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Family standards of living over the long run, England 1280-1850

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Abstract

We utilise wage series for men, women and children to construct a long-run measure of family welfare in England, 1280-1850. We make adjustment for the participation rates of women and children, the varying number of days supplied to the labour market over time, the changing involvement of married women in paid work, and the evolving occupational structure of the economy. The resultant series is the first to depict the long run material experience of a representative, working family. Our family existed just above bare bones survival prior to the Black Death, but, as attested elsewhere, shortage of labour after the plague brought substantial gains. However, these gains were not unassailable. Restrictions on women's work and Tudor turmoil pushed the family below the 'respectable' level previously achieved. Transformation of the economy from the mid-1600s onwards coincided with improved welfare. While the position of the representative family tracked the trajectory of GDP per capita through the early modern and industrial revolution periods, this was only achieved by shifting contributions from different family members. Our paper provides an account of long run material wellbeing on a more satisfactory basis than historians have achieved hitherto, not focussed on men alone nor on marginalised women and children, but on realistically constructed historical families.

JEL classification:

N330 Economic history: labor and consumers, demography, education, health, welfare, income, wealth, religion, philosophy: Europe pre-1913

Work and welfare in Britain 1280-1860
Family living standards
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Keywords:

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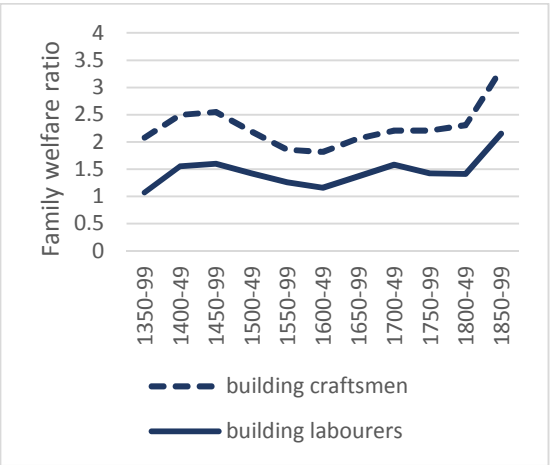
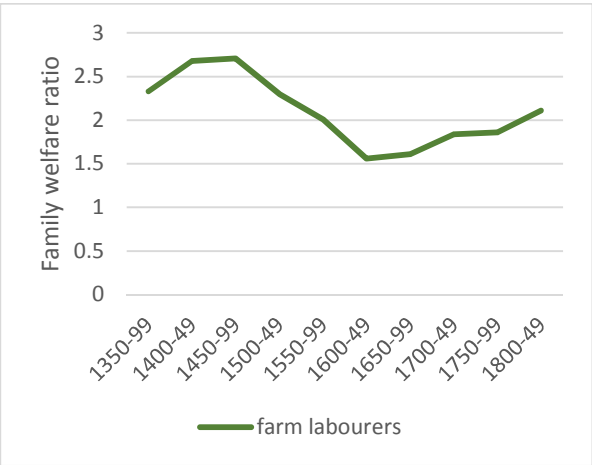
Introduction

Living standards have been of continuing interest to economists and economic historians when trying to assess the quality of life of populations in the past and the impact of economic change on the experience of these people. Nowhere has this been more evident than over Britain's industrial revolution where the standard of living debate took on political and ideological significance, alongside the economic. A variant of living standards has also emerged in recent explanations of long-run growth: the little divergence of the countries in north west Europe from others on the same continent sometime in the C16th (van Zanden 2009; Allen 2009,2010; Broadberry et al 2015). In particular, these economies have been identified as 'high wage'. After the Black Death (1345-51) decimated European populations, resultant labour shortage rewarded survivors with unprecedentedly generous remuneration from work. In many countries, high wages were quickly followed by rapidly growing populations that soon eroded any gains. In Britain and Holland, the agency of women in marriage decisions and the advantages they had working in pastoral agriculture has been argued to result in a demographic system where marriage was deferred, fertility restrained, and population kept in check so that the monetary gains persisted. In these countries high wages were entrenched, not transient. Ultimately the high wages caused employers of labour to consider the relative costs and, alongside the availability of cheap fuel in Britain, arguably, encouraged invention and the substitution of expensive labour by relatively cheap machinery and coal. Industrial revolution occurred.

In these meta-narratives of long-run growth the evolution of wages has been key. Data has been collected on building labourers, building craftsmen and farm labourers' wages over time and across countries and compared to the cost of basic subsistence, defined either at a respectable or barebones level (Allen 2010, 2014).

Figure 1. Welfare ratio: calculated for family of four relative to men's wages.





Notes:

Calculated for 250 days work per year at day rates, barebones living standards for family of 4 (cost of living calculated for 365 days, 3 baskets required). Building labourers and craftsmen have cost of living indexed to average prices in Strasbourg 1745-1754 (Allen 2010, p.420), farm labourers are worked out in nominal d. per day and compared to the cost of the bare bones basket, thus these series are not directly comparable.

Sources: Allen (2010) table 5,6; figures 7,8. pp.428-9; Humphries and Weisdorf (2015) Appendix A1, calculated from Clark (2007).

These wages have also been compared to the cost of supporting a small family (3.5 times the basic consumption needs basket) (Allen and Weisdorf 2011) and building craftsmen, at least, have been shown to have steadily improving pay which afforded them an ever greater range of goods.

However, these wage series offer only a partial glance at the standard of living. Without reciting the arguments in detail, living standards for people (not just men) in the economy are determined at the household level; incomes and the goods they afford are shared and many commodities, such as housing, heat, and light, are largely indivisible within this unit. Unless we can assume women and children's participation rates were unchanged over time and that their monetary contributions remained at a fixed proportion of men's wages, we cannot infer even material living standards without explicitly looking at the contributions of these family members. Furthermore, the wage data has focused on exactly that – wages. Over the long run, many workers received substantial parts of their remuneration in kind. Even farm workers on day pay frequently also received some food and drink, substantial sustenance was customary at harvest time and oftentimes provided in other seasons too. But the proportion of workers receiving in kind payments diminished over time, most probably being offset by monetary compensation. Furthermore, the use of day rates involves an assumption about the number of days worked in a year. The standard assumption is that this stood at some 250 days from 1200 to 1900: a standard that has been challenged. Hatcher (2011) points out that if medieval workers were able to earn the wages observed for 250 days of the year they would have been far wealthier than their land-owning bosses, a nonsensical situation. De Vries (2008) has argued for greater industriousness from the C16th, in part occurring through increased labour market work, in his explanation for the economic growth evident in north west Europe that eventually culminated in industrial revolution. Voth (1998, 2001) has substantiated this with evidence of an increase in the number of days worked per year by men in London from some 208 in 1750 to 306 by 1800-03 (Voth 1998 p.37). We need to consider the amount of work available to or desired by our workers in assessing the standard of living. Indeed, if the work year varies then there is a shift in another element of the standard of living, leisure.[1]

[1] While we do not explicitly consider leisure in this paper it is trivial to show that under a 250 working days per year assumption and the welfare from a day of leisure being valued as at least equivalent to the remuneration from a day of work the measure of welfare used here would increase by a fixed ratio throughout. The adjustment where the number of days worked per year varies over time yields a pattern for leisure-adjusted welfare that closely resembles the trajectory over time for farm labourers' welfare shown in figure 1.

The work presented here tackles these points and provides some estimates of family standards of living over the long run. In earlier work on the industrial revolution, Horrell and Humphries (1992) demonstrated the value of collecting household budgets to ascertain family living standards. From these they could determine not only earnings from various household members, often for periods of a year, but also participation rates, varied occupational experience, payments in kind and even welfare subsidies, such as poor relief. A comprehensive picture of family material welfare could be gained. Unsurprisingly we have been unable to find such a rich and comprehensive source to cover the six centuries we examine here. But, through a range of projects, we have been able to collect detailed data on pay to men working on annual contracts (Humphries and Weisdorf 2019), women on annual contracts and paid by the day (Humphries and Weisdorf 2015) and children's remuneration in a variety of payment systems (Horrell and Humphries 2019). These data collect both monetary remuneration and information on where in kinds were received, they sometimes obviate the need to make assumptions about the number of days worked, and, reciprocally, allow inferences about leisure. We use them to construct the earnings of a putative family. To do this we have to infer female and child participation rates and intensity of labour market engagement and we present evidence to support the assumptions we have made. However, in transitioning from nominal earnings to living standards we have to make use of an appropriate cost-of-living index, we lack independent information on prices for many goods and on the composition of the consumption bundle. For this long-run analysis, we utilise Allen's respectability basket, the cost of an unchanging consumption bundle over time. Thus our living standard measure is better interpreted as a welfare ratio (the number of respectability baskets afforded), as it cannot account for the impact of changing relative prices and varying incomes on the chosen consumption bundle, nor the extension of choice over new and improved goods. It thus omits important components of living standards. Other aspects, such as health, longevity, education, political and civil rights, and environmental conditions, that affect the quality of life also cannot be addressed here. But we do offer the first long-run family living standard (as narrowly defined) series that moves beyond determining what a father might afford for his family, and consider how this series evolves alongside measures of economic growth and demographic change for Britain 1280-1850.

The data

The four wage series collect data from hundreds of, predominantly, primary or printed primary sources, such as manorial, estate or household accounts, from medieval to Victorian times. The sources often refer to the individual by name and detail the wages they were paid on farms, in households and on construction sites. These are supplemented with comparable information from other sources, such as church warden's accounts, workhouse records, wage books from factories, surveys of the poor in particular townships and, for children, schools of industry. Remaining observations are gleaned from secondary sources, such as Arthur Young's (1768,1770,1771) observations on his tours around England in the 1770s and, for boys, Jane Humphries' (2010) collection of working class autobiographies.

We have collected 6,017 observations of women's pay in a variety of unskilled occupations, 6,800 cases for men in agricultural occupations and 3,873 observations of children's work and pay. For men and women care was taken to ensure that skilled occupations, classified as such according to HISCLASS, were excluded and London observations were omitted. Geographical location was noted and controlled for in analysis. For children the data is more heterogeneous. 68.4% of our observations are for boys, reflecting the difficulty of identifying young girls and their occupations when females are often described as 'maid' or 'mayde', whereas boys are more readily categorised, being described as 'x's boy', 'lad' or 'page'. Age is accurately known for 30.6% of the sample and indicated for a further 15%, for the remainder we ascribe age 11 or age 14 as implied by the source or from the type of work. The children worked in a variety of occupations: broadly classified as agriculture, mining, cottage industry, manufacturing, service, distribution, construction, and other. Agriculture predominated throughout the period, but working in service was frequent and girls were often occupied in cottage industry whereas mining tended to be the preserve of boys. Many of our observations represent those living in the south east of England, but the North West, South West, and North East were also reasonably represented.

