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UNREAL WAGES?
REAL INCOME AND ECONOMIC GROWTH IN ENGLAND, 1260-1850[1]

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Abstract

Estimates of historical workers' annual incomes suffer from the fundamental problem that they are inferred from day wage rates without knowing how many days of work day labourers undertook per year. We circumvent the problem by building an income series based on the payments made to workers employed by the year rather than by the day. Our data suggests that earlier annual income estimates based on day wages overestimate medieval labour incomes but underestimate labour incomes during the Industrial Revolution. Our revised estimates indicate that modern economic growth began more than two centuries earlier than commonly thought and was driven by an 'Industrious Revolution'. They also suggest that the current global downturn in labour's share is not exceptional but fits within the range of historical fluctuations.

Keywords: England; Industrial Revolution; Industrious Revolution; Labour Supply; Living standards; Malthusian Model; Modern Economic Growth; Real Wages.

JEL Codes: J3, J4, J5, J6, J7, J8, N33, O10

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1.

When did western societies begin to grow rich? The standard account based on wage rates paid to British day labourers is that annual incomes were trendless before 1800 and that modern economic growth only emerged as late as the 19th century (Allen, 2001, 2009a; Clark, 2004, 2007; Broadberry *et al*., 2015). However, the pessimistic view of English economic development right up to the industrial revolution suffers from the fundamental problem that *day* wage rates are turned into *annual* incomes without accurate information about the number of days worked per year. This raises questions about levels and trends in previous estimates of historical workers' annual incomes with ramifications for our understanding of the timing and causes of modern economic growth.

This paper breaks new ground by building an annual income series based on British workers employed and paid by the *year* rather than the *day*. Our revised labour incomes differ considerably from previous series. The divergences suggest that existing estimates of workers' annual labour incomes based on day wage rates and guesstimates of annual labour supplies overestimate medieval incomes but underestimate incomes during the Industrial Revolution. Our new estimates not only downscale the medieval 'Golden Age of Labour' that followed in the wake of the Black Death when almost half of Britain's population perished, they also push the take-off into modern economic growth back more than two hundred years, from the 19th century to the late 16th century. Indeed, our income estimates continue to increase during the 17th-century's advances in intellectual understanding of the natural world and further through the technological progress of the classical years of the Industrial Revolution. This contrasts with the early modern Malthusian plateau of stagnant incomes exhibited by previous series based on day wage rates. However, the revised chronology of economic growth coincides with the recently revised evolution of Britain's GDP per capita (Broadberry *et al*., 2015).

We argue that a key driving force in Britain's early take-off was more labour on the intensive margin. For this, we use an estimation strategy based on labour market arbitrage proposed by Clark and Van der Werf (1998). Their approach implies that day rates in combination with annual rates facilitate the computation of the working year needed in day labour in order to obtain the income that could be earned by annual employees. The method suggests that labour input per year grew more than two-fold, from less than 150 days during the medieval period to well over 300 days during the Industrial Revolution. Growth in labour input per head supports Jan de Vries' argument that in early modern England a 'Consumer

Revolution' was spurred by an 'Industrious Revolution', i.e. that the growing availability of novel market commodities raised the utility of money and caused a reduction in leisure time as people sought higher incomes (De Vries, 1994, 2004). Labour intensification may also have been prompted by legal changes (Hay, 2018), a rising dependency rate (Voth, 2000), or improved diets enhancing workers' productivity (Fogel, 1992; Floud et al, 2011). More work on the intensive margin aligns with Robert Allen's allusion to Britain's Industrial Revolution as '1% inspiration and 99% perspiration' (Allen, 2011, p. 33), but contradicts the usual assumption that the pre-industrial working year was always and everywhere 250 days long (e.g. Allen and Weisdorf, 2011).

We use our new wage rate series to estimate labour's share of total income across 600 years of British history. Labour's share rose markedly in the wake of the chronic labour shortage that followed the Black Death. Then, from a peak of over 80 per cent in the late 16th century, it fell steadily to less than 60 per cent during early industrialisation, when labour-saving technologies diffused across Britain, before crawling back up to 65 per cent towards the end of the Industrial Revolution. The recent post-1980s decline in labour's share, e.g. in the US from 65 to 60 per cent (Karabarbounis and Neiman, 2014), remains comfortably within the historical range, suggesting that the current global downturn might also be a temporary effect of labour-saving technology.

2. Background

Two conflicting views about long-run economic development dominate earlier studies of economic growth in Britain. The traditional 'Malthusian' view (e.g. Clark, 2008) sees all societies worldwide as being characterised by wide swings in real wage rates linked to rising and falling populations, but with no sustained growth until the 19th century. The competing 'Revisionist' view, supported by the recent output-side estimates of per capita GDP presented in Broadberry *et al*. (2015), argues that it is possible to discern incremental but compounded gains much earlier.

Previous contributions to this debate have relied on evidence of variation in real wage rates and income-side estimates of GDP computed on the basis of wage rate data. Real wage rates cannot however equate to living standards nor be compared with GDP per capita since, as Phelps Brown and Hopkins (1956) warned with respect to their pioneering long-run day wage series, daily wage rates take no account of labour input at the intensive margin. In trying to side-step the issue, previous research has relied on a crude but simple assumption: that

workers always and everywhere worked for 250 (or sometimes 260) days per year (e.g. Allen, 2001, 2007; Allen and Weisdorf, 2011; Allen *et al.*, 2012).

Equal to a 5-day working week plus two weeks' holiday, the 250 working-days assumption is perhaps not unreasonable in today's world, but in the historical context, as Hatcher (2011) has emphasised, it involves two controversial suppositions. The first is that day work was always *available* 250 days per year, which Hatcher claims is out of touch with historic reality, because such a working year would have made day workers better off than many of their land-owning counterparts. The second supposition is that day workers always *supplied* 250 days of labour, which Hatcher points out involves a completely inelastic labour supply, contradicting evidence that medieval workers set themselves goals in terms of cash and ceased to work once these were achieved (Hatcher, 1998).

Moreover, the assumption of an unchanging working year put labour incomes and per capita GDP on different growth paths creating divergences which called for clarification. The standard response draws on two central narratives relating to changing factor shares. The first narrative, known as the 'Golden Age of Labour', referred to the period after 1350 when real annual labour incomes based on day wages multiplied by 250 working days surged while per capita GDP stagnated. The Black Death, and ensuing demographic catastrophe, is thought to have caused food prices to fall and wages to rise, so benefiting workers at the expense of landowners (e.g. Postan, 1966). The second narrative, known as 'Engels' Pause', refers to the period c. 1650-1830 when real wage rates and their implied annual incomes stagnated while per capita GDP grew. In this case, technical change supposedly skewed income in favour of profits, now benefiting capitalists over labourers (e.g. Allen, 2009a). Diverging trends in labour incomes and GDP per head are not unique to England, but apply too to France, Germany, Holland, Italy, and Spain (e.g. Campbell, 2013) suggesting the need for a generalizable explanation and a reassessment of the assumption of an invariant historical working year.

As is made clear in the macroeconomic growth literature, changing factor shares are not the only means of reconciling divergent trends in real incomes and per capita GDP, and hence resolving the conflict between the Malthusian and Revisionist interpretations of long-run growth. Changes in annual labour supply per head can also reconcile different trends (e.g. Angeles, 2008; De Vries, 2008; Hatcher, 2011; Nuvolari and Ricci, 2013; Broadberry *et al*., 2015; Palma and Reis, 2018). The booming real wage rates of the 'Golden Age' could be reconciled with the stagnant GDP per capita if medieval workers worked fewer than 250

annual days, while the sluggish real annual incomes of the era of industrialisation could be squared with the boom in GDP per head if early industrial workers were exhibiting more industriousness. The problem lies in giving such hypotheses empirical substance.

The historical record provides only occasional indications of the length of the working year. These suggest that labour input on the intensive margin varied widely in the past (Allen and Weisdorf, 2011). For example, numbers provided by Blanchard (1978) indicate that the medieval working year was sometimes only 165 days long, while Voth's (2000; 2001) estimates suggest that the industrial-revolution working year was as long as 330 days. If these numbers are even roughly correct, then existing estimates of annual incomes, which are based on 250 days of work, overestimate medieval incomes as much as they underestimate early industrial incomes, by some 30 per cent. The discipline's best guesses about annual incomes could well be badly off target with serious implications for our understanding of when and how modern economic growth emerged.

3. Methods and Data

We circumvent the problem of the missing evidence about the number of days worked per year by focussing on the earnings of men employed and paid by the year. With the exception of Clark and Van der Werf (1998), discussed in more detail below, previous studies have ignored annual payments in constructing long-run income series. On the face of it, the absence of such payments appears strange, as annual service, while particularly important in agriculture, flourished in all sectors of the economy including manufacturing.[2] On the other hand, the customary service contract often included board and lodging at or near the place of work. While such payments in kind had advantages for both employers and employees, they present a challenge to scholars trying to monetise them, an issue we address further below.

Common as yearly service was, it is important to emphasise that our series does not just relate to workers on annual contracts but applies to unskilled workers on daily and annual contracts alike and across all sectors of the economy. As Clark and Van der Werf assert, if workers were homogeneous and mobile between annual and day labour, and employers were

[2] For example, a wage assessment for as late as 1724 prescribed annual stipends for a wide range of artisans and construction workers (Waterman, 1928). Wage assessments originated in legislation that sought to cap wage growth after the Black Death by prescribing wages for workers of different kinds. As wage assessments relate to legal scales not actual payment we have not used them in our analysis. However, the fact that an 18th century assessment continued to prescribe annual rates for artisans and craftsmen is testimony to the persistence of annual contracts outside agriculture.

flexible in terms of the contracts offered, economic reasoning suggests that the cost and return per unit labour would be the same between across contracts and sectors (Clark and Van der Werf, 1998, p. 831). Day labourers would work just the number of days at the day rates needed to earn the salary offered to men on annual contracts, and it would be impossible to make annual employees work more days than their day working peers. Thus, our annual series tracks the annual labour incomes earned by day as well as annual workers, but it does so based on actual days worked rather than some ahistorical and arbitrary guesstimate.[3] Similar assumptions about labour market arbitrage have been used to generalise series based on day rates in agriculture. Later we explore the implications of relaxing these assumptions and assuming some degree of segmentation in the labour market.

Furthermore, we follow earlier studies by focusing on agricultural workers as representative of the historic workforce (Clark, 2007; Allen, 2009a). Agriculture was never less than one third of England's pre-1850 economy, and for most of our time period it was considerably more (Shaw-Taylor and Wrigley, 2010). Although both manufacturing and services grew as a proportion of all economic activities, we assume, again in line with earlier work, that labour market arbitrage ensured that any inter-sectoral unskilled wage gaps were temporary, and hence that our income series indicate trends in earnings across all sectors of the economy.[4] Similarly, although significant urbanisation took place, with the percentage of the population living in towns of more than 10,000 persons increasing from around 3 per cent in 1300 to some 20 per cent around 1800 (Wrigley, 1985), we hold, again based on previous studies, that urban costs wiped out nominal wage differentials.[5] More generally, our focus on agricultural labour ensures a like-for-like comparison with previous estimates of annual incomes grossed up from day wages (Clark, 2007).

[3] Our annual payments also avoid the problem that existing income estimates are based exclusively on day wages paid during off-season work, i.e. when daily rates were markedly lower than in the hay or corn harvests or other times of high demand.

[4] Alternative wage series based on day payments made to unskilled building workers (Allen, 2001; Clark, 2004) follow similar wage trends to those of their agricultural-sector counterparts.

[5] Clark (2007) estimates that the nominal rural-urban wage premium was as high as 25 per cent based on a comparison of farm and building workers' wages, but he also found that urban costs of living, rent in particular, eliminated most of the real wage premium.

3.1 Payments in Kind

Annual workers often received non-pecuniary benefits in addition to their cash payments, usually in the form of board and lodging.[6] This introduces a practical obstacle, explaining the neglect of annual workers' earnings in previous accounts of historical income series. Ideally, in-kind rewards should be valued on a case-by-case basis and added to any cash payments to determine overall remuneration. But there is insufficient historical evidence on the individual values of perquisites to support the construction of a comprehensive series.[7] An alternative strategy is to assume that in general in-kinds covered workers' subsistence, meaning their food, drink, clothes, and housing. Allen's (2009a) so-called 'respectability' consumption basket provides a practical tool for capturing and imputing value to historical subsistence (Humphries and Weisdorf, 2015). Table A1 in the appendix lists the commodities included in Allen's respectability basket and their quantities. The basket offers 2,500 calories per day considered to be a 'respectable' amount of nourishment for an adult. In addition to food and drink, the basket also contains linen for clothes, candles and lamp oil for light, fuel for heat, and a rent allowance. Using historical prices, also provided by Allen,[8] the basket's annual value for each specific year can then be added to a worker's cash wages, and the resulting income estimate transformed into real annual earnings using a cost of living deflator, as explained below. Later on, we explore the validity of the Allen's basket as a way to impute values to workers' non-pecuniary benefits by checking against costings in those cases where these can be read directly from the sources. Also, Allen (2015) proposed a more modest, so-called 'bare bones subsistence' basket, which we employ in a later sensitivity analysis to explore the possibility that payments in cash and kind were positively correlated.

