The Condition of the Working-Class in England, 1209-2003[1]

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The paper estimates both the real wages of male building craftsmen and laborers in England for 1209-2003, and the wage premium associated with skills. These estimates have implications for our understanding of both the Malthusian era, and of the Industrial Revolution. They reveal, for example, that from 1200 until 1800 there was no trend increase in real wages, even though by 1800 English workers were probably the best paid in the world. There was a period of as long as 350 years with no evidence of TFP growth. But they also imply that modern economic growth, fuelled by productivity advance, probably began in the seventeenth century before the institutional reforms of the Glorious Revolution of 1688. Finally these estimates suggest that human capital interpretations of the Industrial Revolution, formalized by Becker et al. (1990), Galor and Weil (2000) and Lucas (2002), as presently constructed, conflict with the empirical record. Human capital accumulation in England began in an era when the market rewards to skill acquisition had fallen substantially from their medieval peak.

Introduction

Pre-industrial England has a uniquely well documented wage and price history. The stability of English institutions after 1066, and the early development of monetary exchange, allowed a large number of documents with wages and prices to survive in the records of churches, monasteries, colleges, craft guilds, charities, and local and national governments. This

[1] The author owes an enormous debt to the many transcribers and compilers of English wage data, some of whom are listed below in footnote 2. Without being able to use these printed sources as a shortcut to the wage data this paper would not have been possible. Thus of the 43,012 observations on wages underlying this paper only 4,303 were collected directly from manuscripts. The rest were collected from printed transcripts, or from calculated wage averages.

paper fashions a large collection of these records of wages and prices – 43,012 quotes of day wages, 85,000 quotes of the prices of 44 commodities, and 20,000 quotes of house rents - into an estimate of English building workers' real day wages from 1209 to 2003.[2]

Figure 1 shows the new estimate of the real day wage of building workers, averaging craftsmen and laborers, for a notional 10 hour day, for decades from 1200 to 2000. To allow for differences in hours the day has been assumed to be 10 hours before 1869, and thereafter hourly wages have been adjusted to represent a 10 hour day.[3] The picture shows clearly the long Malthusian interval before 1800 when on average real wages showed little or no secular increase. Real wages in 1200-49, for example, averaged 8% more than those in 1750-99 on the eve of the Industrial Revolution. Given the large and persistent swings up and down in wages before 1800 it is impossible to be confident that there was any secular trend in real wages before 1800. Thus an interesting implication of the Malthusian model of the pre-industrial era, that there should be no secular gain in wages all the way from the hunter gatherer era to the Industrial Revolution, is borne out. From 1800 to 2000 in contrast hourly real wages grew thirteen fold, at a rate of 1.3% per year.

Below I detail how the new series was constructed. Then I consider its implications for our understanding of the Industrial Revolution. The new series indicates a very different story about the Industrial Revolution than is conventionally told. The only other long run series for

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A particular debt is owed to John Munro for generously sharing his coded data from the Beveridge Archive on the medieval Winchester Estates.

[2] These documents have been the basis of many studies of pre-industrial wages and prices. Most notable are those of James E. Thorold Rogers, Elizabeth Gilboy, William Beveridge, , Henry Phelps-Brown and Sheila Hopkins, Peter Bowden, Bernard Eccleston, David Farmer, Donald Woodward, Steve Rappaport, Jeremy Boulton, and Charles Feinstein (Rogers (1866, 1888a, 1888b, 1902), Gilboy (1934), Beveridge (1936, 1939), Phelps Brown and Hopkins (1981), Bowden (1967, 1985), Eccleston (1976), Farmer (1988, 1991), Rappaport (1989), Woodward (1995), Boulton (1996, 2000), Feinstein (1998)).

[3] Evidence on the length of the day before 1869 is given below.

pre-industrial English wages, that of E. H. Phelps-Brown and Sheila Hopkins for building workers in southern England 1264-1954, has been widely used to measure long run living standards. Combined with conventional estimates of medieval population this series implied that there had been no growth in the total factor productivity of the English economy between 1260 and 1760, a period of 500 years, and that the Industrial Revolution of 1760 was a sudden break from a completely stagnant economy. Wages on the PBH series were at an extraordinarily high level, even compared to the 1860s, for many of the years before 1800. Real wages on their series in some of the decades after the onset of the Black Death in 1349 were not again equaled until the 1880s. Even in the years before the Black Death, when population levels were high, real wages were little below those of the 1840s, and were well above the level attained from 1600 to 1800. Friedrich Engels was seemingly correct when he claimed in 1844 that the pre-industrial worker was far better off than his successors of the factories of the 1840s, "So the workers vegetated throughout a passably comfortable existence, leading a righteous and peaceful life in all piety and probity; and their material position was far better than that of their successors" (Engels, 1892, p. 2).

In the Malthusian era we can roughly approximate the total factor productivity of the economy by comparing real wages to the level of population, as is done for the PBH series for carpenters in figure 2.[4] If there was a constant level of total factor productivity in pre-industrial England, then there will be an inverse relationship between wages and population, other things being equal (including trade possibilities and taxation). At a given level of population, the higher the productivity of the economy the higher will be the level of real wages. Figure 2, using the conventionally accepted figures for population in England before 1540, suggests complete

[4] Loose because the wage only indicates the marginal productivity of labor. So changes in the capital stock could also change wages.

stasis of aggregate productivity between 1280 and 1760, with some surprising declines in productivity in between. The seventeenth century advances in intellectual understanding of the natural world – Bacon, Newton, Hooke, Boyle and their ilk - apparently had little effect on the productivity of the economy before 1760.

The new series is very different from the PBH series, however. In particular real wages before 1600 are much lower, in some decades being almost 50% less than in PBH. Now by the 1850s real wages attain a level great than in any decade before in recorded English history. Figure 3 shows the two series for comparison for the decades before 1870.

The revised series also implies a very different image of economic growth in England before the Industrial Revolution. Figure 4 shows the new real wage series by decade from the 1260s to the 1860s versus a revised estimate of English population before 1540.[5] In the decades prior to 1600 there is a remarkably stable inverse relationship between wages and population. The curve in figure 4 shows the fitted relationship from regressing the logarithm of the real wage on the log of population for the decades of the 1280s to the 1590s. With the new data on wages the efficiency of the economy shows the first signs of significantly exceeding medieval levels in the 1640s, when real wages are 20% higher than would be implied by the population given the data before 1600. There was seemingly significant productivity growth in the economy between the 1630s and 1730s, and by the 1730s wages were 73% higher than would be predicted from the pre-1600 relationship. This growth was followed by a 50 pause in productivity growth before the resumption of apparent productivity growth in the 1770s.

[5] The revised population estimate is detailed in Clark (2004a).

Nominal Day Wages

The wage series of this paper covers a much wider geographic area than PBH, and employs much more data for each region covered. The PBH series is particularly weak for the eighteenth and nineteenth centuries. For 1700-1730 PBH used only wages in Oxford then switched to wages in Maidstone in Kent from 1730 to 1796. From 1796 to the 1890s they used wages in London, reduced by 20% to link these with those of Maidstone in 1796. The new national wage series is calculated as an average of five regional series: London, the south east, the south west, the midlands and the north.[6]

There is a major shift in how wages were quoted around the middle of the nineteenth century. Before 1860 most wages are quoted on the basis of a day of unspecified length, after then increasingly hourly wages were quoted. How long was the work day in the years before the 1860s? Between 1750 and 1869 labor was sometimes charged for by both the day and the hour. I can calculate the implied hours per day in these years by dividing the day wage by the hourly wage. Table 1 gives the implied hours per work day by decade using this method. Either taking just the raw average of the implied hours per day, or controlling for location, the results are the same. From the 1810s to the 1860s the implied work day is close to 10 hours. But from the 1750s to the 1810s the implied work day seemingly declines from 12 hours to 10. However, the evidence for the years before 1800 is limited to two or three observations from two or three towns. Thus I have chosen to assume just a standard 10 hour day for all day wage quotes for the years before 1869, without making any adjustment for potentially longer work days before 1810.

[6] London is defined as any location within 10 miles of the City of London. The national wage series was calculated as a weighted average of the regional series with the weights being 0.13 for London, 0.26 for the North, 0.20 for the Midlands, 0.19 for the South East and 0.22 for the South West, based on the relative populations of these regions in 1801, the earliest English census.

On this basis all the hourly quotes were converted into a notional 10 hour day, so that the length of the day is kept comparable throughout.

To get from the mass of observations of individual wages to a consistent wage series the annual day wages for craftsmen in the new series were calculated by estimating the coefficients of a regression of the following form:

$$\ln(W_{it}) = \alpha_i + \beta_1 MASTER + \beta_2 VOUCHER_{1800-69} + \sum_{j=1}^{29} \gamma_j CRAFT_J + \sum_{k=1}^{12} \eta_k JOINT_k + \sum_{l=1}^{4}\sum_{m=1}^{13} \theta_{lm} REGION_l PERIOD_m + \sum_t \phi_t D_t + \varepsilon_{ijt} \quad (1)$$

W_{it} is the average wage in location *i* of a worker in year *t*. α_i is a fixed wage premium for each location *i,* such as Chelmsford. *MASTER* is an indicator variable for a master craftsman. *VOUCHER* is an indicator variable for a wage not paid directly to the worker, but paid to a contractor for labor, in the years 1800 and later. The regression estimate suggests that such wages were inflated by about 7.5% on average in the years 1800-69 to cover the overhead costs of the contractors. $CRAFT_i$ is a set of 29 indicator variables for different crafts such as bricklayer and mason (the omitted category is carpenter). $JOINT_j$ is an indicator variable for a joint wage of a craftsman and a servant or assistant for the twelve periods 1200-1299, 1300-49, 1350-99,….., 1800-49 (there are no joint wage quotes after 1869). REGION is an indicator variable for each of the four "regions" (London being the omitted category), since London consistently shows a wage premium over the other regions. The relative levels of day wages changed across the other regions over time, but by modest amounts. PERIOD is an indicator variable for each of the periods 1200-1299, 1300-49, 1350-99,….., 1800-49, and 1900-14. D_t is an indicator for each of 671 years with a wage observation.

From 1209 to 1914 there are 28,165 observations of craftmens' wages, where the average wage of each craft at each location in each time period was treated as one observation. 2,423 of these observations were of the joint wage of a craftsman and a helper.

Wages for laborers and assistants were calculated in a similar way from fitting the parameters of a regression of the form,

$$\ln(W_{it}) = \alpha_i + \beta_1 VOUCHER_{1800-69} + \eta_1 JOINT_1 + \sum_{l=1}^{4}\sum_{m=1}^{13} \theta_{lm} REGION_l PERIOD_m + \sum_t \phi_t D_t + \varepsilon_{ijt} \quad (2)$$

The variable definitions are as for equation 1. I have assumed that laborers' wages did not vary between crafts. I also use the joint wages of craftsmen and laborers only for the years before 1350 where wage observations on helpers alone are scarcer. There are 8,215 observations available for this estimation, of which 572 were joint observations of the wage of a craftsman and a helper.

The earlier series for nominal day wages was extended from 1914 to 2003 using a variety of sources. From 1970 on I employed the New Earnings Survey. This reports hourly earnings for regular work hours in April of each year. From 1914 to 1974 various sources report hourly earnings of building workers fixed by collective bargaining agreements in various large towns in England: Bowley (1921), Bowley (1937), United Kingdom, Department of Employment and Productivity (1971), and the Department of Employment Gazette.

The Cost of Living

The cost of living index for 1209 to 1869 was formed as a geometric index of the prices of each component, with expenditure shares used as weights. It thus assumes constant shares of expenditure on each item as relative prices change. That is, if p_{it} is the price index for each commodity i in year t, and a_i is the expenditure share of commodity i, then the overall price level in each year, p_t is calculated as,

$$p_t = \prod_i p_{it}^{a_i}$$

The individual price series were derived as the estimated parameters on year indicators of regressions of the form

$$\ln(P_{it}) = \sum_k \beta_k DTYPE_k + \sum_t \phi_t D_t + \varepsilon_{ikt}$$

where DTYPE was a dummy variable for each type of a product, where a type was defined by location, purchaser, characteristics and measuring unit. In this I try and control for variations in the size of units across sources, and in the quality of the product. This is important because both the quality of the product and the size of the measures varied across sources, even for very homogenous commodities in the same place at the same time. In London in 1827, for example, the Clothworkers Guild paid 20 d. per gallon for milk, Bethlem insane asylum 13 d., and the King's Household 24 d, a range in price for a seemingly standard product of nearly 2:1.

The weights for expenditures are derived mainly from budget studies of manual workers expenditures collected in the years 1786-1854, as summarized by Sarah Horrell (Horrell (1996)). The Horrell average budget shares, together with earlier evidence for London manual workers

from Vanderlint (1734), are given in table 2. For the share of housing costs in expenditure I can supplement this evidence from even earlier for cases where I know the renter of a house is a building worker. In 22 cases before 1740 the average rental payment as a share of estimated annual income (assuming a 300 day work year) was 5.9%.

Since, as we shall see real living standards do not vary by more than about 2.5:1 over the years 1200-1869, I use the same set of weights for the major categories of expenditure throughout these years. I also, in the interests of economy of space, use the same cost of living index for craftsmen and laborers. The expenditure of the craftsmen would have more meat and dairy products, and more beer and tea, than the laborers, but the different movements in their costs of living did not appear big enough to justify the extra space that would be required to treat them separately. There are at maximum 44 sub-items in the cost of living index, including such exotica as stockings and pewter plates.