In collecting our data we noted occupations and, for children, the characteristics mentioned above, alongside monetary remuneration and the period for which this was paid, broadly annual or day rate (casual). We also collected information on payments in kind, specifically whether the individual was boarded, lodged and clothed. We initially work on the assumption that 250 days were worked per year throughout the period we consider, but revisit this assumption later. Thus a person on an annual contract is assumed to work 250 days, a person with weekly pay to work 5 days per week, etc.. Additionally, we need to value in kind payments. We use Robert Allen's respectability consumption basket but, for children, recalibrate it according to their needs; thus board, lodging and clothing provision is attributed the monetary value of one half of Allen's basket.[2] One further consideration is required. Individuals who are boarded or lodged throughout the year will receive in-kinds even on days when they are not working. To consider the standard of living we look at what a person might consume from his/ her work on any representative day in the year. We achieve this measure for workers on annual contracts by taking their yearly pay and adding an in-kind basket multiplied by 365 days then dividing by the cost of Allen's basket for the whole year. This gives a standard of living measure that we describe as the welfare ratio, the number of respectability baskets a person can consume per day from her work. For a day worker the daily pay rate is multiplied by 250 days worked and again divided by the annual cost of the Allen basket.

[2] Again this enables comparability with other series on men and women's wages (Humphries and Weisdorf 2016, 2019), and is consistent with Allen's own suggestion that a family of husband, wife and two or three children would require three baskets (Allen 2009). Use of an alternative measure when valuing children's perquisites, the cost of 1500kcal of energy from wheat, yields essentially the same results (see Horrell and Humphries 2019).

We opt for the respectability basket in this computation because, as has been argued elsewhere (Humphries 2013), the original bare bones basket is hardly sufficient for survival and certainly does not provide enough calories for the hard physical work in which the members of our ordinary family are all engaged. We wish to consider a sustainable standard of living. The respectability basket might be overgenerous, families could economise by eating oats rather than bread and cutting down their consumption of meat, cheese and beer, and still achieve 2,100 calories per person (Allen 2015 t.2). Even so, at only 2,500 calories for an adult male if wheaten bread was eaten the respectability basket remains none too generous for a working man.

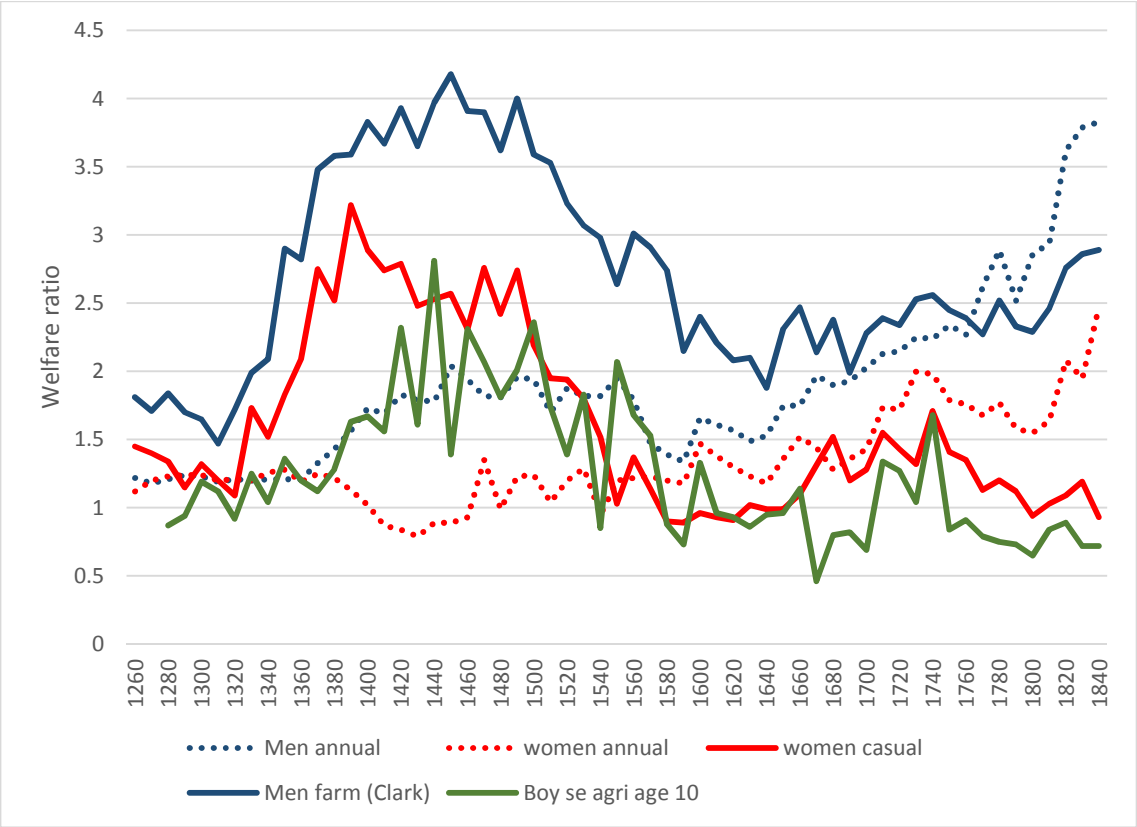
Table 1. Components of the Allen basket

	Respectability basket	
Good	Quantities per year	Calories per day
Oats		
Bread	234 kg	1571
Beans/ peas	52 L	370
Meat	26 kg	178
Butter	5.2 kg	104
Cheese	5.2 kg	54
Eggs	52 each	11
Beer	182 L	212
Soap	2.6 kg	
Linen	5 m	
Candles	2.6 kg	
Lamp oil	2.6 L	
Fuel	5.0 M BTU	
Rent	5 % allowance	
Total calories		2500

Source: Allen (2009) t.2.1.

The children's data, while detailed, is also heterogeneous in terms of source, occupation, region, gender, age and payment contract. Any raw average of the data, even aggregated over a ten-year period, yields considerable variation from decade to decade. To control for these sources of heterogeneity we regress the children's welfare ratio on a number of controls to capture the sources of heterogeneity and decade dummies to capture the variation over time. Our baseline child is a boy working in agriculture on day pay in the south east of England. The regression analysis (see Horrell and Humphries 2019) identifies predictable relationships with age, gender, regional development and occupational skill premia. Children were not just *ad hoc* additions to the labour market, their pay varied in a systematic and reasonable way. The decade dummies capture how our representative boy's welfare ratio moved over time (figure 2). Similar regression analysis controlling for occupational and spatial variation yields the decade averages for men's annual payments (Humphries and Weisdorf 2019).

Figure 2. Welfare ratio based on earnings of various family members.



For day or casual workers, the rise in remuneration in the late medieval period, after the decimation of the labour force by the Black Death and the subsequent labour shortage, is evident. Children, along with adults, capitalised on the material gains this shortage brought. But Tudor times saw these gains partially eroded. There was a short-lived improvement in

the first half of the eighteenth century, contemporaneous with the 'industrious revolution', but low levels of pay persisted through industrialisation. Of course, this depiction alters with varied assumptions about the length of the working year but, although less pronounced, the key features remain unchanged (see Horrell and Humphries 2019). For annual workers the situation was less rosy. Female workers on annual contracts have been identified as being predominantly single women, they were more available for live-in work than women with children and domestic responsibilities and service was a suitable vehicle for controlling what the authorities feared would be disruptive independence, conversely those in casual employment were typically married women and frequently described as such in the sources (for a detailed discussion see Humphries and Weisdorf 2015). Young single women did not share in the 'golden age' of work experienced by day workers, thus querying the underlying mechanism based on female agency argued elsewhere to explain the emergence of a distinctive North European Marriage Pattern (de Moor and van Zanden 2010). Male workers on annual contracts, although not so readily identified as predominantly single, saw delayed and muted gains relative to their day working counterparts. Assuming arbitrage in the male labour market, the implication must be for a shorter working year in this period than the commonly-assumed 250 days (Humphries and Weisdorf 2019).[3] Gaps in remuneration by payment system narrowed in the C16th and C17th, with implications for an increasing length of the working year and the early advent of industriousness occasioning economic growth (Humphries and Weisdorf 2019). Industrialisation brought with it new dynamics. Men gained at the expense of women and children and an annual contract was to be prized.

Family structure and household welfare

To move from individual remuneration to a picture for a representative family we need to define some features of the standard family. Family size is essential. In line with Laslett's and Wall's (1972) observations of unchanging household size of 4.75 people in England from the C16th to C19th,[4] we define our family as comprising five people, husband, wife and three children, aged 3 (representing 0-4 age group), 7 (5-9 years), and 12 (10-14 years) years old. Aggregated such that adults require a whole respectability basket and child just one half, so our family will need 3.5 Allen baskets to achieve a family welfare ratio of 1.

We will assume that the husband works full-time in an unskilled, rural job, thus corresponding to the mass of lower income families. For this analysis we will utilise the remuneration afforded by men on annual contracts from Humphries and Weisdorf (2019). This obviates the need to consider days of work and, indeed, affords an estimate of the days actually worked. We utilise this when we consider alternative days of work scenarios below. For the wife we select remuneration for women on unskilled day rates. As argued in

[3] The length of the working year is predicted from the number of days work at the daily rate that would have been required to achieve the annual stipend, assuming that workers would only work the number of days needed to earn the annual income.

[4] Laslett (1972) p.76 table 1.6 finds mean household size to stand at 4.75 from 1574-1821 in 100 English communities, and Wall (1972) p.192, table 5.2, using printed sources for 409 settlements finds household size to range from 4.60 to 4.92 over the years 1695-1801.