3.2 Sources and Data Processing

Our study draws on standard sources such as the classic collections of primary wage data by James Edwin Thorold Rogers and William Beveridge. But we also searched less-known secondary sources and supplemented these records with new material from printed primary and archival sources, including manorial accounts, estate accounts, farm accounts, settlement

[6] Even annual workers who did not reside with their employers, some *famuli* for example in the medieval period, enjoyed perquisites in the form of grain liveries or other supplements (Poos, 1991; Hilton, 1975; Hanawalt, 1986).

[7] The problem of monetising payments in kind is not unique to workers employed on an annual basis. Day labourers sometimes received an allowance for the money value of food and drink and sometimes did not, making it hard to provide an exact day wages based on the existing records.

[8] The average daily cost of the 'respectability' basket between 1260 and 1850, taken from Allen's website (Allen, *Link*), is summarised in Table A2 in our appendix by decade.

examinations, diaries, and memoirs. All our sources are listed with brief annotations in the online appendix.

The geographical coverage is comparable to that of the widely-cited series for day workers provided by Clark (2007), whose sources we systematically revisited, alongside other repositories, many uncovered in our analogous work on women's wages (Humphries and Weisdorf, 2015). Our male income series include 6,800 annual payments in total.[9] Table A2 in the appendix reports their distribution across nearly six centuries of English history.

Table 1
Number of Annual Payments by Region and Occupational Category

Occupation	Frequency	Per cent	Cum.	Region	Frequency	Per cent	Cum.
Men/Helpers	2.730	40	40	South	2.334	34	34
Servants	865	13	53	Midlands	3.516	52	86
Labourers	559	8	61	North	950	14	100
Unknown	2.646	39	100				
All	6,800	100		All	6,800	100	

Source: see the text.

Building an income series from heterogeneous sources requires care and consistency. Geographically and occupationally diverse evidence must be flagged to avoid the introduction of misleading trends associated with compositional shifts. We have adopted three main strategies to curb such dangers. First, we endeavoured to avoid reliance on any single source or location in any specific decade. Our data (see Table 1) come mainly from the midlands and the south of England but with some northern coverage.[10] Furthermore, in order to make our series comparable to those for unskilled day workers (e.g. Clark, 2004, 2007; Allen, 2007), we excluded observations related to workers with managerial or financial responsibilities,

[9] Our 6,800 annual payments appear perhaps to be a modest number compared to the 19,417 casual payments reported in Clark (2007). However, a large share of those casual payments are not day rates, but threshing rates. Also, it is worth noting that payments for day work are much easier to find in the surviving records: a day worker can potentially be recorded 365 times each year, but as an annual worker he can only be observed once.
[10] Regions included in the south are the South West, the South East, as well as East Anglia. The midlands include East and West. The north includes the remaining regions (the North West and North East, as well as Yorkshire). We have excluded payments from the city of London where labour and costs of living were at a premium.

ignoring also workers whose job titles implied specialist training.[11] We have categorised our occupations into three main groups reported in Table 1: men and helpers, servants, and labourers. Examples of 'men' are coachmen, footmen, herdsmen, horsemen, and watchmen, while 'helpers' include cook's help, groom's help, hunter's help, and so on. Sometimes, although the source reported that the work was unskilled, no occupational title was provided. This gave rise to a fourth category, unknown work, which made up about one in three workers. Reassuringly, our regression analysis below shows that workers with no occupational designation were paid in line with men and helpers.

Last but not least, we account for the occupational and spatial heterogeneities reported in Table 1 above by running a piecewise OLS model of the following form:

$$\ln(\text{Wage}_{it}) = \alpha_i + \sum_j \gamma_j \text{Work}_j + \sum_k \eta_k \text{Region}_k + \sum \varphi_l \text{Decade}_l + e_{it},$$

where Wage_{it} is a wage payment made to individual *i* at year *t*; Work_j is a dummy for each of the four categories of work (men and helpers, servants, labourers, and unknown occupations) reported in Table 1 above; Region_k is a dummy for each of the three macro regions (south, centre, north) of Table 1 above; Decade_i is a dummy capturing the decade during when the wage payment was observed; and e_{it} is the error term.

The model is run piecewise, i.e. for each of the following periods: 1260-1499; 1500-1599; 1600-1699; 1700-49; 1750-99; and 1800-50. This periodisation is motivated by the structural breaks that Clark identified in his day wage series (Clark, 2007), which forms the basis of our comparison below. Our national annual income series reported in Table A2 in the appendix is then constructed using the weights and OLS regression coefficients reported in Table A3.[12] Consistent with economic historians' expectations, the estimated coefficients

[11] To illustrate: the Shuttleworth household in 1597 included 14 full-time male employees (Harland, 1856; 1857; Foster, 2002). The four highest paid workers were the butler and brewer, the cook, the miller and the steward, who all earned over £2 per annum that year and were excluded. The shepherd and gardener, with less status and skill, earned £1 13s 4d and £1 12s 0d, close to the wage of £1 6s 8d received by the two best-paid farm workers, all of whom were included. Four of the remaining farm workers, earning between £1 3s 4d and £1 0s 0d, were also included while the two poorest paid (on 16s and 12s) were shown by their wage trajectories to be not yet adults and so excluded.

[12] The predicted nominal payments come from adding the regression coefficients together using the weights reported in Table A3. In particular, each of the four occupational coefficients were multiplied by the share of observations within each occupational category for the relevant sub-period. Similarly, each of the three regional coefficients was multiplied by the share of population in each of the three regions. Population data were taken from Broadberry et al (2015) for the first sub-period and from www.visionofbritain.org.uk/census/ for the remaining periods. For example, the predicted nominal cash payment for the decade of the 1260s is e(5,3076+(0.61*0.0404)+(0.04*0.0254)-(0.28*0.0616)+(0.53*0.1829)+(0.24*0.0308)-1.651)=e(3.7691)=43.

show that labourers (the reference group) were usually paid slightly less than the other groups of workers. The analysis also suggests that workers in the midlands (the reference group) were regularly paid less than their northern counterparts, but more than their peers in the south.

4. Results

Our national annual labour incomes series in nominal terms, i.e. the cash component and the monetised benefits based on Allen's basket, is reported by decade in Table A2. The nominal payments have then been deflated using a standard historic consumer price index, in this case the annual cost of Allen's respectability basket. The resulting estimated real annual incomes are reported in Table A4 and graphed in Figure 1 with the solid lines showing the 10-year moving averages. The deflated series represents the numbers of respectability baskets that an unskilled male's annual income could buy, which Allen (2009a) calls 'welfare ratios'.[13]

Our estimates of real annual incomes show significant improvements, especially in the aftermath of the Black Death. Although some ground was lost after c. 1550, it was regained in the long boom originating some 50 years later and continued with only minor interruptions until the late 18th century. Here, the most significant reversal appears to coincide with the often-overlooked French wars (from 1792 until 1802), which created significant economic and social dislocation. The rise in real annual incomes starting in the late 16th century and with only small setbacks thereafter suggests that the origins of economic growth are more than two centuries earlier than commonly thought.

In contrast to previous pessimistic interpretations of British economic growth anchored to day wage rates and their early-modern Malthusian plateau, the continual rise in income after c. 1600 suggests that perhaps the reforms of 1688-9 really did create the preconditions for modern growth, as Douglass North and Barry Weingast have famously claimed (North and Weingast, 1989). North and Weingast argued that the institutional changes summarised as the 'Glorious Revolution' gave a security to investors and innovators denied their counterparts in previous regimes presided over by despotic monarchs unable to control their predatory

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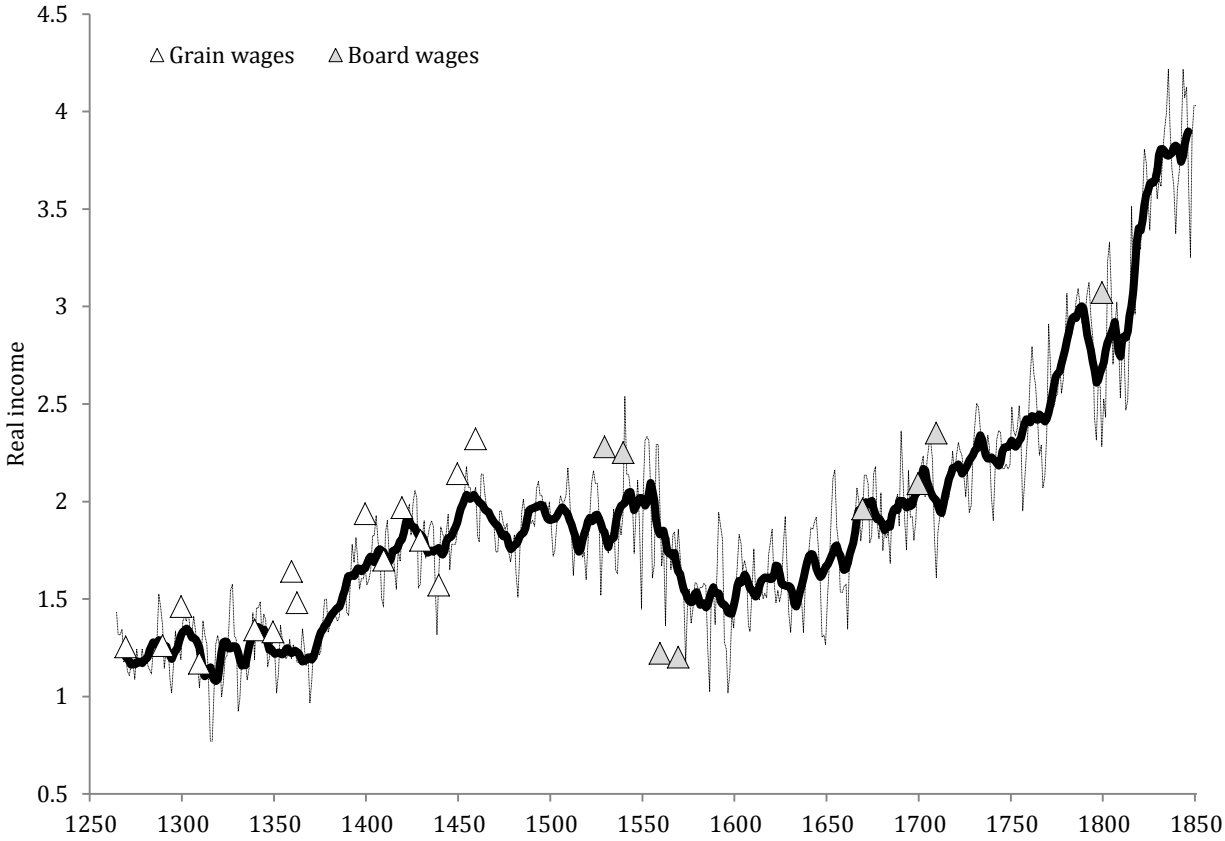
Figure A1 in the appendix shows that the predicted series is largely identical to using flat occupational and regional weights instead, or even simply the raw averages.

[13] Allen's original welfare ratios were computed on the assumption that an average family was made up of two adults and three children (Allen, 2007). Here, because the size of historical families arguably varied considerably during the period of observation, we simply compute the number of consumption basket that one male salary could afford. In order to compare our numbers with Allen's original numbers, our numbers must be divided by 3.25 (as children consume half as much as adults).

urges. Secure property rights should have enhanced asset values, encouraged investment and growth and thus driven up wages, but economic historians have been sceptical about the existence of empirical support for such gains in capital, land and labour markets (Clark, 1996; 2002a,b). In this sense, our findings offer support for the older institutionalist view.[14]

Figure 1
National Real Annual Incomes, 1260-1850



Note: Annual nominal income is the sum of cash payments and monetised in-kind benefits. Annual nominal income estimates are predicted based on the weights and regression coefficient reported in Table A3. Annual real income is computed by dividing nominal income by 365 days multiplied by daily costs of consumption. The bold line is the 10-year moving averages. The triangles report the monetary value of grain and board wages. *Source*: Annual wages: see the text. Grain and board wages: see Table A5. Daily costs of consumption: Allen (Link).

However, to put these apparent real wage gains in context, it is only after c. 1700 that an unskilled man's annual labour income could purchase more than two of Allen's respectable consumption baskets, that is, support himself and a wife. Moreover, in spite of gradually rising real annual income after c. 1600, it was not until the 19th century that male labour income alone was able to provide a 'respectable' living for a contemporaneously average family

[14] In fact, Clark's own evidence, reported in Clark (2004), suggests growth in real wages from c. 1620, but as he finds this interrupted by 1680, he dismisses the institutionalist account of the origins of British take-off (Clark, 2004, p. 1313).

comprising two adults and three children. Figure 1 thus demonstrates that the male breadwinner model in which a man's wages are deemed sufficient to support a family was irrelevant before 1800. Families needed other sources of income in addition to their male head's wages, not just during the early modern period, a time for which the male breadwinner model has been widely discredited, but also during medieval times when previous estimates of male earning possibilities suggested that male wages could extend to family support. Even in the post-plague 'Golden Age', an unskilled working man would have struggled to support more than one other person: there were no gilded medieval breadwinners.

4.1 The Basket Methodology

Our use of Allen's *one-size-fits-all* consumption basket to represent the value of annual workers' in-kind benefits at first glance might seem both heroic and out of synch with other research. One challenge springs from de Vries' claim that an early modern Consumer Revolution was paid for by an Industrious Revolution (de Vries, 1998, 2008). It is not implausible that the novelty market commodities, which became available during the early modern period (e.g. Acemoglu *et al.*, 2005; Palma and Silva, 2016), but which do not feature in Allen's basket, increasingly made their way into workers' non-pecuniary rewards alongside rising cash payments. Moreover, earlier in time, post-plague labour scarcity might have prompted employers not only to increase workers' cash pay, but also the quality and quantity of their rewards in kind. For example, the rise of the land-to-labour ratio in the aftermath of the Black Death and the ensuing growth of pastoral farming allegedly caused a swing in diets 'from corn to horn' (Campbell, 2000; Voigtländer and Voth, 2013), that is, away from cereals towards higher quality foodstuffs like meat and dairy products, which, while plausible, cannot be reconciled with the fixed composition of the Allen consumption basket.