For bread and flour, the staple article that formed the largest single share of workers' expenditures, I use the price of wheat and other inputs in making bread rather than bread prices themselves for the years before 1818. The available bread prices before 1818 are those for London. But bread prices in London were regulated by statute before 1815, and over time the ratio of the assize price of bread in London to the cost of wheat changed markedly in a way that was surprising given the ratio of wheat costs in total bread costs. A breakdown of the costs of bread baked for the Navy in 1767 given by Beveridge suggests that the price of flour and bread should move closely in line with that of wheat, since wheat constituted 92% of the costs of making bread, and would be an even larger share of the costs of flour (Beveridge (1939), p. 542). Yet the ratio of the price of 4 lbs. of bread in London in pence to the price of a bushel of wheat in England in shillings falls from an average of 1.36 in 1670-1769 to 1.14 in the years 1770-1799,

but then bounces back up to 1.32 in the years 1820-69 when the assize was abolished.[7] This would not be possible if the bread was of constant quality. The quality of bread would vary according to what fraction of the wheat was incorporated in the flour. Thus it has seemed more prudent to use the price of wheat as a proxy for bread and flour before 1818, and include an increased allowance for salt, fuel, and services in the cost of living index to cover the manufacturing cost. The costs of barley meal and oatmeal were similarly proxied by the prices of barley and oats. Together these basic grains, and later potatoes, formed 27% of the cost of living index.

For beer a major improvement of this index over previous indexes is that I have been able to compile from churchwarden and other accounts a series of beer prices by the gallon back to the fifteenth century, as well as cider prices by the gallon from then back to 1209.

Meat prices by the pound can be found only after 1540. Before this meat was typically quoted by the live animal, the carcass, the quarter carcass, or such cuts as the leg, not by weight. Farm animals by the nineteenth century seem to have been much larger than those of the medieval period (Clark (1991)). So it seems unwise to proxy meat prices using whole animal prices before 1540. For the years before 1540 I approximate meat prices using the one animal product that was sold by the pound, suet or tallow, and also using the price of fish (which being caught in the wild can be assumed to be of uniform size over time).

"Sugar" is calculated based on the price of sugar alone in later years, but earlier on the prices of both sugar and honey. As can be seen in table 3 "sugar" is extremely expensive in the early years relative to other goods. For fuel I use the price of faggots (bundles of sticks), turf, charcoal and coal, increasing the relative weight of coal over time.[8] For light I use a mixture of

[7] Webb and Webb (1904).

gas light prices and candle prices for the years after 1815, and tallow candles alone before then. Gas light prices are measured by the average cost of a cubic foot of gas. The inclusion of gas light which fell rapidly in price from the 1810s to the 1860s makes light prices relatively much higher in earlier years than on the PBH cost of living series.

A major innovation in the cost of living series in this paper is the inclusion of housing rental costs, which I estimate constituted 8% of the expenditure of workers. Rents controlling for housing quality are estimated for 1290-1869 using the methods discussed in Clark (2002). For the years before 1500 there is only one major source of housing rents, a detailed study of medieval Winchester by Derek Keane (Keane (1985)). After this the range of sources is greater. For London I have properties leased by such London Guild Companies as the Armorers and Braziers, Carpenters, Clothworkers, and Grocers which give rents back to the 1560s. Outside London I have rents on a substantial set of leases for houses owned by the Almshouse in Saffron Waldon, Essex before 1700. For the sixteenth century churches sometimes had property for their support that they rented, where the rents are recorded in printed churchwardens accounts. This provided some rent information for towns and villages such as Ashburton, Betresden, Cambridge, Tewkesbury and York. To calculate the whole cost of lodging I combine the estimates of house rents with an estimate of the cost of pewter plates and vessels, and of wooden plates 1540-1650.

The cost of living series used in this paper also has much improved estimates of clothing and bedding costs. These are estimated to constitute about 12% of total expenditure. Much new data for the years 1560-1869 was collected from the records of clothing charities administered by London Guilds or parishes. The Clothworkers' Company in particular supplied a wealth of information on linen, cloth, stocking and shoe prices over these years. For the later years the

clothing provided to the inhabitants of Wyatt's Almshouse administered by the Carpenters' Company gave a continuous series of prices.

Services, such as schooling, doctors, and barbers, and labor in baking bread constitute 2.5% of expenditures. Their cost is approximated by the average wage of building workers.

The decadal price levels for the major commodity groups used to form the cost of living index are given in table 3. For the years 1870-1995 I used the cost of living index of Feinstein (1995). Thereafter I employed the retail price index of British National Statistics.

One thing that makes the price index before 1869 much more reliable than previous indices is the greater range of commodities included, and the consequently much smaller weight of any individual commodity. Any one series may contain errors, but with 44 different prices at its maximum the law of large numbers begins to operate in reducing the effects of these errors. Thus in the new price index, after wheat (18.5%) the commodities with the next largest weights are housing (6.5%) and beer (6%). In contrast PBH use at their maximum only 20 goods, and give in some periods a weight of 25% to sheep alone, and 22.5% to malt alone. Errors in individual series can have a huge effect on the cost of living index as a whole.

Table 4 shows the estimated day wage for skilled and unskilled building workers, the cost of living, and real wage of skilled and unskilled workers by decade from 1200-9 to 1990-9. For real wages and the cost of living 1860-9 is set to 100. Several features lend plausibility to the new real wage series, compared to PBH. The lowest level of real wages in the new series occurs in the 1310s, the decade that witnessed the last major famine in England in the years 1316-7. On the old series real wages from 1590-9 to 1660-9 and in 1800-9 fell below the decade of the 1310s, yet without any sign in either of these periods of hunger-related deaths. For an economy without much external trade the level of urbanization is usually a good indictor of the level of

income per capita. Higher income consumers spend proportionately more on manufactured items produced in urban areas. De Vries suggests that about 13% of the population in England lived in towns of more than 10,000 people in 1700, while the comparable proportion in 1300 would have been 3% or less.[9] Yet on the PBH series real wages are the same in both periods. In appendix 1 I detail why the new real wage series differs so much from PBH. The differences stem mainly from two aspects of the cost of living index constructed here: the use of constant expenditure shares in all the years through geometric weightings as opposed to the Laspeyres index used by PBH, and differences between the improved price series and the PBH series, especially for just one category, "drink."

Real Wages and the Causes of the Industrial Revolution

What do these wage series imply about the Industrial Revolution? We see already in figure 4 one surprising fact. When we compare wages to population the first distinct signs of the escape from the Malthusian stagnation in England, which lasted all the way from the 1200s to the 1630s appears in the 1650s. Yet this was an era of considerable political uncertainty. It began as the Civil War continued and ended with the death of the dictator Cromwell and the political uncertainty which led to the restoration of the traditional monarchy after the collapse of the Puritan regime. From 1200 to 1600 there is no evidence of any total factor productivity advance in the economy. Population swings alone determined real wages. Yet, as is illustrated in figure 5, for the first time in the years 1630 to 1690 there was a near 50% gain in real wages despite modest population gains.[10] This is the first sustained period of growth in measured TFP

[9] de Vries (1984), pp. 39-43

[10] This wage gain does not seem to be the result just of the redistribution of incomes. Real land rents rose in these years, the tax burden was largely unchanged, and while returns on capital fell, they fell so modestly that they could not explain these wage gains. See Clark (1998, 2002b).

in recorded English history. The first period of apparent TFP growth was followed by a long pause in the eighteenth century before the onset of more rapid TFP growth with the Industrial Revolution, which is also illustrated in figure 5 through the flatness of real wages in the years 1690-1760.

For the many economists who see institutions as the explanation for the lack of TFP growth before 1800 the first appearance of modern growth in the years 1630-1690, and its disappearance for a hundred years thereafter is an uncomfortable revelation. The Glorious Revolution of 1688-9 established a highly stable democracy in England, an institutional regime largely unchanged to the present day. Economists such as Douglass North and Barry Weingast have asserted that the reforms of 1688-9 were the pre-condition of modern growth. They gave security to investors and innovators in a way that previous rule by despotic monarchs, unable to control their predatory urges, could never ensure (North and Weingast (1989), see also Jones (2001) who argues that the increased appropriability of knowledge was key to the Industrial Revolution). Their characterization of the ills of the old regime would seemingly suggest that immediately after 1689 we would see signs of improvement. Increased security should have raised the value of private assets such as land or houses, and reduced the rate of return on capital. Greater investment and capital accumulation should have driven up real wages. Instead it is impossible to trace any effect of the Glorious Revolution on capital markets, or now on labor markets either (see Clark (1991)). The old regime was at least as capable of fostering economic growth as the new.

Another class of recent theories of the Industrial Revolution have focused on the acquisition of human capital and the growth externalities this creates (Becker et al. (1990), Galor and Weil (1996, 2000), Lucas (2002)). The vision has been of a pre-industrial equilibrium where

both incomes and the private returns to skills were low. This induced parents to prefer to produce as many as children as possible, but invest little in the human capital of their offspring. Short term gains in income in this pre-industrial equilibrium resulted only in population growth, which pushed income back to the subsistence level. The Industrial Revolution represented a break from the Malthusian Equilibrium associated with families switching their behavior towards fewer births but greater investment in each child. The cause of this break differs with the specific theory, but there are really only two things that can signal families to change their childbearing and child rearing behavior towards modern norms. The first is a higher level of real incomes, for husbands, wives or both, which determines the value of the opportunity cost of the parents' time. The second is a higher implied private return to human capital, which determines the returns to investing in human capital.

England in the period before the Industrial Revolution certainly witnessed signs of a greatly increased stock of human capital. Figure 6 shows estimates of the proportion of men and women who had at least basic literacy by decade in England. This proportion rose substantially in the years before the Industrial Revolution. Literacy was also associated strongly with occupation and with wealth in the pre-industrial period. Table 5 shows the fraction of will writers in the early seventeenth century the fraction seemingly illiterate (because they signed the will with an "X"), and the average value of the bequests by occupation. Those in skilled occupations were more literate than those in unskilled occupations, and had more assets at time of death.

But why did literacy increase in England in the years preceding the Industrial Revolution? The real wage series illustrated in figure 3 shows that the gains in human capital evident in England in the seventeenth century were occurring in an environment where real

wages in the early part of that century were in fact low for the Malthusian era. Real wages in the fifteenth century were about 60% higher than in the seventeenth century, because of the very small population of the earlier years. Nor is there any sign in this era of a rise in women's wages relative to those of men.

The wage premium for skills similarly does not point to the seventeenth century as a period when skill acquisition was being better rewarded in the marketplace. Skilled building workers typically acquired those skills by apprenticing themselves to a craftsman, with the traditional apprenticeship lasting up to seven years. Parents in at least some cases had to pay to secure apprenticeships for their children.

Figure 7 shows the earnings of a craftsman relative to that of an unskilled worker by decade from the 1220s on. The premium is calculated in two ways. The first is by calculating by decade the relative wage of craftsmen relative to laborers from table 4. The second is by using only those observations where we have a matched pair for the same place and year of wages for craftsmen and laborers, and running a regression of the form

$$\ln\left(\frac{W_{craft}}{W_{lab}}\right)_{it} = \alpha_i + \sum_k \beta_k IDCRAFT_k + \sum_t \phi_t DEC_t + \varepsilon_{ijt}, \qquad (3)$$

where *i* indexes places, and *t* the year. IDCRAFT is as before an indicator for the craft of the skilled worker, and DEC an indicator for the decade. The results of this estimation, shown in table 1 are broadly similar, though with some disparity for the earlier year when the premium was very large. The reason may be that this second estimator weights more heavily those locations with many observations than the first estimator. In the early years this weights rural locations much more heavily than urban ones such as London. The skill premium seems to have been higher in the countryside in these early years. Thus we get premiums of

Urban Rural

1200-1349	1.91	2.14
1700-1869	1.55	1.59.

The differences between the skill premiums derived from these two estimators reveal that we cannot be sure, even with all this data, about whether modest changes in the skill premium across decades of 10% or less are true changes or just sampling error.

As figure 7 reveals the strong trend in England has been a declining premium for skills. The premium was at a peak of 100% or more around 1300, before declining to only about 50% by 1400. It maintained this level, with perhaps a modest revision upwards, till about 1900. Then in the twentieth century there was another profound decline in the market reward for skills in the building industry, to a level of less than 25% by the 1950s.

These market wage rates would be misleading about the incentives to invest in training would be if the high skill premiums in the early years was caused by restriction of access to skilled crafts through guild limitations on apprenticeships. In major urban centers such as London from at least medieval times crafts were organized through guilds, which required apprenticeships for access to the skilled trades. If the crafts could successfully limit this access then they could drive up the relative wage of the skilled workers. This would result in the premium existing craftsmen were able to demand for apprenticeships rising, so that higher skill premiums in this case would indicate no greater incentive to pursue training for children.

But all the indications are that guild control of entry to skilled crafts in centers like London was weaker in the years before 1350 when skill premiums were high than in subsequent years when premiums were low. One way to limit entry to the skilled crafts was to increase the required apprenticeship term. In the years 1309-12 in London the modal term of registered guild apprenticeships was 7 years: 82% served an apprenticeship of 8 years or less (with the modal

apprentice beginning the apprenticeship at age 14). By the early fifteenth century, when the premium for skills in the London building trades had fallen markedly, apprenticeships had lengthened: only 41% of registered apprenticeships were for 8 years or less (Hanawalt (1993), p. 135).