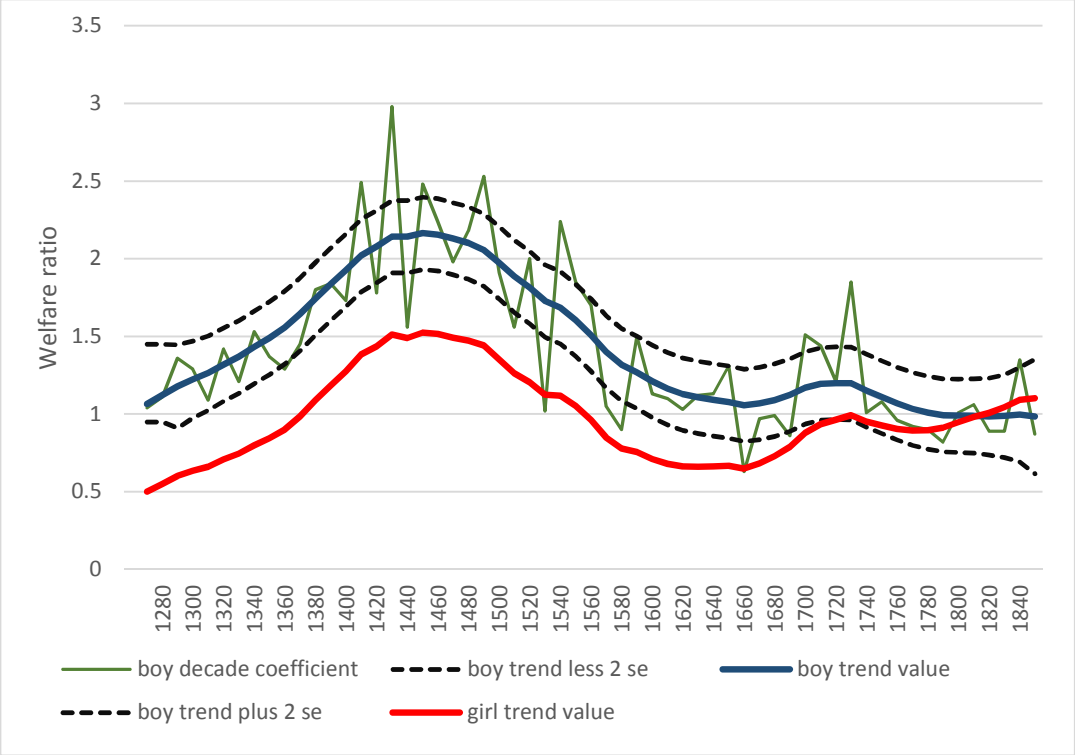
Humphries and Weisdorf (2015) and summarised above, single women were typically in receipt of annual contracts, whereas married women had access to the casual, day labour market. Initially we assume our woman had a standard of living per day in the year based on working for 250 days in each year.[5] For the children defining an appropriate unit of remuneration is somewhat more difficult. The children's wage data is heterogenous. Although regression analysis was used to extract the decade coefficients of the welfare ratio pertinent to a boy aged 12 working in agriculture in the south east (see green line figure 3), the regression analysis suffers from the use of decade averages for the cost-of-living variable and does not remove all the heterogeneity present in the original data, further work is required to capture the trend. STAMP (Structural Time Series Analyser, Modeller and Predictor. Koopman, Harvey, Doornik and Shepherd 2009) uses state space methods and Kalman filtering to decompose time series data into trend, cycle and irregular components.[6] The trend is now clearly discernible (blue line) and significantly different to zero for most of the period under study. It confirms the suggestions from the plot of the decade coefficients: the boom associated with the Black Death and its aftermath, the much reduced circumstances of the early modern period, the brief improvement during the 'Smithian revolution' of the mid-eighteenth century, and the strangely subdued findings for the era of industrialisation appear robust. We use the values retrieved from this trend analysis to represent the remuneration of a 12 year old boy on day pay in agriculture. We use analogous methods to estimate the earnings of a 7 year old girl working in cottage industry in the south east of England (see red line figure 3).[7] The three year old child is dependent.

Figure 3. Decade coefficients from regression with estimated trend and confidence intervals: boy aged 12 working in agriculture, girl aged 7 working in cottage industry, both in south east England. (Welfare ratio: standard of living per day in year afforded from working 250 days, measured relative to Allen respectability basket).

[5] That is, day wage x 250 / 365 days.

[6] See Horrell and Humphries (2019) for a full discussion of the trend analysis.

[7] The upward trend in the early C19th is the result of the estimated time trend for female wage rates in the underlying regression. The coefficients on the dummy variable for sector and the estimated age premia remain constant over time but the divergence of girls' wages from boys' is estimated through a dummy variable, a gendered time trend and the gendered time trend squared. This specification may give insufficient flexibility to detect more nuanced movements in gender differentials. The intention of Horrell and Humphries (2019) was to capture the movement in children's wages over time, analysis of the gendered patterns remains the subject of a separate paper.

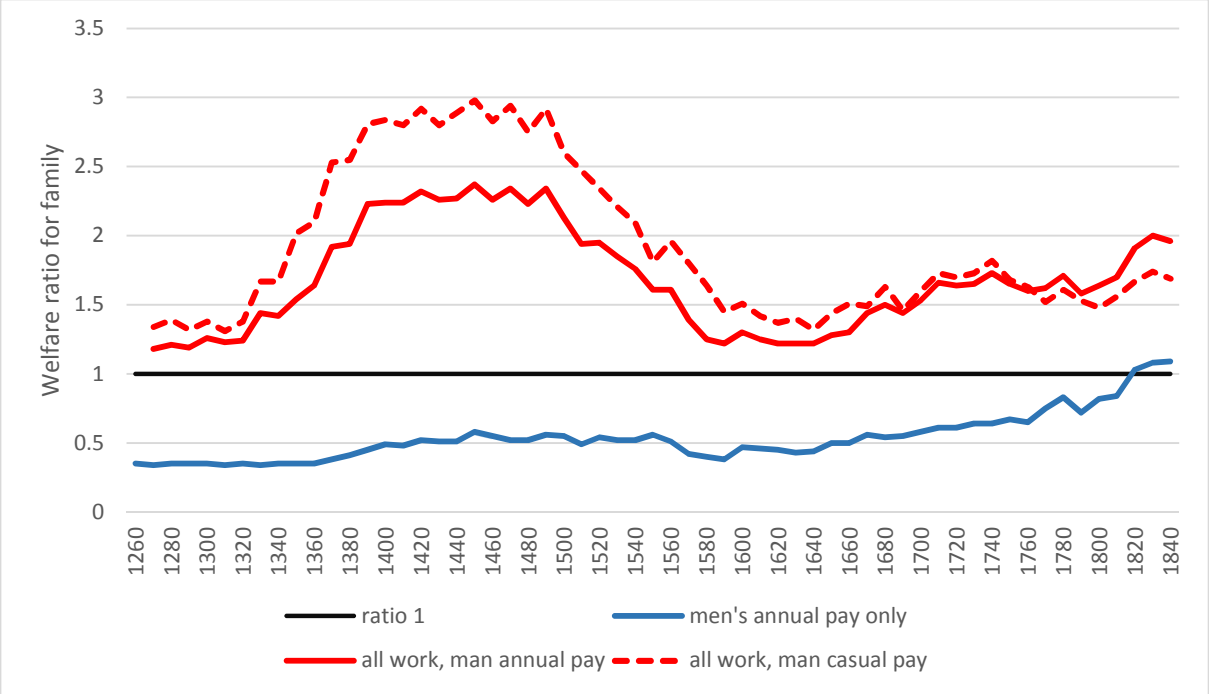


Our family are all working in unskilled, rural occupations. Their situation is likely to understate that of more fortunate groups, particularly those who had access to jobs in domestic manufacturing, factory industry, coal mining and maybe even transport and distribution, as the economy moved towards industrialisation. However, it will present an optimistic view of those less-fortunate households headed by a widow or with an incapacitated father, household forms that may have pertained to one fifth of the population.[8] We accept this first estimate as presenting a very optimistic view of the position of a middling ordinary household. We note the underlying assumption that women and children in households would all engage in paid work, which imparts a strong upward bias to our findings, and discuss possible participation rates and contributions to income further below.

We construct our family welfare measure by adding the contribution to daily standard of living from the husband, his wife and the two working children. The evolution over time relative to the family welfare basket (=1) is depicted in figure 4 below.

Figure 4. Family welfare afforded by male annual earnings and whole family working, 250 days work per year at casual rates assumed for woman and children, measured relative to Allen respectability basket x 3.5.

[8] Estimates range from over 10% in late C18th and early C19th (Humphries 1998), 15% in 19 English communities 1599-1811 (Laslett 1974) to 19.1% in Bristol in 1690s (Holman 1975).



Men on annual pay clearly could not manage to earn sufficient to sustain their families until the early decades of the C19th, other family members needed to work if the family was to manage a decent standard of living that afforded them the basics and the ability to work. [9]The picture was only slightly more rosy for men on day rates who could be sure of 250 days of work in every year; only for the long C15th was this father able to ensure adequacy for his family. However, once we consider the income contributions of all family members, household welfare is considerably improved. Although in many decades the position of the family was one of borderline respectability, the mid C14th to mid C16th afforded a period of unprecedented wealth. On this measure the rural family was able to afford something close to twice the respectability basket, a seemingly high amount.

Table 2. Welfare ratios for some actual and constructed families

Year (source, see notes)	H'hold type	Annual h'hold income (£)	Wife's contribution (£)	Children's contribution (£)	Adult equiv h'hold size	Cost one respectability basket per day (d)	Family welfare ratio
1568[1]	Constructed: agricultural worker and spinners	17.7	5.2	2	3.5	1.46	2.28
1597[1]		19.1	5.2	2	3.5	2.39	1.50
1625[1]		22.95	6.05	2	3.5	2.83	1.46
1690/50[1]		28.55	9.25	3	3.5	3.2	1.68
1760/40[1]		33.3	11.5	4	3.5	3.05	2.05

[9] This finding is demonstrated in detail in Horrell, Humphries and Weisdorf (2019a).

1688[2]	Labourer/ servant	20			2.5	2.97	1.77
1688[2]	Lesser freeholder	40			4	2.97	2.21
1688[2]	Artisan	40			3.5	2.97	2.53
1698[3]	Advisory budget	9.375	3.125	0	3.5	3.125	0.56
1724-67[4]	Latham family: farming and spinning	30	?	?	5	3.2	1.23
1790[5]	Ealing gardener	38.6	1		4	4.76	1.32
1850[6]	Ironworker	70.61	5.58		4	5.21	2.40
1854[6]	Cutler	44.82	2.15		3.5	5.21	1.62

Sources and notes: [1.] Muldrew (2011) p.257 table 5.19, p.217 table 5.4, constructed households: man in agriculture, woman spinning and in agriculture, children work, family size assumed 2 adults, 3 children = 3.5. [2.] Stone (1988) from Gregory King's notebook, table 6. Income per family, labourers and servants 3 people per household, lesser freeholders 6 people per household, artisans 5 people per household. [3.] Dunning (1698) advisory budget. [4.] Styles (2007) pp.229ff. Latham family, income estimated about £30 per annum, household comprises man, woman, 6 daughters, 3 left home, one son, daughters and wife spin; [5.] Humphries (2013) from Frederic Eden, *State of the Poor,* Ealing gardener, wife and four young children. [6.] Le Play (1857) ironworker, Derbyshire, four children aged 4 to 11 years old, cutler, Sheffield, wife makes 'pop', three children aged 5 to 10 years old.