A broader interpretation of these scenarios is that workers were systematically offered more benefits in tandem with more cash. Because Allen's basket is not designed to accommodate the possibility of such fluctuations in non-pecuniary pay, our income series might under- or overestimate annual workers' *actual* remunerations, during both the medieval and the early modern periods. There are several ways to address this criticism. One possibility is to exploit the fact that Allen operates with two consumption baskets: the 'respectability' basket, the monetary value of which we have used up to this point and in Figure 1, and the more restrictive 'bare bones subsistence' basket, which affords workers little more than what is needed for survival (Allen, 2015). The bare-bones basket not only

provides cheap calories from foodstuffs, such as oatmeal; it is also curmudgeonly compared with the respectability basket in terms of meat, dairy, and other, more expensive, calories. Furthermore, the bare-bones basket is significantly less generous with respect to clothing, heating, and housing. Table A1 in the appendix compares the composition of the bare-bones and respectability baskets.

To accommodate the idea that payments in cash and kind were positively correlated we can furnish workers with the more generous respectability basket when the cash-to-total payment was comparatively high, and then resort to the more meagre bare-bones basket when the share of cash was low.[15] Figure A2 in the appendix shows that cash reached nearly 50 per cent of the estimated total incomes between c. 1400 and 1550 and once again after c. 1650. Figure A3 shows the implication for the trends and levels in income in two scenarios: the original situation where workers receive the respectability basket through the entire period (Figure 1), and an alternative scenario where payments in cash and kind move together and workers' remunerations shift between the respectable and bare-bones baskets.[16] As is predictable, in the alternative scenario hard times become even worse and the subsequent turnarounds even more dramatic, further burnishing the post-plague Golden Age and amplifying the early take-off into modern economic growth.

Another way to consider the suitability of the basket methodology involves using the scattered empirical evidence on recorded values of annual workers' in-kinds to check whether they fit with the monetary value of Allen's respectability baskets. Starting with the medieval period, Gerald Lui's study of medieval workers' remuneration provides us with valuations for grain wages on the Pittington manorial demesne in Durham and the Lullington manorial demesne in East Sussex between 1390 and 1450 (Lui, 2012). Interestingly, although Durham is situated in the North-East of England, and Sussex in the South, the total wages, paid in cash or grains or both, during this period were remarkably similar in size, thus building confidence that Lui's grain wages are more widely representative. Grain liveries from other secondary or printed-primary sources have also been collected (see Table A5 in the

[15] Figure A2 in the appendix show how the cash component in workers' annual earnings evolved over time. Before the Black Death, cash payments comprised less than 20 per cent of workers' total compensation. But, as Figure A2 shows, the cash component rose markedly in the aftermath of the plague reaching nearly 50 per cent during the 15th and 16th centuries. Then, as the population recovered, cash payments also returned to their pre-plague level, reaching slightly less than 25 per cent of total income just before 1600. Cash payments then once gradually again increased in importance to reach 70 per cent of workers' compensation around 1850.

[16] On the thin line in Figure A3, workers receive the respectability basket between 1400 and 1500 and again after 1650. During 1350-99 and 1600-49 payments in kinds gradually shift from the bare-bones basket to the respectability basket, while during the period 1550-99 payments in kinds gradually shift the opposite way. During the remaining periods, workers receive the bare-bones basket.

appendix). Where these are valued within the source, we take this estimate; otherwise, we have imputed a value based on the grain mix specified using time-specific grain prices.

Furthermore, in our search for workers' payments from the early modern period, we sometimes came across records of payment made to workers who were *boarded out* for which they received compensation. Their so-called *board wages* were paid in cash on top of any ordinary wage remuneration. These workers full salaries thus conflated the employer's monetary valuation of the cost of board and lodging privileges and the worker's usual wage.[17] Of course, workers who were boarded out might have been selected for the privilege and their remuneration in the higher end of the pay scale.

These cases, along with the total remunerations including grain wages from the medieval period, can be compared directly to our estimates in Figure 1 of wages plus in-kinds valued by Allen's basket. Table A5 in the appendix reports the average cash equivalents for those workers whose wages were combined with a monetary subvention in place of their usual in-kinds for the decades where we were able to find data. The cash equivalents, transformed into real income in the same way that we deflated our implied income estimates above, i.e. by dividing by the annual cost of living, are shown as triangles in Figure 1.

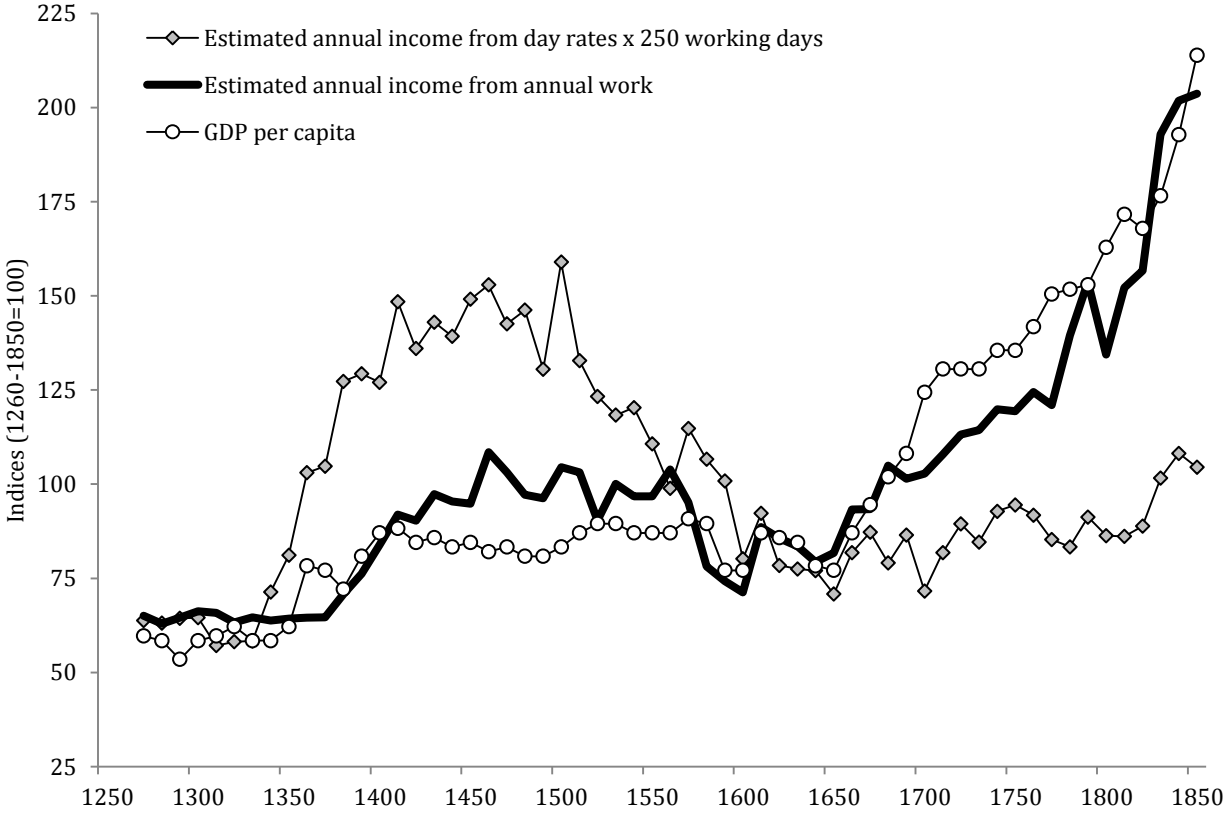
Table A5 also compares the average implied benefits, i.e. the conflated cash salaries minus our average cash payments from Table A2, with the value of Allen's respectability basket for the relevant decades. There is a fairly good correspondence between the two, although the monetary value of Allen's respectability basket slightly underestimates workers' privileges, as the triangles in Figure 1 also indicate, with the exception of the 1560-70s, when the comparisons suggest that Allen's bare-bones basket would perhaps be more appropriate.[18] The implied value of payments increased markedly after c. 1600 along with rising cash payments, indicating that the generosity of payment in kind did not fall when cash payments began to rise. Overall, the trends and levels displayed in Figure 1 above, and the conclusion that early modern growth began more than two centuries earlier than commonly thought, are robust to the spot checks on the validity of the Allen respectability basket as an approximation for the value of annual workers' payments in kind.

[17] For example, in Northumberland few farm servants were kept in the house but provided with accommodation and other in kinds. Thus one hind's wage in the early nineteenth century was reported as 'paid largely in kind, with a house and garden and other perquisites', the package costed as worth £18 11s 0d (Orde, 2006).

[18] Note that this chronology coincides with the suggestion from the variation in the share of the monetary component of annual incomes that resort to the bare-bones basket might be apt.

Figure 2

Indices of GDP/Capita and Real Annual Income Inferred from Day and Annual Work, 1260-1850



Note: Annual real income is constructed by dividing annual nominal income by 365 days multiplied by daily costs of consumption (see Table A2). Annual nominal income from day work (squares) is computed by multiplying day wages by 250 days. Annual nominal income from annual work (black), which is predicted based on the regression coefficient reported in Table A3, is the sum of cash payments and monetised in-kind benefits. *Sources*: Day wages: Clark (2007, Table A2). Annual wages: see the text. Daily costs of consumption: Allen (Link). GDP per capita: Broadberry *et al.* (2015).

4.2 Comparison with Day Wages and Per Capita GDP

Figure 2 reports our new series of annual labour incomes directly in the context of previous work. It shows the indexed annual real wages along with indices for per capital GDP as well as for earlier conventional estimates of annual incomes based on day wage rates multiplied by 250 working days. The graph captures three key findings.[19] First, real incomes inferred from annual work (i.e. the solid bold line) exhibit systematic and large divergences from annual incomes estimated on the basis of day rates multiplied by 250 days of work (the line with squares). If incomes from day and annual work were roughly identical, arbitraged into convergence by the flexibility of employers and the mobility of workers between day and annual employment as argued in Clark and Van der Werf (1998) and above, then this suggests

[19] Figure A1 in the Online appendix shows the raw data averages against the estimated data based on the regression coefficients reported in Table A3.

that annual incomes inferred from day wage rates are heavily burdened by a misrepresentation of labour input on the intensive margin, which we return to below.

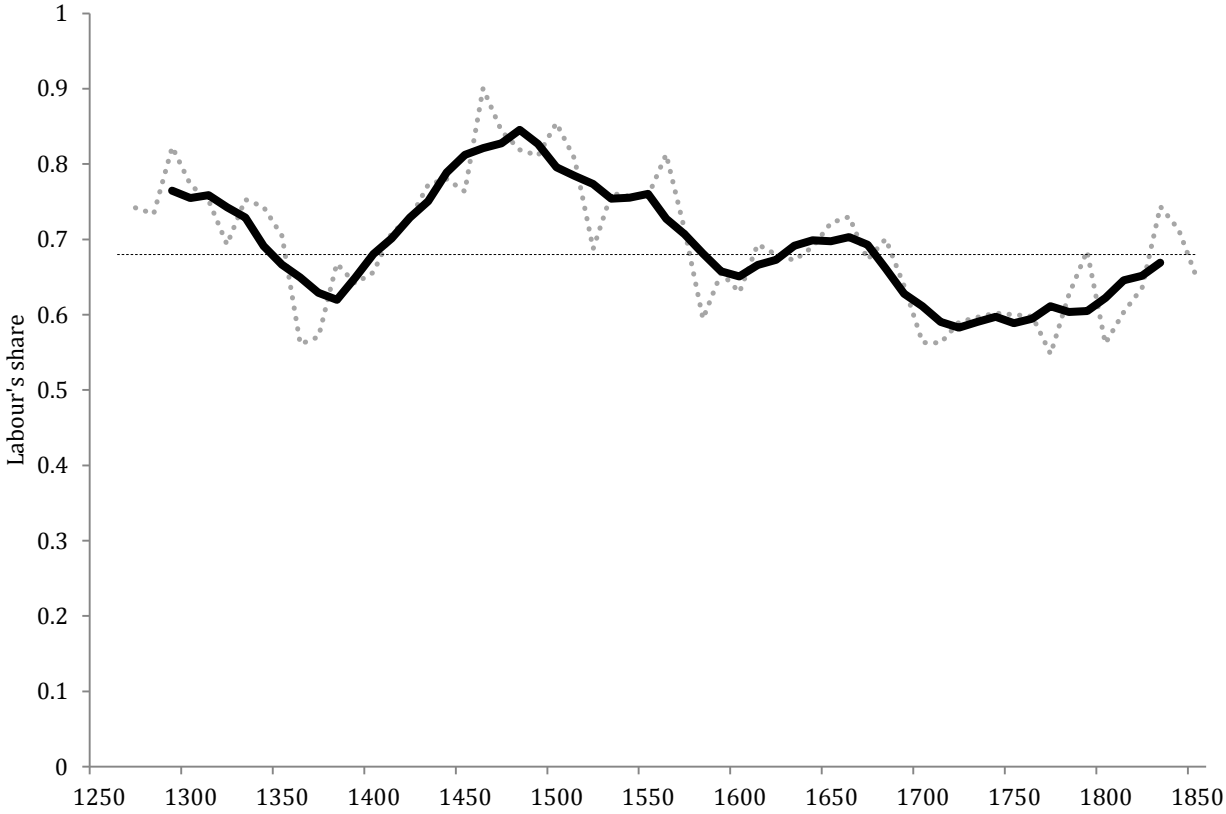
Thus, a second key finding is that the post-Black Death 'Golden Age' glittered much less brightly than is suggested by annual income estimates from day rates and the 250 days assumption. The Golden Age apogee according to Figure 2 (solid bold line) was lower and surpassed much earlier than other authors have proposed. Annual workers' 'golden' incomes were outshone by the late 17th century rather than by the late 19th century, as Clark (2007) observed based on day rates. If annual incomes from day work and annual work were roughly the same, then our conclusion aligns with Hatcher's (2011) intuition that day workers' annual earnings during the long 15th century were much smaller than those inferred from multiplying day rates by 250 days of work.