Guild regulation of crafts was much stronger in cities than in the countryside. Yet as we saw above the premium in early years was greater in the largely unregulated country and small town locations. And the decline in the premium over time was just as profound there. Thus the secular decline in skill premiums must reflect underlying trends in the demand for and supply of skills in the building industry.

Another possible explanation for rising literacy in the years 1600 to 1900 would be the increasing urbanization of English society associated with industrialization. Estimates of the urban share of the population before 1800 are tentative, but most imply it was very small before 1700. Between 1600 and 1800 the urban share of the population probably increased from about 15% to 35%.[11] Since there are different occupational demands for literacy, and urban areas benefit from economies of scale in providing schooling, it is possible that the spread of education in pre-industrial was at least partially driven by urbanization and industrialization. However, evidence from the sample of male will writers presented in table 5 suggests that these effects at best explain little of the increase in male literacy between 1600 and 1800. Male testators in towns in 1620-36 had 68% chance of being literate, compared to 45% for those dying in the countryside. But if we re-weight the sample to conform more to the likely occupational distribution of the country as a whole the difference was only about 15%. With one fifth more

[11] For example, of the sample of will makers in Suffolk 1620-36 described in table 5, only about 10% were resident in towns at the time of their death. Adding in London the overall implied urban total for England would be more like 15%. By the time of the 1801 census, if we measure

people in urban areas in 1800 than in 1600 this would then explain a 3% greater male literacy rate. Figure 6 suggests that at least 20% more of the population of males was literate in 1800 compared to 1600 (with an even greater increase for women). Rural literacy rates in 1800 must have been much higher in 1800 than in 1600.

Comparing figures 6 and 7 we see that the skill premium globally moved in inverse relationship to the average stock of human capital. There was a fundamental shift in the amounts of education parents supplied children, even in rural areas, beginning long before the Industrial Revolution, without any significant improvement in the returns to skill. Further as Clark (2005) shows this increased investment in skills occurred long before there was any decline in fertility, and indeed in an era where fertility was increasing from 1650 up until about 1820. It thus seems probable that explaining rising human capital accumulation in pre-industrial England will require models which posit changes in household preferences, as do Galor and Moav (2002) .

Standards of Living in the Industrial Revolution

There has been a long standing controversy about whether and when labor gained from the Industrial Revolution in England.[12] Figure 8 shows real building workers wages by year from 1760 to 1869 as calculated here, but also in contrast the recent pessimistic real wage series for British workers as a whole of Charles Feinstein (Feinstein (1998)). The series here is much more optimistic than that of Feinstein. While Feinstein shows real wage gains from the 1770s to the 1860s of only 47%, here the wage gains are nearly double this at 75%. The reason for my

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urban areas as parishes or townships with a population density of more than 1 person per acre, 34% of England was urban.

much greater optimism is almost entirely that my estimated cost of living rises much less than Feinstein's. The nominal wages of the building workers here rise only by 4% more than wages in general are estimated to rise by Feinstein. Appendix 1 also discusses why the cost of living index here is preferable to Feinstein's.

The real wage series in figure 8 does suggest, however, that Feinstein is if anything too optimistic about the early Industrial Revolution. It was not till the 1820s that real wages advanced beyond their level in the 1760s at the beginning of the Industrial Revolution era. Before then real wages actually declined somewhat from their level of the 1760s. When Malthus published his famous "Essay on a Principle of Population" in 1798 it was in a setting where real wages had been flat or declining for several generations, ever since the beginning of the eighteenth century. At the time Malthus was writing the dramatic technical innovations which transformed cotton spinning - the Spinning Jenny and Water Frame in 1769, and the Mule in 1776 – were almost a generation old. But the rapid population growth in England from 1760 on exerted downward pressure on real wages. There was still no sign that the economy could generate enough productivity growth to allow real wage increases. Ricardo's adoption and elaboration of the subsistence wage doctrine in the "Principles of Political Economy and Taxation" published in 1817 was also entirely reasonable at the time of its formulation, given the path of real wages to that point. Only in the 1820s did real wages begin showing robust growth. Between then and the 1860s real wages grew at 1% per year on average. Real wages by then exceeded their level in any decade since the observations begin in the 1200s. At the time of the publication of the "Communist Manifesto" in London in 1848 which asserted that for the new industrial proletariat wages were determined by "the means of subsistence that he requires for

[12] This debate seems endless. Recent arguments for optimism are found in Lindert and Williamson (1985), and Clark (2002). Feinstein (1998) and Allen (2001) are much more

maintenance, and for the propagation of his race" wages had begun to exceed the highest level they attained in any previous decade. By 1867 when Marx published the first volume of "Capital" his subsistence doctrine of wages was increasingly remote from English reality.

The validity of this optimistic figure for England is confirmed in figure 9, which shows the movement of the real wages of Irish building workers in the Industrial Revolution era in comparison with those in England, where both series have been set to 100 in the 1860s. Irish real wages were always considerably below those in England, but as the figure shows they were rising almost as rapidly as those in England between the 1780s and the 1860s. In the Industrial Revolution era Ireland largely de-industrialized in response to the industrialization of Britain, losing much of its textile industry, and specializing increasingly in the production of foodstuffs for the urban population of England. Ireland also suffered in the years 1846 to 1850 from the devastating Potato Famine, which resulted in the deaths of perhaps as many as 12% of the population. If the real wages of Irish workers were showing such gains, in part from the declining prices of cloth, candles, fuel, sugar, tea, and salt, then it would be bizarre indeed that the workers at the heart of the Industrial Revolution saw less improvement. But this data does suggest that it would be unwise to assume that English workers gained any more from the Industrial Revolution than those in the Netherlands, France or Ireland. The competitive nature of Industrial Revolution industries, and the rapid transition of England towards exporting manufactures in return for foodstuffs and raw materials, meant that perhaps half of all the TFP gains of the Industrial Revolution showed up as falling prices to consumers in England's trading partners, such as Ireland.

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pessimistic.

Conclusion

The real wage series developed above provide interesting insights into the English economy in the Malthusian and Industrial Revolution eras. The Malthusian implication that real wages should be trendless before the Industrial Revolution is confirmed. We also find extremely long periods where there was apparently no productivity growth in the economy. If we compare real wages with population we see from the 1280s to the 1600s a period of 350 years without any signs of TFP growth. But the Industrial Revolution of the 1760s and later is preceded by a period of modest economic growth starting in the 1600s. Thus the Industrial Revolution is not an abrupt break around 1800 from a stagnant economy, but an acceleration of a process of modern growth that began about 150 years earlier.

We also see in the premium paid for skills that while increased investment in human capital may lie at the heart of the Industrial Revolution, the causes of this increased investment, evident in England as early as 1600 are mysterious. The market signal to parents, in the form of the level of real wages, the relative wages of men and women, or and the market premium for skills, does not explain the increased investment in human skills evident after 1600.

Appendix 1: Why the New Series is Different from Phelps-Brown and Hopkins

Since the new real wages deviate so significantly from the well known Phelps Brown and Hopkins series before 1600, this appendix explains the major causes of the differences, and why the new series is much preferable. Figure 10 shows the nominal wage estimated by PBH relative to this paper for craftsmen and for their helpers. Though in individual decades the wage

estimates deviate by as much as 32%, there is little pattern to these deviations. They do not explain the much higher real wages systematically found by PBH in the years before 1600.

The real cause of the dramatic divergence of real wages between the series lies in the cost of living indices. The lowest curve in figure 11 shows the PBH cost of living index relative to the index employed here by decade. For the years before the 1520s PBH estimated the cost of living as typically only 60-70% of the level estimated here, a remarkable deviation.

Little of this divergence actually stems from the much more extensive set of prices employed here. Instead the divergence has two main sources. The first is that PBH employ a Laspeyres index, with fixed quantity weights derived from their base period of 1451-75. The Laspeyres index overestimates costs of living compared to the base period when relative prices change because then, contrary to the assumptions of the index, people consume more of the cheaper goods. The fixed quantity weighting means that over time goods with unusually rapid price increases become an ever larger implied share of expenditures. Between 1451-75 and the 1860s PBH do indeed find dramatic differences in relative prices, as table 6 shows. Their index of drink prices, for example, increased by more than 17 times, while textiles prices increased less than 2 times. While in the base period PBH give an already robust 22.5% weight to drink, by the 1860s they implicitly assume drink is 32% of the cost of living for workers! And while in the base period textiles are given a very reasonable 12.5% weight in expenditures, by the 1860s they are a mere 3% of expenditures. As table 2 shows the actual expenditure weights in these years were closer to 8% for drink, and 12% for textiles.

Figure 11 also shows the level of the PBH index relative to the index in this paper if instead of the Laspeyres assumption we employ fixed expenditure shares for the sub-series in PBH over time, by employing the geometric index used in this paper. This change alone

increases the cost of living on the PBH index for the years before 1500, relative to the 1860s, by 11% on average. But this is only a partial correction of the problems created by the Laspeyres nature of their index. For each of the six sub-series that PBH combine into their overall index were themselves created as Laspeyres indices of the individual items. And even within categories such as "drink" relative prices changed significantly over time.

The second source of the divergence is the price series that PBH employ for their index. The top curve in figure 11 illustrates the relative level of the cost of living indices if I replace all the PBH price series with the ones used in this paper, using the PBH expenditure shares but with constant expenditure weights throughout. Now there is little difference between the level of the series through most of the decades. By having much more data than Phelps Brown, including a mass of unpublished material from the Beveridge archives, I am able to achieve much greater overlap in the series used to form the price index for each good. For a number of important series, meat and dairy products, for example, PBH have complete breaks in their sources and have to make ad hoc assumptions to create the linkages.

The most important difference in prices occurs in the "drink" series. As noted, even using constant expenditure weights, drink is 22.5% of expenditure in PBH. Drink represents beer exclusively before 1689, and after 1801 beer and tea and sugar. PBH, however, do not observe beer prices directly, but infer them through the prices of malt and hops, two major costs in beer production. Despite the rise of large scale brewing in the late eighteenth century, and the introduction of tea and sugar as an alternative to beer, PBH find that these inferred drink prices rise more rapidly than any other prices in their index. I calculate an alternative drink index using actual prices of beer, and using tea prices earlier than PBH introduce them in 1801, since tea is already important in working class budgets before 1800 as is shown in table 2. This drink price

index instead of increasing 18 fold between 1451-75 and the 1860s, increases by 7.5 times. Figure 11 also shows the relative level of the PBH to the Clark index if we both employ fixed weights and use these improved drink prices. This alone removes a substantial part of the difference between the two series.

The drink series is not the only one in PBH which is potentially problematic. PBH estimate medieval meat prices using the price of whole pigs from 1264 to 1460 and whole sheep from 1265 to 1582, linked somehow in a way that is not explained with series on prices of beef and pork by the pound which start respectively in 1584 and 1602. How a proper linkage was achieved in series that do not overlap is unclear. Also there is evidence that sheep at least were much smaller in the medieval period than they were in later years, and this will cause early meat prices to seem very low (Clark (1991)). Certainly after 1540 the prices of live animals moved differently from that of meat sold by the pound. The PBH meat prices increase much more rapidly than the ones I derive. Thus in 1300-49 their meat prices were only 70% of mine.

The new cost of living series improves on PBH in three main ways. The geometric weighting accords much better with evidence of relatively constant expenditure shares even when prices change by substantial amounts. The individual series are constructed from much more data in a more systematic manner. And the much larger numbers of individual price series (a maximum of 44 versus a maximum of 20 in PBH) allows the law of large numbers to average out the errors inherent in any particular series much more effectively.

The new cost of living series also differs from the more recent one of Charles Feinstein for the years 1770-1869. The reasons for this are explored in detail in Clark (2001). The single most important one is that Feinstein, as with PBH, uses a Laspeyres (base weighted) index which by construction overestimates price increases from the base period. Others include Feinstein's

use of London bread prices which were regulated in the early years of the Industrial Revolution but not later, so again inflating apparent price increases. Further Feinstein does not include some products such as salt, pepper, raisins and gas lighting which were falling rapidly in price from 1815 on.

Appendix 2: Sources on Nominal Wages

The 43,000 wage quotes were drawn from a variety of sources, either directly from the original manuscripts, or when possible from transcripts of manuscripts or summaries of their contents. The variety of sources used included manorial account rolls, monasteries, records of Oxford and Cambridge colleges, charitable foundations, churchwardens' accounts, town government records, London guild corporation records, payments by county governments for the maintenance of goals, courts and bridges, and private accounts.

Major Secondary Sources

Rogers (1866, 1888a, 1888b, 1902), gives wages from Oxford and Cambridge colleges from 1300 to 1792, and wages on their manorial estates for the earlier years. All Roger's wage material was used except where a more recent source duplicated it. Gilboy (1934) gives wages approved by Quarter Sessions for repairs to county facilities in the years 1700 to 1800 in a variety of counties. Eccleston (1976) gives wages paid on estates for building workers for five Midland counties for the years 1750-1835. Rappaport (1989) and Boulton (1996, 2000) summarize wages to building workers paid by the London Livery Companies from 1490 to 1700. Woodward (1995) reports annual wage rates for major northern towns for building workers from 1450 to 1750 derived from Town Chamberlains' accounts and vouchers supplemented by

Churchwardens' records. These sources I have supplemented with a set of 26 printed transcriptions of churchwarden's and chamberlains' accounts from around the country, detailed below, mainly for the sixteenth century.

