proportion) of employment in sector i in year t
1 = current year
0 = base year

Summation is always over i. Of course, $\sum w_{it} = 1$. There are two logical index numbers that measure the total-economy average-earnings rate. First, "an index of true average earnings…the total wage bill in the economy divided by total employment" (Turnbull and King, 1999, p. 35). Following Turnbull and King, this index is called the "true index." Chambers and Holmes (1998, p. 3) term it a "cost of wages" index. Letting C_t denote the average cost of wages in time t, $C_t = \sum(N_{it} \cdot E_{it})/\sum N_{it} = \sum w_{it} \cdot E_{it}$. Then the "true" or "cost of wages" index in year 1 is $T_1 = C_1/C_0$. Note that, as Feinstein (1990, p. 600) properly observes, T_1 is not a formal index number in the sense that a common weighting pattern is applied in current and base year. In particular, the set w_{i1} over i comprises weights for year 1, the set w_{i0} for year 0.

For computational purposes, a different formula is often used. The situation confronting the researcher may be as follows: the earnings rates E_{i0} (over all i) is available, but the E_{it} (over all i) for $t \neq 0$ do not exist. However, earnings-rate indexes I_{it}, that in principle equal E_{it}/E_{i0} (over all i), may be available for all t. Then C_1 is computable as $\sum w_{i1} \cdot (I_{i1} \cdot E_{i0})$.

The second index number is the Laspeyres index, denoted as L_t for period t. Then $L_1 = (\sum N_{i0} \cdot E_{i1})/(\sum N_{i0} \cdot E_{i0})$, generally computed as $\sum S_{i0} \cdot I_{i1}$, where $S_{i0} = (N_{i0} \cdot E_{i0})/(\sum N_{i0} \cdot E_{i0})$, sector i's share of the total-economy wage bill. Note that this is a conventional Laspeyres index, because the base-year "quantity" weights, N_{i0} (over all i), are applied to both current and base period. Chambers and Holmes (1998, p. 8) call the Laspeyres index a "price of wages" index.

What is the difference between the alternative indexes? The true (cost-of-wages) index is "*current*-weighted" or "current-employment weighted," meaning employment weights of the year to which earnings rates apply are used: N_{i1} (over all i) for the current year, N_{i0} for the base year.[9] The Laspeyres (price-of-wages) index is "base-weighted" or "base-employment weighted:" base-year employment weights are used for both current period and base period.

What is the implication of one index versus the other? The Laspeyres index is affected *only* by changes in earnings rates. Alterations in the sectoral-employment pattern of the economy have no impact. Changes in the occupational or industrial composition of the labor force are irrelevant to the index, as the sectoral pattern (represented by the N_{i0}) is fixed. The Laspeyres index "controls for the impact of industry and sectoral shifts on change in average weekly wages" (Chambers and Holmes, 1998, p. 9).

In contrast, the true index responds not only to changes in wages but also to changes in the occupational or industrial structure of the labor force. "The index allows for the effect of changes in the composition of the labour force between sectors and of changes within each sector by age, skill and region" (Feinstein, 1995, p. 4). It "includes the effects of inter-occupational shifts in employment" (Dowie, 1975, p. 450). The index "measures the change in the weekly average wage cost (per employee)…with no attempt to isolate the source(s) of the change" (Chambers and Holmes, 1998, p. 8).

The true, current-weighted, index is adopted here as the appropriate index. The reasons are as follows. First, the true index accords with the intuitive, common-sense, view of the meaning of an average earnings rate for a given period, that is, the average reflects that specific-period's employment structure. Second, the overall earnings-rate average is the appropriate concept from the standpoint of the worker or household. A worker's change in occupation or industry affects his/her standard of living, and so should be reflected in an average-earnings series. Third, almost all potential component series are in the true-index domain; only a minority are Laspeyres. While the true index is the ideal, some component series are base-weighted or (in the case of some official series) a compromise between base-weighted and current-weighted.

B. Selection of Component Series

In this section all potential component series are listed, assessed, and the optimum series selected and justified, on a period-by-period basis. Except for official series, only true (current-weighted) indexes are considered.

First, consideration is given to series at a *national* level, meaning here geographic area "England and Wales" as a minimum. Only earnings-rate series, not wage-rate series are included in the procedure, although the available series do not generally incorporate all non-cash (in-kind) payments. Component series for the years 1770 to 2002 are thereby obtained.

Second, for the period 1264 to 1770, national series do not exist. The only available series are for two specific industries, agriculture and building; so of necessity component series are obtained from data for these industries. For this, early, period, the available data technically pertain to wages rather than earnings. As noted in section A.3 above, prior to 1914, the difference between wages and earnings was relatively unimportant as far as overtime is concerned. However, in-kind payments are not in the wage data (that reflect only *money* wage). How developers of the component series view this issue will be noted.

1. National Series (1770 to 2002)

a. Official Series

Official earnings-rate series are summarized in Table 1E. Unlike other tables, those for official series are in reverse chronological order. The reason is that the long-run series are constructed beginning from the year 2002 going back in time, and it is desired that the most-recent component be official in nature, so that the series can be readily updated. Data sources are selected so that the maximum digits in the figures are obtained.

Table 1E
Average Weekly Earnings—Official Series

Source	Time Period	Base Period[a]	Coverage		
			Location	Occupations	Industries
national statistics website[b]	1990-2002	1995	Great Britain	all employees[c]	all
ET Oct. 1993	1988-1990	1988	”	”	”
ET AS 1995	1985-1988	1985	”	”	”
ET AS 1988	1980-1985	Jan. 1980	”	”	”
ET AS 1984	1976-1980	Jan. 1976	”	”	”
”	1963-1976[d]	Jan. 1970	”	”	PI, A, T, a few MS
HA Table 85	1938, 1940-1963	1956	U.K.	full-time, manual[e]	PI, T and C, PA

[a]Period for which series is 100.
[b]www.nationalstatistics.gov.uk
[c]Full-time and part-time, manual and non-manual.

[d]Series terminated in 1980.
[e]That is, wage-earners.

Legend:
ET = *Economic Trends*
AS = Annual Supplement
HA = *British Labour Statistics, Historical Abstract, 1886-1968*
PI = production industries
A = agriculture
T = transport
MS = miscellaneous services
C = communication
PA = public administration

There are three official series of interest, that constitute the component earnings series for three subperiods: 1976-2002, 1963-1976, and 1938-1963. In all these official series, average weekly earnings are measured.

For 1976-2002, the monthly average-earnings index (AEI) in its annual form is the obvious choice as component series. The AEI has the advantage of complete industry and occupation coverage of all workers (manual and non-manual, wage and salary earners, full-time and part-time). It also has the virtue of being the current preferred official series (the "headline rate," in seasonally adjusted form). However, the AEI does have limitations. First, earnings data are not collected for Northern Ireland; so the AEI pertains only to Great Britain. Second, the AEI is a Laspeyres (base-weighted) series. Fortunately, there are two ameliorating factors to this deficiency (from the standpoint of the desired long-run series). (1) The AEI distinguishes industries and sectors within industries for the purpose of base-weighting; but otherwise current-weighting is applied. (2) "The industry/sector weights…are updated periodically in order to reflect differing growth rates in employment in different parts of the economy" (Chambers and Holmes, 1998, p. 18). The frequency of this updating increased from the year 1990, as a result of the change in methodology in the AEI that occurred in the year 1999.[10] Third, the series with full industry coverage begins in 1976 rather than earlier.

For 1963-1976, an average-earnings index less comprehensive in industry coverage (and called the "older series" in official publications) is taken as the component series. For 1938-1963, the corresponding official series covers only full-time wage-earners (manual workers) and not all industries are represented; but the series does refer to the United Kingdom rather than Great Britain. Further in its favor, it is clearly a current-weighted index. Data are available monthly, but only for one month annually to 1941 and two months annually thereafter. The figures for the two months are averaged to obtain annual figures for the component series.

There is no observation for the year 1939; it is estimated as follows. There is an official monthly index of the "[average] basic weekly rates of wages" for manual workers

in all industries, that exists for 1938-1940. Averaging the monthly figures produces annual figures for the three years. Let B_t = average basic weekly wage rate of manual workers in year t and E_t = average weekly earnings of manual workers in year t. Now, $B_{1940} > B_{1939} > B_{1938}$, and $E_{1940} > E_{1938}$. Then E_{1939} is estimated as $E_{1938} + \{(B_{1939} - B_{1938})/ B_{1940} - B_{1938})\}\cdot(E_{1940} - E_{1938})$.

b. Feinstein Series

For 1770-1938, potential component series are found in the work of Charles H. Feinstein. The series developed by Feinstein in his various publications are summarized in Table 2E. Tentatively, as the work of other scholars for the period is yet to be examined, Feinstein (1998b) is taken as the component series for 1770-1882 and Feinstein (1995) for 1882-1938. Feinstein's earnings series are weekly, current-weighted, and provide a valuation of in-kind payments.[11] It is true that Feinstein's series can be criticized, from the standpoint of the present goal of a long-run series, in their limitation to manual workers and, for 1770-1882, in their exclusion of Ireland. However, in making his series as comprehensive (in industry) as possible, in artful use of data from various sources, and in care to detail, Feinstein set a standard against which other developers of earnings data have to measure themselves. The construction of the Feinstein series taken as components of the long-run series is described in Feinstein (1990, pp. 601-606, 608-609, 614-629; 1995, pp. 7-8; 1998a, pp. 184-194, 202-207; 1998b, pp. 631-633, Appendix 2).

Table 2E
Average Weekly Earnings, Manual Workers—Feinstein Series

Feinstein Study	Time Period	Base Period[a]	Coverage	
			Location	Industries
1972, pp. T140-T141[b]	1855-1965[c]	1913	U.K.[d]	"main industries and services"
1990, p. 612	1880-1913	1911	U.K.	all
1995, pp. 263-266	1790, 1795, 1800, 1805, 1810, 1816, 1820, 1824, 1830-1990[e]	1913	U.K.[d]	1830-1879: agriculture and 7 non-agricultural, 1880-1990: all
1998b, pp. 652-653	1770-1882	1778-1782	Great Britain	all

[a]Period for which series is 100.
[b]Reprinted 1914-1924 in Dowie (1975, p. 449) and Mitchell (1988, p. 150).
[c]1855-1860 from Wood (1909), 1860-1920 from Bowley (1904, 1937) with interpolation 1914-1920, 1920-1938 from data in Chapman (1953), 1938-1965 official series.
[d]Excluding Southern Ireland from 1920 onward.