Finally, while our series of annual labour incomes diverges from the older series based on day rates and an assumed 250 day working year, over the whole 600-year timespan it is much closer to the recently revised series for GDP per capita (circles). This improved fit has knock-on implications for interpretations of long-run growth. Since it leaves much less room for swings in factor shares to be needed to reconcile macro magnitudes, it challenges both the 'Golden Age' of post-Black Death workers' wellbeing and the 'Engels' Pause' in early industrial workers' gains, points which implicate labour's share.

4.3 Labour's Share

The relative developments of real annual labour incomes and per capita GDP speaks to the debate about capitalism and the long-term evolution in inequality (e.g. Piketty, 2011; 2014), because a central component of this debate relates to the evolution of factor shares and labour's share of total income in particular. While the record for most of the 20th century suggests that labour's share has stayed relatively constant (Gollin, 2002), developments in the 1980s, along with wider evidence on growing inequality, have seemed to posit a structural break. For example, labour's share in the US has declined since the early 1980s from 65 to 60 per cent (Karabarbounis and Neiman, 2014, Figure 2), sparking a debate about whether this marks a permanent change. Figure 3 illustrates the progress of labour's share between 1260 and 1850 based on our new income estimates. Labour's share fluctuates between 60 and 80 per cent of total output, which is consistent with 20th-century data. When framed relative to 600 years of data as in Figure 3, the current global reversal in labour's share seems comfortably within the range of historical fluctuations.

Figure 3
Labour's Share in England, 1260-1850



Note: The dotted graph shows the indexed evolution in the share of real income to GDP per capita. The solid line is the 50-year moving average. The dashed line is the average labour share across the six centuries and equals 0.68. Labour's share in 1800 is set to 0.60 consistent with Allen (2009b). *Sources*: Annual wages: see the text. Daily costs of consumption: Allen (Link). GDP per capita: Broadberry *et al*. (2015).

Movements in labour's share of GDP are strongly linked to the role of technical change in the demand for labour. It is commonly thought that technical progress during the Industrial Revolution skewed income in favour of profits, so benefiting capitalists over labourers. Engels (1845) reconciled the huge increases in output associated with the Industrial Revolution with the deleterious social and economic conditions that he observed in northern England (where industrialisation first took hold) by arguing that the gains from economic development accrued overwhelmingly to capitalists. Indeed, the mounting gap after 1650 between earlier estimates of real annual incomes grossed up from day rates multiplied by 250 and per capita GDP (see Figure 2) prompted Robert Allen to suggest that a surge in inequality was intrinsic to the growth process: technical change increased the demand for capital and thus raised the profit rate and capital's share (Allen, 2009b). Based on annual incomes inferred from day rates, Allen envisioned that the rise in profits sustained the Industrial Revolution by financing investment, but only much later (after c. 1800) led workers' pay to rise. The closer fit between

the trends in real annual income from annual work and per capita GDP as displayed in Figure 2 thus suggests that inequality between workers and capitalists was less pronounced than hitherto thought, though it is important to note that any gains for working people were probably bought at the expense of longer working years, as we propose below. Moreover, it is notable that labour's share according to our new estimates of annual labour incomes, reached a nadir in the era of industrialisation, evidence supporting a more nuanced version of 'Engels' Pause'.

4.4 The Industrious Revolution

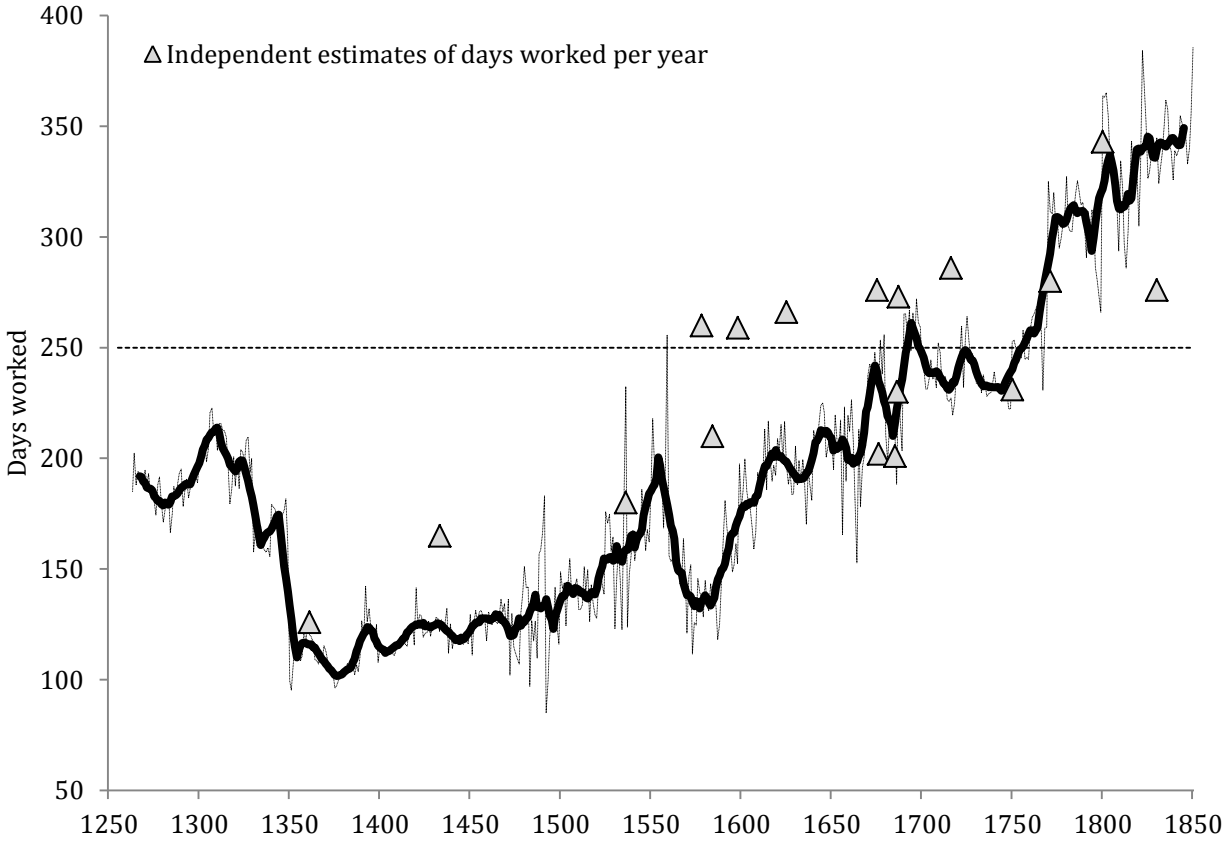
In their seminal article from 1998, Clark and Van der Werf pointed out that day wage rates in combination with annual wage rates facilitate the computation of the working year needed in day labour in order to obtain the income that could be earned in annual employment (Clark and Van der Werf, 1998). Based on wage assessments and estate records, they found that the average working week grew modestly, from five to six days, between the late 16th and the late 17th centuries. Our new and more comprehensive series of annual rates, in combination with Clark's (2007) full series of day rates, enable the replication of their exercise using a greatly expanded dataset and covering an extended time period.

The evidence illustrated in Figure 4 proposes a remarkable change in annual labour input on the intensive margin between the pre-Black Death period and the end of the classical years of the Industrial Revolution. Before the plague, some four days of casual work per week would provide the same income as that enjoyed by an annual worker. But steeply rising day rates combined with more modestly growing annual rates in the aftermath of the plague meant that as few 2-3 days of casual work per week were sufficient to match an annual worker's yearly remuneration.[20] The shorter working year after c. 1350 agrees with Hatcher's (2011) supposition that the post-Black Death labour market did not gild the peasantry's world to the extent previously thought, either because day workers could not find enough work or because their labour supply curves bent backwards.[21]

[20] While this seems like a rather short working year, payments made in 1361-62 reported in Booth (2003) reveal that full-year salaries were paid for no more than 21 weeks' work. If the working week back then was five or six days long, then this meant that Booth's labourers supplied somewhere between 105 and 126 days of work per year. Moreover, our sensitivity analysis below shows that, if annual workers accepted non-trivial wage cuts in exchange for job security, then the working year immediately after the Black Death would have been some 130-140 days long.

[21] The latter conclusion accords with historians' description of medieval workers' *mentalities*: 'A plausible reconstruction of workers' attitudes in the period 1349-1520 is that they set themselves goals in cash or

Figure 4
The Length of the Working Year, 1260-1850



Note: The graphs show the number of days that a day labourer needed in order to earn an annual worker's yearly income (see Table A4). The solid line shows the 10-year moving average. Triangles report independent estimates of annual days worked per person. *Sources*: Day wages: Clark (2007, Table A2). Annual wages: see the text. Daily costs of consumption: Allen (Link). Independent working days: from Blanchard (1978), Clark and van der Werf (1998), and Voth (2001) as explained in Allen and Weisdorf (2011, pp. 720-21); from Booth (2003) in which 21 workweeks paid a full year's salary; and from Hatcher (1998) and Woodward (1995).

Furthermore, Figure 4 chimes with the view that the simplifying but crude assumption of 250 days of work overlooks the possibility of a 'preference switch' in workers' evaluation of the labour-leisure trade-off, as described in De Vries' concept of an Industrious Revolution (De Vries, 1994, 2008). The work-year estimates of Figure 4 are also more in line with Voth's derivation of time use from 18th- and 19th-century court records, confirming his assessment that the period 1760-1830 saw 'the longest years' (Voth, 2001, title). Resort to the scattered evidence on the number of days actually worked in different times and places can provide spot checks as indicated by the triangles in Figure 4. Overall, the implied working year agrees reasonably well with the trend in the independent estimates found in the literature

consumption needs and worked until they had achieved their aims. Then they ceased to work' (Dyer 1989, p. 224).

(Woodward, 1995; Hatcher, 1998; Booth 2003; Allen and Weisdorf, 2011; Broadberry *et al.,* 2015). Figures 2 and 4 together provide strong support for our claim that the two conflicting grand narratives of long-run economic development, the Malthusian and Revisionist view, can be reconciled by allowing the historical working year to vary along the lines shown, and as anticipated in Campbell (2013) and elsewhere.

4.5 The Earnings of An Average Worker

Up to this point, however, we have implicitly followed the supposition in Clark and Van der Werf (1998) that labour market arbitrage ensured that day and annual workers earned roughly the same labour income per year. But if labour market regulations, or compensating differentials, or still other selection effects meant that day workers earned systematically more or less per annum than did annual workers, then the incomes of annual workers would systematically under- or over-estimate the average earnings of unskilled males. Worse still, the size of any mis-estimation would vary with the relative shares of daily and annual workers in the economy in ways that are explicated below. This issue is not unique to our study but applies with equal strength to existing income estimates based on day rates. But by combining our new annual payments with educated guesses about trends in the proportions of day and annual workers in the labour force and the direction and extent of any wage premiums, we can try, as a sensitivity check, to estimate the earnings of an average unskilled male worker in agriculture, even in the absence of complete mobility on the part of workers and complete flexibility on the part of employers as between annual and day work.

In the following, we employ a simple model for a segmented labour market: one segment for day labour and one for annual work. The annual earnings of an average worker are then the weighted average of workers' earnings in the two sub-markets. In other words, average annual earnings can be expressed as $e=\alpha e_A+(1-\alpha)e_D$, where e_A and e_D and are annual incomes in annual and day work, respectively, and where α denotes the share of workers employed in annual work. If we suppose that earnings in the two segments of the labour market are proportional, i.e. that $e_D=\beta e_A$, then average earnings can be written as $e=(\alpha+(1-\alpha)\beta)e_A$. If $\beta=1$, i.e. if there are no labour market specific premium or selection effects, the case explored hitherto, then arbitrage ensures that day and annual workers earn the same over the course of a year, and it follows that $e=e_A=e_D$. In this case, the share of labour engaged in annual work (α) plays no role in determining the annual earnings of an average worker, which is then captured by Figure 1 above.