We can check the plausibility of these results by comparing the welfare ratios with those constructed for some well known and respectable families who appear in the literature (table 2). The comfortable position of the Ealing gardener has been much feted, even so, his welfare ratio of 1.32 lay somewhat below the position of the average unskilled labouring household in 1790 suggested here. Similarly, the prosperous and well-resourced early C18th Latham family were unable to match these levels. Muldrew's constructed work-rich households were able to outperform our labouring family in the mid-C16th but appear more in line by the C17th. Gregory King's late C17th freeholders and artisans could, on his estimate, support a rather more luxurious lifestyle than our working household, but his labourers were quite closely matched to ours. A little beyond the period we are considering, the mid-C19th skilled trade of cutler also exhibited the same standard of living from work as our labouring family, although the ironworker fared somewhat better. These early industrial estimates indicate considerable overstatement of the resources available to our representative family.

We can conduct a similar, but necessarily more speculative, exercise for the medieval period. A number of scholars have made estimates of the income of the peasant household for the 13th to 15th centuries (Dyer 1989, Kitsikopoulos 2000, Hatcher 2019). Conducted for various sizes of landholding, this essentially involves careful inference about fallow, rotations, crops grown, yields, livestock kept and the resultant produce. For different sizes

of land holding the marketable surplus after the family's direct consumption needs have been satisfied can be valued. From this tithes, rents, milling tolls, repair of equipment and costs of labour employed are deducted. We work with the surplus cash available for expenditure and an estimate of the cost of the family's self-produced food based on either the respectability basket or the bare bones basket as appropriate. Family welfare ratios for different categories of peasant household can then be computed (table 3).

Table 3. Family welfare ratios for medieval peasant households (based on a typical family size of man, woman and three, usually dependent, children. The man is assumed to devote his time to the smallholding and/or to paid labour. Valued relative to the cost of the respectability basket).

Year	Landholding	Consumption basket	Cash surplus	Household members' work	Family welfare ratio
1299[1]					
Actual accounts: Cleeve Manor, Worcs.	30 acres Yardlander	respectability	£1	Wife helped, brewed and spun	1.36
	15 acres Half-yardlander	barebones	4s	Earnings of women and children would be important	0.53
	12 acres Cotlander	barebones	-		0.46
	3 acres Smallholder	barebones		Needs to work 130 days at 1.5d for bare bones. Earnings women and children crucial	0.46
	Average*				0.913
1300-1350					
Detailed reconstruction	18 acres Half virgate + meadow	bare bones	7s 7d	Son working age. Land requires 443.5 days, from man, woman and son. Each also do 80	0.54

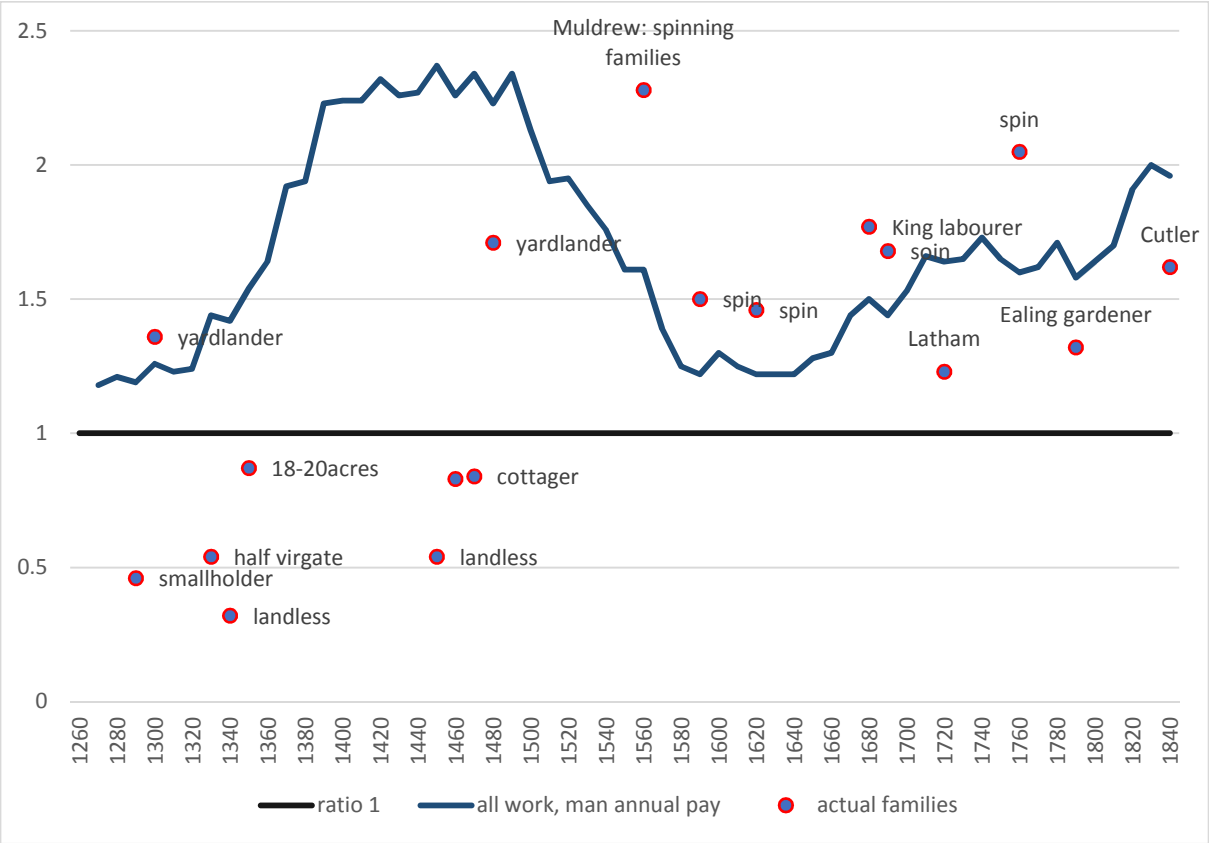
				days outside employment	
1348-9[3]					
Reconstruction with assumptions, covering 90% rural population (75% whole population). Only male work considered, own land requires 13 days per acre	Landless			150 days paid work @1.5d	0.32
	5 acres			140 days paid @1.5d	0.43
	10 acres			100 days paid @1.5d	0.49
	18-20 acres			All man's labour on farm	0.87
	36-40 acres			Hires labour	2.01
1450-79[3]					
Reconstruction with assumptions, see above	Landless			30 days paid @ 4d, 120 @2.5d	0.54
	5 acres			20 days @ 4d, 120@2.5d	0.61
	10 acres			15 days @ 4d, 85@2.5d	0.64
	18-20 acres			Own land requires man's labour	0.83
	36-40 acres			Hires labour	1.52
1475[1]					
Actual accounts: Cleeve Manor, Worcs.	Yardlander	Respectability	£2	Household size reduced: 2 adults and 2 children	1.71
	Half-yardlander	Between respectability and bare bones	15s 4d		1.01
	Cottager	Barebones	Works 135 days, surplus after barebones	Wife contributes to earnings	0.84

			satisfied 60 days@4d		
	Average**				1.20

Sources: [1.] Dyer (1989) pp.109-18, 148-50 [2.] Kitsikopoulos (2000) [3.] Hatcher (2019)

Notes: * average weighted by proportions of landholdings from 1279-80 Hundred Rolls (Dyer 1989 pp.118-19). ** average based on share type of landholding represents of 53 tenants in Cleeve rental record.

Figure 5. Comparison of household observations and calculations for medieval peasant families with the aggregated family wage data.



The comparisons suggest that the actual resources being brought into the labouring household have been substantially overestimated when based on the assumption of universal participation in paid work for 250 days of the year for female and child family members (figure 5). The medieval peasant households differ in their consideration of the inputs of women and children but, where this is included, a family welfare ratio of just 0.54 is reached in 1300-1350 (Kitsikopoulos 2000). This is a family with half a virgate of land, a holding of the size or greater than some 46% of pre-plague agriculturalists. Indeed, the vast majority of the rural population were living on inadequate landholdings (Hatcher 2019,

p.18) and an aggregate picture suggests that few were able to achieve the respectable consumption basket through their work (see estimates from Dyer 1989 above). The post-Black Death years offered some improvement and the estimates for specific households presented here probably understate the gain. The expansion of opportunities for women's work are not incorporated and the constructed estimates neglect some of the technological improvement in agricultural methods, the potential to expand pastoral husbandry, and the possibility of employing servants rather than day labourers on the land. But the gains indicated do suggest that a respectable consumption level became achievable for more families. The proportion of landless and near landless decreased from maybe two thirds pre 1349 to less than one half in the later C15th and a larger proportion of those with land had holdings that were of subsistence size or larger (Hatcher 2019). Gains are undeniable, but they do not reach the heady heights implied by our family earnings for this period. Of course some of this shortfall results from the assumptions of fewer than 250 days being worked in the year but, as both Dyer and Hatcher have pointed out, it is unlikely that the standard amount of work was actually on offer and it is even more unlikely that people would be acquiring additional land to farm themselves, as undoubtedly occurred, if the gains from so doing were less than could be achieved through paid employment. The estimates for the peasant households suggest something close to subsistence prior to the Black Death with some improvement, although many landowning families were still not able to achieve respectability, one hundred years later.

Overall, the welfare ratios deduced from the income and structure of actual families rarely match up to the level of material welfare implied from our wage aggregation. The assumption of intensive labour market engagement by all family members clearly imparts an optimistic bias, we thus make refinements to our estimates.

Participation rates and contribution to household income.

An optimistic view of the remuneration of our family members (man annual, women casual, children casual) has been presented above. But this family is lucky, both parents are present and able to work, and the children also have opportunities to contribute to the household income. But we know that for many families work opportunities were not so easy to come by, work might have been intermittent or unavailable and, indeed, family members themselves may have been incapacitated and so unable to contribute. To construct a more realistic picture of family living standards we want to take these diverse experiences into account. We retain the assumption that the adult male is able to find full time work, but now review the participation rates and income contributions of children and women over time.

Children's participation rates in long-term perspective.