Archival Sources

Beveridge Papers, Robbins Library

The Beveridge Wage and Price History extracted wage materials from a whole variety of archival sources. First there were medieval manorial records: eight Winchester manors, Hinderclay and Redgrave in Suffolk, Westminster Abbey manors, and some Battle Abbey material. Then there were the records of religious and charitable institutions: Westminster Abbey and College, Winchester College, St Bartholomew's Hospital in Sandwich, Kent, Eton College, Greenwich Hospital. Also town corporation accounts were utilized in the cases of Bath, Exeter, Canterbury, and Nottingham. Finally Beveridge extracted central government records from the Office of Royal Works.

Bristol Record Office: Bristol Town Chamberlain's Vouchers, 1750-1855.

Cheshire Record Office: Town Chamberlain's Vouchers, 1766-1836. TAV/3/51-83.

Cumbria Record Office: Carlisle Town Chamberlain's Vouchers, 1748-1834. CA/4/11, Cumberland Quarter Session Vouchers, 1851-4. CQF/5/117.

Dorset Record Office: Lardner MSS. 1702-1749. PE/WCH/MI/7.

Devon Record Office: Exeter Chamberlain's Vouchers. 1760-1855.

Essex Record Office: Quarter Session Vouchers, 1759-1869. Q/FAc/5/1, Q/FAc/6/2/1-59.

Hull City Record Office: Chamberlain's Vouchers, 1750-1798, 1828, 1833. BFR/6/--. Charterhouse Charity, 1850-1, 1860-1. WT/6/--.

Leicester Record Office: Quarter Session Vouchers, 1778-1869. QS/112/1-426.

Stafford Record Office: --------- MS, 1808-1867. D 240/E/F/4/1-27.

Surrey Record Office: Quarter Session Vouchers, 1750-1851, QS2/6. Guildford Borough Vouchers. BR/OC/6/9/1-60.

Appendix 3: Sources on the Cost of Living

Price quotes were located in the same way as the wage data, either directly from the original manuscripts, or when possible from transcripts of manuscripts or summaries of their contents.

Secondary Sources

Rogers (1866, 1888a, 1888b, 1902), gives prices from Oxford and Cambridge colleges from 1300 to 1792, and prices on their manorial estates for the earlier years. All Roger's price material was used except where a more recent source duplicated it. Beveridge (1939) gives a great variety of carefully constructed price series for the years 1500 to 1830 drawn from Westminster Abbey, Winchester College, Saint Bartholomew's Hospital in Sandwich, Kent, Eton College, Chelsea Hospital, and Greenwich Hospital. The Board of Trade (1902) gives prices for the nineteenth century drawn from a variety of institutions such as Bethlem Hospital and Greenwich Hospital. Information for the years 1750 to 1869 is also drawn from Afton and Turner (2000), John (1989), and Gayer, Rostow and Schwartz (1953). For earlier years I get London food prices from Ainsworth (1939), Marsh (1913), Boulton (1996, 2000), and Rappaport (1989).

Archival Sources:

Beveridge Papers, Robbins Library

The Beveridge Wage and Price History again extracted price materials from a whole variety of archival sources for the earlier years which were not published in Beveridge (1939): prices from eight Winchester manors, Hinderclay and Redgrave in Suffolk, the estates of Battle Abbey, Canterbury Cathedral Priory, Croyland Abbey, Durham Priory, Norwich Cathedral Priory, and Westminster Abbey,. Examples for the later years include wheat prices from Hull 1708-1798 (Box I14), Norwich, 1552-1601 (Box G4), York 1584-1763 (Box I15), and barley and oats prices, Hull 1708-1791 (Box I14).

Clothworkers' Hall Warden's Accounts 1580-1869. Records of purchases of clothing, shoes, and of the rental of company owned housing. Court Minutes, 1580-1690. Lease Books 1770-1800. Records of house leases.

Essex Record Office Saffron Walden almshouse leases.

Guildhall Library Brewers' Company. Pratt's Almshouse, Aldenham, Hertfordshire. Dame Alice Owen's Almshouse, Islington. 1600-1869. 5491/1-3. 5492. 5478/1-3. 5473/1-5. Clothing, firewood, coals. Carpenters' Company, Warden's Accounts, 1680-1869. Clothing.

UK Data Archive Southall, H. R. and Gilbert, D. R., Great Britain Historical Database: Economic Distress and Labour Markets Data: Wages Statistics, 1845-13 [computer file]. Colchester, Essex: UK Data Archive [distributor], August 2004. SN: 4564.

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Figure 1: Real Builders Day Wages from 1200 to 2000

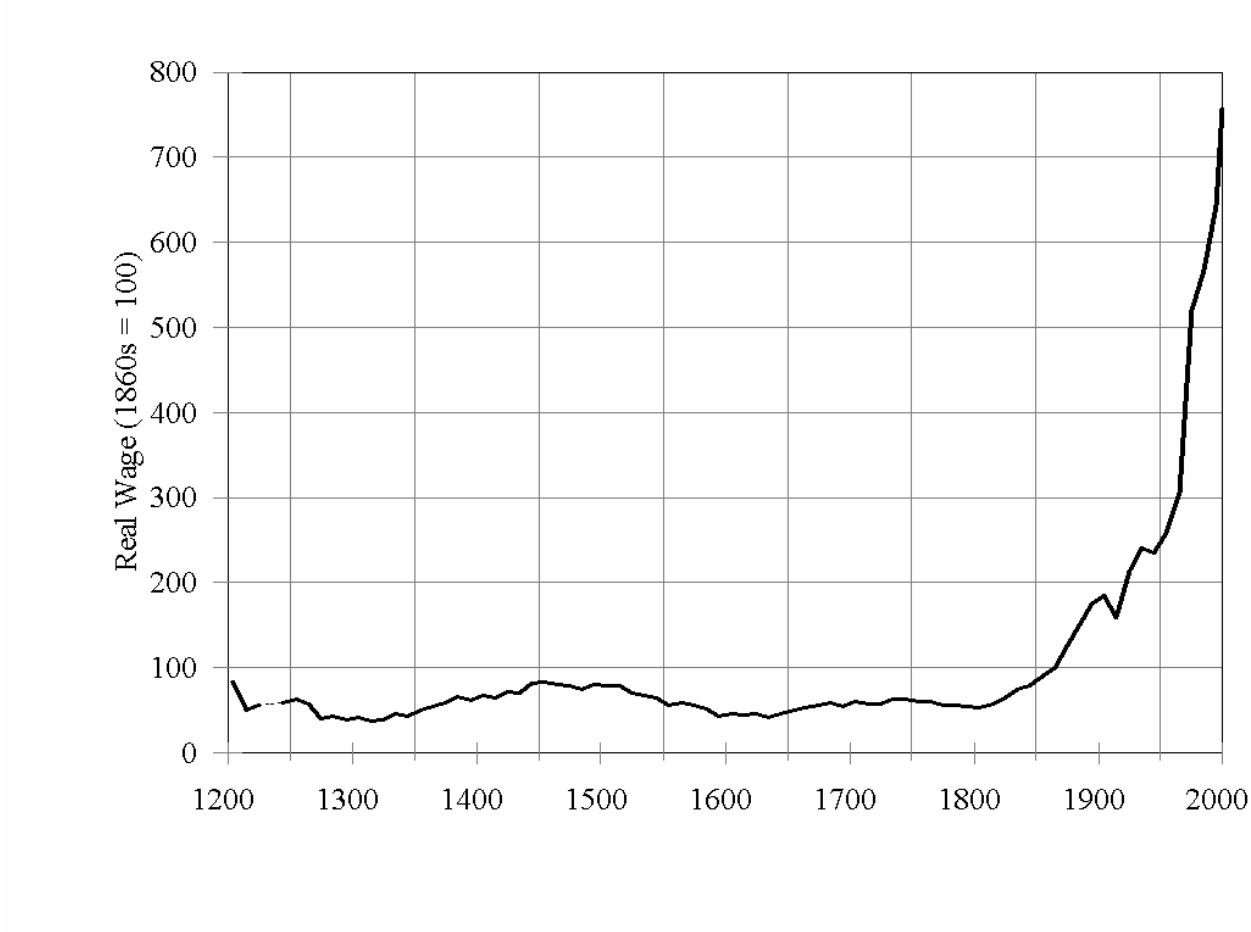
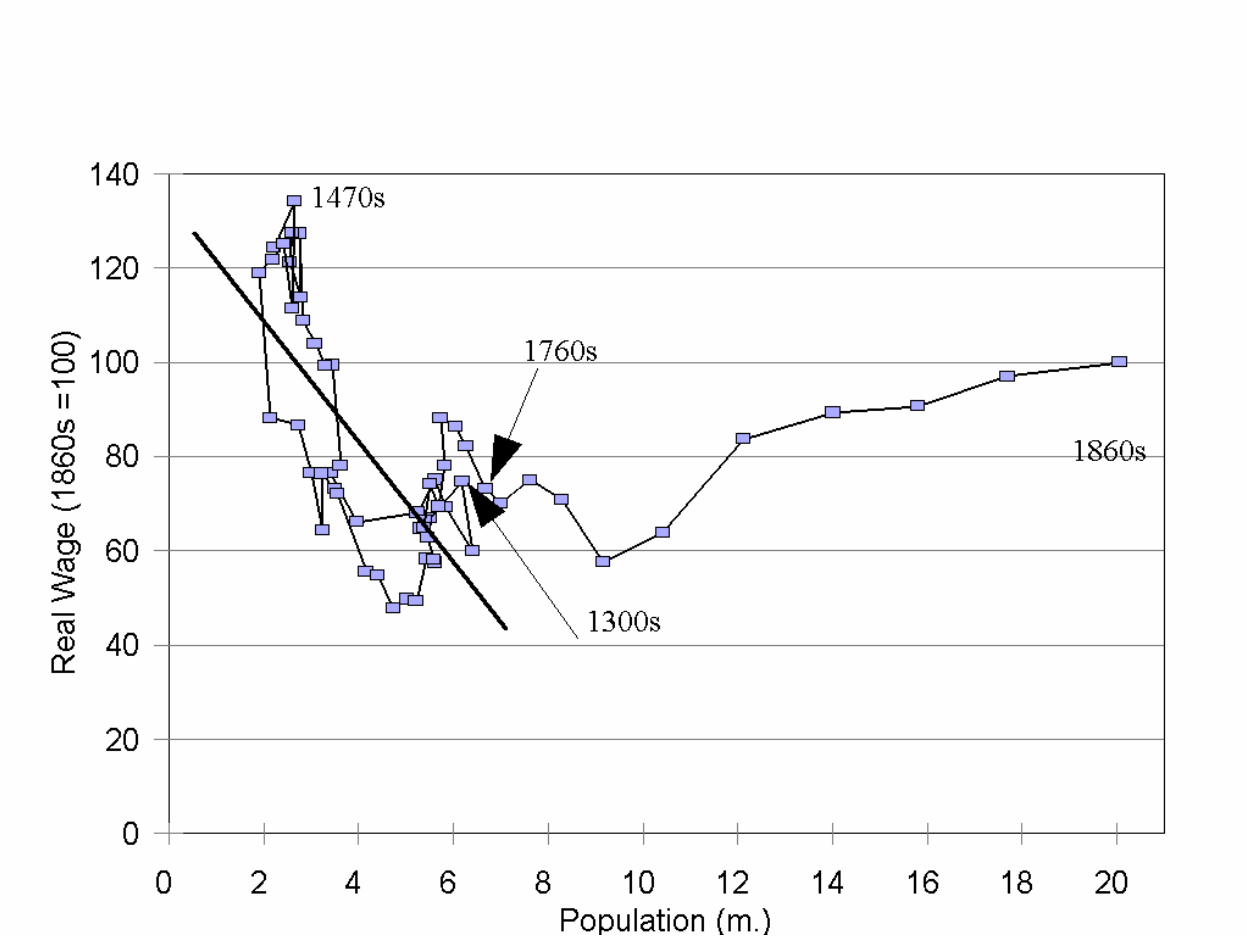