However, if it turned out that $\beta \neq 1$, i.e. a premium or selection effect applied, then average annual earnings becomes $e=(\alpha+(1-\alpha)\beta)e_A$,. In this case, the size of α (the share of annual workers) and β (the size of a possible casual-annual pay gap) both influence average earnings. This means that yearly incomes from annual work, e_A, is a more or less accurate indicator of *average* earnings, e, depending on changes in the magnitudes of α and β over time. For example, in the standard interpretation, β would have exceeded unity because day workers required compensation for shouldering labour market risk and were more mobile and therefore better able than their annual counterparts to take advantage of labour scarcity and bargain more aggressively. If so, then the higher the day worker premium was, the more the payments in annual work would underestimate average earnings (i.e. $d(e/e_A)/d\beta>0$). Moreover, if the share of annual workers declined over time, as is usually assumed in the literature, the more annual earnings would underrate average earnings ($d^2(e/e_A)/d\beta d\alpha<0$). Although the historical values of α and β are not well known for the period we observe, it is still possible to make educated guesses about their magnitudes and trends to see if the resulting average earnings challenge the conclusions above.

The conventional view is that α declined over the course of the pre-industrial era. Here, we firm up the fragmentary evidence derived from the literature with reference to research on social structure, which has identified socio-economic groups by number and size of household. This enables us to compute rough estimates of the number of live-in servants relative to wage-earners and subsistence producers. Starting at the beginning of our time period, the Social Table constructed by Campbell (2016, Table 3.4) for the end of the 13th century divides the population into eight social groups.[22] For each group, Campbell estimates the number of households, household size, population, various measures of landholdings, and incomes. On the basis of household size, landholding, and income, it is assumed that those in group (1) had four annual male servants; those of group (3) had two annual male servants; and those in groups (2) and (4) had one annual male servant. We also assume that groups (6) to (8), characterised by small households (≤ 3.5 persons) and living below Campbell's poverty line, contained no annual servants, although it is assumed that half of group (8), which contains soldiers and sailors, were employed on annual contracts. Adding the numbers up

[22] These are: (1) landowners (spiritual lords, aristocracy, gentry, clergy); (2) minor clergy, professionals, lawyers, merchants, tradesmen, craftsmen, builders, urban labourers; (3) substantial tenants; (4) yard landers; (5) smallholders; (6) cottagers and agricultural labourers; (7) rural craftsmen, non-agricultural labourers, labourers, paupers, vagrants; and finally (8) men–at-arms, miners, fishermen and sailors.

comes to a total of 444,000 workers employed on annual contracts.[23] Further, households in groups (1), (6), and (7) are assumed to have contained one male day labourer, which gives a total of 530,000 day workers. Adding together annual servants and day labourers gives a total of 974,000 wage earners. Next, adding to this the total landowners, yard-landowners, and smallholders (501,000), and the remaining 25,000 from group (8), assuming they are unwaged subsistence workers. This gives a total male labour force of 1,500,000,[24] meaning that annual workers comprised 46 per cent of the waged labour force in the latter half of the 13th century.

For 1688, we used Gregory King's celebrated Social Table (King, 1696, reproduced in Barnett, 1936) as the basis for a similar exercise. By this date, the proportion of annual servants in the male labour force was down to 23 per cent, an estimate roughly consistent with Peter Laslett's claim (based on household listings) that 29 per cent of households in British pre-industrial communities (1564-1821) contained servants of one kind or another. Finally, for an estimate towards the end of our period, we resorted to the first population censuses.[25] In agriculture, where live-in service persisted longest, by 1871 16 per cent of hired workers were annual servants. A conservative but not implausible estimate is therefore that α gradually (we assume linearly) declined from 46 per cent in the 1260s, to some 25 per cent in the 1680s, and further around 16 per cent in the 1850s.

Turning to β, it is commonly thought that the day-annual income premium was persistently positive, even if it varied over time. In the 13th century, some annual workers appear to have been relatively well paid compared with day labour.[26] By contrast, in the post-Black Death period, especially shortly after the plague, it is widely held that day labourers

[23] Our estimates of servants in the households of landowners (i.e. 84,000) fit reasonably well with Claridge and Langdon's (2016) estimate of 94,000 *famuli* employed on English demesnes in 1300.

[24] If half of the population in 1290, which consisted of 4,746,000 people in total, was male, and if 65 per cent of them were in the working-age group, then this suggests a male labour force of 1,542,450, which is consistent with our 1,500,000-male work force.

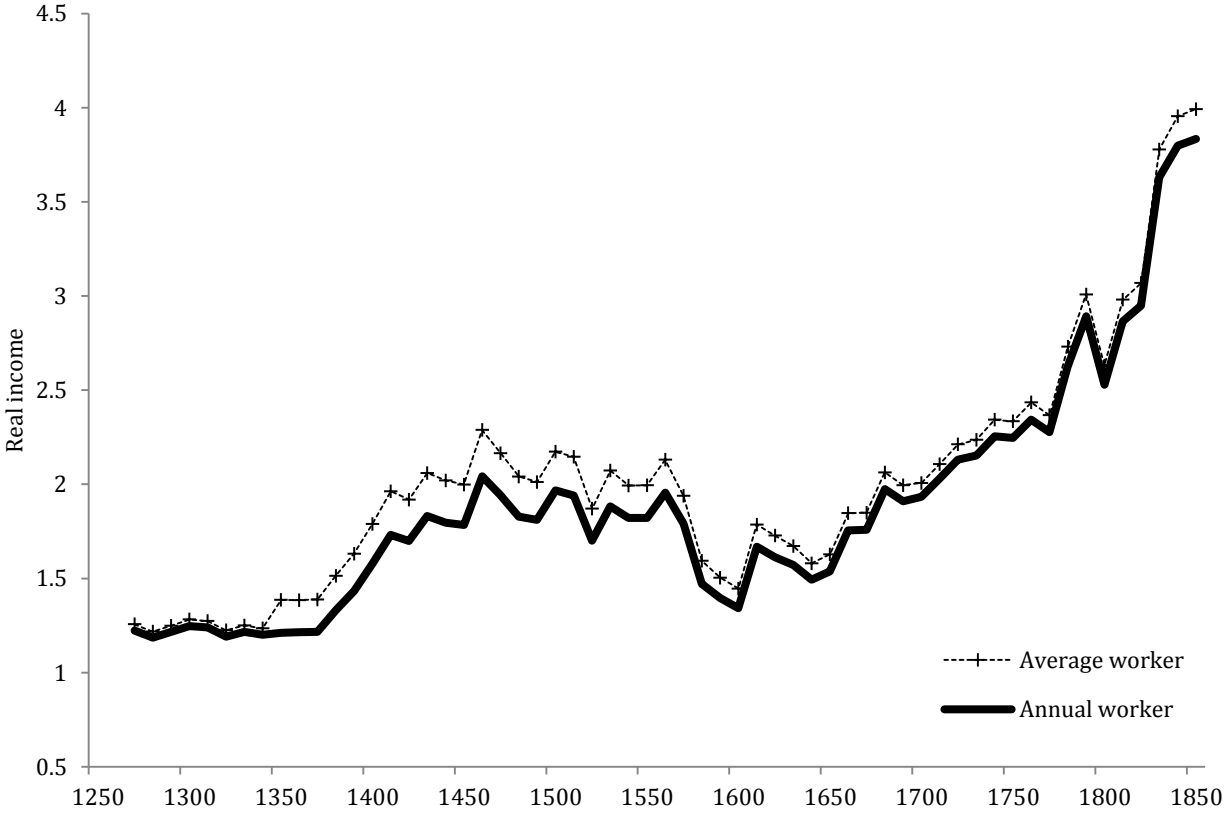
[25] The censuses suggest considerable variation by type of community: in rural Lancashire, where traditional family farms survived, 28 per cent of households continued to harbour servants; Preston at 10 per cent; Nottingham at 12 per cent; and the potteries at 9-11 per cent were more typical.

[26] According to Claridge and Langdon (2016), however, there were groups within the famuli that did not fare so well. David Farmer has suggested that *famuli* on medieval estates, while employed year-round, were not full-time workers, since they held farmland of their own on which they would simultaneously have worked (Farmer, 1996, pp. 228-9). This originally discouraged Clark and Van der Werf from using such workers' annual wages to impute the length of the working year. We have corrected for this matter in the data collection by paying careful attention to those instances when workers were paid by the term, often in differing cash amounts, aggregating up to the annual wage rather than simply multiplying out. Besides, even for the medieval period our estimates of days worked per year presented below do not just rely on the wages of *famuli*, but instead include many other types of workers and of domestic servants (see Table 2).

were best able to exploit the labour scarcity and hold up landowners in order to force wage concessions, while annual remunerations remained anchored to customary levels or levels set by law and were slower to respond, as we also noted of our own data (see Figure 2 above). Differential bargaining power explains the widespread accounts of medieval workers' preference for day employment and the coercive prominence given to yearlong contracts in the labour legislation of the 14th century (Putnam, 1908; McIntosh, 1986, pp. 161; Penn and Dyer, 1990, pp. 367-9; Bailey, 1994). Under these circumstances, the day versus annual pay gap probably grew larger and remained inflated until labour scarcity abated.

Figure 5

Real Annual Incomes of An Annual Worker and An Average Worker, 1260-1850



Note: Annual real income is constructed by dividing annual nominal income by 365 days multiplied by daily costs of consumption (see Table A2). Annual nominal income from annual work (black) is the sum of the predicted cash payments and monetised in-kind benefits. Annual nominal income of an average worker (squares) is equal to $(\alpha+(1+\alpha)\beta)e_A$, where e_A is the annual nominal income of an annual worker (black). *Sources*: Annual wages: see the text. Daily cost of consumption: Allen (Link).

Moreover, with population growth in the 18th century, the supply of younger workers seeking berths as servants and apprentices grew, while a growing preference for privacy on the part of employers, perhaps alongside increasing recognition of the real costs of live-in

servants, continued to ensure a day-labour premium. A plausible scenario, then, is that β was 1.05 before the Black Death rising to 1.25 when the plague first hit (c. 1350), after which it gradually (again we assume linearly) fell back to 1.05 after the population had re-stabilised (c. 1700), staying at this level to the end of our period. Based on these suppositions about the magnitudes and trends in α and β, we can now compute and illustrate the earnings of an *average* worker against the estimated earnings of *annual* workers. Figure 5 above shows that despite the introduction of a significant pay gap between the two types of labour, the magnitudes and trends in yearly incomes were roughly similar for annual and average workers, even if the 'Golden Age' for an average worker would have been slightly brighter under the probable assumptions about α and β explained above.

5. Conclusion

The leading theory of long-run developments in real incomes in Western Europe, known as the 'little divergence' hypothesis, holds that the North Sea region, notably England and the Low Countries, diverged from the rest of Europe between 1500 and 1750 in terms of real annual incomes inferred from day wage rates (Allen, 2001). The income estimates used to sustain the 'little divergence' hypothesis also play a central role in the 'great divergence' debate, where they feature as illustrations of Western European progress in comparison with Africa, Asia, and the Americas (e.g. Broadberry and Gupta, 2006; Allen *et al.,* 2011, 2012; Frankema and van Waijenburg, 2012). Furthermore, real incomes similar to those provided by Allen (2001; 2009a) and Clark (2004; 2007) are the central pillars in the Malthusian model used to describe economic development in pre-industrial societies (Clark, 2008). If the annual earnings supporting these theories are subject to measurement error of the kind and extent suggested here, the mainstream accounts of the timing of the take-off into modern economic growth and the onset and extent of the 'little' and 'great' divergences require revision. Indeed, if the diverging trends in day and annual payments reported above are not unique to England, but apply equally to France, Germany, Holland, Italy, and Spain, as argued in Campbell (2013) and elsewhere, a Europe-wide reassessment of annual incomes will be needed, along with a reconsideration of the accounts of comparative development that have hitherto underpinned European and indeed global meta-narratives.

Moreover, in a discipline increasingly captured by the idea that the Industrial Revolution was a product of scientific advancement or inventive genius, the post-1600 continuous

increase in the length of the working year and the intensification of this growth in the run-up to industrialisation, provides a salutary reminder of the relevance of other factors. Whether the English increase in labour input was voluntary, as workers gave up leisure for material goods, or imposed as a consequence of structural changes in employment, or the erosion of alternatives to wage labour, more dependants to support, or shifts in bargaining power, remains the key unanswered question.

Primary Sources – FOR ONLINE PUBLICATION

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Beveridge/Price History:

Papers relating to prices and wages in England from 1100-1900 collated by William Henry Beveridge and his research assistants (notably Miss ME Rayner and Dr Hubert Hall between [923] and [1963]). comprising raw and tabulated price data and reports and notes on the source material.

British Library

Blenheim Collection. Add MS 19592:

Monthly accounts of Payments for the building of Blenheim Palace; with cash accounts of the same.

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Add MS 61680:

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Accompts of receipts and (reversing the volume) disbursements by the bailiff of Sir John Pelham; 1653-1670. Farming. household and personal accompts.

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Receipt of George Peacock to M.C Salvin for work by his family. 1849.

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Copy Memorandum book of Ralph Watson of Harton. 1812-184. including general accounts of information concerning the running of the farm and servants' wages.

Londonderry Collection. D/Lo F 950. 951. 953. 955-6. 959:

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Account Book of Thomas Mort. 1703-1725. MS HM 7281:

Detailed volume recording expenditures including servants' wages.

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Kent History Centre

H.W. Knocker Collection. U55/E7:

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Weller Collection. U38/A1:

Deeds and papers of the Weller family of Tonbridge. 1446-1854. including accounts.

Oxfordshire History Centre

Dillon Estate and Family Collection. E36/1/12/F/2:

Account books with receipts. 1754-61. for household at Ditchley.