[e]1790-1830 combined Wood/Bowley index, 1830-1880 "provisional index," 1880-1913 from Feinstein (1990), 1914-1920 interpolated, 1920-1938 from data in Chapman (1953), 1938-1990 from official series.

c. Other Series

Are there other series that trump the Feinstein series tentatively adopted as components for 1770-1938? Excluded from consideration are three classes of series that begin in 1770 or later: (1) subnational series (geographic area smaller than England), (2) wage-rate rather than earnings series, and (3) series with discontinuities. Series in these categories cannot be superior to Feinstein, given the criteria for component series. Confining the list of alternatives to series that fall outside these three categories, the list is summarized in Table 3E (for the series of Arthur L. Bowley, George H. Wood, and other authors that heavily base their work on Bowley and/or Wood) and in Table 4E (for the series of other scholars). Notwithstanding the truly admirable pioneering work of Bowley and Wood, all the series in Table 3E can be rejected as alternatives to the Feinstein series, because the earnings series of Bowley and Wood have been effectively criticized by Dowie (1975, pp. 432-437), Greasley (1986, pp. 420-422), and especially Feinstein (1990, pp. 595-599). Indeed, Feinstein developed his new earnings indexes in response to the limitations of the generally accepted Bowley-and-Wood work.

Table 3E
Average Weekly Earnings, Wage-Earners—Bowley-Wood Series and Offshoots

Author	Time Period	Base Period[a]	Coverage	
			Location	Industries
Bowley in Wood (1899, pp. 639, 665)	1860-1896	1890	varies with industry	agriculture and 6 nonagricultural
Bowley (1904, p. 459)	1860-1901	1901	unstated[b]	unstated[b]
Wood (1909, pp. 94, 102-103)[c]	1850-1907	1850	U.K.	agriculture and 11 nonagricultural
Bowley (1928, p. 165)[d]	1880-1914	1880	”	all
Wood in Bowley (1937, p. 6)	1880-1910[e]	”	”	”
Bowley (1937, p. 30)[f]	1880-1914, 1924-1936	1914	”	”
Layton (1920,				agriculture and 11

Table 3E Average Weekly Earnings, Wage-Earners—Bowley-Wood Series and Offshoots				
			Coverage	
Author	Time Period	Base Period[a]	Location	Industries
p. 184)	1850-1910[g]	1850	”	nonagricultural
Tinbergen (1956, Table 1A)	1865-1912[h]	1907	”	”
Brown and Browne (1968, pp. 444-471)	1860-1913, 1913-1938, 1945-1960	1890-1899, 1925-1929, 1952-1959	”	main or all

[a]Period for which series is 100.
[b]But presumably as for Bowley in Wood (1899) (see Bowley, 1904, p. 458).
[c]Reprinted in Carus-Wilson (1962, pp. 135, 142-143), Mitchell and Deane (1962, pp. 343-344), and Mitchell (1988, pp. 149-150).
[d]Reprinted in Bowley (1937, p. 6).
[e]1850-1902 from Wood (1909).
[f]Reprinted in Mitchell and Deane (1962, pp. 344-345) and Mitchell (1988, pp. 150-151).
[g]Source is Wood (1909) and official series.
[h]1865-1910 from Layton (1920).

Other series worthy of consideration are summarized in Table 4E. All can be dismissed. Routh's series has Bowley (1921, 1937) and official series as sources, so cannot improve over Feinstein and the adopted official series. Greasley (1986) is effectively criticized by Feinstein (1989, pp. 238-242) for the index-number form, the small sample of sectors, and the questionable nature of some sectoral wage series. To his credit, Greasley (1989) responds and provides a revised index. However, the adopted Feinstein series remains more comprehensive than Greasley's amended work, and in any event Greasley's time period (1856-1913) is too short to warrant substitution for part of the period encompassed by the Feinstein series. Mitchell's series has the same data source as Feinstein's series for the former's time period (1920-1938), so can mark no improvement over Feinstein. All these alternative series pertain to wage-earners, so in that respect are no more comprehensive than Feinstein's series.

Table 4E Average Earnings, all Industries—Other National Series				
Author	Time Period	Base Period[a]	Frequency of Earnings	Occupations
I. U.K.				
Routh (1980, pp. 134-135)	1906-1978[b]	1906-1910	weekly	wage-earner
Greasley (1986, p. 437)	1856-1909	1913	”	”
Mitchell (1988,				

Table 4E Average Earnings, all Industries—Other National Series				
Author	Time Period	Base Period[a]	Frequency of Earnings	Occupations
p. 172)	1920-1938[c]	1924	annually	”
Greasley (1989, p. 257)	1856-1913	1913	weekly	”
II. England and Wales				
Lindert and Williamson (1983, p. 7)[d]	1755, 1781, 1797, 1805, 1810, 1815, 1819, 1827, 1835, 1851	1851	annually	adult-male employee
Williamson (1985, p. 30)	1851, 1861, 1871, 1881, 1891, 1901, 1911	1901	”	”

[a]Period for which series is 100.
[b]Source is Bowley (1921, 1937) and official series.
[c]Excluding Southern Ireland throughout period. Data from Chapman (1953).
[d]Reprinted in Mitchell (1988, p. 152), Mokyr (1985, p. 184), and 1797-1851 in Williamson (1985, p. 14) and Mokyr (1999, p. 118).

The series of Peter H. Lindert and Jeffrey G. Williamson are unique in their inclusion of all employees, salaried as well as wage-earners—though only adult males are covered and the geographic area is England and Wales rather than Great Britain or the United Kingdom. Also in their favor, they have a data point prior to 1770. However, their series has been criticized by Flinn (1984, pp. 91-92) and Feinstein (1995, p. 6; 1998b, p. 633). In any event, their figures are scattered over time with no continuity, so could not serve as a component of the long-run series. In the end, the contribution of Feinstein as component series is no longer tentative but is confirmed.

2. Specific Industries (1264 to 1770)

a. Agriculture

Table 5E lists series of agricultural wages. Only series beginning prior to 1770 need be considered, as national series (the preferred characteristic) serve as components of the long-run series from that date onward. For wages in agriculture, the gold standard is the work of Gregory Clark. Construction of the series is described in Clark (2001, pp. 477-483, 500-501, 503). His series, for all adult male wage-earners, pertains to the entirety of England, a comprehensive occupational-geographic coverage that no other

author has attained for the period antedating 1770. Unfortunately, from the standpoint of the present study, there are two flaws in Clark's series. First, while the series is current-weighted by occupation and within each of the four regions of England delineated by Clark, it is base-weighted in aggregating the average regional wages to compute the national wage. Second, in-kind payments are not included in wages.[12] Nevertheless, Clark's series is constructed with eminent care and is obviously superior to alternatives; so it is taken as the component series for agriculture for 1670-1770.

Table 5E
Wages in Agriculture—Series Beginning Prior to 1770[a]

Author	Time Period	Base Period[b] or Currency	Frequency of Earnings	Coverage	
				Location	Occupations
Rogers (1866, pp. 303-308)	1260-1401[c]	pence	piece-rate	England (five parts[d])	thresher: three crops[d]
" pp. 309-314)	1264-1401[c]	"		England	reaper (six crops[d]), mower[d]
" pp. 309-314)	1262-1401[c]	"	daily	"	thatcher, helper, both[d]
Rogers (1882, pp. 515-523)	1402-1573[c,e]	"	piece-rate	"	thresher and winnower (four crops[d]), reaper (three crops[d]), mower[d]
" pp. 515-423)	1402-1583[c]	"	daily	"	laborer[f]
Rogers (1887, pp. 665-671)	1584-1703[c]	shillings and pence	"	"	laborer[g]
Farmer (1988, pp. 811-817)	1209-1356[c]	1331-1347	piece-rate	Southern England	thresher and winnower, reaper and binder[d]
Farmer (1991, pp. 516-519)	1351-1490[c]	"	"	"	thresher and winnower, reaper and binder, mower and spreader[d,h]
Clark (2001, pp. 502-503)	1670-1850	pence	daily	England	adult-male wage-earner

[a]Excluding subnational series (area smaller than England) beginning after 1670.
[b]Period for which series is 100.

[c]Harvest years. Harvest year September 29 (calendar year t) to September 28 (calendar year t + 1) assigned to calendar year t + 1.
[d]Separate series.
[e]Many gaps, unusable series.
[f][c]"Ordinary unskilled farm hand."
[g]"Ordinary agricultural hand [engaged in] "digging, hedging or ditching."
[h]Also, three series combined as unweighted average, with missing observations excluded rather than interpolated (Farmer, 1991, pp. 520-523).

Given the Clark component, subnational series (pertaining to geographic area smaller than England) that begin after 1670 may be excluded from consideration, and are omitted from Table 5E. The remaining series, those of David L. Farmer and James E. Thorold Rogers, record figures as harvest years, traditionally running from September 29 to September 28. The issue is: to which calendar year should a harvest year be assigned? Consider the harvest year beginning September 29 of "calendar-year t" and ending September 28 of "calendar-year t + 1" (identified in the literature sometimes as "harvest-year t," sometimes as "harvest-year t/t + 1"). It is only logical that the harvest year be allocated to the calendar year encompassing the majority of the harvest year. Therefore, in the present study, "harvest-year t" (or "harvest-year t/t + 1") is always assigned to "calendar year t + 1," irrespective of the practice of the author who generated the data.

Both Rogers and Farmer provide series of average wage for various agricultural occupations, obtained from manorial accounts. Construction of the series is outlined in Rogers (1866, p. 301; 1882, pp. 512-513; 1887, pp. 662-663) and Farmer (1988, pp. 779-786; 1991, pp. 495-499). Without removing any praise from Rogers for his pioneering work (indeed, Farmer uses some Rogers wage data for manors the accounts of which Farmer was not able to study directly), the series of Farmer are preferred because of presumed greater care in obtaining the data and greater precision in construction of the representative wage—always a clearly constructed average for Farmer; not always so for Rogers, who sometimes takes an average figure, sometimes the highest figure. Regarding in-kind payments, it may be presumed that Rogers excludes them from his wage figures. Farmer (1991, p. 496) writes: "The figures used are for wages paid to workers to whom no food was given (as far as one can tell), irrespective of the time of year or the length of the working day." So it appears that Farmer views in-kind payments as not provided to the workers of his study; it may be that the same applies to the Rogers data.