There is relatively little information on children's participation rates for the period we are considering. We utilise information available from Surveys of the Poor, household budgets

and censuses to construct an estimate of the proportion of children working (table 4, figure 6). Rates are assumed to be 75% for our 12 year old boy and 50% for our 7 year old girl in the earlier centuries. It should be noted that there was relatively little legislation affecting children's work throughout most of the period under study. Compulsory education was not introduced in Britain until 1870. The main pieces of workplace legislation were the Factory Acts 1833 and the Coal Mines Regulation Act 1842. The former applied to cotton and woollen manufactories, it banned the employment of children under 9 years of age, stipulated a maximum 8 hour day for 9 to 13 year olds, 12 hours for 13 to 18 year olds, and required education for 2 hours per day for under 13 year olds. The latter prohibited the work of all women and girls and boys under 10 years of age underground. The legislation acted to restrict children's employment in these occupations (Nardinelli 1990, Kirby 2013) but probably crowded them into unregulated sectors (Horrell and Humphries 1995).

Table 4. Children's participation rates.

Year	Ages 5-9			Ages 10-14		
	Boys	All	Girls	Boys	All	Girls
1570 Norwich		36.3-49.5 (380)			73.5-86.7 (181)	
1597 Ipswich		25.8-36.4 (66)			56.3-70.3 (64)	
1625 Salisbury		18.5-29.6 (27)			66.7-73.3 (30)	
1790 Dorset	9.6 (83)		11.0 (82)	66.7 (66)		69.6 (79)
1787-96		10.5			54.1	
1830-39		9.2			70.4	
1840-54		6.9			41.6	
1851	2.0		1.4	36.6		19.9
1861	2.0		1.1	36.9		20.2

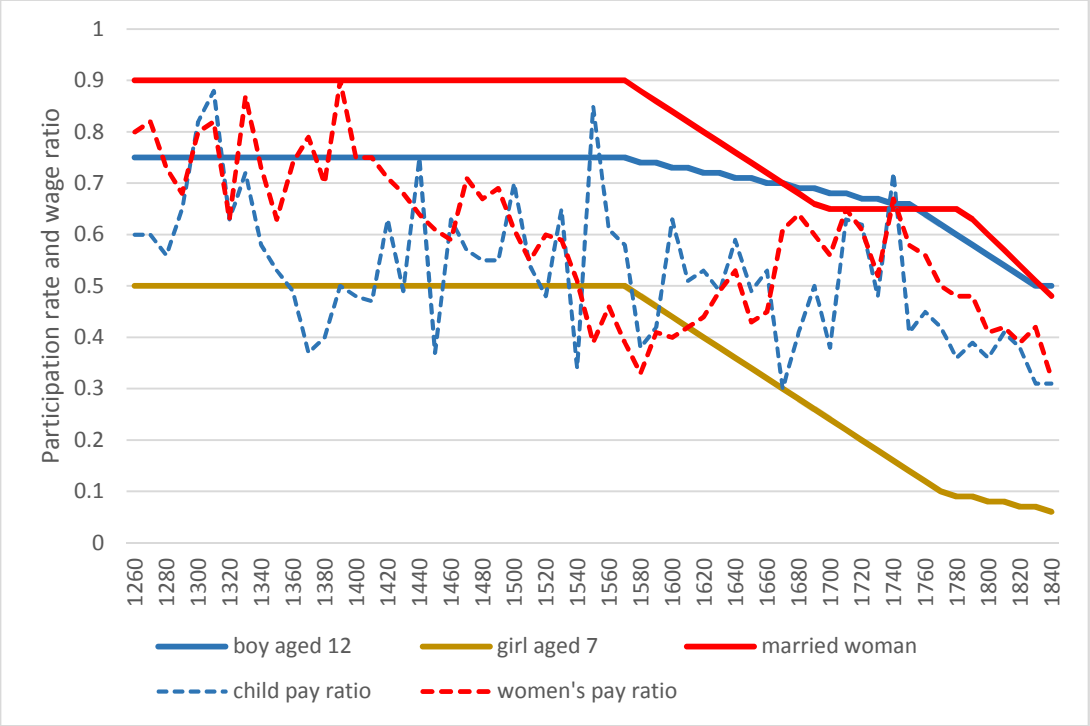
Notes: Ranges for the early participation rates are for those recorded as working alone to those working and in school. In a number of cases 'skole to spyn' is recorded which would be akin to on-the-job training and hence should maybe be considered as work.

(sample sizes, except national Census, in parentheses)

Sources:
1570 Pound (1962); 1597 Webb (ed) (1966); 1635 Slack (ed) (1975) St Edmund's and St. Thomases' parishes, pp.75-80; 1790 Census of Corfe Castle, Dorset; 1787-1854 Horrell and Humphries (1995b) t. 4, participation rates by age and father's occupation. Aggregated using male employment weights from Horrell (1996) n.38, p.580. Children from families with two parents, participation assumed where any earnings or an occupation was recorded;
1851-1861 Censuses of England and Wales, Lavalette (1999) t. 5.1 p.124.

Our information on children's contribution to household income is limited to more recent centuries. Depending on father's occupation, children's individual earnings when aged 10-14 ranged from around 20 to 50% of their father's earnings from 1787-1872 (Horrell and Humphries 1995b, t. 5, p.500), with the present data children's remuneration relative to male unskilled rural workers declines from around 60% to 40% 1270-1860. The higher level in the current dataset is affected by a wider range of children's ages, the inclusion of payments in kind and the unskilled nature of all men's work (figure 6).

Figure 6. Constructed participation rates for married women and children and comparison with women and children's daily pay with that found for a male casual worker.



Note: the pay ratios are constructed for all children, raw average of the data in each decade, compared with male casual pay, and women on casual contracts compared to men on casual contracts. Day rates calculated assuming 250 days worked in the year.

Sources: Clark 2007; Humphries and Weisdorf 2015, 2019; Horrell and Humphries 2019.

Women's participation rates and income contribution

We know a little more about women's participation rates and contributions to household incomes. A variety of local censuses and the national census 1851 give female participation rates. Women's participation can also be estimated from the writings of Sir Frederic Morton Eden (1795), Arthur Young (1768-1770) and Daniel Defoe (1724-6) (table 5). Most of the sources from which we can extract women's participation rates are self explanatory, but our

computation of participation from the three accounts above requires further explanation.[10] In brief, Eden in his investigation of the 'State of the Poor' reports returns from 156 parishes which explicitly mention the availability of employment for women. For each county we create an index of the sector of employment (agriculture, textile, manufacture, no employment) and the proportion of parishes in the county reporting employment in the sector. Thus 5 parish observations where 1 has agricultural work, 3 have textile work and 1 has none would convert to 20%, 60% and 20% within the county leading to 80% employment. Adjusted by the proportion of the total population of England and Wales in each county gives each county's contribution to the national participation rate. But Eden's observations are largely from rural areas so we adjust these totals for the relevant proportion of urban to rural population in each county.[11] We assume 50% of the women in urban areas have opportunities to work in service, retail, dress making, food processing, some manufacturing and working alongside husband's in trades. We make a further adjustment for women in rural areas having usage of commons (as recorded for each parish) but no access to other employment. Our participation rate reflects the proportion of adolescent and adult women bringing resources into the household.

Young's farmer's tours were more focussed on agricultural employment. In his farm accounts the numbers of maids, men, labourers, boys and servants employed were enumerated. He also asked whether women worked in harvest and hay making and about the winter employment of the poor. Additionally, there are scattered details on manufactures and employment in manufacturing towns. We make two computations: the proportion of girls employed as maids on farms and an estimate of the proportion of women working nationally. The latter is achieved by aggregating the farm and parish information into a county picture with a score given for the frequency and type of employment and weighted using county population figures.

Defoe's interest was in investigating trade and manufactures throughout the country. Although a descriptive account it can, with some ingenuity, be converted into a female participation rate. Defoe gives a detailed picture of the type of employment available in nearly every county in England. He documented seaports, coastal shipping and river navigations and the trade they carried. He noted the use of the land through which he passed: wooded, corn, fertile, dairies and sheep downs, and where mining activities occurred. Using this information to draw a map of the country with its chief activities in agriculture, mining, manufacturing, shipping and trade placed upon it produces a realistically plausible picture. The number of women of working age are assumed to be a constant 25% of the population in each county, the population figure resulting from Gregory King's formula for calculating the population in any region from the number of households and hearth taxes taken at Lady Day 1690 (Stone 1989). The 35 different activities, from heavy involvement in sheep breeding to glass houses and paper mills, are recorded by

[10] A document detailing the computation of these participation rates is available from Horrell on request.
[11] Our initial focuses on families with the father in a rural occupation but computing national participation rates enables comparability between different sources. We make adjustment for a more diverse occupational structure in section x below.

county, an assumption is made about the proportion of women likely to be involved in the activity and a resulting figure for overall female participation calculated.

Table 5. Women's participation rates from various sources

Source	**Date**	**Married women**	**Single women**	**All women**
Statute of labourers	1351			Every man and woman … able of body and within age of three score
Census of Poor, Norwich	1570	94.7%	89.3%	91.9% (73% in spinning)
Census of Poor, Ipswich	1597	79.0%	91.1%	83.3% (45% spin and card; 73.3% all textile work)
Survey of Poor, Salisbury, Wilts	1625	89.6%		71.6%
Survey of Poor, Salisbury, Wilts	1635			49.0% of very poor women only
London Church Courts	1695-1725	60%	83.4%	72% stated occupation
	1580 1615 1700 1741 1770			Spinning only 25.0% 30.0% 38.1% 46.7% 48.7% (with other textiles 75.0%)
Daniel Defoe	1724-6			61.6% all women (19.3% in full-time occupations; further 31.48% textiles and 10.82% seasonal agriculture only) Probably lower bound estimate
Arthur Young	1768-1770		33% girls aged 15-24 employed as farm or dairy maids	61.3% (agriculture, textiles and manufacturing)
Methodist census	1781			54.7-69.3%
Cardington, Beds	1782	70% (textiles)		
Corfe Castle, Dorset	1790	10%		

		(agricultural area)		
Westmoreland census	1797	69.4%	64.3%	65% (in agricultural area)
Frederic Morton Eden	1795			56% in regular work, 9.75% access to commons only
Household budgets	1787-1815	65.7%		Maybe 66% over 10 year olds bring resources into household
Local census, Ashton	1816	35.9-47.7%		41-52% (with occupation)
Local census, Tottington	1817	33.6-40.1%		33.3%-42.7% (with occupation)
Local census, Halstead, Essex	1821		13.9-83.3% (uncertain classification)	
Local census, Bedford, Lancs	1835/6	65.4-73.1%		54.7-62.3% (with occupation)
Boys' autobiographies: mothers with husband's present	Late C18th/ C19th	28.5 – 35.9%		
National Census	1851			43%

Sources: 1570 Pound (1962); 1597 Webb (ed) (1966); 1625/35 Slack (ed) (1975), 1695-1725 Earle (1989); 1580-1770 Muldrew (2012) estimates of spinning employment; 1724-6 Defoe (reprint 1928); 1768-70 Young (1768, 1770, 1771); 1781 Field and Erickson (2010); 1782-1790 Saito (1979); 1795 Eden (1928); 1787-1815 Horrell and Humphries (1995a); 1797, 1816, 1817, 1821, 1835/6 Local censuses; late C18th/C19th Humphries (2010); 1851 Shaw Taylor (2007).