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Compton Verney Collection. DR98/1799-1816:

Papers of the combined families of Verney (Lords Willoughby de Broke from 1696) of Compton Verney and Peyto of Chesterton. including estate and household accounts.

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Appendix

Table A1

Allen's Consumption Baskets (for One Adult Person)

Respectability		**Bare bones subsistence**	
Good	Quantities per year	Good	Quantities per year
Bread	234 kg	Oatmeal	170 kg
Beans/peas	52 L	Beans/peas	34 kg
Meat	26 kg	Meat	5 kg
Butter	5.2 kg	Butter	3 kg
Cheese	5.2 kg	Cheese	
Eggs	52 each	Eggs	
Beer	182 L	Beer	
Soap	2.6 kg	Soap	1.3 kg
Linen	5 m	Linen	3 m
Candles	2.6 kg	Candles	1.3 kg
Lamp oil	2.6 L	Lamp oil	1.3 kg
Fuel	5.0 M BTU	Fuel	2.0 M BTU
Rent	5% allowance	Rent	5% allowance
Total	2,500 cal/day	Total	2,100 cal/day

Source: Allen (2009a, Table 2.1) and Allen (2015, Table 2).

Table A2

Estimated Payments, in Pence and Real Terms, By Decade, 1260-1850

Years	Annual wages					Day wages			Other variables		
in decades	No of obs.	Est. cash	Implied benefits	Implied income	Real income	Day pay	Implied income	Real income	CPI/day Respect	CPI/day Bare bone	GDP per cap
1260-70	101	43	193	236	1.22	1.28	321	1.66	0.53	0.22	48
1270-80	179	36	197	233	1.18	1.29	323	1.64	0.54	0.25	47
1280-90	126	42	197	239	1.21	1.32	330	1.67	0.54	0.22	43
1290-1300	245	48	197	245	1.24	1.32	331	1.68	0.54	0.25	47
1300-10	631	53	222	275	1.23	1.32	331	1.48	0.61	0.26	48
1310-20	148	46	240	286	1.19	1.46	364	1.51	0.66	0.30	50
1320-30	105	53	248	301	1.21	1.51	376	1.52	0.68	0.28	47
1330-40	157	40	200	240	1.20	1.49	372	1.85	0.55	0.23	47
1340-50	235	44	211	256	1.21	1.78	446	2.11	0.58	0.24	50
1350-60	338	51	240	292	1.21	2.58	645	2.68	0.66	0.30	63
1360-70	38	55	259	315	1.21	2.82	705	2.72	0.71	0.32	62
1370-80	56	78	237	315	1.33	3.14	784	3.31	0.65	0.27	58
1380-90	79	99	229	329	1.43	3.09	772	3.36	0.63	0.25	65
1390-1400	47	135	233	368	1.57	3.08	771	3.3	0.64	0.25	70
1400-10	72	165	226	391	1.73	3.49	873	3.86	0.62	0.26	71
1410-20	72	171	244	415	1.69	3.46	864	3.53	0.67	0.25	68
1420-30	28	200	240	441	1.83	3.58	895	3.72	0.66	0.25	69
1430-40	26	203	255	458	1.79	3.70	924	3.62	0.70	0.26	67
1440-50	33	189	240	429	1.78	3.73	933	3.87	0.66	0.24	68
1450-60	97	247	237	484	2.04	3.77	943	3.97	0.65	0.24	66
1460-70	76	226	240	467	1.94	3.57	892	3.70	0.66	0.24	67
1470-80	82	196	237	433	1.82	3.60	901	3.80	0.65	0.23	65
1480-90	108	207	255	462	1.81	3.46	866	3.39	0.70	0.25	65
1490-1500	57	225	233	459	1.96	3.86	965	4.13	0.64	0.24	67
1500-10	58	230	244	474	1.94	3.38	844	3.45	0.67	0.25	70
1510-20	89	186	266	453	1.70	3.41	854	3.2	0.73	0.28	72
1520-30	65	248	281	529	1.88	3.46	864	3.07	0.77	0.30	72
1530-40	67	233	284	518	1.82	3.56	890	3.13	0.78	0.32	70
1540-50	19	302	368	671	1.82	4.24	1060	2.88	1.01	0.44	70
1550-60	43	502	525	1028	1.95	5.40	1350	2.57	1.44	0.64	70
1560-70	44	421	532	954	1.79	6.36	1589	2.98	1.46	0.65	73
1570-80	56	283	602	885	1.47	6.67	1668	2.77	1.65	0.71	72
1580-90	63	256	646	902	1.39	6.77	1693	2.62	1.77	0.87	62

Table A1 cont'd	Annual wages					Day wages			Other variables		
	No of obs.	Est. cash	Implied benefits	Implied income	Real income	Day pay	Implied income	Real income	CPI/day Respect	CPI/day Bare bone	GDP per cap
1590-1600	65	298	872	1170	1.34	7.27	1817	2.08	2.39	1.07	62
1600-10	146	533	799	1333	1.66	7.66	1916	2.4	2.19	0.98	70
1610-20	135	587	959	1547	1.61	7.82	1956	2.04	2.63	1.18	69
1620-30	249	589	1032	1622	1.57	8.32	2079	2.01	2.83	1.15	68
1630-40	221	553	1120	1673	1.49	8.97	2242	2.00	3.07	1.28	63
1640-50	112	687	1277	1965	1.53	9.40	2350	1.84	3.5	1.39	62
1650-60	155	877	1160	2038	1.75	9.86	2466	2.12	3.18	1.36	70
1660-70	105	882	1164	2046	1.75	10.55	2638	2.27	3.19	1.30	76
1670-80	178	1167	1197	2364	1.97	9.84	2459	2.05	3.28	1.33	82
1680-90	27	986	1084	2070	1.90	9.74	2436	2.25	2.97	1.34	87
1690-1700	29	1207	1292	2499	1.93	9.62	2404	1.86	3.54	1.28	100
1700-10	25	1180	1146	2326	2.03	9.75	2437	2.13	3.14	1.09	105
1710-20	35	1221	1080	2301	2.13	10.04	2510	2.32	2.96	1.30	105
1720-30	320	1304	1131	2435	2.15	9.94	2486	2.20	3.10	1.30	105
1730-40	301	1388	1105	2494	2.25	10.66	2665	2.41	3.03	1.23	109
1740-50	214	1346	1080	2427	2.24	10.61	2652	2.45	2.96	1.30	109
1750-60	60	1544	1149	2693	2.34	10.96	2741	2.38	3.15	1.43	114
1760-70	142	1664	1303	2967	2.27	11.55	2888	2.22	3.57	1.49	121
1770-80	173	2320	1427	3748	2.62	12.36	3090	2.16	3.91	1.60	122
1780-90	152	2652	1401	4054	2.89	13.29	3323	2.37	3.84	1.69	123
1790-1800	93	2656	1737	4393	2.52	15.58	3896	2.24	4.76	2.18	131
1800-10	29	4171	2237	6408	2.86	20.02	5005	2.24	6.13	2.67	138
1810-20	67	4807	2467	7274	2.94	22.77	5694	2.31	6.76	2.82	135
1820-30	69	5010	1905	6915	3.62	20.12	5031	2.64	5.22	2.08	142
1830-40	38	5085	1817	6903	3.79	20.43	5108	2.81	4.98	2.01	155
1840-50	20	5387	1901	7289	3.83	20.65	5161	2.71	5.21	1.88	172

Note: Implied annual incomes are estimated using the regression coefficients reported in Table A2. Implied benefits are computed as 365 days multiplied by the daily costs of consumption. Implied nominal income in annual work is the sum of cash payments and the implied benefits. Implied nominal income in day work is 250 days multiplied by the daily cash payment. Real annual income computed as the nominal annual income divided by 365 days multiplied by the daily costs of consumption. *Sources*: Annual wages: see the text. Day wages: Clark (2007). Daily costs of consumption (CPI per day): Allen (2007)/Allen (*Link*). GDP per capita index (1700=100): Broadberry *et al*. (2015).

Table A3

Estimated Coefficients of the OLS Regression

Weights	**1260-1499**	**1500-1599**	**1600-99**	**1700-49**	**1750-99**	**1800-50**
Man or helper	0.61	0.41	0.11	0.33	0.13	0.35
Servant	0.04	0.17	0.17	0.27	0.20	0.18
Labourer	0.07	0.15	0.03	0.11	0.15	0.03
Unknown	0.28	0.28	0.69	0.30	0.52	0.44
South	0.53	0.52	0.48	0.46	0.49	0.48
North	0.23	0.24	0.23	0.22	0.23	0.24
Centre	0.24	0.24	0.29	0.32	0.28	0.29
Coefficients	**1260-1499**	**1500-1599**	**1600-99**	**1700-49**	**1750-99**	**1800-50**
Man or helper	0.0404	0.0948	0.2929	0.1627	0.5163	-0.0172
Servant	0.0254	-0.1240	0.0953	0.0447	0.0477	-0.0239
Labourer (ref.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unknown	-0.0616	0.6868	0.2643	0.1874	0.3205	0.0094
South	0.1829	-0.0682	0.2731	-0.0590	-0.1022	-0.2214
North	0.0308	-0.4747	0.2562	0.1237	0.2292	0.0000
Centre (ref.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1260s	-1.6510	0.0000	0.0000	0.0000	0.0000	0.0000
1270s	-1.8219	0.0000	0.0000	0.0000	0.0000	0.0000
1280s	-1.6702	0.0000	0.0000	0.0000	0.0000	0.0000
1290s	-1.5328	0.0000	0.0000	0.0000	0.0000	0.0000
1300s	-1.4440	0.0000	0.0000	0.0000	0.0000	0.0000
1310s	-1.5910	0.0000	0.0000	0.0000	0.0000	0.0000
1320s	-1.4372	0.0000	0.0000	0.0000	0.0000	0.0000
1330s	-1.7252	0.0000	0.0000	0.0000	0.0000	0.0000
1340s	-1.6230	0.0000	0.0000	0.0000	0.0000	0.0000
1350s	-1.4739	0.0000	0.0000	0.0000	0.0000	0.0000
1360s	-1.3950	0.0000	0.0000	0.0000	0.0000	0.0000
1370s	-1.0543	0.0000	0.0000	0.0000	0.0000	0.0000
1380s	-0.8177	0.0000	0.0000	0.0000	0.0000	0.0000
1390s	-0.5140	0.0000	0.0000	0.0000	0.0000	0.0000
1400s	-0.3118	0.0000	0.0000	0.0000	0.0000	0.0000
1410s	-0.2780	0.0000	0.0000	0.0000	0.0000	0.0000
1420s	-0.1191	0.0000	0.0000	0.0000	0.0000	0.0000
1430s	-0.1049	0.0000	0.0000	0.0000	0.0000	0.0000
1440s	-0.1781	0.0000	0.0000	0.0000	0.0000	0.0000
1450s	0.0903	0.0000	0.0000	0.0000	0.0000	0.0000
1460s	0.0041	0.0000	0.0000	0.0000	0.0000	0.0000
1470s	-0.1385	0.0000	0.0000	0.0000	0.0000	0.0000
1480s	-0.0853	0.0000	0.0000	0.0000	0.0000	0.0000
1490s (ref.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1500s	0.0000	-0.2595	0.0000	0.0000	0.0000	0.0000

Table A2 cont'd						
1510s	0.0000	-0.4684	0.0000	0.0000	0.0000	0.0000
1520s	0.0000	-0.1838	0.0000	0.0000	0.0000	0.0000
1530s	0.0000	-0.2440	0.0000	0.0000	0.0000	0.0000
1540s	0.0000	0.0147	0.0000	0.0000	0.0000	0.0000
1550s	0.0000	0.5210	0.0000	0.0000	0.0000	0.0000
1560s	0.0000	0.3451	0.0000	0.0000	0.0000	0.0000
1570s	0.0000	-0.0509	0.0000	0.0000	0.0000	0.0000
1580s	0.0000	-0.1519	0.0000	0.0000	0.0000	0.0000
1590s (ref.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1600s	0.0000	0.0000	-0.8160	0.0000	0.0000	0.0000
1610s	0.0000	0.0000	-0.7195	0.0000	0.0000	0.0000
1620s	0.0000	0.0000	-0.7164	0.0000	0.0000	0.0000
1630s	0.0000	0.0000	-0.7803	0.0000	0.0000	0.0000
1640s	0.0000	0.0000	-0.5629	0.0000	0.0000	0.0000
1650s	0.0000	0.0000	-0.3191	0.0000	0.0000	0.0000
1660s	0.0000	0.0000	-0.3134	0.0000	0.0000	0.0000
1670s	0.0000	0.0000	-0.0336	0.0000	0.0000	0.0000
1680s	0.0000	0.0000	-0.2022	0.0000	0.0000	0.0000
1690s (ref.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1700s	0.0000	0.0000	0.0000	-0.1317	0.0000	0.0000
1710s	0.0000	0.0000	0.0000	-0.0979	0.0000	0.0000
1720s	0.0000	0.0000	0.0000	-0.0320	0.0000	0.0000
1730s	0.0000	0.0000	0.0000	0.0305	0.0000	0.0000
1740s (ref.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1750s	0.0000	0.0000	0.0000	0.0000	-0.5426	0.0000
1760s	0.0000	0.0000	0.0000	0.0000	-0.4677	0.0000
1770s	0.0000	0.0000	0.0000	0.0000	-0.1350	0.0000
1780s	0.0000	0.0000	0.0000	0.0000	-0.0014	0.0000
1790s	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1800s (ref.)	0.0000	0.0000	0.0000	0.0000	0.0000	-0.2559
1810s	0.0000	0.0000	0.0000	0.0000	0.0000	-0.1140
1820s	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0727
1830s	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0578
1840s (ref.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Constant	5.3076	5.6392	6.6589	7.0721	7.6271	8.7033
Observations	3136	569	1357	895	620	223

Note: The predicted nominal payments reported in Table A2 come from adding the regression coefficients together using the weights reported in this Table as explained on page 9. *Sources*: Annual wages. see the text. Population data: Broadberry *et al.* (2015) and www.visionofbritain.org.uk/census.