For 1264-1351 and 1351-1474, the occupational series of Farmer (1988, 1991) are selected for the component series. These series—two for the former subperiod, three for the latter—have some missing observations, and they are linearly interpolated by the present author. Also, the series need to be combined for construction of the component series; this procedure is described in section C.1.a below. Prior to 1263, there are too many missing observations in the Farmer series for feasible interpolation. As building wage data begin in 1264, it is reasonable to start the agriculture wage series also with that year. After 1474, there are again too many gaps in the data to continue with the Farmer

series. Therefore the Rogers (1882, 1887) series, confined to the wage of the (unskilled) laborer, is used for 1474-1670.

b. Building

Table 6E summarizes series of building wages, with location London in part I of the table, Southern England in part II, and other regions in part III. As for agriculture, only series beginning prior to 1770 need be considered. For London, the compilations of Hutchins, Tucker, and Gilboy may be eliminated for the purpose of this study, as they have been superseded by later work—the studies of L. D. Schwarz, Steve Rappaport, and Jeremy Boulton. For Southern England, the Rogers series may also be omitted from consideration, as Rogers'data are effectively mined by Brown and Hopkins for their series. Finally, for other regions, the series of Botham-Hunt and Woodward are rejected, because of their local characteristic.

Table 6E
Wages in Building[a]—Series Beginning Prior to 1770

Author	Time Period	Base Period[b] or Currency	Frequency of Earnings	Occupations
I. London				
Hutchins (1899, pp. 599, 603-604)	1580-1649	shillings and pence	daily	craftsman (four series[c]), laborer[c]
Hutchins (1900, p. 194)	1661-1725	”	”	”
Tucker (1936, pp.-78-80)[d]	1729-1935	1900	weekly	craftsman[e]
Gilboy (1936, p. 140)[f]	1700-1787[g]	1700	daily	craftsman (four occupations)
Schwarz (1985, pp. 36-38)	1700-1860	shillings and pence[h]	”	bricklayer, carpenter, bricklayer' laborer[c]
Rappaport (1989, pp. 403-407)	1490-1609	1457-1471	”	skilled,[i] semi-skilled[c,i,j]
Boulton (1996, pp. 288-289)	1574-1721	pence	”	craftsman, laborer[c]
II. Southern England				
Rogers (1866, pp. 315-319)	1264-1401[k]	”	”	carpenter (two series), mason, tiler, slater, sawyer[c]
”	1289-1395[k]	”	piece-rate	sawyer
				carpenter (two series), mason, mason's laborer,

Table 6E
Wages in Building[a]—Series Beginning Prior to 1770

Author	Time Period	Base Period[b] or Currency	Frequency of Earnings	Occupations
Rogers (1882, pp. 514-522)	1402-1583[k]	shillings and pence	daily	sawyers (pair), tiler, thatcher, assistant to each[c]
”	1403-1575[k]	”	piece-rate	sawyer
Rogers (1887, pp. 664-671)	1584-1703[k]	”	daily	carpenter (three series[l]), mason (three series[l]), bricklayer (two series[l]), sawyers (pair), tiler/slater (two series[l]), plumber (two series[l]), joiner, laborer[c]
”	1586-1702[k]	”	piece-rate	sawyer
Brown and Hopkins (1955, pp. 205-206)[m]	1264-1954	pence	daily, ten hours from 1847	craftsman
”	1301-1954	”	”	laborer
Farmer (1988, pp. 811-817)	1209-1356[k]	pence	daily	carpenter, thatcher and mate, slater/tile and mate[c]
Farmer (1991, pp. 516-520)	1351-1500[k]	”	”	thatcher and helper, slater and helper, mason[c,n]
III. Other Regions				
Gilboy (1934, pp. 254-287)[o]	1700-1800	shillings and pence	”	craftsman,[p,q] laborer[c,p,r]
Botham and Hunt (1987, pp. 389, 391, 393)[s]	1750-1792	shillings and pence, and 1790 = 100	”	craftsman (carpenter and bricklayer[c,t]), laborer[c,u]
Woodward (1995, pp. 250-275)[v]	1450-1750	pence	”	craftsman, laborer[c,u]

[a]And other industries as specified.
[b]Period for which series is 100.
[c]Separate series.
[d]Reprinted in Taylor (1975, pp. 27-31), 1790-1848 in Gayer, Rostow and Schwartz (1953, pp. 25, 54, 81, 108, 135, 167, 208, 238, 273, 301, 337), and 1729-1860 (1790 = 100) in Schwarz (1985, pp. 36-38).

[e]From 1780, artisans in diverse industries.
[f]Reprinted in Taylor (1975, pp. 11-13), Mitchell and Deane (1962, pp. 346-347), and Mitchell (1988, pp. 154-155).
[g]Also, Lancashire 1700-1796. For Lancashire, laborer rather than craftsman.
[h]Also, 1790 = 100 for bricklayers.
[i]Series combined with weights .6, .4 for real-wage series.
[j]Rappaport (1989, p. 129) believes a majority of workers in this category (that is, entered in contemporary accounts as "servant," "assistant," or "labourer") were probably journeymen rather than laborers—hence series is titled "semi-skilled" rather than "unskilled."
[k]Harvest years. Harvest year September 29 (calendar year t) to September 28 (calendar year t + 1) assigned to calendar year t + 1.
[l]One series, with mate.
[m]Reprinted in Carus-Wilson (1962, pp. 177-178), Brown and Hopkins (1981, pp. 11-12), Mitchell (1988, p. 165), and 1412-1914 in Wrigley and Schofield (1981, p. 640).
[n]Also, three series combined as unweighted average, with missing observations excluded rather than interpolated (Farmer, 1991, pp. 520-523).
[o]London and surrounding area, the West, the North (Lancashire and Yorkshire).
[p]Separate series by locality, sometimes combined.
[q]Sometimes separate series by craft as well as combined.
[r]For some localities, "bridges and roads" separate series from building.
[s]North Staffordshire.
[t]Also, skilled male potters 1750-1794.
[u]General laborer, not confined to building.
[v]Ten towns in Northern England (separate series).

The Brown-Hopkins series is the most famous and most utilized of the remaining series (encompassing also Schwarz, Rappaport, and Boulton), in part because Brown-Hopkins is the oldest of these series, in part because of the pioneering work of Brown-Hopkins in assembling annual series over seven centuries. However, the Brown-Hopkins series has three deficiencies that are not conspicuously characteristic of the other authors' series. Brown-Hopkins provide two separate series—one for the craftsman, and one for the laborer. Therefore the discussion of these deficiencies (which, for ease in exposition, refers to only one series) applies to each of their series separately.

First, as Boulton (1996, p. 268) remarks, there are "relatively few entries for each year" (up to 1700, when Brown-Hopkins use of the Rogers data ends). Boulton uses the strong word "fragility" to describe the resulting pre-18th century component of the Brown-Hopkins series. For this reason alone, it behooves the present author to use the other series whenever data availability permits.

Second, Brown-Hopkins do not compute a statistical central tendency (the mean, median, or mode) of their data for any given year, to constitute their average nominal wage for that year. Rather, as Brown and Hopkins (1955, p. 196) write, "we avoided any mechanical treatment of the series for the various crafts and their labourers, but graphed them: then, amid the year-to-year movements, we looked for rates which we could regard

as representative because they were recurrent." This procedure has the advantage of a non-mechanistic treatment of the basic data, which is recognized by Boulton (1996, p. 275): "Phelps Brown and Hopkins avoided 'mechanical treatment' of such rates, to overcome variations caused by different levels of skill, experience, and seasonal variation." However, the result is "short-run stickiness of the Phelps Brown-Hopkins nominal wage rate" (Lindert, 1985, p. 613, n. 7). Of course, such rigidity may be reflecting the actual rate, and indeed a recurring wage rate tends to be somewhat characteristic of the alternative series as well. However, the Brown procedure that leads to the rigidity of *their* series is highly subjective and therefore to be avoided. This is another reason to use the other series in preference to Brown-Hopkins.

Third, when there is no one representative rate—that is, in the transition from one "representative" rate to another, in Brown-Hopkins' view—a range of rates is presented, and this range can extend over many years. Such ranges of figures, instead of single annual figures, are unsuitable for the present purpose. Fortunately, a simple adjustment of the Brown-Hopkins series can correct this problem. Before explaining this adjustment, it is convenient to select the various component series. Restricting the explanation of the adjustment procedure to the subperiod for which the Brown-Hopkins series is selected, simplifies the exposition.

Boulton's series are chosen for the component series for the subperiod, 1574-1721, corresponding to his entire time period. The advantages of the Boulton series are as follows. First, Boulton (1996, p. 275) is careful to exclude "those described variously as apprentices, journeymen, workmen, lads, boys, and servants;" so his series of "the money wages rates of labourers and building craftsmen" (separate series) may have a greater occupational purity than do the series of the other authors. Second, the mode is used to obtain the figure for any given year, a procedure that has the twin virtues of objectivity rather than subjectivity in the process and flexibility rather rigidity in the resulting series (as noted by Boulton). Third, "a large number of different manuscript sources" are employed. Construction of the series (one for the craftsman, one for the laborer) is outlined in Boulton (1996, pp. 269, 275-280, 287). In-kind payments are not included in the wage rate. Boulton (1996, pp. 271-272) argues that (1) such payments were probably less important in construction than in other industries, and (2) they do not seem to have affected the wage rate.

For 1721-1770, the only remaining series is Schwarz, who develops three series—the wage rate of the bricklayer, carpenter, and bricklayer's laborer—the construction of which is outlined in Schwarz (1985, pp. 25-26). An advantage of Schwarz is that, following Gilboy, he uses original builders' bills as the primary data source. Schwarz (1985, p. 33) cites unanimous authority that in-kind payments declined in importance during the 18th century, and they are not included in his series. Minor interpolation of figures that are repetitive (yielding "constant-value interpolation") is performed by the present author.