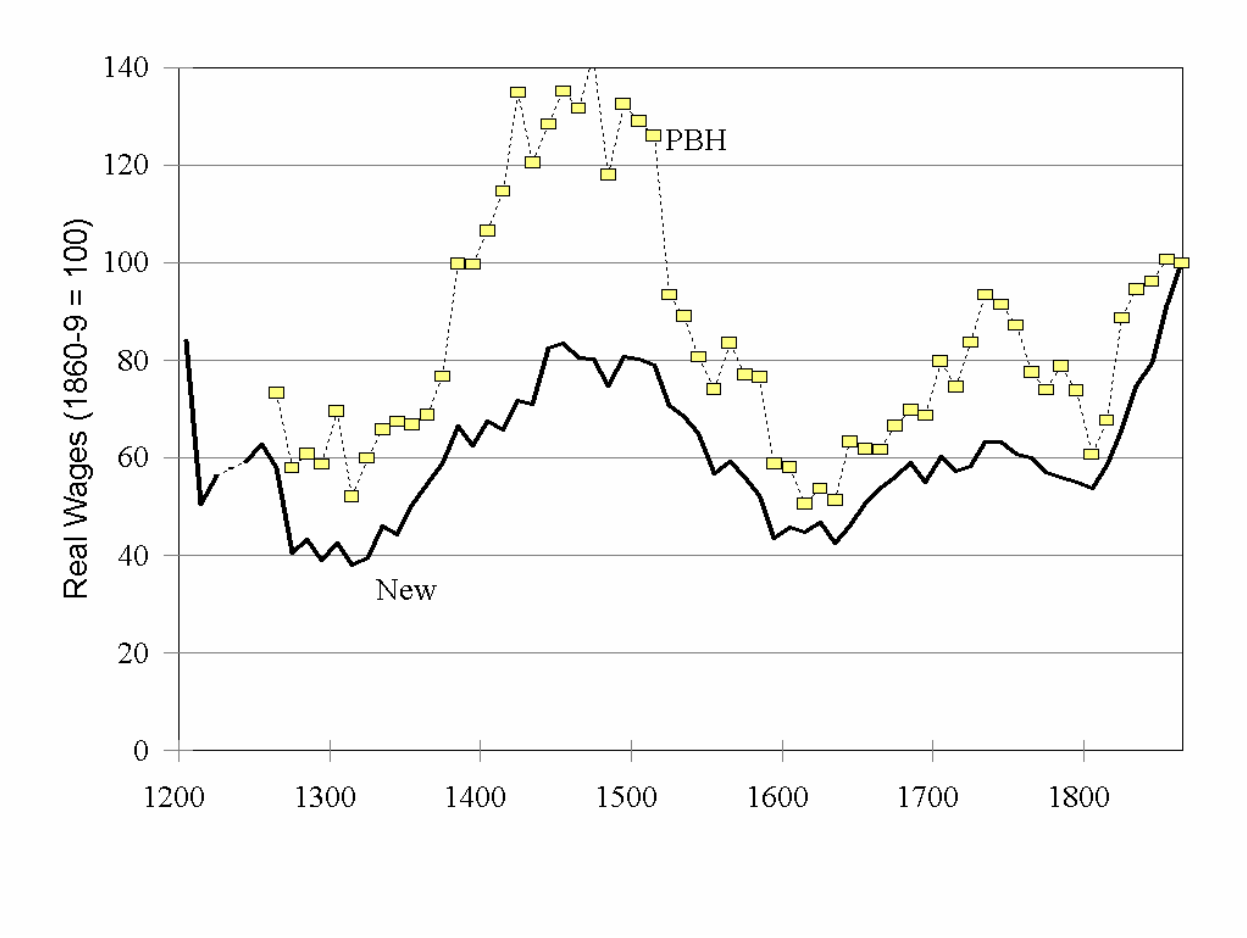
Figure 2: Real Craftsmen's Day Wages from PBH Versus Estimated Population by Decade, 1280-1869



Notes: The line summarizing the tradeoff between population and real wages for the pr-industrial era is fitted using the data from 1280-9 to 1590-9.

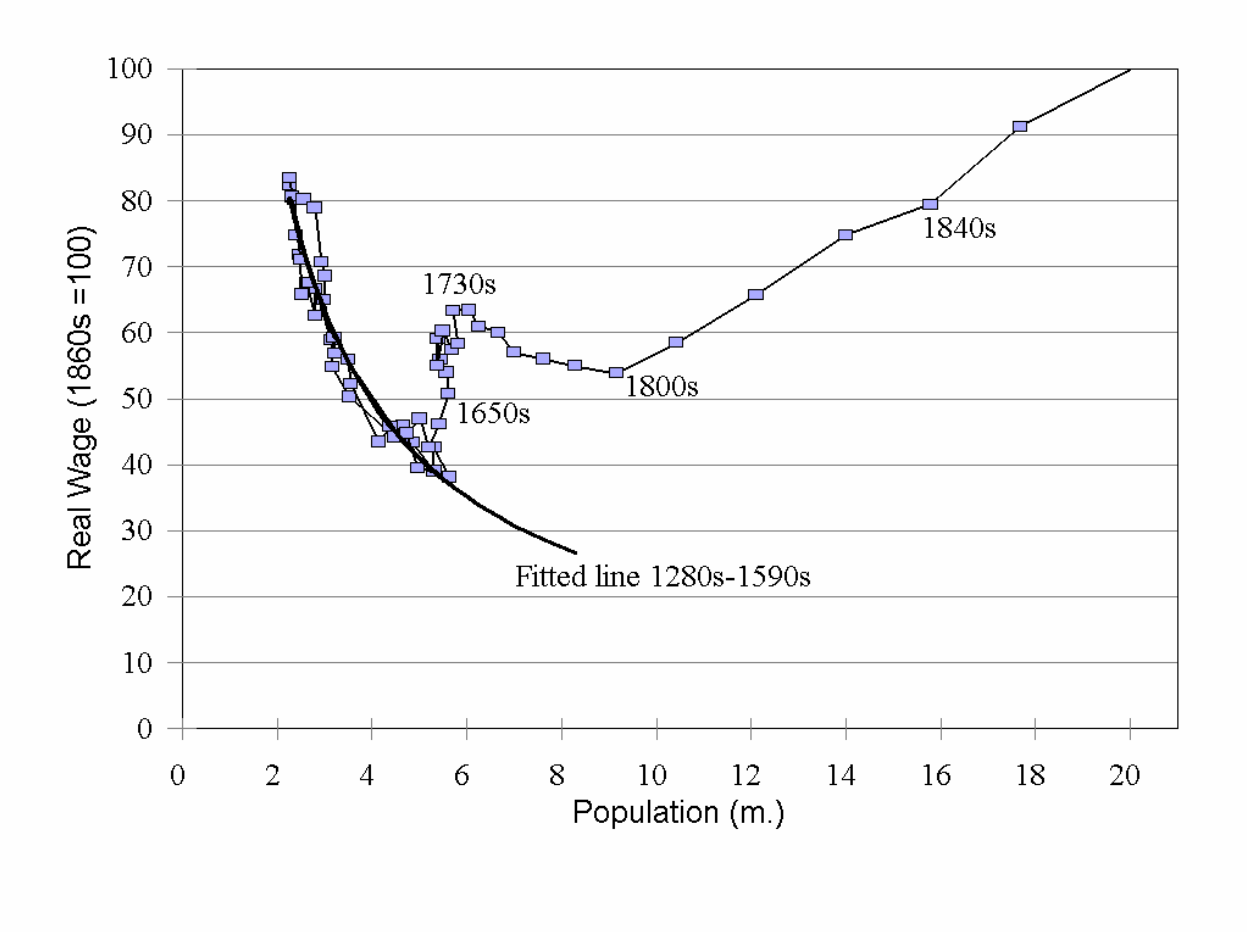
Sources: Real wages. Phelps-Brown and Hopkins (1981), pp. 28-31. Population, 1540-1850. Wrigley, Davies, Oeppen, and Schofield (1997), pp. 614-5. Population, 1280-1530. Hatcher (1977).

Figure 3: Real Wages, 1200-1869, PBH versus new series.



Note: 1860-9 on both series set to 100.

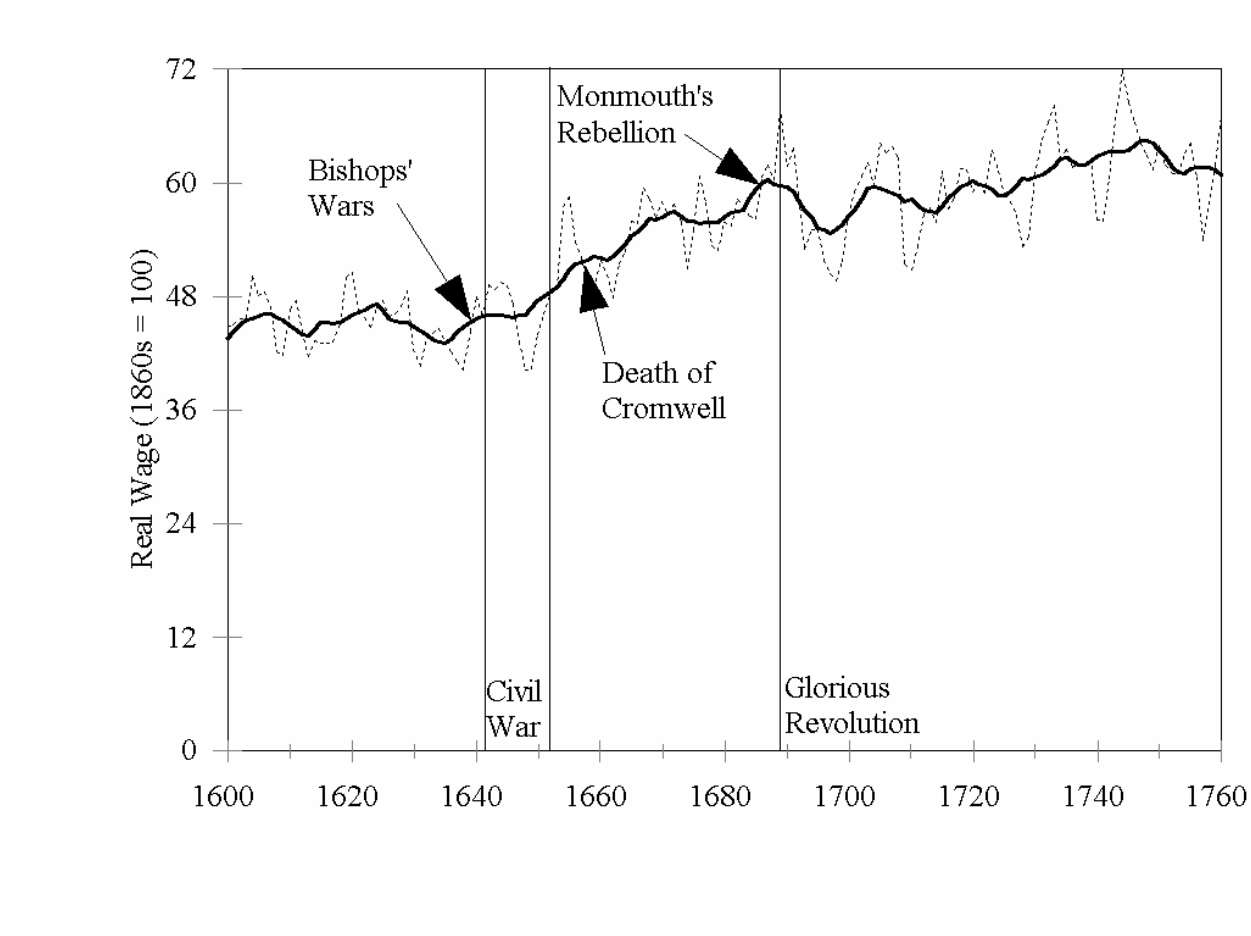
Figure 4: Real Wages Versus Population on the new series, 1280s-1860s



Notes: The line summarizing the tradeoff between population and real wages for the pr-industrial era is fitted using the data from 1260-9 to 1590-9.

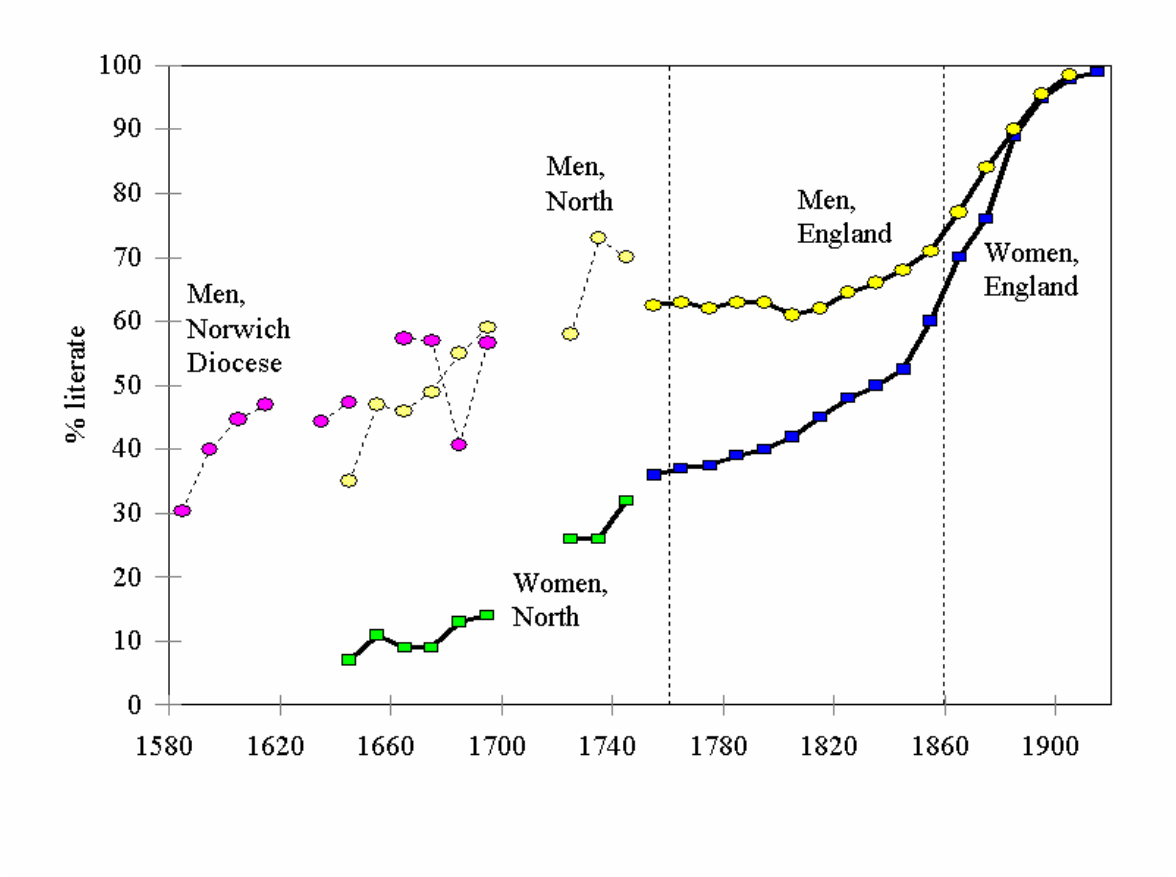
Sources: Population, 1540s-1860s. Wrigley, Davies, Oeppen, and Schofield (1997), pp. 614-5. Population, 1280s-1530s. Clark (2004a).