Table A4 – FOR ONLINE PUBLICATION

The Real Income of Unskilled Annual Male Workers, 1260-1850

1265	1.32	**1300**	1.38	**1335**	1.08	**1370**	1.08	**1405**	1.93
1266	1.32	**1301**	1.41	**1336**	1.14	**1371**	1.25	**1406**	1.79
1267	1.34	**1302**	1.38	**1337**	1.28	**1372**	1.23	**1407**	1.73
1268	1.18	**1303**	1.44	**1338**	1.43	**1373**	1.31	**1408**	1.50
1269	1.22	**1304**	1.33	**1339**	1.19	**1374**	1.21	**1409**	1.46
1270	1.13	**1305**	1.33	**1340**	1.45	**1375**	1.23	**1410**	1.84
1271	1.11	**1306**	1.41	**1341**	1.45	**1376**	1.37	**1411**	1.90
1272	1.17	**1307**	1.33	**1342**	1.49	**1377**	1.50	**1412**	1.75
1273	1.17	**1308**	1.16	**1343**	1.31	**1378**	1.50	**1413**	1.75
1274	1.09	**1309**	1.04	**1344**	1.42	**1379**	1.33	**1414**	1.75
1275	1.24	**1310**	1.17	**1345**	1.39	**1380**	1.37	**1415**	1.64
1276	1.15	**1311**	1.39	**1346**	1.15	**1381**	1.39	**1416**	1.55
1277	1.17	**1312**	1.31	**1347**	1.19	**1382**	1.41	**1417**	1.75
1278	1.24	**1313**	1.27	**1348**	1.34	**1383**	1.41	**1418**	1.69
1279	1.17	**1314**	1.10	**1349**	1.24	**1384**	1.39	**1419**	1.84
1280	1.23	**1315**	0.77	**1350**	1.19	**1385**	1.41	**1420**	1.89
1281	1.16	**1316**	0.77	**1351**	1.02	**1386**	1.54	**1421**	1.92
1282	1.14	**1317**	1.05	**1352**	1.12	**1387**	1.59	**1422**	1.95
1283	1.12	**1318**	1.27	**1353**	1.36	**1388**	1.62	**1423**	1.99
1284	1.25	**1319**	1.31	**1354**	1.29	**1389**	1.43	**1424**	1.83
1285	1.28	**1320**	1.25	**1355**	1.27	**1390**	1.41	**1425**	1.99
1286	1.28	**1321**	1.00	**1356**	1.19	**1391**	1.60	**1426**	2.06
1287	1.52	**1322**	1.06	**1357**	1.21	**1392**	1.78	**1427**	2.02
1288	1.45	**1323**	1.19	**1358**	1.29	**1393**	1.69	**1428**	1.56
1289	1.36	**1324**	1.21	**1359**	1.19	**1394**	1.82	**1429**	1.58
1290	1.15	**1325**	1.36	**1360**	1.27	**1395**	1.69	**1430**	1.81
1291	1.23	**1326**	1.54	**1361**	1.23	**1396**	1.55	**1431**	1.90
1292	1.26	**1327**	1.58	**1362**	1.17	**1397**	1.60	**1432**	1.71
1293	1.09	**1328**	1.31	**1363**	1.17	**1398**	1.60	**1433**	1.81
1294	1.02	**1329**	1.29	**1364**	1.21	**1399**	1.66	**1434**	1.87
1295	1.17	**1330**	0.92	**1365**	1.35	**1400**	1.57	**1435**	1.90
1296	1.34	**1331**	0.98	**1366**	1.25	**1401**	1.60	**1436**	1.87
1297	1.23	**1332**	1.19	**1367**	1.16	**1402**	1.65	**1437**	1.60
1298	1.26	**1333**	1.19	**1368**	1.21	**1403**	1.83	**1438**	1.32
1299	1.19	**1334**	1.19	**1369**	0.97	**1404**	1.83	**1439**	1.64

Table A3
cont'd

1440	1.87	**1475**	1.86	**1510**	2.04	**1545**	1.73	**1580**	1.54
1441	1.84	**1476**	1.89	**1511**	1.85	**1546**	1.95	**1581**	1.56
1442	1.81	**1477**	1.74	**1512**	1.62	**1547**	2.11	**1582**	1.56
1443	1.84	**1478**	1.69	**1513**	1.79	**1548**	1.86	**1583**	1.58
1444	1.93	**1479**	1.77	**1514**	1.82	**1549**	1.45	**1584**	1.57
1445	1.65	**1480**	1.83	**1515**	1.74	**1550**	2.08	**1585**	1.25
1446	1.78	**1481**	1.63	**1516**	1.77	**1551**	2.31	**1586**	1.02
1447	1.78	**1482**	1.51	**1517**	1.71	**1552**	2.33	**1587**	1.54
1448	1.78	**1483**	1.75	**1518**	1.74	**1553**	2.31	**1588**	1.58
1449	1.84	**1484**	1.95	**1519**	1.60	**1554**	2.05	**1589**	1.37
1450	1.89	**1485**	2.01	**1520**	1.79	**1555**	1.61	**1590**	1.64
1451	1.94	**1486**	1.92	**1521**	1.95	**1556**	1.68	**1591**	1.95
1452	2.04	**1487**	1.92	**1522**	2.09	**1557**	2.29	**1592**	1.87
1453	2.04	**1488**	1.92	**1523**	2.16	**1558**	2.29	**1593**	1.81
1454	2.18	**1489**	1.89	**1524**	2.09	**1559**	2.00	**1594**	1.28
1455	2.07	**1490**	1.90	**1525**	2.09	**1560**	1.67	**1595**	1.24
1456	2.07	**1491**	1.87	**1526**	1.95	**1561**	1.79	**1596**	1.02
1457	2.01	**1492**	2.07	**1527**	1.52	**1562**	1.36	**1597**	1.12
1458	2.04	**1493**	2.10	**1528**	1.82	**1563**	1.80	**1598**	1.43
1459	2.07	**1494**	2.03	**1529**	1.84	**1564**	1.82	**1599**	1.35
1460	1.82	**1495**	2.03	**1530**	1.83	**1565**	1.65	**1600**	1.51
1461	1.79	**1496**	1.93	**1531**	1.73	**1566**	1.83	**1601**	1.66
1462	2.14	**1497**	2.00	**1532**	1.83	**1567**	1.84	**1602**	1.83
1463	2.14	**1498**	1.90	**1533**	1.85	**1568**	1.71	**1603**	1.78
1464	2.03	**1499**	2.00	**1534**	1.96	**1569**	1.86	**1604**	1.65
1465	1.97	**1500**	1.88	**1535**	1.65	**1570**	1.71	**1605**	1.70
1466	1.94	**1501**	1.72	**1536**	1.63	**1571**	1.62	**1606**	1.65
1467	1.94	**1502**	1.74	**1537**	1.91	**1572**	1.52	**1607**	1.36
1468	1.94	**1503**	1.88	**1538**	1.83	**1573**	1.17	**1608**	1.33
1469	1.88	**1504**	1.97	**1539**	1.93	**1574**	1.49	**1609**	1.54
1470	1.74	**1505**	2.03	**1540**	2.54	**1575**	1.55	**1610**	1.76
1471	1.74	**1506**	2.00	**1541**	2.14	**1576**	1.38	**1611**	1.51
1472	1.95	**1507**	2.00	**1542**	2.14	**1577**	1.45	**1612**	1.53
1473	1.95	**1508**	2.03	**1543**	2.06	**1578**	1.58	**1613**	1.50
1474	1.89	**1509**	2.17	**1544**	2.04	**1579**	1.58	**1614**	1.57

Table A3
cont'd

1615	1.50	**1650**	1.51	**1685**	1.96	**1720**	2.24	**1755**	2.35
1616	1.53	**1651**	1.68	**1686**	1.90	**1721**	2.30	**1756**	1.95
1617	1.51	**1652**	1.93	**1687**	2.00	**1722**	2.26	**1757**	2.10
1618	1.73	**1653**	2.12	**1688**	2.04	**1723**	2.24	**1758**	2.26
1619	1.79	**1654**	2.16	**1689**	1.88	**1724**	2.13	**1759**	2.38
1620	1.86	**1655**	1.87	**1690**	2.36	**1725**	2.02	**1760**	2.63
1621	1.59	**1656**	1.78	**1691**	2.12	**1726**	2.17	**1761**	2.80
1622	1.48	**1657**	1.54	**1692**	1.88	**1727**	1.94	**1762**	2.65
1623	1.55	**1658**	1.53	**1693**	1.75	**1728**	1.98	**1763**	2.60
1624	1.49	**1659**	1.56	**1694**	2.16	**1729**	2.25	**1764**	2.43
1625	1.53	**1660**	1.58	**1695**	1.92	**1730**	2.38	**1765**	2.24
1626	1.77	**1661**	1.35	**1696**	1.92	**1731**	2.50	**1766**	2.29
1627	1.92	**1662**	1.74	**1697**	1.80	**1732**	2.48	**1767**	2.07
1628	1.70	**1663**	1.76	**1698**	1.90	**1733**	2.36	**1768**	2.13
1629	1.43	**1664**	1.80	**1699**	2.15	**1734**	2.28	**1769**	2.35
1630	1.33	**1665**	1.91	**1700**	2.15	**1735**	2.27	**1770**	2.91
1631	1.52	**1666**	2.07	**1701**	2.19	**1736**	2.24	**1771**	2.72
1632	1.47	**1667**	2.00	**1702**	2.23	**1737**	2.34	**1772**	2.49
1633	1.50	**1668**	1.80	**1703**	2.02	**1738**	2.28	**1773**	2.49
1634	1.50	**1669**	1.87	**1704**	2.21	**1739**	2.03	**1774**	2.54
1635	1.47	**1670**	2.13	**1705**	2.29	**1740**	1.90	**1775**	2.55
1636	1.50	**1671**	2.13	**1706**	2.32	**1741**	2.18	**1776**	2.74
1637	1.33	**1672**	2.09	**1707**	2.22	**1742**	2.32	**1777**	2.55
1638	1.59	**1673**	1.79	**1708**	1.82	**1743**	2.36	**1778**	2.63
1639	1.73	**1674**	1.82	**1709**	1.61	**1744**	2.35	**1779**	2.79
1640	1.75	**1675**	2.14	**1710**	1.84	**1745**	2.17	**1780**	3.07
1641	1.86	**1676**	2.18	**1711**	1.92	**1746**	2.17	**1781**	2.82
1642	1.86	**1677**	1.89	**1712**	2.01	**1747**	2.19	**1782**	2.84
1643	1.90	**1678**	1.81	**1713**	1.92	**1748**	2.17	**1783**	2.87
1644	1.92	**1679**	2.04	**1714**	2.11	**1749**	2.18	**1784**	2.94
1645	1.77	**1680**	1.75	**1715**	2.00	**1750**	2.48	**1785**	3.03
1646	1.60	**1681**	1.84	**1716**	2.02	**1751**	2.37	**1786**	3.09
1647	1.30	**1682**	1.81	**1717**	2.14	**1752**	2.34	**1787**	3.02
1648	1.31	**1683**	1.84	**1718**	2.26	**1753**	2.37	**1788**	2.92
1649	1.27	**1684**	1.68	**1719**	2.14	**1754**	2.49	**1789**	2.88

Table A3
cont'd

1790	2.99	**1803**	3.33	**1816**	3.11	**1829**	3.55	**1842**	3.84
1791	3.07	**1804**	3.11	**1817**	2.96	**1830**	3.65	**1843**	4.22
1792	3.12	**1805**	2.71	**1818**	3.17	**1831**	3.62	**1844**	4.07
1793	2.95	**1806**	2.89	**1819**	3.32	**1832**	3.78	**1845**	4.13
1794	2.84	**1807**	3.02	**1820**	3.29	**1833**	3.91	**1846**	3.64
1795	2.43	**1808**	2.85	**1821**	3.53	**1834**	3.99	**1847**	3.25
1796	2.32	**1809**	2.53	**1822**	3.81	**1835**	4.22	**1848**	3.87
1797	2.61	**1810**	2.79	**1823**	3.74	**1836**	3.92	**1849**	4.03
1798	2.59	**1811**	2.75	**1824**	3.57	**1837**	3.71	**1850**	4.03
1799	2.28	**1812**	2.47	**1825**	3.39	**1838**	3.62		
1800	2.53	**1813**	2.52	**1826**	3.64	**1839**	3.37		
1801	2.43	**1814**	2.91	**1827**	3.71	**1840**	3.60		
1802	3.23	**1815**	3.52	**1828**	3.72	**1841**	3.69		

Note: Real annual income is computed as the annual income by decade (see Table A1) divided 365 multiplied by the daily costs of consumption. *Sources*: Annual wages: see the text. Daily costs of consumption: Allen (2007)/Allen (*Link*).