Avoiding the Brown-Hopkins series to the maximum extent, the Rappaport series—for skilled and semi-skilled workers—is selected for the component for

1490-1574. Construction of the series is exposited in Rappaport (1989, pp. 123, 128-130, 238). His data emanate from the account books of livery (specific-craft) companies. These companies were suppliers of labor in the building industry. The wage rate is not adjusted to incorporate in-kind payments, although Rappaport (1989, p. 129) observes that "in the companies' accounts containing wages there is frequently a separate entry for money spent 'for bread and drink among the workmen at times.'" For most years, Rappaport takes the median rate as his figure. For other years, the selection appears to have a subjective element, which is implicitly criticized by Boulton (1996, p. 275).

What remains to be selected are the component series for the period prior to 1490. With no other option, the Brown-Hopkins series (for the craftsman and laborer separately) must be adopted. The problem of data range (the third limitation of Brown-Hopkins mentioned above) is solved as follows, for each of their series separately. The range for a given period of years always has the previous period's prevailing rate as lower limit and the next period's prevailing rate as upper limit. Therefore it is only logical to apply linear interpolation to obtain specific-year figures for the given period. For one "previous period" (1309-1311, for the laborer), Brown-Hopkins list two wage rates as alternatives; the average is taken. The series for the craftsman begins in 1264, while that for the laborer begins in 1301.

C. Construction of Long-Run Series

1. Agriculture and Building Series

a. Combining Multiple Series

Several industry (agriculture or building) component series for a specific subperiod are multiple in nature, and must be combined to enable construction of the specific-industry series for 1264-1770. First, each of the multiple series must be on a pence-per-day or pence-per-equivalent-output basis. Farmer (1988, pp. 811-187; 1991, pp. 516-519) provides a correspondence between his piece-rate index-number series and an equivalent piece-rate pence series: 100, the base-period value, equals (5.38, 6.04, 5.66) pence for the (thresher and winnower, reaper and binder, mower and spreader). Hence the respective index-number series is multiplied by (5.38/100, 6.04/100, 5.66/100). The Schwarz series are readily converted from shillings and pence per day to pence per day, while the Boulton and Brown-Hopkins series are in pence per day in original form. Rappaport (1989, p. 130) reports that for his base period, 1457-1471, "nearly all skilled craftsmen were paid 8d. a day and few labourers earned more than 5d. for a day's work." Therefore his (skilled, semi-skilled) index-number series is multiplied by (8/100, 5/100) for expression in pence per day.[13]

The next step, for each subperiod, is to combine the multiple series to create a single series, expressed as pence per equivalent output (Farmer) or pence per day (Schwarz, Boulton, Rappaport, and Brown-Hopkins). A weighted average of each series is taken, described as follows and summarized in Table 7E (columns 1, 3 and notes c-h).

Table 7E
Components of Earnings Series

Time Period	Coverage			Source	
	Location	Occupations	Industries	Publication	Table
I. National Series					
1990-2002	Great Britain	all employees	all	national statistics website	1E
1988-1990	”	”	”	ET Oct. 1993	”
1985-1988	”	”	”	ET AS 1995	”
1980-1985	”	”	”	ET AS 1988	”
1976-1980	”	”	”	ET AS 1984	”
1963-1976	”	”	PI, A, T, a few MS	”	”
1940-1963	U.K.	full-time, manual[a]	PI, T and C, PA	HA Table 85	”
1939	”	”	”	estimated by author (see text)	
1938	”	”	”	HA Table 85	1E
1882-1938	U.K.[b]	manual	all	Feinstein (1995)	2E
1770-1882	Great Britain	”	”	Feinstein (1998b)	”
II. Agriculture					
1670-1770	England	adult-male wage-earner	agriculture	Clark (2001)	5E
1584-1670	”	laborer	”	Rogers (1887)	”
1474-1583	”	”	”	Rogers (1882)	”
1351-1474	Southern England	piece-rated[c]	”	Farmer (1991)	”
1264-1351	”	piece-rated[d]	”	Farmer (1988)	”
III. Building					
1721-1770	London	craftsman and laborer[e]	building	Schwarz (1985)	6E
1574-1721	”	craftsman and laborer[f]	”	Boulton (1996)	”
1490-1574	”	skilled and semi-skilled[g]	”	Rappaport (1989)	”
1301-1490	Southern England	craftsman, laborer[h]	”	Brown and Hopkins (1955)	”
1264-1301	”	craftsman[i]	”	”	”

[a]That is, wage-earners.
[b]Excluding Southern Ireland from 1920 onward.
[c]Weighted average of wages of thresher and winnower (.3219), reaper and binder (.1610), mower and spreader (.5171), in accordance with Clark (2001, p. 480) data—after missing observations linearly interpolated for each of the three series (see text).
[d]Weighted average of wages of thresher and winnower (2/3), reaper and binder (1/3), with weights in accordance with Clark's (2001, p. 480) data—after missing observations linearly interpolated for each of the two series (see text).
[e]Weighted average of wages of bricklayer (5/12), carpenter (5/12), bricklayer' laborer (1/6), with craftsman-laborer weights in accordance with Brown and Hopkins' (1955, p. 195) data and bricklayer-carpenter weights made equal for lack of information—after missing observations linearly interpolated for each of the three series (see text).
[f]Weighted average of wages of craftsman (5/6) and laborer (1/6), with weights in accordance with Brown and Hopkins' (1955, p. 195) data (see text).
[g]Weighted average of wages of skilled (.6) and semi-skilled (.4) workers, with weights in accordance with Rappaport's (1989, pp. 242-243, 401) data (see text).
[h]Weighted average of wages of craftsman (5/6) and laborer (1/6), with weights in accordance with Brown and Hopkins' (1955, p. 195) data—after each of the two series smoothed via interpolation (see text).
[i]Series smoothed via interpolation (see text).

Legend:
ET = *Economic Trends*
AS = Annual Supplement
HA = *British Labour Statistics, Historical Abstract, 1886-1968*
PI = production industries
A = agriculture
T = transport
MS = miscellaneous services
C = communication
PA = public administration

For agriculture (the Farmer series), the weighting patterns are obtained from Clark (2001, p. 480), who lists, for each "work type" (occupation), the number of observations averaged by year and place. ("Thresh and winnow," "mow," "reap") has (216, 347, 108) observations. Therefore, for 1264-1351, (thresher and winnower, reaper and binder) are weighted (2/3, 1/3); and, for 1351-1474, (thresher and winnower, reaper and binder, mower and spreader) are weighted (.3219, .1610, .5171).

For building, series from three sources require combination. The weighting pattern emanates from Brown and Hopkins (1955, p. 195), who report that, for the 1264-1700 period, there are generally 15 observations per year for craftsmen versus three for laborers. This suggests a weighting pattern of (5/6, 1/6) for (craftsman, laborer), which is applied to the Boulton series for 1574-1721 and the Brown-Hopkins series for

1301-1490. For Schwarz, the two craftsmen are given equal weight; so the pattern is (5/12, 5/12, 1/6) for (bricklayer, carpenter, bricklayers' laborer). Rappaport (1989, pp. 148, 242-244, 401) himself applies weights of (.6, .4) to construct a real-wage combined (skilled, semi-skilled) series, and provides empirical justification for these weights; so these weights are adopted here for the 1490-1574 subperiod.

The application of unvarying weighting patterns to combine the multiple series for a given subperiod implies that the resulting component series is "fixed-weighted," meaning essentially "base-weighted," rather than current-weighted, at least in that respect. Employment structures are not available on a yearly basis; were such data available, they would be used instead, to obtain current-weighted series.

b. Expression of Series

It must be checked that all component series in 1264-1770, for both agriculture and building, are expressed in pence per day (except for those already established as pence per piece-work). The only series that requires adjustment is Rogers (1887) for 1584-1670, which is converted from shilling and pence per day to pence per day.

2. National Series

Now one is in a position to construct a consistent national earnings-rate series for 1770-2002 and separate consistent agriculture and building wage-rate series for 1264-1770.

First, the long-run national, agriculture, and building are constructed. The component series for the (national, agriculture, building) long-run series are listed and their salient characteristics summarized in parts (I, II, III) of Table 7E. The linking process for each of the three series is summarized in *steps 1-3* of Table 8E. Consider two adjacent subperiods, a "later" and an "earlier" subperiod. All such subperiods have been constructed such that the earliest year (say, t) of the later subperiod is the latest year (again, t) of the earlier subperiod. Let (Y_t, Z_t) denote the value of the component series in year t for the (later, earlier) subperiod. Begin with the latest subperiod: 1990-2002 for the national series, 1670-1770 for the agriculture series, and 1721-1770 for the building series. Multiply each year of the earlier (in this case, second-latest) subperiod (that is, from the earliest year to year $t - 1$) by the ratio Y_t/Z_t. Now the second-latest subperiod has been adjusted so that it is consistent in level with the latest subperiod. The adjusted second-latest subperiod is now the "later" subperiod and the third-latest subperiod is the earlier subperiod, and the process is repeated—and so on.

Table 8E Construction of Earnings Series, 1264-2002		
Time Periods	Linking Year	Encompassed Period
Step 1: Linking of Component Series to Obtain National Series		1770-2002
1988-1990 to 1990-2002	1990	
1985-1988 to 1988-1990	1988	
1980-1985 to 1985-1988	1985	
1976-1980 to 1980-1985	1980	
1963-1976 to 1976-1980	1976	
1938-1963 to 1963-1976	1963	
1882-1938 to 1938-1963	1938	
1770-1882 to 1882-1938	1882	
Step 2: Linking of Component Series to Obtain Agriculture Series		1264-1770
1474-1670 to 1670-1770	1670	
1351-1474 to 1474-1670	1474	
1264-1351 to 1351-1474	1351	
Step 3: Linking of Component Series to Obtain Building Series		1264-1770
1574-1721 to 1721-1770	1721	
1490-1574 to 1574-1721	1574	
1301-1490 to 1490-1574	1490	
1264-1301 to 1301-1490	1301	
Step 4: Combining Agriculture and Building Series[a]		1264-1770
Step 5: Linking of Agriculture-Building Series to National Series		1264-2002
1264-1770 to 1770-2002	1770	
Step 6: Rebasing Series to 1913 =100		1264-2002

[a]Weights (.9055, .0945) from Feinstein (1998b, Appendix 2), see text.