Figure 5: Economic Growth in the Seventeenth Century



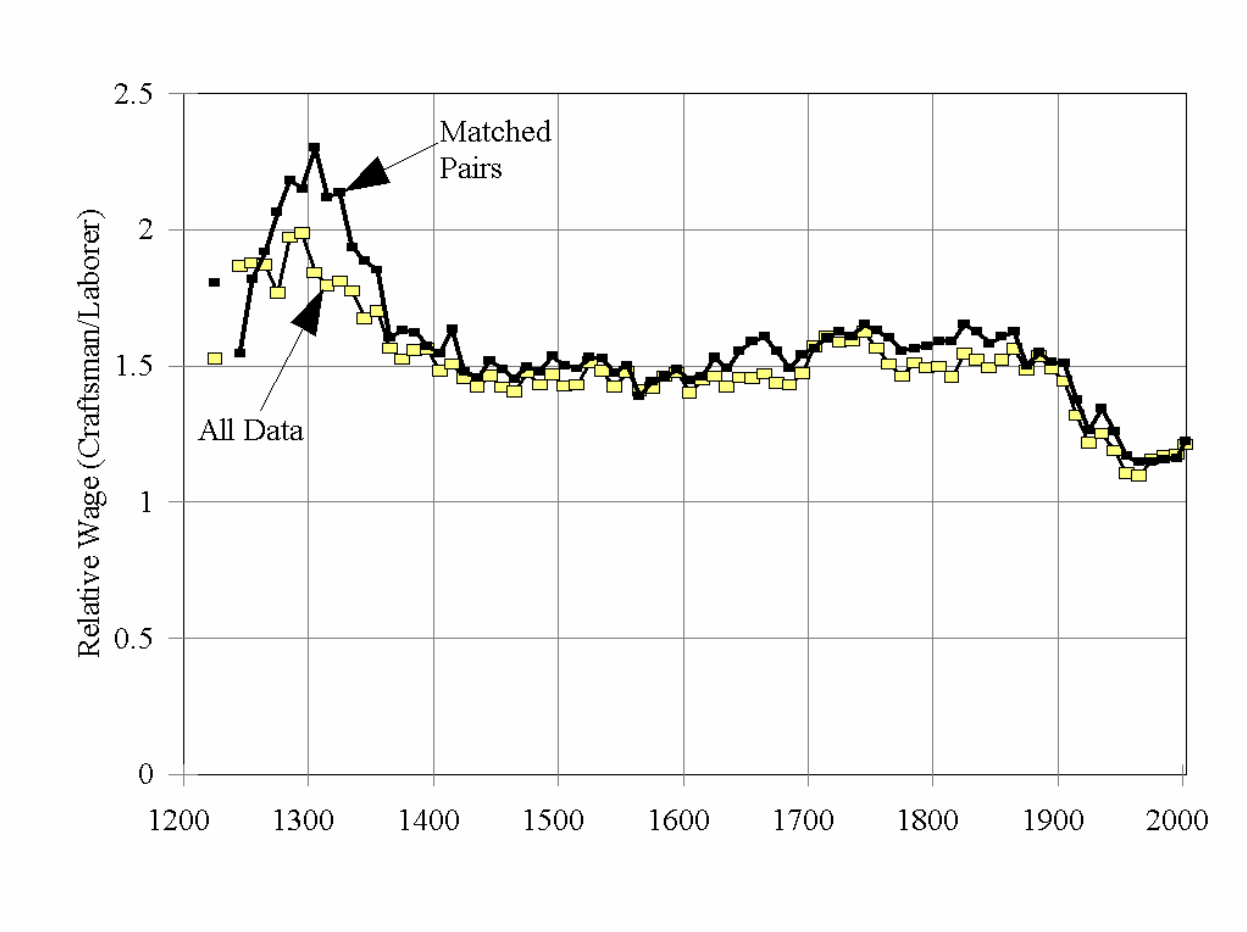
Notes: The dashed line shows the annual real day wage of building workers, the solid line the 11 year moving average of real day wages.

Figure 6: Average Literacy in England, 1580-1920



Sources: 1750s-1920s, Schofield (1973), men and women who can sign marriage resisters. The north, 1630s-1740s, Houston (1982), witnesses who can sign court depositions. Norwich Diocese, 1580s-1690s, Cressy (1977), percent of witnesses who can sign ecclesiastical court declarations.

Figure 7: The Wage of Unskilled Relative to Skilled Building Workers, 1220s-2000s



Source: Table 4.

Figure 8: Real Wages in the Industrial Revolution Era

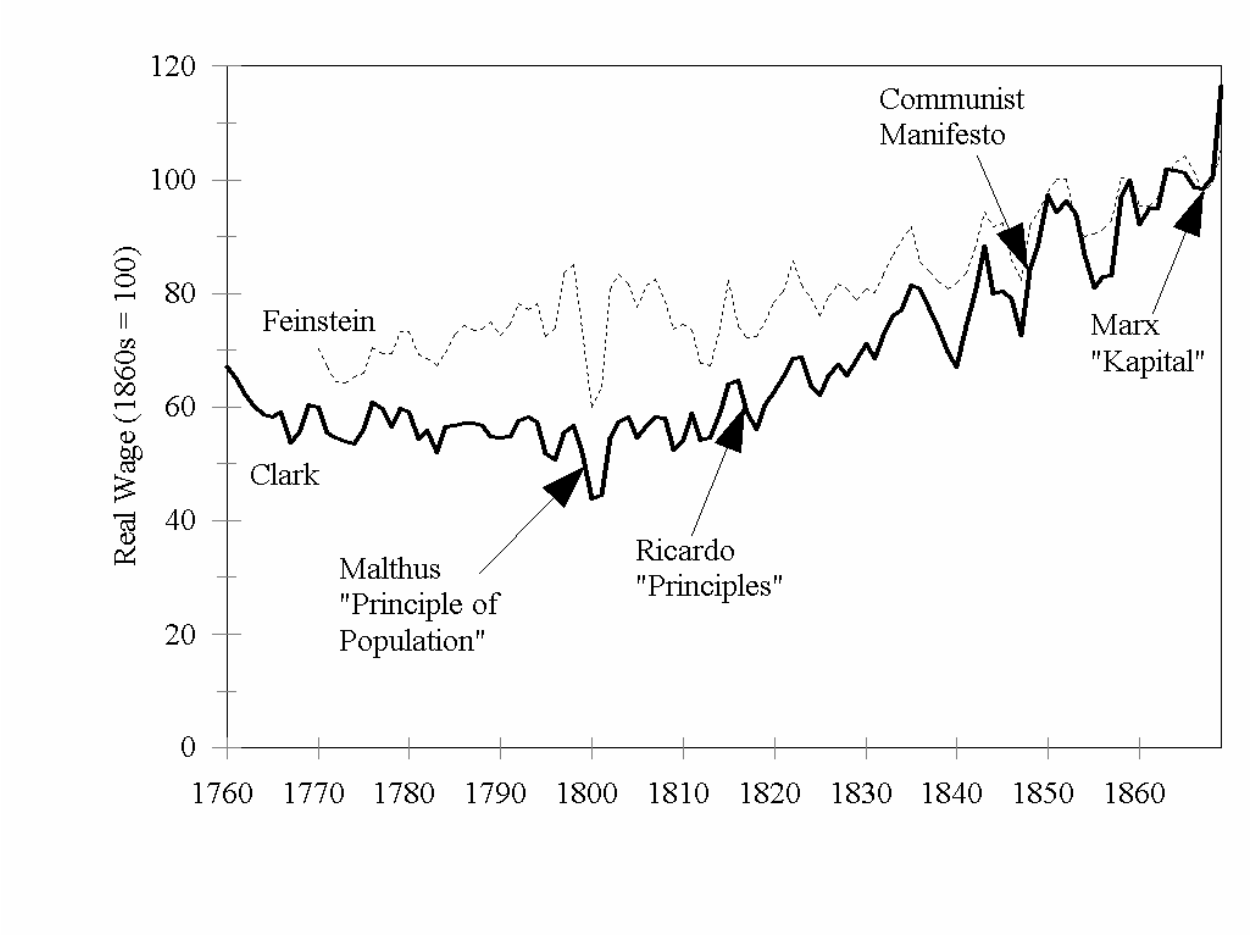
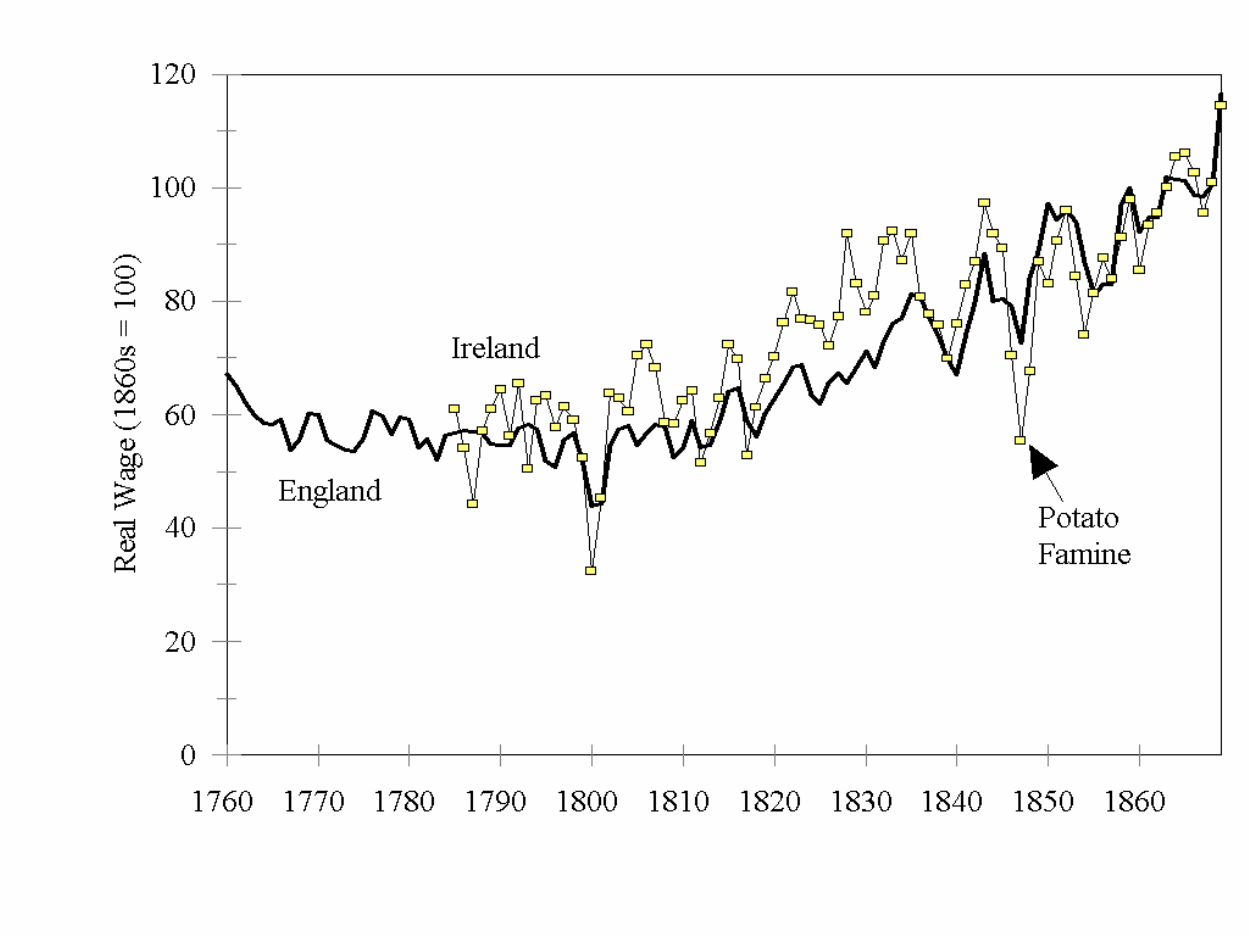
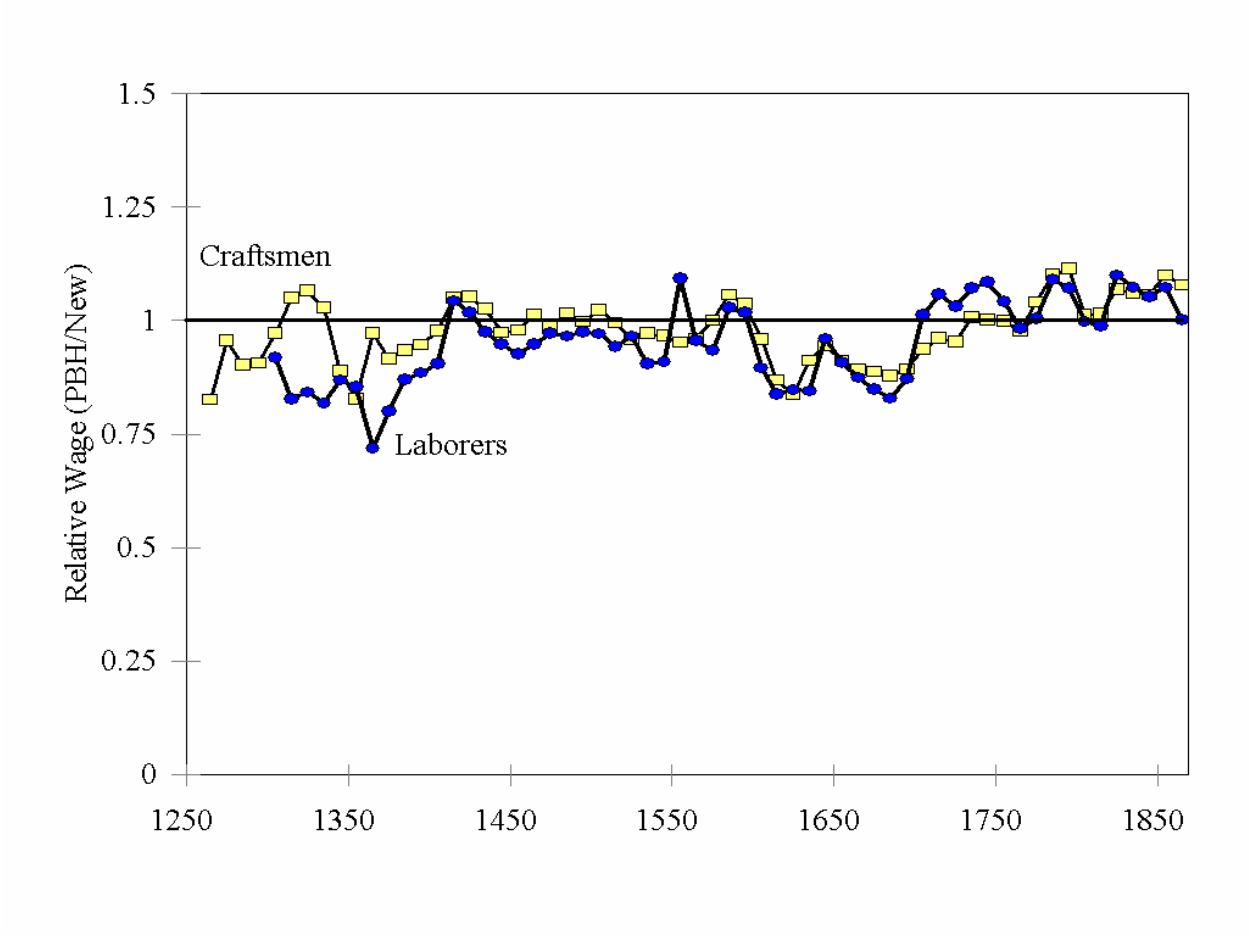