These participation rates suggest a large involvement of married women in the labour market for much of the period we consider, but rates decline from 1600 onwards reaching just 43% of all women engaged in regular employment by 1851 (figure 6). At this stage we take no account of the possibility that married women's participation is very part-time and intermittent, as with child workers, we are assuming that those who work do so for 250 days of the year. We investigate the consequences of relaxing this assumption in a later section. The only information we have on participation for the earlier centuries is the Statute of Labourers 1351 (and others) that required all men and women, able of body, and under the age of 60, to work if so required. This likely led to high participation rates for women, but we note that it was to be applied to people without land, who were not serfs and who had no other means of support, so it was by no means universal (Bennett 2010)

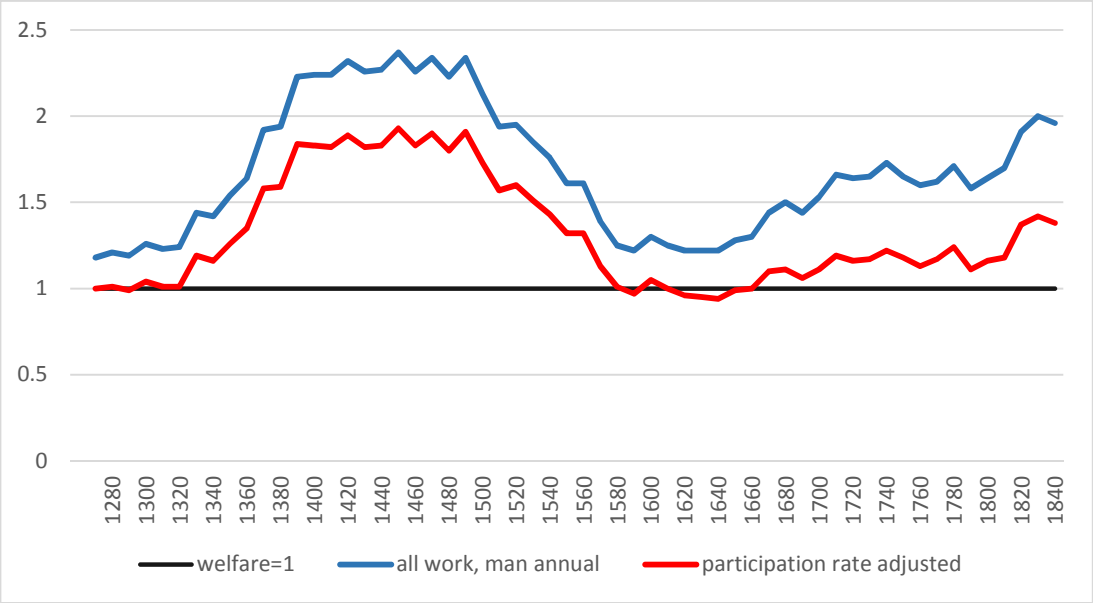
Women's contributions to household income can be ascertained for the period 1787-1865 from the household budgets (Horrell and Humphries 1995a). Taking the percentage women's earnings make up of husband's earnings only in cases where the woman is

working, shows some variability but a basic pattern emerges of 25-40% of men's earnings if the woman has an occupation recorded, 10-25% if the account states only her earnings. A weighted average of the contribution from working women (relative to their husband's) when aggregated across occupations using male occupational weights gives 23.54%. Again this ratio is somewhat lower than observed for male and female workers for the same period in our current dataset on wages. Clearly many women made less than full-time contributions to household income but also the measure is biased upwards by the unskilled nature of men's work.

An adjusted welfare ratio

We utilise the information on participation rates to capture a welfare picture more representative of the average working family. Men's annual earnings remain the same as previously, but women's and children's are now adjusted by the participation rate (figure 7).

Figure 7. Family welfare ratio, men annual pay, women and children casual pay, participation rate adjusted (250 days worked per year)



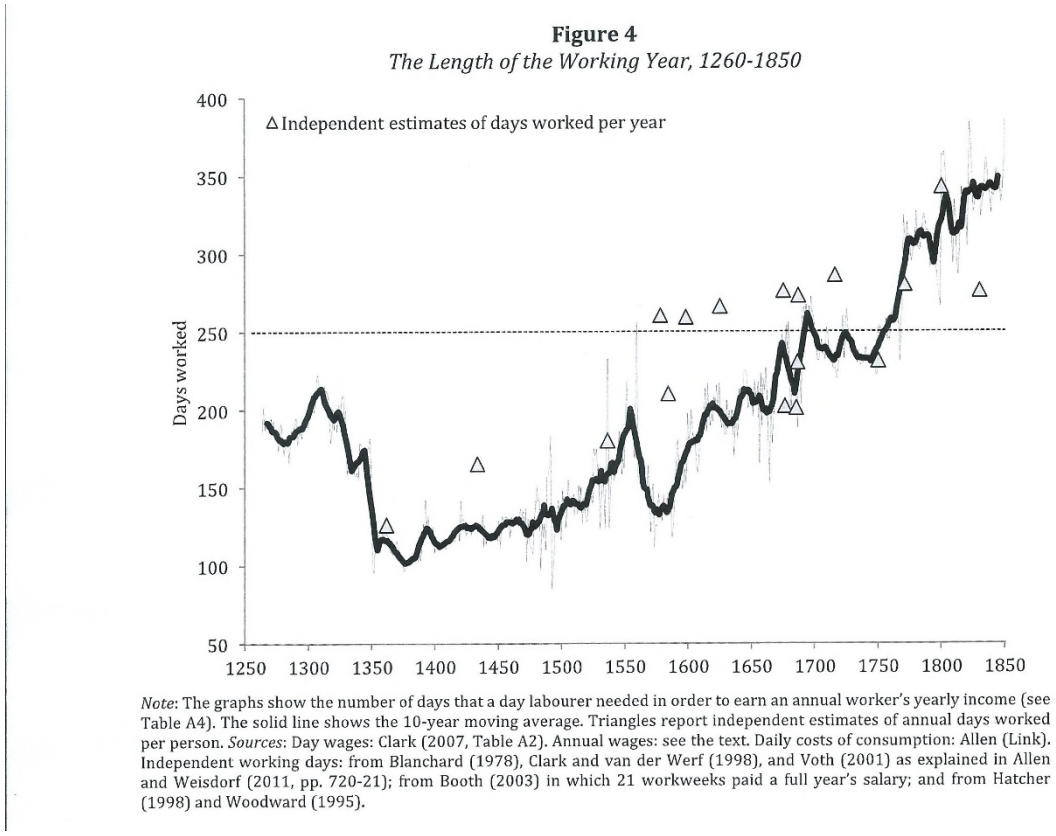
Evidently, most ordinary families were just able to achieve a respectable standard of living in many of the centuries we observe. However, the mid C14th to mid C16th remain propitious times, but the magnitude and duration of the gains cause concern. It is possible, but we believe unlikely, that this was being counteracted by women and children withdrawing from the labour force; families becoming dependent on a male breadwinner and women and children staying at home improving domestic comfort and developing human capital over this period. The ubiquity of both women and children in the farm and household accounts and other sources from which we have collected our data speak against any mass

withdrawal. Instead we query the realism of the assumption of a fixed 250 days being worked per year.

Relaxing the 250 days work per year assumption for women and children.

Assuming arbitrage in the male labour market, the gap in pay between work available on an annual contract and work available on a daily rate basis has been exploited to demonstrate the likely number of days worked over time (Humphries and Weisdorf 2019).

Figure 8. Days worked per year, 1260-1850

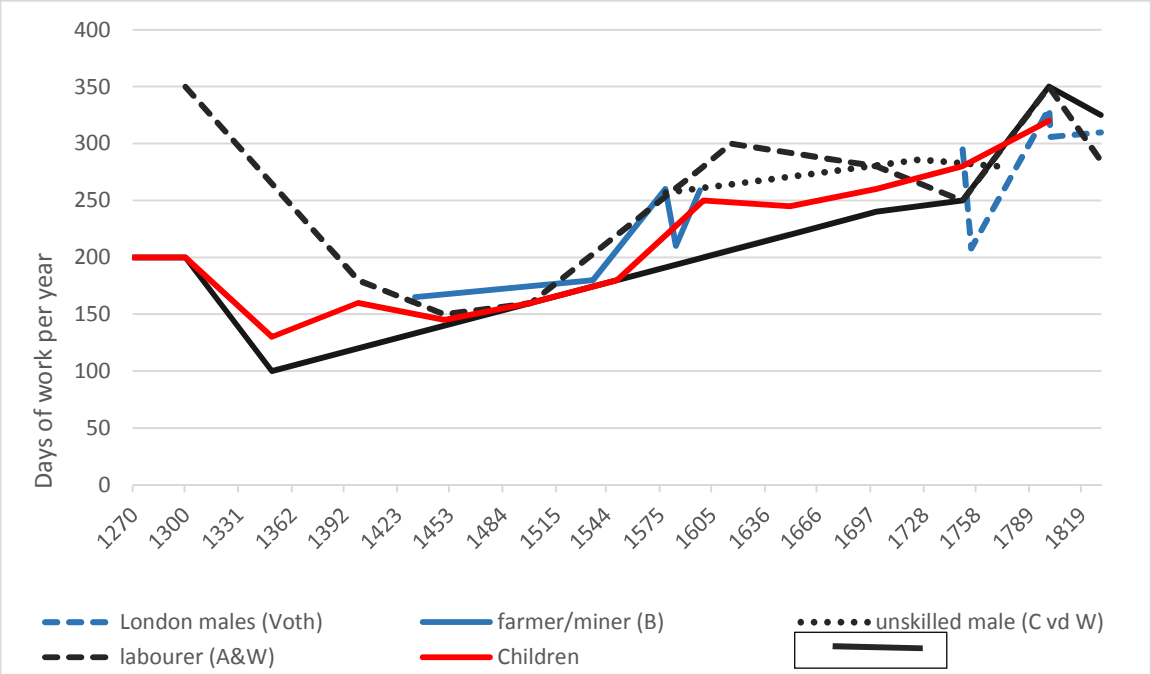


Source: Humphries and Weisdorf (2019)

The rates of pay on annual contracts are consistent with the growth of GDP derived from national accounts and reflect the emerging consensus that days of work reduced after the Black Death but increased thereafter. Here we utilise these estimates, along with those derived from other sources, to determine the numbers of days actually worked by women and children on casual contracts for the period 1260-1850 (see Horrell and Humphries 2019) and recalculate the standard of living afforded on a day in the year when the number of days worked per year is allowed to vary over time. No adjustment is required for our adult

male worker as his annual payments ensure he received the same income per day in the year regardless of the number of days actually worked.