Second, the agriculture and building series must be combined to create a "synthetic" national series. The relative employment in the two industries is not available annually (or, indeed, at all); so again a fixed weighting pattern is applied. The synthetic national series is to be linked directly to the Feinstein 1770-1882 component of the national series. Therefore it is only logical to use a weighting pattern consistent with that adopted by Feinstein at the beginning of his period. Feinstein (1998b, Appendix 2, Table B) shows 1.15 million male wage earners in agriculture and 0.12 million in building, yielding a weighting pattern of (.9055, .0945) for (agriculture, building), and the two industry series are combined with these weights. This is shown as *step 4* in Table 8E.

Third, the synthetic (agriculture-building) national series is linked to the national series in *step 5*, with 1770 the linking year (t). It might be noted that, according to the Feinstein data, agriculture and building together comprised 59.6 percent of male wage-earners in 1771. Although data are lacking, it is a safe assumption that this percent was even higher in earlier centuries. Therefore the coverage of the synthetic portion (1264-1769) of the long-run national series can be construed as satisfactory.

Fourth, as *step 6*, the long-run national series resulting from step 5, is rebased to 1913 = 100 by division by its 1913 value and multiplication by 100. The "average nominal earnings" series is now constructed for 1264-2002.

III. Retail-Price Series

A. Methodology

1. Index Number

Almost all scholars use the Laspeyres price index as the index-number concept for the retail price series. The Laspeyres price index is typically computed in practice as a base-period arithmetic *expenditure-weighted* index, but in theory it is a base-period arithmetic (physical-) *quantity-weighted* index.[14] Clark (2001, pp. 492-493) is a maverick in his adoption of a variant of the Törnqvist index (though he does not call it as such).[15] The Törnqvist index is geometric rather than arithmetic, and involves exponential instead of multiplicative expenditure weights.

Consider the following notation:

P_{it} = price of commodity i in period t
Q_{it} = physical quantity of commodity i in period t
Si_t = share of commodity i in total expenditure in period t
L_t = Laspeyres price index in period t
T_t = Törnqvist-variant price index in period t
1 = current period
0 = base period

Then $S_{it} = (P_{it} \cdot Q_{it})/(\sum(P_{it} \cdot Q_{it})$, $L_1 = (\sum P_{i1} \cdot Q_{i0})/ (\sum P_{i0} \cdot Q_{i0}) = \sum(P_{i1}/P_{i0}) \cdot S_{i0}$, and $T_1 = \prod(P_{i1}/P_{i0})^{Sio}$, where all summation is over i. Actually, Clark does not use *base-year* expenditure weights, though his weighting pattern is invariant for all t. A true Törnqvist index would involve $(S_{i0} + S_{i1})/2$ as the weight; thus the weight would vary with t.

One limitation of the Laspeyres index is that as relative prices change, physical quantities purchased nevertheless remain fixed: a zero elasticity of demand is imposed for all commodities i. So there is no substitution of a relatively cheaper for a relatively dearer commodity as prices change over time. In constrast, the Törnqvist-variant index incorporates genuine constant expenditure-share weights: a uniform identical elasticity of demand is implicitly assumed for all commodities i, this elasticity varying with total expenditure in the current period and equaling unity for total expenditure unchanged from the base period. Therefore there is a response, albeit limited, of quantity to relative-price changes—but not a response of expenditure share to relative-price changes.

Another deficiency, applicable to both indexes, is that new goods are not purchased over time, because of the rigidity of the weighting pattern. The two

deficiencies impart definite upward biases to the indexes, providing that the base period is the earliest year of the period to which the index pertains.

The rigid quantity pattern of the Laspeyres index and the rigid relative-expenditure pattern of the Törnqvist-variant index, and therefore the associated biases of the indexes, can be alleviated to some extent by the use of weighting patterns specific to subperiods and subsequent linking of the subperiod indexes. So the above two deficiencies then apply only within, not between, subperiods.

However, there is a further defect, applicable to both indexes; or this defect can be viewed as the general deficiency serving as the rubric for the above specific deficiencies. The indexes are not genuine cost-of-living indexes, that is, indexes that yield the minimum varying monetary expenditure required to achieve a given level of utility of the consumer ("to keep the consumer on the original indifference curve," in the parlance of economists). Therefore series based on these indexes are not true cost-of-living series, and the term "cost-of-living index" is a misnomer when applied to such series. Official U.K. statisticians, therefore, were correct in changing the name of their series to the "retail price index" (see section B.1.a below).

It should be noted that, in U.K. official statistics, the retail price index is distinguished from the consumer price index (CPI). The RPI is the traditional measure of inflation as it affects consumers; the CPI is a more recently developed measure. The RPI covers a population representative of the typical household, whereas the CPI encompasses a broader population. Interestingly, for many non-U.K. official series, "consumer price index" is the nomenclature.

A corollary of the above defect is that retail price series do not incorporate changes in quality of goods. Typically, goods improve in quality over time and therefore increase the consumer's utility from a given quantity. Mokyr (1999, p. 224) provides some good examples: "A typical textile product in 1830 was not only cheaper than in 1750 but was also better in terms of the evenness of its fabric, its durability, its ability to absorb and maintain color, its ease of laundering, and so on. The same was true for a wide range of products, from iron pots to glass to steel pens to printed illustrations in books." So there is an upward bias in any retail-price index number.

An attempt to save the Laspeyres index from a theoretical standpoint has been made by David and Solar (1977, pp. 7-13). From a normative standpoint, they find value in a fixed-quantities index as a "cost-of-necessities" index. The Laspeyres index prices a "minimum-commitment basket of goods" or a "normal basket of goods." If the basket is geared to the basic (say, subsistence) "needs" of the population *and* if the basket is revised periodically as these "needs" change, the Laspeyres index receives normative justification. Some historians have accepted this argument.[16]

2. Prices

a. Categories

Historical RPI series have made use of four types of prices:

i. Retail prices: Such prices are the rates at which consumer-households directly transact their purchases. Therefore retail prices are the preferred price type for a RPI series, whether historical or not. The problem, as mentioned above, is that, with rare exception (of which the price of bread is the most conspicuous), data on retail prices do not generally exist prior to the 20th century.

ii. Wholesale prices: Prices at the wholesale level are more readily available than retail prices, in earlier centuries.

iii. Contract prices: A substantial amount of data exists on contract prices in earlier centuries. These prices are for the purchases of institutions such as hospitals, schools, the military, and other government departments (so the prices are sometimes called "institutional"). The available data are from records of the purchasers, not the suppliers, of commodities.

iv. Export and import unit values: Often misnamed export and import price indexes, unit values are computed from official trade statistics as the ratio of the value to the physical quantity of an exported or imported commodity.

The prices in categories ii-iv of necessity serve as price input to historical retail-price series antedating the 20th century. There are problems with each of these price categories.[17] Both wholesale and contract prices generally are specific to London or occasionally some other location. There are also specific problems with each of these price categories.

Wholesale prices move differently from retail prices. Also, wholesale prices are typically for the raw materials that comprise consumer goods rather than for the consumer goods themselves. So the price of wool may proxy that of clothing, the price of tallow that of candles, etc.

Contract prices are generally established for long periods and therefore tend to be rigid, compared to the greater frequency of transactions and of price change encountered by the household-consumer. Also, the purchasing institutions bought in bulk at favorable prices, compared to the small purchases and lack of market power of the individual household-consumer.

Export and import unit-value series have the problem of changes in quality, as the composition of the export or import commodity category changes over time.

In spite of these problems, some historians are sanguine about the use of the alternative price categories in place of retail prices. Williamson (1985, pp. 206-207) writes: "Deane and Cole…do admit, however, that contract prices for food, coal and candles did move quite freely. Moreover, the use of wholesale prices when retail prices

are unavailable has been defended for analysis covering many decades since 'in the long run…retail prices must move in sympathy with wholesale prices' (Flinn, 1974, p. 402). I agree with Flinn." Feinstein (1998b, p. 636) states: "It is not difficult, however, to find a large range of wholesale and institutional prices that are highly sensitive to short-term variations, and which mirror closely what is known of the fluctuations in retail prices. It can also be shown that the London series accurately reflect national movements in prices."

b. Commodities

Historical retail-price series can be judged, in part, on the inclusiveness of their commodity coverage. Five important commodity groups can be distinguished for pre-20th centuries: food, alcohol, clothing, fuel and light, and rent. In the next section, the tables that summarize historical RPI series have a column that lists which of these commodity groups are omitted from the respective series. RPI series limited to only one commodity group (invariably food) are excluded from the tables and from consideration as component series of the long-run RI.

B. Component Series

1. National Series (1770-2002)

a. Official Series

The long-run retail-price series is generated symmetrically to the earnings-rate series, with a directly computed national component (or, rather, set of components) for 1770-2002 and a synthetic national component constructed from separate retail-price series for workers in agriculture and building.

Official RPI series are summarized in Table 1P. As for the official earnings series, the various series are in reverse chronological order. Because the most-recent component of the series is official in nature, the long-run series can be readily updated. Also again, data sources are selected so that the maximum digits in the figures are obtained.

Table 1P
Retail Price Index—Official Series

Source	Time Period	Time Base[a]	Weight Base[b]	Location	Excluded Items[c]

Table 1P Retail Price Index—Official Series					
Source	Time Period	Time Base[a]	Weight Base[b]	Location	Excluded Items[c]
ET AS 2002, Oct. 2003	1987-2002	January 13, 1987	Most recent FES	U.K.	____
ET AS 2001	1985-1987	1985	”	”	”
ET AS 1988	1975-1985	1975	”	”	”
ET AS 1977	1970-1975	1970	Three years ended in previous June[d]	”	”
AAS 1981	1969-1970	January 16, 1962	”	”	”
HA Table 94	1962-1968	”	”	”	”
HA Table 93	1956-1961[e]	January 17, 1956	1953-1954	”	”
” Table 91	1952-1955[f]	January 15, 1952	1937-1938[g]	”	”
” Table 90	1948-1951[h]	June 17, 1947	1937-1938	”	”
” Table 89	1915-1946[i]	July 1914	1904	”	”
” Table 88	1892-1900	1900	”	London[j]	alcohol
”	1901-1914[k]	”	____[l]	”	alcohol, rent

[a]Period for which series is 100.
[b]Period from which weighting pattern for component indexes obtained.
[c]Of items: food, alcohol, clothing, fuel and light, rent.
[d]Except 1975, year ended in previous June.
[e]And January 16, 1962.
[f]And January 17, 1956.
[g]Modified.
[h]And January 15, 1952.
[i]And August-December 1914 and June 17, 1947.
[j]And other towns.
[k]Ending August 1, 1914.
[l]Component indexes not combined.