Figure 9: Real Wages in England and Ireland



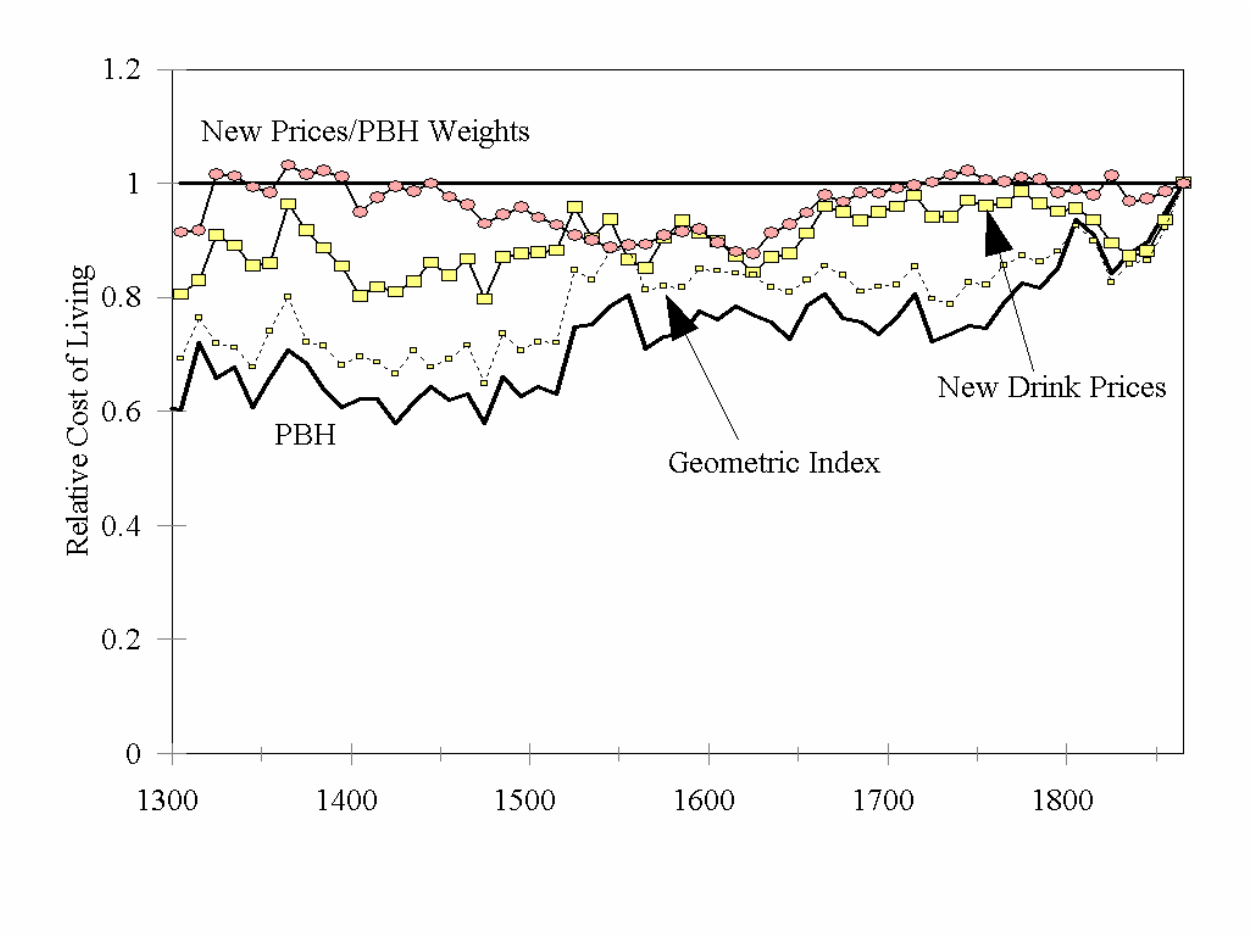
Source: Ireland, Geary and Stark (2004).

Figure 10: Nominal Wages in PBH relative to this paper



Sources: Table 4. Phelps-Brown and Hopkins (1981), pp. 11-12.

Figure 11: The Cost of Living in PBH Relative to this Paper



Note: The ratio is the relative cost of living by 10 year periods, compared to 1860-9.

Sources: Tables 4 and 5. Phelps-Brown and Hopkins (1981), pp. 44-58.

Table 1: Estimated Hours of Work 1750-1869

Decade	Towns	Observations	Simple average length of day	Towns with multiple observations	Average length of day (controlling for town)
1750	1	2	12.0	-	-
1760	1	3	12.0	1	12.1
1770	-	-	-	-	-
1780	1	3	12.1	1	12.0
1790	2	10	11.8	2	11.8
1800	4	22	10.6	4	10.5
1810	5	39	10.2	5	10.2
1820	7	51	10.1	6	10.1
1830	8	32	9.8	7	9.8
1840	9	48	9.7	8	9.8
1850	9	71	10.0	8	9.8
1860	7	85	9.9	5	9.9

Table 2: The Percentage of Expenditure by Category for Manual Workers before 1869

Category of Expenditure	Vanderlint (1734)	1787-96 (Horrell)	1840-54 (Horrell)	Assumed Here
Food and Drink:	**54.4**	**75.4**	**61.7**	**67.0**
Bread and flour	12.5	17.5	23.5	18.5
Wheat	0	0.5	0.0	0.0
Barley	0	3.6	0.0	1.0
Oats and oatmeal	0	9.9	1.5	2.0
Peas	0	-	-	1.0
Potato	0	6.3	4.0	4.0
Rice	0	0.0	0.2	0.5
Farinaceous	**12.5**	**37.8**	**29.7**	**27.0**
Meat (beef, mutton, pork)	16.7	11.8	9.8	10.0
Fish	0	0.1	0.2	0.5
Bacon	0	0.2	1.8	1.0
Eggs	0	0.0	0.3	0.5
Meat	**16.7**	**12.1**	**12.1**	**12.0**
Milk	2.1	5.9	2.7	4.0
Cheese	2.1	2.7	1.9	2.5
Butter	4.2	6.2	4.1	5.0
Dairy	**8.4**	**14.8**	**8.7**	**11.5**
Sugar and Honey	**-**	**4.2**	**4.5**	**4.5**
Beer/cider	12.5	2.8	1.7	6.5
Tea	0	3.4	2.2	2.5
Coffee	0	0.0	1.0	1.0
Drink	**12.5**	**6.2**	**4.9**	**10.0**
Salt	-	-	-	0.5
Pepper	-	-	-	0.5
Currants/Raisins	-	-	-	1.0
Other Food	**4.2**	**0.6**	**2.1**	**2.0**
Housing	**7.2**	**5.3**	**10.9**	**8.0**
Fuel	**5.6**	**4.4**	**4.8**	**5.0**
Light	2.1	-	-	4.0
Soap	2.1	-	-	0.5
Light and Soap	**4.2**	**3.8**	**5.2**	**4.5**
Services	**8.2**	**0.1**	**2.5**	**2.5**
Tobacco	**0**	**0.0**	**0.7**	**1.0**
Other (Clothing, Bed linen)	**20.5**	**11.0**	**14.2**	**12.0**

Sources: Horrell (1996), pp. 568-9, 577. Vanderlint (1734), pp. 76-77.

Table 3: Living Costs, 1200s-1860s, By Commodity Groups

Decade	Grain and potato	Meat	Dairy	Sugar and honey	Drink	Salt	Pepper	Shelter	Fuel	Light	Soap	Clothing
1200-9	4.2	5.9	3.4		5.4	7.9				16.2		16.7
1210-9	5.7	6.0	4.7		6.9	14.5				16.3		17.0
1220-9	6.5	6.3	4.8		7.3	14.0		9.6		24.4		15.8
1230-9	6.2	7.0	4.0		5.5	13.0				19.9		14.4
1240-9	6.7	7.3	5.4		7.0	16.5				27.4		18.4
1250-9	7.5	7.1	6.2		7.9	16.7			12.5	24.0		18.0
1260-9	7.0	7.6	6.3		9.2	17.8	134.7	9.3	19.5	30.2		19.2
1270-9	10.4	8.5	6.6	50.8	11.6	20.5	131.4	12.1	24.8	33.7	12.0	18.8
1280-9	8.7	7.9	7.9	40.5	11.0	18.4	134.8	12.4	17.4	34.2	16.5	21.2
1290-9	11.1	8.5	7.5	39.6	11.1	23.7	190.3	12.8	20.5	37.2	22.6	19.8
1300-9	8.9	8.6	8.3	39.8	12.4	21.1	162.9	11.7	21.1	46.4	25.7	24.0
1310-9	13.6	10.4	10.7	43.1	13.4	43.9	170.7	11.0	24.1	51.2	16.9	26.7
1320-9	11.3	10.5	10.2	42.9	22.5	31.0	181.9	8.9	21.6	52.6	19.8	23.9
1330-9	8.9	8.6	9.1	39.9	20.0	25.5	170.0	8.5	21.7	45.9	21.4	22.5
1340-9	8.6	8.4	8.9	45.0	16.6	23.1	196.1	7.8	19.7	44.5	21.8	19.7
1350-9	11.8	9.4	10.7	65.2	16.5	55.2	334.1	5.0	32.7	50.3	22.2	31.0
1360-9	11.8	9.8	10.8	66.4	22.6	46.3	214.4	4.6	27.6	53.3	22.4	32.2
1370-9	12.4	9.3	11.7	78.3	20.4	52.9	252.9	4.8	28.6	51.7	26.2	33.1
1380-9	8.5	8.2	10.4	61.8	16.3	44.1	164.2	4.6	26.1	49.5	26.5	32.8
1390-9	9.3	8.8	11.0	72.1	18.1	37.4	209.2	5.7	30.8	45.6	26.5	27.9
1400-9	9.8	8.2	11.7	72.1	13.1	49.6	160.8	6.5	31.0	46.0	26.5	26.6
1410-9	10.1	9.0	12.8	68.0	15.1	37.9	327.3	6.9	31.2	42.8	26.5	27.1
1420-9	8.4	8.8	12.2	62.5	15.0	37.8	247.3	6.5	33.7	39.6	26.7	27.2
1430-9	10.9	9.8	11.4	61.9	15.1	42.6	193.3	4.9	31.5	38.4	27.3	27.7
1440-9	8.1	9.0	9.9	64.5	15.6	36.8	131.2	4.9	29.9	38.1	37.3	27.5
1450-9	8.7	8.8	10.1	68.4	13.3	34.5	152.3	4.7	29.2	31.8	36.9	25.6
1460-9	8.9	7.8	9.6	73.8	13.8	32.6	192.1	5.3	29.9	32.8	35.4	26.7
1470-9	9.2	8.0	9.0	87.2	12.9	32.3	198.0	5.5	27.8	32.7	26.6	27.0
1480-9	10.6	8.7	10.1	80.0	14.1	43.5	225.0	5.8	21.8	32.4	29.2	26.7
1490-9	9.0	9.0	9.3	75.0	14.1	51.4	209.1	5.6	22.5	27.7	29.8	26.4
1500-9	10.1	8.0	8.3	60.3	13.5	36.0	242.1	5.5	25.4	26.9	26.9	27.9
1510-9	10.1	8.4	9.3	93.6	13.9	43.4	217.1	6.4	25.8	29.5	31.0	25.4
1520-9	13.8	9.3	9.8	96.5	14.4	54.5	304.9	6.2	27.1	30.6	35.0	27.0
1530-9	14.7	9.5	11.8	110.4	13.4	55.3	320.1	6.5	27.3	31.3	44.7	29.5
1540-9	16.3	11.8	14.5	177.9	14.1	64.0	330.3	7.7	29.7	35.4	41.7	30.3
1550-9	28.4	22.7	21.8	237.4	18.9	72.4	436.3	9.2	41.8	46.8	72.1	36.2
1560-9	25.6	26.9	25.6	203.3	20.1	81.1	572.3	13.9	46.7	63.6	88.6	42.7
1570-9	28.1	24.4	26.3	239.2	26.4	136.5	486.8	14.7	52.9	66.4	76.3	50.4
1580-9	33.3	26.1	28.5	295.2	35.3	109.9	573.9	17.8	58.3	72.8	73.7	53.7
1590-9	50.1	30.5	35.8	245.0	40.7	145.8	645.0	20.7	64.7	98.4	81.8	55.9

Table 3: Living Costs, 1200-1869, By Commodity Groups (cont.)