Figure 9. Estimates of length of working year, various sources, and scenario selected for women and children.



Notes: Voth from Allen and Weisdorf (2011), B = Blanchard from Allen and Weisdorf (2011), C vd W = Clark and van der Werf (1998), A&W = Allen and Weisdorf (2011), solid black line H&W = Humphries and Weisdorf (2019)

Source: Horrell and Humphries (2019)

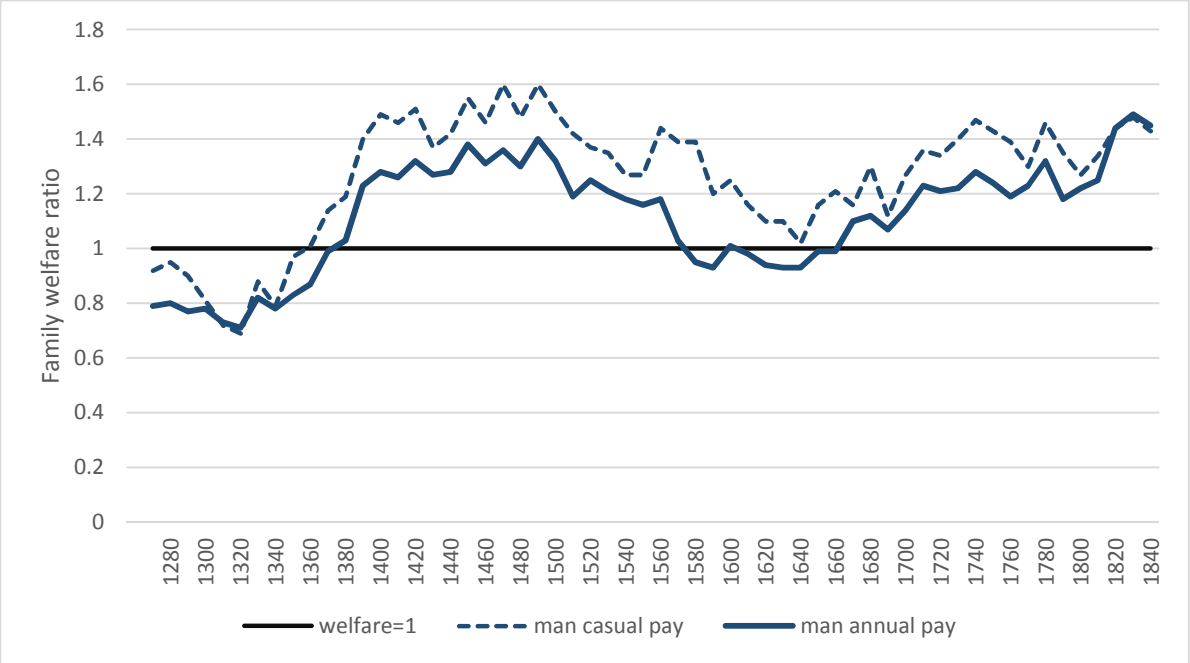
We test this estimate against the number of days worked implied by comparing annual and casual rates of pay for women and children. Humphries and Weisdorf (2015, fig. 4, pp.418) consider the casual working year needed to earn the annual contract income. This follows a pattern of around 250 days being required in the C13th, falling to around 100 in the C15th, rising subsequently with a plateau in the C17th and early C18th. Although lack of arbitrage in the female labour markets renders the number of days required in the later period implausible, the overall pattern adopted here is confirmed.

Children's days of work can be analysed in an analogous manner. The yearly remuneration from an annual contract is divided by the daily remuneration for those on a casual contract to give days of work required for a child in the casual labour market to match the earnings of those in service. The implied days of work not only follow the same pattern as those for

adult men above, but reveal almost exactly the same number of days required in each half century.[12]

We use the estimate of the number of days worked each year as shown in figure 9 to adjust the income from work for women and children and thus the standard of living this afforded over the year. We retain the assumption that men were employed on annual contracts, thus the material standard of living yielded by the man's labour was unaffected by the number of days worked, but we offer a measure of family welfare computed using male casual workers' pay for a varying number of days of work each year for comparison (figure 10).

Figure 10. Family welfare, allowing the number of days worked in a year to vary. (Women's and children's remuneration adjusted for participation).

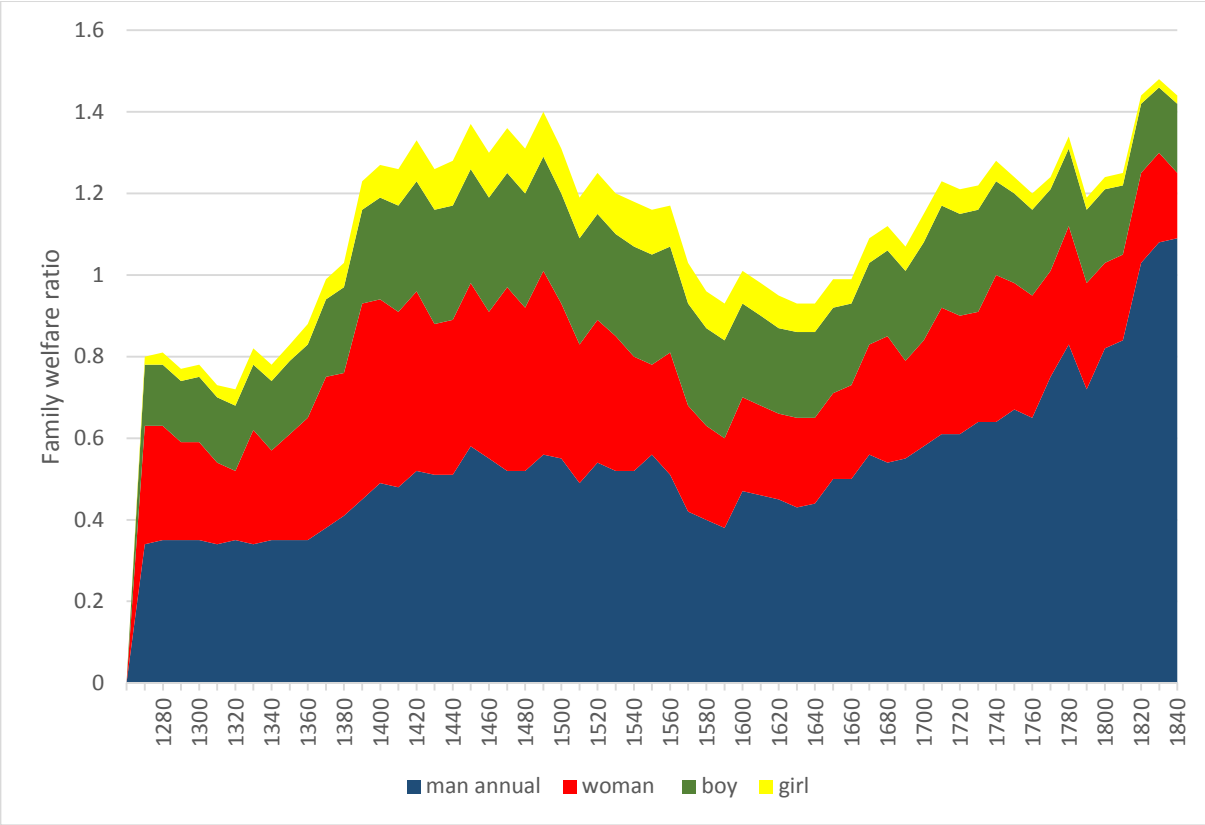


The effect of varying the working year provides a more realistic picture of living standards over the long run. Prior to the Black Death families were eking out an existence at below the respectability level, bare bones survival was the norm. As attested elsewhere, the horrors of the Black Death heralded a golden age for those labourers who survived. Even though fewer days of work were needed to meet income needs, material living standards were boosted significantly. For much of the period a family could get 25% more than required for respectability alone. Shifts in the types of goods consumed probably occurred: people ate more meat, cheese and milk; they possibly made or purchased more leather footwear, woollen clothing, soap and candles; and the additional pasture may have supported more animals for traction, particularly oxen, enabling rural households to complete their

[12] Omitting obvious outliers and very small sample sizes, days of work required for children to match pay from an annual contract: 1280-99 94, 1300-49 220, 1350-99 211, 1400-49 125, 1450-99 62, 1500-49 123, 1550-99 143, 1600-49 179, 1650-99 264, 1700-49 143, 1750-99 321, 1800-49 330.

agricultural work with less effort and, maybe, in fewer days. Tudor turmoil and civil war put an end to these benevolent times, but respectability was maintained, there was no slide back to pre-plague subsistence. Instead, this period witnessed market expansion, increased trade, improvement in transport, innovation in agriculture and gradually increasing use of coal for energy, which ultimately allowed more continuous economic growth and, gradually, a return to the earlier prosperity. But, as found elsewhere, it was only as industriousness gave way to industrial revolution that an ordinary family could expect to see a better standard of living than its forebears. Our data terminates in 1840 so can only hint at this transition, but from 1820 we can see that living standards started to rise above the implied heady heights previously achieved.

Figure 11. Relative contributions to family welfare (adjusted by participation rates and varying number of days in the year worked for woman and children, man on annual contract).