Legend:
ET = *Economic Trends*
AS = Annual Supplement
FES = Family Expenditure Survey
AAS = *Annual Abstract of Statistics*
HA = *British Labour Statistics, Historical Abstract, 1886-1968*

The nomenclature of the official series is interesting: "cost of living index" for 1914-1947, "interim index of retail prices" for 1947-1956, "general index of retail prices" for 1956-2001, and "retail prices index" for 2002 onward. The official statisticians are to be praised for acknowledging that "the index measures price changes only; it is not a cost of living index" (*Economic Trends*, Annual Supplement 2002, p. 299).

Official series constitute components of the long-run series only from 1948 onward. The reason for excluding earlier years is that from 1914 to 1947—a third of a century, covering two world wars and theirs aftermaths—a weight base of 1904 was used, and that weighting pattern surely became obsolete before its official use ceased.[18] Since 1962, weights have been revised annually, from 1962 to 1974 based on information for the three years ended in the previous June, from 1975 based on information for one year only. So the official retail-price series has become an institutionalized annually linked ("chain-linked") Laspeyres index.

b. Feinstein Series

Just as for nominal earnings, Charles H. Feinstein has set the standard for retail-price series. His data contributions in this area are listed in Table 2P. The virtues of Feinstein's work here are several. First, he improves his series over time with each new study. Second, he takes meticulous care in selection of price indicators and in generation of weighting patterns. Third, he adjusts the official series for 1938-1947, replacing the 1904 with the 1937-1938 weighting pattern. Fourth, he produces separate Laspeyres series for overlapping subperiods, each with specific weighting patterns and linked. Base years are in the middle of subperiods, thus minimizing bias (or, one can say, averaging upward and downward bias). Fifth, Feinstein does not just use the Laspeyres index; he justifies the index both theoretically and empirically. In Feinstein's (1991, p. 155; 1998b, p. 634) view, the Laspeyres index is "the most appropriate and convenient form for a cost of living index;" it is "the most suitable procedure for measuring long-run changes in workers' cost of living."

Table 2P
Retail Price Index—Feinstein Series

Feinstein Study	Time Period	Time Base[a]	Weight Base[b]	Location	Price Measure[c]	Excluded Items[d]
1972, pp. T140-T141[e]	1855-1965[f]	1913	1904[g,h]	London[g,i] and U.K.	retail, wholesale	alcohol, other[g]
1991, pp. 170-171	1870-1914	1900	1900, 1904[j]	U.K.	retail, wholesale, MUV and XUV	____

Table 2P
Retail Price Index—Feinstein Series

Feinstein Study	Time Period	Time Base[a]	Weight Base[b]	Location	Price Measure[c]	Excluded Items[d]
1995, p. 26[k]	1780-1870	1820-1824	1787-1796, 1860	U.K.[l]	contract, retail, wholesale, XUV	_____
1995, pp. 263-266	1790-1824 (scattered)[m], 1830-1990[n]	1913	1787-1796, 1860, 1900, 1904, 1937-1938[h]	”	retail, contract, wholesale, MUV and XUV	_____
1998b, pp. 652-653	1770-1882	1778-1782	1788-1792, 1828-1832, 1858-1862	Great Britain	contract, wholesale, retail, XUV	_____

[a]Period for which series is 100.
[b]Period from which weighting pattern for component indexes obtained.
[c]In order of importance
[d]Of items: food, alcohol, clothing, fuel and light, rent.
[e]Reprinted 1870-1965 in Capie and Webber (1985, pp. 535-536).
[f]Source is Bowley (1937) for 1855-1914, official series for 1914-1965.
[g]For 1855-1914.
[h]Also, as for official series.
[i]And other towns.
[j]For components of food.
[k]Reprinted 1780-1850 in Boot (1999, pp. 663-664).
[l]Excluding Southern Ireland from 1920 onward.
[m]1790, 1795, 1800, 1805, 1810, 1816, 1820, 1824.
[n]Source is Feinstein (1991) for 1870-1914, official series for 1947-1990.

Legend:
MUV = import unit value
XUV = XUV

Therefore Feinstein’s series, in its latest versions, are tentatively accepted as component series for the maximum time length available: Feinstein (1998b) for 1770-1882, and Feinstein (1995) for 1882-1948. Construction of the series is exposited in Feinstein (1991, pp. 155-169; 1995, p. 28; 1998b, pp. 633-641, Appendices 3-4).

Clark (2001, pp. 492-496) is critical of Feinstein’s (1998b) series on two counts. First, Clark objects to the Laspeyres form of the index and presents an alternative index-number. The choice between the two indexes is not as clear-cut as Clark makes it, and

this issue is discussed in section A.1 above. Also, in criticizing Feinstein's use of Laspeyres, Clark is implicitly criticizing virtually all other published RPI series for the U.K., as these also are Laspeyres-based.

Second, Clark criticizes Feinstein's use of the retail price for the price-of-bread series for the time period when bread was subject to controls (up to 1815). Clark refers to Webb and Webb's (1904) history of the London assize-price of bread for support. Feinstein's data source is Mitchell (1988, p. 769), and this series is quite variable rather then rigid (as one would expect of a controlled price). In explanation, Webb and Webb (1904, p. 200) state that "what Parliament tried to accomplish was not, as is often supposed, to fix the price of bread, but merely to fix the relation which it should bear to the current market price of wheat." They add that "even this easier problem proved too difficult for the administrative capacity of the eighteenth century." Webb and Webb tell a story of shortages, reductions in quality, illegal reductions in size of a loaf, and (most tellingly) constant complaints. One would expect these reactions to effective price and quality controls. However, in each case the law was changed and punitive action taken as required. It may be that the assize price was in fact the effective retail price, although perhaps with a lag.

Also, it appears that the Mitchell series is derived directly from the assize price only to 1800. In any case, Clark's use of the wholesale wheat price as an alternative price indicator is subject to criticism that it is at the wrong level, wholesale rather than retail. Logically, there is a trade-off in reliability between the controlled retail price and the uncontrolled wholesale price. It is not obvious, in such a situation, that the correct choice is necessarily the wholesale price.

c. Other Series

Just as for earnings, other national series are evaluated to check if they should be adopted in place of Feinstein. Excluded from consideration are subnational series (meaning pertaining to an area smaller than Great Britain) or series with discontinuities, that begin later than 1770; as Feinstein's series are superior to such series in the crucial characteristics of geographical coverage and continuity. Remaining potential alternative national series are summarized in Table 3P (series of Bowley and Wood) and 4P (series of other scholars). The Bowley and Wood series are excluded from consideration, because they have been effectively criticized by Gazeley (1989, pp. 207-213) and Feinstein (1991, pp. 153-155).

Table 3P
Retail Price Index (U.K.)—Bowley-Wood Series

Study	Time Period	Time Base[a] or Currency	Weight Base[b]	Price Measure[c]	Excluded Items[d]
Wood (1909, pp. 102-103)[e]	1850-1902	shillings	unweighted[f]	unstated	alcohol[g]

Table 3P Retail Price Index (U.K.)—Bowley-Wood Series					
Study	Time Period	Time Base[a] or Currency	Weight Base[b]	Price Measure[c]	Excluded Items[d]
Bowley (1921, p. 106)	1914-1920[h]	July 1914	1920[i]	retail	_____
Bowley (1937, pp. 30, 121-122)[j]	1846-1914[k], 1924-1936	1900, 1914	1904, 1914	retail, wholesale	alcohol[l]

[a]Period for which series is 100.
[b]Period from which weighting pattern for component indexes obtained.
[c]In order of importance
[d]Of items: food, alcohol, clothing, fuel and light, rent.
[e]Reprinted in Carus-Wilson (1962, pp. 142-143); reprinted and extended to 1910 in Layton (1920, p. 184).
[f]For commodities. Feinstein (1991, p. 155) notes that Wood applies varying weights for commodities as a group and rent. This is true in effect, resulting from Wood adding the shilling cost of commodities and of rent.
[g]Presumably.
[h]July only, in every year. Modified official series.
[i]Apparently. Modified from 1914.
[j]Reprinted in Carus-Wilson (1962, pp. 142-143); reprinted 1846-1914 in Mitchell (1988, p. 738) and 1851-1914 (1851, 1914 = 100) in Mitchell (1998, pp. 863-864).
[k]1846-1879 obtained by Bowley via adjusting wholesale price index via retail-wholesale indexes relationship 1880-1914.
[l]To 1914.

Turning to Table 4P, part I, the Allen series is an early redoing of the 1904-based official series using 1937-1938 weights, while the Tinbergen and Brown-Browne series have Bowley and official series as sources. These series are clearly superseded by Feinstein. The virtue of the Gazeley and Boot series is their discovery and use of neglected expenditure information for weighting patterns. However, as Feinstein (1991, p. 174) points out, Gazeley's series does not start until 1886, and it differs little from Feinstein's series. Boot's (two) series are for middle-class households, as distinct from Feinstein's series for working-class families. Gazeley and Boot do not trump Feinstein.

Table 4P Retail Price Index—Other National Series					
Study	Time Period	Time Base[a]	Weight Base[b]	Price Measure[c]	Excluded Items[d]
I. U.K.					