Decade	Grain and potato	Meat	Dairy	Sugar	Drink	Salt	Pepper	Shelter	Fuel	Light	Soap	Clothing
1600-9	47.6	32.1	36.5	311.6	38.0	126.4	472.2	23.1	77.2	101.3	84.8	61.1
1610-9	57.1	35.9	39.8	289.7	37.1	120.1	359.5	27.1	85.2	106.9	88.1	66.0
1620-9	55.1	35.7	40.8	249.7	32.8	133.6	320.4	26.5	89.0	108.0	87.5	71.2
1630-9	69.1	38.6	42.8	323.2	57.5	152.0	299.9	29.8	97.0	115.9	109.2	83.7
1640-9	67.8	43.4	45.8	297.7	55.4	204.3	358.3	24.9	118.4	127.2	108.2	92.9
1650-9	65.6	46.2	48.8	271.9	60.0	210.1	314.7	25.9	109.4	125.4	96.9	91.1
1660-9	63.4	47.5	49.2	164.8	65.1	186.4	179.2	29.9	116.4	130.7	92.9	90.9
1670-9	60.4	48.7	46.4	144.8	63.2	193.6	163.3	33.6	121.3	120.6	81.9	84.1
1680-9	53.8	47.8	47.4	134.8	65.6	179.2	180.8	36.0	120.8	113.7	83.7	81.9
1690-9	66.6	47.8	49.7	146.6	73.5	256.8	283.2	33.0	129.7	127.6	116.2	85.0
1700-9	52.4	43.2	46.8	140.5	77.0	460.5	225.1	38.6	131.6	116.0	95.3	84.2
1710-9	62.2	42.0	48.3	125.3	82.7	436.0	388.3	35.0	129.4	142.3	130.3	88.0
1720-9	60.3	43.6	48.3	119.3	85.2	421.8	319.0	38.0	124.5	135.5	132.4	87.6
1730-9	50.1	43.0	46.5	114.9	81.7	353.2	239.5	37.1	123.6	127.2	125.4	86.3
1740-9	51.2	45.9	48.0	120.9	81.6	381.0	234.1	34.2	134.8	153.1	139.5	89.0
1750-9	59.7	46.8	48.6	118.4	79.6	374.9	227.9	35.6	133.8	147.7	133.0	93.5
1760-9	65.6	48.0	52.8	115.7	81.2	373.8	233.3	38.9	137.1	159.3	144.1	97.2
1770-9	74.9	55.4	60.6	119.6	90.6	376.3	250.1	42.8	150.1	168.8	144.1	95.3
1780-9	77.3	57.2	63.1	130.9	94.2	467.6	293.2	42.3	146.3	176.4	159.5	94.9
1790-9	93.2	68.6	77.9	169.2	96.3	592.4	305.9	52.7	166.7	194.2	180.2	97.2
1800-9	133.6	96.9	109.4	191.5	129.9	1318.9	359.1	74.3	203.1	251.3	223.6	110.9
1810-9	146.5	117.6	116.8	204.4	145.8	1587.5	446.7	89.3	222.7	269.1	249.9	122.1
1820-9	104.3	103.1	95.5	143.4	145.8	675.4	409.8	87.5	191.5	168.4	179.0	115.7
1830-9	99.8	97.1	83.6	135.8	103.9	136.3	235.6	86.0	133.9	148.6	161.2	111.5
1840-9	102.0	95.1	84.3	123.4	96.6	120.4	91.6	82.0	113.4	124.9	118.4	108.8
1850-9	98.0	87.9	88.7	116.0	99.9	82.3	101.8	90.4	97.6	101.9	100.7	96.5
1860-9	100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0

Notes: The index for each commodity and overall is set to 100 for 1860-9.

Sources: See appendix 2.

Table 4: Building Wages, the Cost of Living and Real Wages by Decade, 1200-2003

Decade	Craftsmen Day Wage (d.)	Helpers Day Wage (d.)	Relative Wage	Cost of Living	Craftsmen Real Wage	Helper Real Wage
1200-9	3.27	-	-	6.44	92.2	-
1210-9	2.44	-	-	7.92	55.4	-
1220-9	3.05	1.94	1.58	8.89	62.8	57.4
1230-9	-	-	-	7.96	-	-
1240-9	3.39	2.28	1.49	8.49	68.3	70.4
1250-9	3.74	2.06	1.82	9.41	74.7	59.1
1260-9	3.63	2.07	1.76	10.06	66.7	57.1
1270-9	3.14	1.81	1.73	12.44	46.2	40.6
1280-9	3.32	1.69	1.96	11.65	52.0	41.6
1290-9	3.31	1.67	1.98	12.71	47.5	37.4
1300-9	3.50	1.90	1.84	12.54	50.8	43.3
1310-9	3.79	2.11	1.79	15.33	45.7	39.7
1320-9	3.75	2.08	1.81	14.58	47.3	40.9
1330-9	3.79	2.14	1.77	12.72	54.6	48.1
1340-9	3.37	2.01	1.67	12.06	51.0	47.6
1350-9	4.71	2.78	1.69	14.87	57.6	53.0
1360-9	5.14	3.30	1.56	15.32	61.0	61.1
1370-9	5.46	3.59	1.52	15.56	64.9	66.6
1380-9	5.34	3.45	1.55	13.09	74.4	74.8
1390-9	5.28	3.39	1.56	13.80	70.0	70.0
1400-9	5.47	3.70	1.48	13.77	72.5	76.5
1410-9	5.62	3.74	1.50	14.48	70.8	73.6
1420-9	5.70	3.93	1.45	13.51	76.7	82.6
1430-9	5.85	4.10	1.42	14.25	75.1	82.3
1440-9	6.16	4.22	1.46	12.80	87.8	93.8
1450-9	6.12	4.31	1.42	12.64	88.0	96.8
1460-9	5.92	4.22	1.40	12.74	84.7	94.2
1470-9	6.07	4.11	1.47	12.85	85.9	90.9
1480-9	5.90	4.14	1.43	13.58	79.2	86.7
1490-9	6.01	4.10	1.46	12.75	85.9	91.5
1500-9	5.86	4.12	1.42	12.73	84.1	92.1
1510-9	6.03	4.24	1.42	13.31	82.8	90.5
1520-9	6.25	4.14	1.51	15.11	75.9	78.5
1530-9	6.53	4.42	1.48	16.23	73.2	77.2
1540-9	6.88	4.83	1.42	18.44	68.3	74.9
1550-9	9.03	6.13	1.47	27.70	59.8	63.3
1560-9	10.31	7.31	1.41	30.34	61.8	68.4
1570-9	10.59	7.48	1.42	33.05	58.5	64.5
1580-9	11.36	7.77	1.46	37.64	55.0	58.7
1590-9	11.58	7.85	1.47	46.29	46.0	48.6

Table 4: Building Wages, the Cost of Living and Real Wages by Decade, 1200-2003 (cont.)

Decade	Craftsmen Day Wage (d.)	Helpers Day Wage (d.)	Relative Wage	Cost of Living	Craftsmen Real Wage	Helper Real Wage
1600-9	12.5	8.9	1.40	48.0	47.4	52.8
1610-9	13.8	9.5	1.45	53.4	47.0	50.7
1620-9	14.3	9.8	1.46	52.4	49.7	53.0
1630-9	15.3	10.8	1.42	62.9	44.3	48.6
1640-9	17.3	11.9	1.45	64.3	49.2	52.5
1650-9	19.2	13.2	1.45	64.7	54.2	58.1
1660-9	20.2	13.7	1.47	64.4	57.1	60.6
1670-9	20.3	14.1	1.44	62.9	58.6	63.6
1680-9	20.7	14.5	1.43	60.8	62.1	67.6
1690-9	21.3	14.5	1.47	66.5	58.6	62.0
1700-9	22.2	14.1	1.57	61.5	65.8	65.3
1710-9	22.8	14.2	1.61	65.3	63.5	61.7
1720-9	23.1	14.5	1.59	65.2	64.4	63.3
1730-9	23.2	14.6	1.59	60.5	69.7	68.3
1740-9	24.0	14.7	1.63	61.9	70.7	67.7
1750-9	24.0	15.3	1.56	65.2	67.0	66.8
1760-9	24.5	16.3	1.51	69.2	64.7	66.8
1770-9	25.5	17.4	1.46	76.6	60.5	64.5
1780-9	26.3	17.4	1.51	79.1	60.5	62.5
1790-9	29.8	20.0	1.49	92.0	59.0	61.6
1800-9	39.3	26.3	1.49	123.6	58.0	60.6
1810-9	47.2	32.4	1.46	138.3	62.2	66.5
1820-9	44.9	29.1	1.54	113.2	72.1	72.8
1830-9	45.2	29.8	1.52	102.6	80.3	82.5
1840-9	45.7	30.7	1.49	99.4	83.9	87.9
1850-9	47.7	31.4	1.52	94.4	92.2	94.8
1860-9	55.1	35.3	1.56	100.0	100	100
1870-9	67.2	45.3	1.48	99.3	123	129
1880-9	70.3	45.8	1.54	88.5	151	150
1890-9	75.9	50.9	1.49	83.2	173	177
1900-9	82.7	57.3	1.44	87.2	180	190
1910-9	94.9	79.9	1.19	128	140	180
1920-9	173	143	1.21	173	189	239
1930-9	160	128	1.25	139	217	265
1940-9	237	199	1.19	218	206	265
1950-9	399	362	1.10	349	216	300
1960-9	645	586	1.10	478	256	355
1970-9	2,608	2,246	1.16	1099	450	591
1980-9	7,734	6,594	1.17	2974	493	642
1990-9	14,127	12,022	1.18	4787	559	727
2000-3	20,125	16,670	1.21	5705	669	846

Note: Wages throughout are measured in old English pence (d.), where £1 = 240 d.

Source: See appendices 1 and 2.

Table 5: Occupations, Literacy and Assets – Will Writers, 1620-1636

Social Group	Wills in sample	Fraction of **all** wills signed with X	Fraction **town** wills signed with X	Average value of assets bequeathed (£)
Gentry	50	0.11	0.12	706
Merchants, Professionals	60	0.11	0.13	284
Yeomen, Farmers	439	0.51	0.36	271
Traders	60	0.37	0.40	87
Craftsmen	193	0.56	0.66	87
Husbandmen, Shepherds	212	0.65	0.75	63
Laborers	34	0.76	-	52
ALL	1,048	0.53	0.32	-

Sources: Allen (1989), Evans (1987).

Table 6: Price Movements 1451-75 to 1860s

Expenditure Category	Weight PBH 1450s	Price PBH 1860s/ 1451-75	Weight PBH 1860s	Weight Clark	Price Clark 1860s/ 1451-75
Grains	0.200	11.7	0.180	0.270	11.2
Meat	0.250	14.9	0.305	0.120	10.2
Dairy	0.125	13.2	0.130	0.115	12.2
Drink	0.225	18.2	0.319	0.100	7.5
Honey/Sugar	-	-	-	0.040	1.3
Salt	-	-	-	0.005	3.0
Pepper	-	-	-	0.005	0.5
Raisins/Currants	-	-	-	0.010	1.7
Fuel and Light	0.075	5.9	0.035	0.090	3.3
Soap	-	-	-	0.005	2.9
Clothing	0.125	2.9	0.030	0.120	3.8
Housing and housewares	-	-	-	0.080	19.4
Services	-	-	-	0.025	9.5
ALL	**1.00**	**12.6**	**1.00**	**1.00**	**7.8**

Sources: Table 3. Phelps-Brown and Hopkins (1981), pp. 44-58.