Table A5

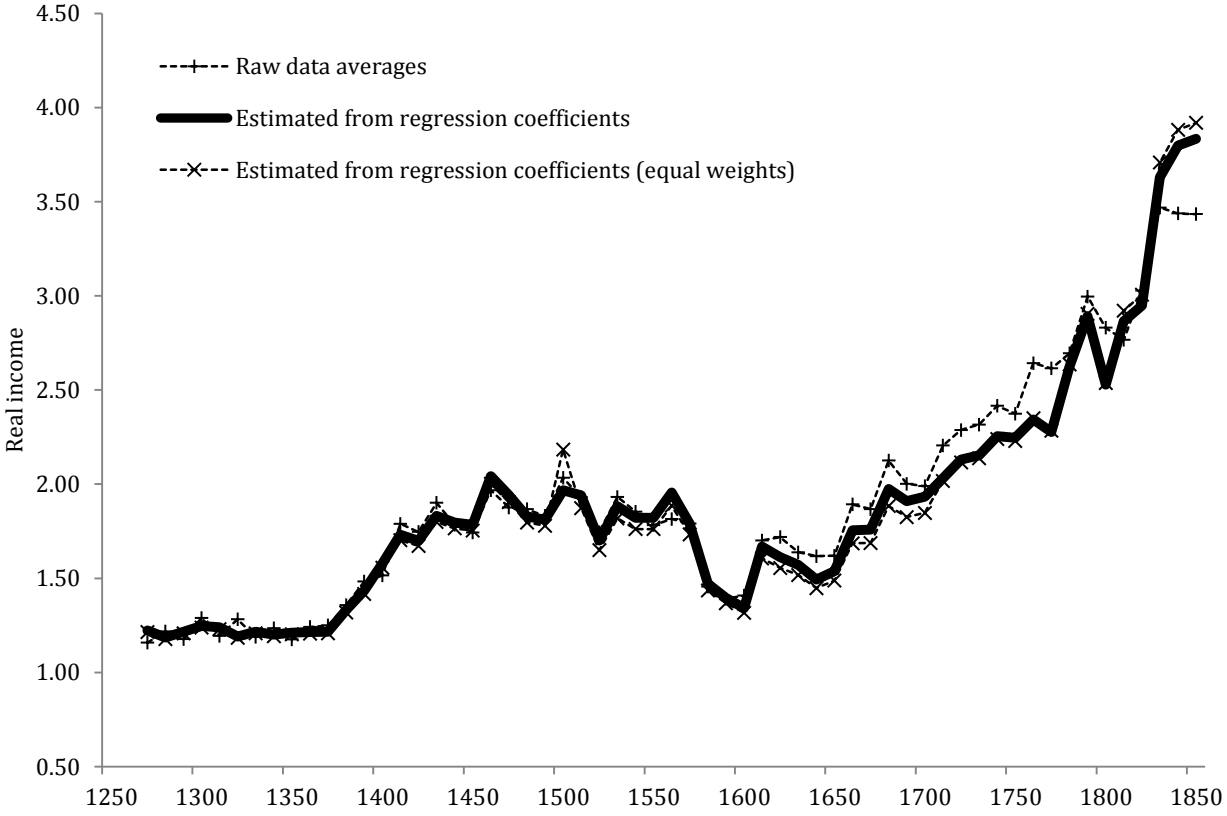
The Real Income of Unskilled Annual Male Workers from Board and Grain Wages, 1260-1850

Years decades	Cash equiv.	Real income	CPI per day	Cash pay	Implied privileges	Allen's basket	Source used
1260-70	242	1.25	0.53	43	199	193	Rogers (1866)
1280-90	249	1.26	0.54	43	206	197	Wells-Furby (2012)
1290-1300	288	1.46	0.54	49	239	197	Raban (2011)
1300-10	260	1.17	0.61	53	207	223	Britnell (2014); Raban (2011)
1330-40	269	1.34	0.55	40	229	201	Wells-Furby (2012)
1340-50	281	1.33	0.58	45	237	212	Salzman (1955); Wells-Furby (2012)
1350-60	396	1.64	0.66	52	344	241	Salzman (1955)
1360-70	384	1.48	0.71	56	328	259	Booth (2003)
1390-1400	452	1.94	0.64	135	317	234	Lui (2002)
1400-10	384	1.70	0.62	165	219	226	Lui (2002)
1410-20	481	1.97	0.67	171	310	245	Lui (2002)
1420-30	434	1.80	0.66	201	233	241	Lui (2002)
1430-40	401	1.57	0.70	203	198	256	Lui (2002)
1440-50	516	2.14	0.66	189	327	241	Lui (2002)
1450-60	551	2.32	0.65	247	303	237	Lui (2002)
1520-30	640	2.28	0.77	248	392	281	Bailey (2007)
1530-40	640	2.25	0.78	234	406	285	Bailey (2007)
1550-60	640	1.22	1.44	502	138	526	Adams (1995)
1560-70	640	1.20	1.46	421	219	533	Adams (1995)
1660-70	2280	1.96	3.19	882	1398	1164	Bettey (2005)
1690-1700	2702	2.09	3.54	1207	1495	1292	Bettey (2005)
1700-10	2696	2.35	3.14	1181	1515	1146	Bettey (2005)
1790-1800	5340	3.07	4.76	2657	2683	1737	Orde (2006)

Note: Cash equivalents comprise the salaries of workers whose wages conflate the valuation of specific privileges and ordinary cash wage. Real income is obtained by dividing the cash equivalents by 365 times the CPI per day. Cash pay is taken from Table A2. Implied privileges make up the difference between the cash equivalents and the cash pay from Table A2. Allen's basket is 365 times the CPI per day. *Sources*: Annual wages: as listed. Daily consumption costs: Allen (Link).

Figure A1

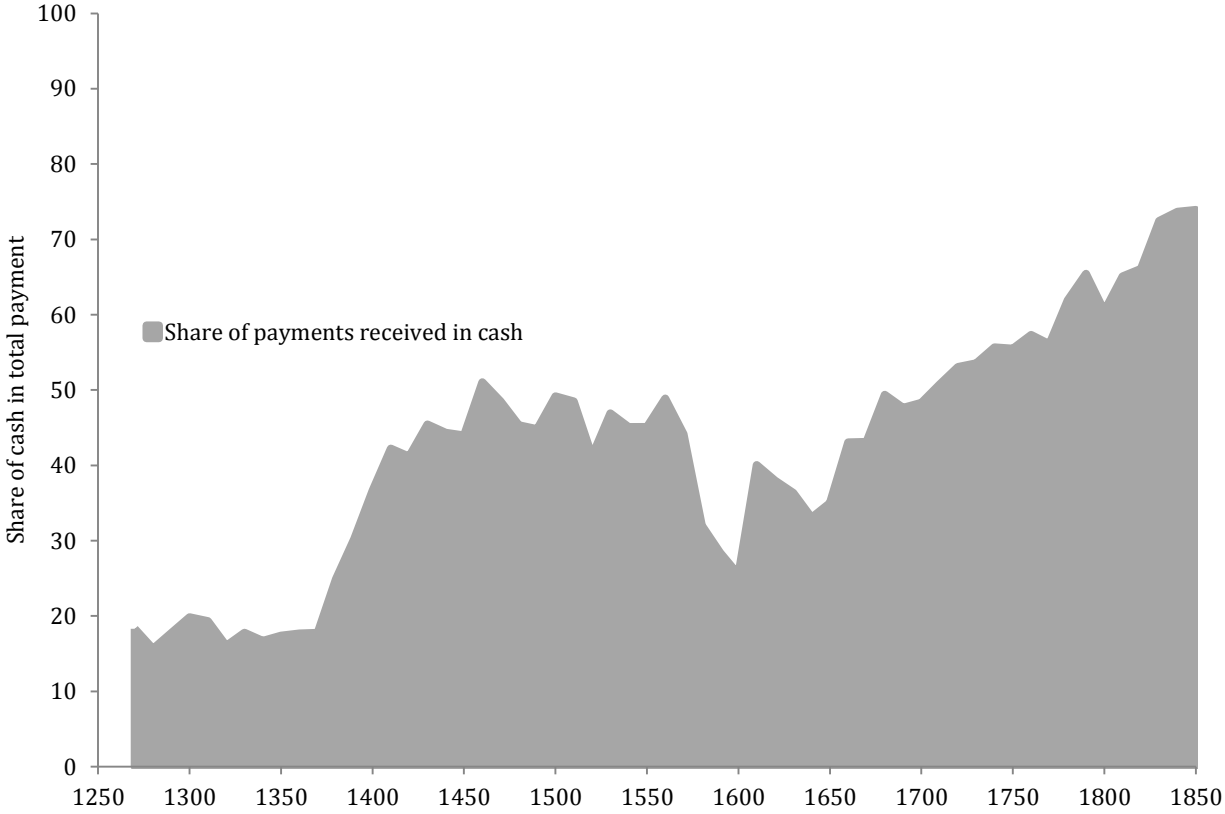
Raw Data Averages and Estimates Based on Regression Coefficients, By Decade, 1260-1850



Note: Annual real income is constructed by dividing annual nominal income by 365 days multiplied by daily costs of consumption (see Table A1). Annual nominal income is the sum of cash payments and monetised in-kind benefits. Annual nominal income estimates are predicted based on the weights and regression coefficient reported in Table A3. Equal weights mean that each coefficient for the occupational categories were divide by four and there each coefficient for the regional categories were divided by three. *Sources*: Annual wages: see the text. Daily cost of consumption: Allen (Link).

Figure A2

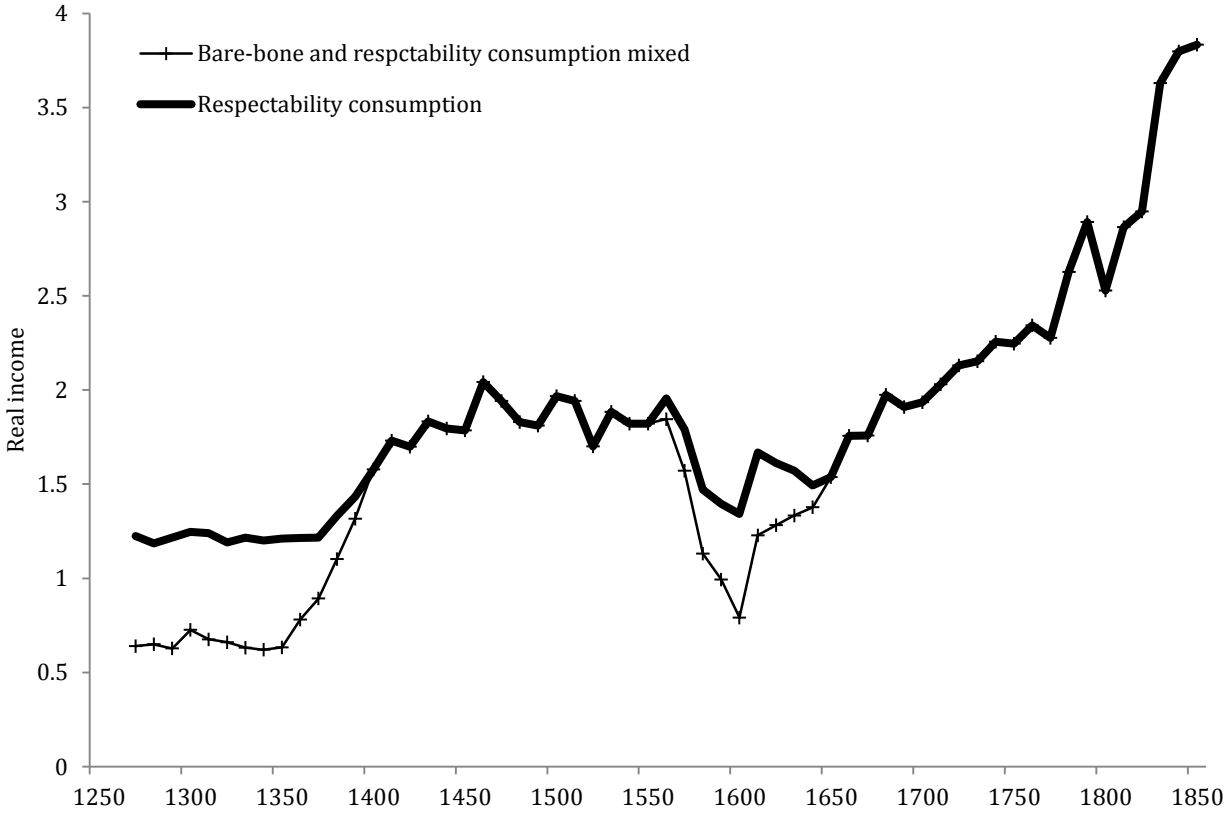
The Share of Cash in Annual Workers' Total Remuneration, 1260-1850



Sources: Annual wages: see the text. Daily consumption costs: Allen (Link).

Figure A3

Estimated Real Annual Incomes Using Mixed Consumption Baskets, 1260-1850



Note: Annual real income is constructed by dividing annual nominal income by 365 days multiplied by daily costs of consumption (see Table A1). On the thin line. workers receive the respectability basket between 1400 and 1500 and again after 1650. During 1350-99 and 1600-49 payments in kinds gradually shift from the bare-bones basket to the respectability basket. while during the period 1550-99 payments in kinds gradually shift the opposite way. During the remaining periods. workers receive the bare-bones basket. On the thick line. workers receive the respectability basket throughout the entire period. *Sources*: Annual wages: see the text. Daily cost of consumption: Allen (Link).