Table 4P Retail Price Index—Other National Series					
Study	Time Period	Time Base[a]	Weight Base[b]	Price Measure[c]	Excluded Items[d]
Allen (1948, p. 18)[e]	1938-1946[f]	1938	1937-1938	retail	____
Tinbergen (1956, Table 1A)	1866-1914[g]	1907	unweighted[h]	unstated[h]	alcohol
Brown and Browne (1968, pp. 444-447)	1860-1913, 1920-1938, 1946-1960[i]	1890-1899, 1925-1929, 1952-1959	1904, 1914, 1937-1938,[j]	retail, wholesale	alcohol (1860-1913)
Routh (1980, pp.134-135)	1906-1978[k]	1906-1910	various	”	”
Gazeley (1989, pp. 214, 215)	1886-1912	1900	1890-1891, 1904	retail, contract	____
Boot (1999, pp. 663-664)	1780-1850	1820-1824	1823-1824	contract, retail, wholesale, XUV, wages	____
II. England and Wales					
LW (1983, p. 11)[l]	1781-1850	1850	1795, 1804	wholesale, contract, XUV, retail	alcohol
LW (1985, p. 148)[m]	1781, 1785, 1790, 1795, 1800, 1805-1851	1851	”	”	”
Williamson (1985, p. 220)	1846-1914	1900	1860, 1904, 1914	retail, wholesale, MUV, wages	”
Mitchell (1988, p. 737)[n]	1781-1850[o]	1851	1795, 1904	wholesale, contract, XUV, retail	”

[a]Period for which series is 100.
[b]Period from which weighting pattern for component indexes obtained.
[c]In order of importance.
[d]Of items: food, alcohol, clothing, fuel and light, rent.
[e]Also, June 1947. Reprinted in Bowley (1952, p. 504).
[f]Adjustment of official series from July 1914 to 1937-1938 weight base.
[g]Based on Wood (1909), Clark (1937), and apparently official series.

[h]Wood component.
[i]Source is Bowley (1937) for 1860-1913, Allen (1948) for 1938 and 1946-1947, and official series.
[j]And as for official series.
[k]Source is Bowley (1921, 1937) for 1906-1920, and official series.
[l]Reprinted in Mokyr (1985, p. 186), Williamson (1985, p. 216), and Mitchell (1988, p. 737).
[m]Reprinted in Mitchell (1988, p. 737).
[n] Reprinted, with one less digit, in Mitchell (1998, p. 863), with base 1857 = 100 for 1781-1814.
[o]Source is LW (1985) and Williamson.

Legend:
LW = Lindert and Williamson
XUV = export unit value
MUV = import unit value

Part II of Table 4P lists series developed by Lindert and Williamson. The Lindert-Williamson 1985 series is a revision of their series for 1983, consequent upon comments of Crafts (1985). The Mitchell (1988) series is an extended version of Lindert-Williamson (1985). Crafts is critical of Lindert-Williamson's indexes for cereals, rent, and clothing, as well as their weighting pattern for cereals and their omission of potatoes and oatmeal. Lindert and Williamson (1985) make use of Crafts' comments only on clothing, in their revision. Schwarz (1985, pp. 27-28) also is critical of Lindert-Williamson's price indicators for rent and cereals.

Feinstein provides critiques of Lindert and Williamson series in several writings. Feinstein (1991, p. 174) observes that the index of Williamson (1985) for 1877-1914 "differs only marginally from Bowley's (1937)]," hence Feinstein's criticisms of Bowley apply to Williamson as well. Feinstein (1995, p. 20) criticizes the Lindert-Willliamson selection of the source for their weighting pattern. Finally, Feinstein (1998b, pp. 640-642) criticizes the Lindert-Williamson choice of the end-year of their series (1851) as the year of their weighting pattern, their "abnormally high expenditure share" of bread and wheat flour (44 percent), and their omission of potatoes, oatmeal, and other items. In sum, the Lindert-Williamson series cannot be construed as worthy to displace Feinstein as component series.

2. Subnational Series (1264-1770)

a. Potential Component Series

Potential series to serve as components of the RPI for agricultural workers, and those to serve as components of the RPI for building workers are not necessarily mutually exclusive series. Therefore in this section all these potential component series are evaluated. In part I of Table 5P, series for Southern England are listed. Of these series,

that of Brown-Hopkins is the only one oriented to building rather than agricultural workers. Just as for wage series, Brown-Hopkins may be the most-famous and most-utilized historical RPI series of all time and place. The construction of this series is exposited in Brown and Hopkins (1956, pp. 296-310; 1981, pp. 32-44). While commodity-group weights are fixed over the entire time period, individual commodities within the groups have varying weights over time.

Table 5P
Retail Price Index—Parts of England

Study	Time Period	Time Base[a] or Currency	Weight Base[b]	Price Measure[c]	Excluded Items[d]
I. Southern England					
BH (1956, pp. 311-314)[e]	1264-1954[f]	1451-1475	1450s, 1790s, 1904-1913	contract, wholesale	rent
Farmer (1983, pp. 123-127)	1272-1411[f]	shillings	weights assumed	manorial[g], wholesale	fuel and light, rent
Farmer (1988, pp. 776-777)	1209-1356[f]	1331-1347	”	”	”
Farmer (1991, pp. 520-524)	1351-1500[f]	shillings[h]	”	”	”
II. Rural England					
Clark (2001, pp. 502-503)	1670-1869	unstated[i]	1787-1796, 1840-1854	contract, wholesale	_____

[a]Period for which series is 100.
[b]Period from which weighting pattern for component indexes obtained.
[c]In order of importance
[d]Of items: food, alcohol, clothing, fuel and light, rent.
[e]Reprinted in Carus-Wilson (1962, pp. 193-196), Brown and Hopkins (1981, pp. 28-31), Mitchell (1988, pp. 166-169), and 1790-1914 Burnett (1969, p. 199).
[f]Harvest years. Harvest year September 29 (calendar year t) to September 28 (calendar year t + 1) assigned to calendar year t + 1.
[g]Sale and purchase.
[h]Also index, 31.91s. = 100.
[i]But effectively 1698 (first year of 100).

Legend:
BH = Brown and Hopkins

In spite of its illustrious history, the Brown-Hopkins series has been subjected to severe criticism. First, the Brown-Hopkins price indicators are criticized by Wrigley and Schofield (1981, p. 639) and by Boulton (2000, p. 457, n. 14).Wrigley and Schofield take Brown-Hopkins to task for their heavy use of data on raw materials or partly processed

commodities as distinct rather than finished goods, and for their reliance on contract and wholesale prices. In fairness to Brown-Hopkins, they had little choice in these matters. Boulton is critical of the wide variety of different sources for their price indicators and of abrupt changes in the source of a given price indicator.

Second, the Brown-Hopkins weighting pattern overweights meat and fish and underweights cereals and peas. The reason is that their source of expenditure patterns is the purchases of certain 15th-century priests, who had a higher standard of living than building (or agricultural) workers. This criticism is made by Burnett (1969, p. 51), Dyer (1989, p. 220), and Farmer (1983, p. 140; 1988, p. 775; 1991, p. 492). As Farmer (1988, p. 775) remarks, "Thirteenth-century England was not as Merrie as such figures [the Brown-Hopkins expenditure pattern] suggests."

Third, in proxying consumer goods by the raw material from which they were made, Brown and Hopkins exaggerate the price rise especially in the 16th century, when mark-ups over raw-materials price experienced much lower increases than the raw-materials prices themselves. This phenomenon is recognized by Brown and Hopkins (1957, pp. 292, 293):

> the day's wages of the building craftsman at the end of the sixteenth century would buy less than half of what it had commanded in the second half of the fifteenth…[there is] a check to the rate of fall about 1600, and some recovery after the 1630's….Processed products like bread and beer will not have risen in price so much as gain and malt: the price of the loaf, for example, will have had to cover not the cost of grain only but wages for milling, transporting and baking, and as these did not go up as much as grain, the loaf will have gone up rather less too.

As Rappaport (1989, p. 127) notes, "the authors cautioned that their series might overstate by a third or more the rise in retail price during the sixteenth century." Woodward (1995, p. 212) comments: "The picture they painted was a gloomy one with real wages tumbling in the sixteenth century and failing to recover in the early decades of the following century," and he notes the skepticism of some historians with this result. One can only conclude that the Brown-Hopkins RPI should *not* be used for the 16th and early 17th centuries, providing a suitable alternative is available.

Farmer claims superiority of his RPI series over that of Brown-Hopkins and describes his series in Farmer (1983, pp. 138-141, 1988, pp. 715, 772-775, 779-781; 1991, pp. 492, 495-496, 498-499). The claim of Farmer is accepted, and his series will be used in place of Brown-Hopkins where data permit. Until 1263, the observations of the Farmer series are too few and too scattered for usability. It is reasonable to consider the usable portion of the series as beginning in 1264, the earliest date of any other subnational RPI and the beginning date of the long-run earnings series.

The best RPI series for agricultural workers that has been produced to date is that of Clark, who describes construction of his series in Clark (2001, pp. 492-495, 503-504). Clark offers an innovative index-number form, and emulates Feinstein in careful selection of price indicators and weighting pattern. Also, as is Clark's earnings series, his RPI series is presented as national in scope, comprising the entirety of rural England. Therefore, subnational series beginning 1670 or later and pertaining to an area smaller than England may be disregarded, so are not included in the tables.

Table 6P lists RPI series specific to London, with one series (Botham-Hunt) for North Staffordshire. While the Botham-Hunt series is a good regional index, the region is very specific economically (see Botham and Hunt, 1987, p. 385), so may be eliminated from consideration. The same decision is made for Schumpeter-Gilboy (the authors' series are often considered together as closely related) and Tucker. The latter author is criticized by Schwarz (1985, p. 27) for failing to report individual-commodity weights and for using a major source that provides only quinquennial prices, requiring interpolation for the intervening years. Tucker's extension of his series to include rent via wage proxy is found wanting by Williamson (1985, p. 208) and Feinstein (1995, p. 33, n. 12). The Schumpeter series is unweighted, and the weight of cereals in the Gilboy series is criticized by Schwarz (1985, p. 27) as "suspiciously high for an urban population." In any event, all three series are superseded by later work.

Table 6P
Retail Price Index—Other Localities[a]

Study	Time Period	Time Base[b]	Weight Base[c]	Price Measure[d]	Excluded Items[e]
I. London					
Gilboy (1936, p. 137)[f]	1696-1816[g]	1700	1795-1797	contract	rent
Tucker (1936, pp. 78-80)[h]	1729-1935[i]	1900	unstated	contract, wholesale, retail, XUV	rent
Schumpeter (1938, pp. 34-35)[j]	1661-1697, 1696-1823[g]	1697, 1701	unweighted	contract	rent
Rappaport (1989, pp. 403-407)	1490-1609	1457-1471	unstated[k]	contract	clothing, rent
II. North Staffordshire					
Botham and Hunt (1977, p. 388)	1750-1792	1790	unstated[l]	contract, wholesale	clothing

[a]Series beginning prior to 1770.
[b]Period for which series is 100.

[c]Period from which weighting pattern for component indexes obtained.
[d]In order of importance
[e]Of items: food, alcohol, clothing, fuel and light, rent.
[f]Reprinted in Taylor (1975, p. 8), and Mitchell and Deane (1962, pp. 346-347).
[g]Harvest years. Harvest year September 29 (calendar year t) to September 28 (calendar year t + 1) assigned to calendar year t + 1.
[h]Reprinted in Taylor (1975, pp. 27-31).
[i]Treatment of harvest years unstated. Official series source for 1901-1935.
[j]Reprinted in Mitchell and Deane (1962, pp. 468-469) and Mitchell (1988, pp. 719-720).
[k]But stated as based on Brown and Hopkins (1956).
[l]But stated as based on Gilboy (1936).

The Rappaport RPI is clearly the best among urban series. Construction of the series is exposited in Rappaport (1989, pp. 123-128). His price data, emanating from the purchase records of livery companies, appear to be admired by Woodward (1995, p. 213) and Boulton (2000, pp. 457-458).

b. Selection of Component Series

For agricultural workers, the most-reliable RPI series is Clark (2001), which is taken for its maximum expanse to the beginning of Feinstein's component series, 1670-1770. Then the Farmer series are selected for as much of the remaining period as its observations permit: Farmer (1991) for 1351-1500, Farmer (1988) for 1264-1351. Unfortunately, no other specifically agricultural series exists to fill the gap 1500-1670. That includes the period (the 16th century) for which the Brown-Hopkins series is to be avoided. Rappaport, by happy coincidence the best of the urban series, is selected for its maximum expanse, 1500-1609, and Brown-Hopkins for 1609-1670.

For building workers, Rappaport (1989) is the best series, and so serves as the component for its full length, 1490-1609. For the remaining periods, 1264-1490 and 1609-1770, Brown-Hopkins (1956) dominate the alternatives and so is taken as component series.

C. Construction of Long-Run Series

The process of constructing the long-run retail-price series is similar to that of the earning series, but simpler; for there are no multiple series to be combined. First, a consistent long-run national series for 1770-2002 and separate agriculture and building series for 1264-1770 must be constructed. The respective component series for this purpose are listed and summarized in parts I-III of Table 7P.

Table 7P Components of Retail-Price-Index Series				
			Source	
Time Period	Location	Excluded Items	Publication	Table
I. National Series				
1987-2002	U.K.	_____	ET AS 2002, Oct. 2003	1P
1985-1987	”	_____	ET AS 2001	”
1975-1985	”	_____	ET AS 1988	”
1970-1975	”	_____	ET AS 1977	”
1969-1970	”	_____	AAS 1981	”
1962-1968	”	_____	HA Table 94	”
1956-1961[a]	”	_____	HA Table 93	”
1952-1955[b]	”	_____	HA Table 91	”
1948-1951[c]	”	_____	HA Table 90	”
1882-1948	”	_____	Feinstein (1995)	2P
1770-1882	Great Britain	_____	Feinstein (1998b)	”
II. For Agricultural Workers				
1670-1770	rural England	_____	Clark (2001)	5P
1609-1670	Southern England	rent	BH (1956)	”
1500-1609	London	rent, clothing	Rappaport (1989)	6P
1351-1500	Southern England	fuel and light, rent	Farmer (1991)	5P
1264-1351	”	”	Farmer (1988)	”
III. For Building Workers				
1609-1770	”	rent	BH (1956)	”
1490-1609	London	clothing, rent	Rappaport (1989)	6P
1264-1490	Southern England	rent	BH (1956)	5P

[a]And January 16, 1962.
[b]And January 17, 1956.
[c]And January 15, 1952.

Legend:
ET = *Economic Trends*
AS = Annual Supplement
AAS = *Annual Abstract of Statistics*
HA = *British Labour Statistics, Historical Abstract, 1886-1968*
BH = Brown and Hopkins

The linking process for each of the three series is summarized in *steps 1-3* of Table 8P, repeating the same procedure as for the earnings series. Consider two adjacent subperiods, a “later” and an “earlier” subperiod. All such subperiods have been constructed such that the earliest year (say, t) of the later subperiod is the latest year (again, t) of the earlier subperiod. Let (Y_t, Z_t) denote the value of the component series in

year t for the (later, earlier) subperiod. Begin with the latest subperiod: 1987-2002 for the national series, 1670-1770 for the agriculture series, and 1609-1770 for the building series. Multiply each year of the earlier (in this case, second-latest) subperiod (that is, from the earliest year to year t – 1) by the ratio Y_t/Z_t. Now the second-latest subperiod has been adjusted so that it is consistent in level with the latest subperiod. The adjusted second-latest subperiod is now the "later" subperiod and the third-latest subperiod is the earlier subperiod, and the process is repeated—and so on.

Table 8P
Construction of Retail-Price-Index Series, 1264-2002

Time Periods	Linking Year or Day	Encompassed Period
Step 1: Linking of Component Series to Obtain National Series		1770-2002
1985-1987 to 1987-2002	1987	
1975-1985 to 1985-1987	1985	
1962-1970 to 1970-1975	1970	
1956-1961 to 1962-1970	January 16, 1962	
1952-1955 to 1956-1961	January 17, 1956	
1948-1951 to 1952-1955	January 15, 1952	
1882-1948 to 1948-1951	1948	
1770-1882 to 1882-1948	1882	
Step 2: Linking of Component Series to Obtain Agriculture Series		1264-1770
1609-1670 to 1670-1770	1670	
1500-1609 to 1609-1670	1609	
1351-1500 to 1500-1609	1500	
1264-1351 to 1351-1500	1351	
Step 3: Linking of Component Series to Obtain Building Series		1264-1770
1490-1609 to 1609-1770	1609	
1264-1490 to 1490-1609	1490	
Step 4: Combining Agriculture and Building Series[a]		1264-1770
Step 5: Linking of Agriculture-Building Series to National Series		1264-2002
1264-1770 to 1770-2002	1770	
Step 6: Rebasing Series to 1913 = 100		1264-2002

[a]Weights (.9055, .0945) from Feinstein (1998b, Appendix 2), see text.

Second, the agriculture and building series must be combined to create a "synthetic" national series. It is reasonable to use the same weighting pattern as for the earning series: (.9055, .0945) for (agriculture, building), and the two RPI series are combined with these weights. This is shown as *step 4* in Table 8P.

Third, the synthetic (agriculture-building) national series is linked to the national series in *step 5*, with 1770 the linking year (t).

Fourth, as *step 6*, the long-run national series resulting from step 5, is rebased to 1913 = 100 by division by its 1913 value and multiplication by 100. The "retail price index" is now constructed for 1264-2002.

IV. Real-Earning Series

It is a simple matter to construct the "average real earnings" series for 1264-2002. Both "average nominal earnings" and the "retail price index" are on the same (1913 = 100) base. Therefore, dividing "average nominal earnings" by the "retail price index," and multiplying the result by 100 yields "average real earnings." Because "average nominal earnings" and the "retail price index" are consistent series, "average real earnings" has the same property.

Notes

1. Yet it must be admitted that were real earnings the *only* series of interest, direct construction of the series might be adopted. Ultimately, the decision regarding indirect or direct construction is a matter of judgment on which scholars can reasonably differ.

2. Also, monthly series as such are, of course, omitted from consideration—except to the extent that they are averaged to produce an annual series or that the series involves only one monthly observation per year.

3. Southern Ireland became independent as the Irish Free State (later the Republic of Ireland) on December 5, 1922.

4. See Taylor (1960, pp. 29-30), Mokyr and Ó Gráda (1988, pp. 209-210), and Feinstein (1998b, pp. 627-630).

5. A pioneering work with the household as the focus is Horrell and Humphries (1992).

6. See the references in Feinstein (1998b, p. 650, n. 72).

7. See, for example, Nef (1937, p. 170) and Schwarz (1992, pp. 161-166).

8. The relationship of unemployment to earnings depends in part on the nature of unemployment. Cyclical unemployment is associated with downward pressure on the earnings rate, whereas voluntary unemployment may reflect a preference for more leisure in the face of a rising earning rate. Dyer (1989, p. 224) views such voluntary unemployment as "plausible" for the later-medieval workers, who "set themselves goals in cash or consumption needs, and worked until they had achieved their aims."

9. *Current*-weighted is different from *current-year* weighted, the latter characteristic of a Paasche index and involving the current-year weights applied to *both* current and base year.

10. See Turnbull and King (1999, p. 44).

11. "They include an addition for the value of board and lodging or other payments in kind in agriculture, domestic service, the merchant navy, and the armed forces, but more minor perquisites and allowances are not included."—Feinstein (1998b, p. 633).

12. Clark (2001, p. 478) writes: "In earlier years and in the north of England many workers were employed on annual contracts as 'servants in husbandry' and received food, lodging, and clothing in addition to a money wage. Although references to the payments to such workers are frequently found in accounts, these payments have not been used in constructing the estimates because of the impossibility of valuing the in-kind compensation."

13. Although Rappaport (1989, p. 129) believes that a majority of the workers he classifies as "semi-skilled" were not mere laborers, it seems clear from the context that the 5d. per day applies to "semi-skilled" workers.

14. This point is emphasized by Feinstein (1995, pp. 22, 33-34, n. 17), who writes "it is the relative *quantities* purchased which are the effective weights, not the *shares* in overall expenditure."

15. Tucker (1936, p. 75) appears to have employed the same index number, though not given credit by Clark. The Tucker retail-price series is discussed in section B.2.a below.

16. See the references in Feinstein (1998b, p. 634, n. 31).

17. These problems are discussed in Ashton (1949, pp. 29-31), Deane and Cole (1967, p. 13), Burnett (1969, p. 12), Lindert and Williamson (1985, p. 147), Daunton (1995, p. 433), and Feinstein (1995, p. 101; 1998b, pp. 635-637).

18. Of course, scholars have recognized this problem—for example, Bowley (1937, p. 114), Allen (1948, p. 18), Burnett (1969, p. 13), and Feinstein (1995, p. 28).

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