The breakdown of total household material welfare by different members' contributions is illuminating (figure 11). As already seen, the father of a typical family working in agriculture on an annual contract could not support his family in a respectable manner until the C19th, contributions of other family members were essential. Under our assumptions the mother made a significant contribution, enough to lift the family above the respectability threshold

from the late C18th, this is consistent with the opportunities offered by a growing economy and the industrious revolution. But it was in the medieval period particularly that married woman appear to have made most impact on their families' material welfare and, indeed, were responsible for much of the dramatic rise in living standards observed in this period. However, we should remind ourselves that, up until 1570, our assumption has been a participation rate of 90% for married women from 1270. This was motivated by the exhortation of the Statute of Labourers 1351 for all men and *women*, able of body and under three score, to work. Our suspicion is that while this may have promoted increased participation for, maybe, the next three or four decades, it did not persist into the C15th. The Statute may also not have been widely applied to married women (Bennett 2010). More work is needed on the participation rates of women in families in the medieval period to understand both long-run levels of welfare and some of the underlying motivations, such as the female agency evident in the Northern European Marriage Pattern. The contributions of children were also important for welfare. Children's work was essential to move the family towards a respectable standard of living but only consistently achieved this from 1680. The C17th expansion of the economy enabled the respectability barrier to be breached but it wasn't until later industrialisation that the family could start to manage without children's labour.

Married women's days of work: further thoughts

As highlighted above, we have so far worked on the assumption that not only were the majority of married women engaged in some form of market work, they were also able to work the same number of days per year as their husbands. How plausible is this assumption? In fact, it is very unlikely that, in the medieval period at least, women working on a casual basis were able to find anywhere near this amount of work. Prior to the Black Death the types and availability of work for women was limited (Dyer 1989 pp.131-4), although the post-plague shortage of labour opened up opportunities for both women and children and a wider range of jobs became available to women by 1379-81 than previously, women acted only as a reserve army of labour, brought in to shore up the labour supply when the numbers of available men were inadequate (Dyer 1989 pp.145-6, 229-31, Goldberg 1992 pp.100-1, Mate 1999). However, even these gains were probably short lived. In York the peak of women's involvement occurred in 1450 (Goldberg 1992, pp.333-7). the collapse of the cloth trade, the increased concentration of trade in luxury goods on London which brought decline to many provincial towns, and the reduction of land area under cultivation meant that by 1500 there were more constraints on women's work (Dyer 1989 ch.7; Mate 1999). The 1600s saw even greater restrictions and changes in the legal situation worsened women's position. Women were not allowed to enter many occupations so that most were confined to assisting male relatives in their work, getting work as a servant in another's household or engaging in piecework in their own homes (McIntosh 2005). For much of the medieval period women's work comprised a patch work of intermittent, part-time opportunities (McIntosh 2005 p.251), more a grey than a golden age (Bardsley 1999, p.44).

The few instances where there is fragmentary evidence on the number of days worked by women in this period illustrate the very casual nature of much of this work. Prior to the Black Death, 1330-9, the numbers of days worked by general labourers at Ebury Manor were recorded. Over the ten years men worked on average 119 days per annum, women just 10 days per year, while in some years women found no work at all (Bardsley 1999, t.4, p.24). Similarly in Cuxham, only men were hired to weed in 1348, but women were engaged for this activity in 1349-50 and again in 1358-9 (Mate 1999, p.28-29). The proportion women formed of the labour force even in the desperate years following the plague was low. 15 percent of the 1,556 named labourers in Essex in 1352 could be identified as married (Poos 1991, p.226) and women were only 20 percent of those prosecuted for taking too high wages, although they were just over 50 percent of those who refused compulsory service and just under 50 percent of those refusing compelled harvest work under the Statute of Labourers in 1349 (Bennett 2010 pp.). Even if there was more work in the immediate aftermath of the plague, a return to previous low levels of availability is indicated. On the Sussex estate of Chalvington, men were regularly hired for agricultural work, but, in 1441, only eight women were hired (seven of whom could be identified as married) and they collectively worked just 53 days at the harvest, some 6.5 days each (Mate 1999 p.30-1). Similarly at Porter's Hill in Essex mean employment for men over a year was 7 to 8 days, women 6.5 days (Poos, 1991, p.219). There is every reason to believe that we are seriously overestimating the amount of paid work done by married women in the medieval period.

For the early modern period, we might expect the growing economy to have offered more employment to women. Indeed, this is at the heart of de Vries' 'industrious revolution' (de Vries 2008). Industrialisation too increased the regularity of work and expanded opportunities, but married women may have been restricted by their other commitments from whole heartedly engaging in these activities. The earlier computations of participation from Eden (1795) and Defoe (1724-6) allow some inference of the extent of formal, regular and irregular, part-time work in the economy. From Defoe's descriptions we identified 19.3% of women in full-time occupations other than textiles and a further 31.5% working in textiles. We also compute that a maximum 42.3% of women may have worked in part-time seasonal agriculture, but some of this might have been alongside textile production. We thus conclude that around 50% of women had regular work, while a further 10% had very intermittent work in 1724-6. Similarly from Eden's work 56% all women over the age of 10 could have been involved in regular work in 1795, and a further 10% had access to commons through which they could supplement the households resources but no other individual form of support.

For the industrial period, we constructed an estimate of the extent of married women's engagement in paid work for the period 1787-1865 from household budgets (Horrell and Humphries, 1995a, table 1). If the woman had an occupation recorded we assumed she had 'regular' (possibly full time) work, for those women with only some earnings recorded we assumed that this represented intermittent or irregular work. This yields 35% of married women in families working regularly and 25% working intermittently. The range of activities undertaken and the intermittent nature of much of this work in the period has been vividly described as an 'economy of makeshifts' (Tompkins and King 2003).

Some gleanings on the number of days worked by a few individual women can also be found for this period. Analysis of 84 farm accounts from 1750-1850 finds women to be just 10 per cent of those mentioned as day labourers (Burnette 2004). Female labourers at the Oakes farm outside Sheffield mainly worked on a casual basis for two weeks at hay harvest, but changes in agriculture reduced the availability of even this work (Burnette 1999). Two women in the accounts had reasonably regular employment. From 1772-75 Ann Parkinson worked for 4 ¼ days per week for an average of 29 ¼ weeks per annum, that is 124 days per year, and from 1837-45 Elizabeth Dyson worked a similar number of weeks in the year but only 3 ¾ days per week, her annual average being 112 days per year (Burnette 1999).

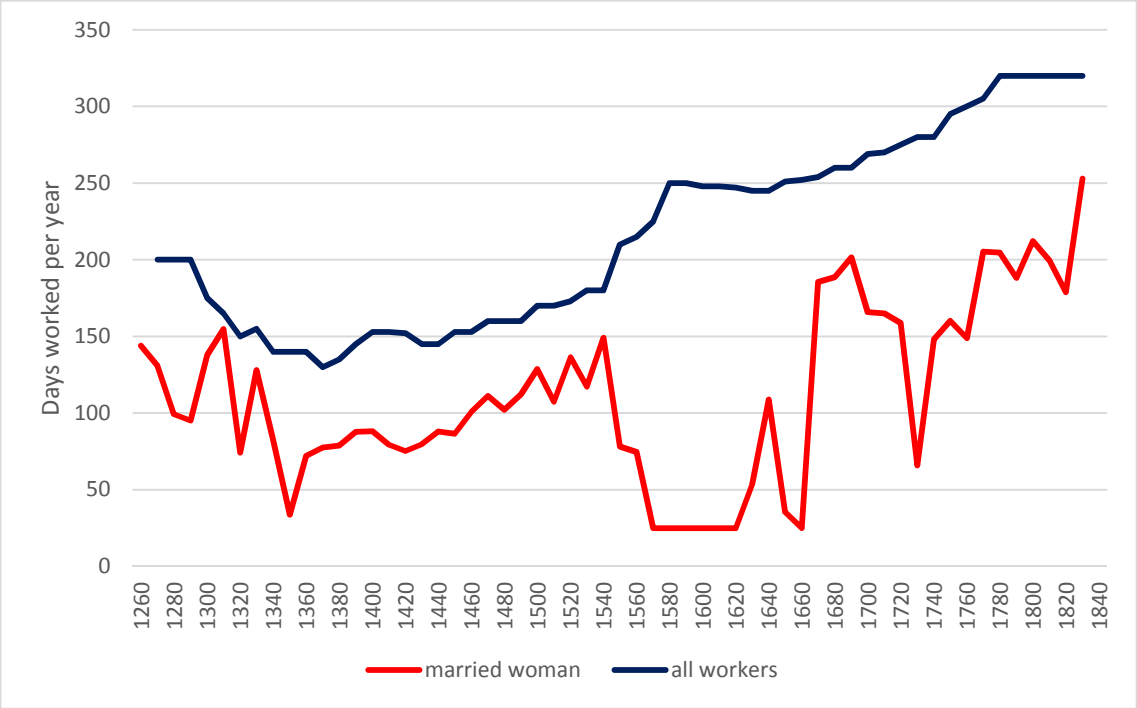
Le Play's (1857) household accounts for four industrial workers' families in the mid-nineteenth century also provide an estimate of the number of days worked in a year by the wives. Leaving aside the 120-180 days per year these women spent at housework and other tasks, we focus just on their remunerated activities. One woman worked for 112 days in the year, 52 days making clothes and a further 60 facilitating her husband's work by acting as an intermediary and transporting goods. The others represented the economy of makeshifts. One spent 18 days grazing pigs, 10 days looking after her chickens and a further 20 days brewing a fermented 'pop' drink for sale, some 48 days in total. Another spent 15 days in the year knitting stockings and also worked as a paid childminder for a three year old. The fourth women spent 15 days in the year grazing her pig.

What emerges from these vignettes of past women's lives is a remarkable degree of continuity. Married women rarely exceeded more than 10-20 percent of the agricultural labour force and were only employed for a handful of days, although they may have had more regular work in other activities. By the early modern period maybe 40 percent of married women had regular work and this might comprise 112 to 124 days per annum, but around 20 percent of wives made much more intermittent contributions to their households' income and again worked only 12 to 50 days in the year. Without doubt the assumption that married women participating in the labour market worked the same number of days in each year as men is erroneous. We need to adjust the wife's contribution in our representative household.

We have previously shown that the number of days worked by men in the year can be extracted from a comparison of annual and casual remuneration. To some extent the same can be done for women but we argue that the female labour market was clearly segmented, annual work was predominantly the preserve of single women and casual work was largely available only to married women. This segmentation reduces any arbitrage that might act to influence rates of pay. Indeed, the implied days of work resulting from the comparison often suggest an implausibly high number of days would have to be worked by women on casual pay to match their single sisters' remuneration. Furthermore, the computation frequently implies that these women were working for more days in the year than men. However, we can exploit this apparent discrepancy in the number of days worked by husbands and wives to get an indication of the number of days worked by a woman with regular employment. Specifically, where the implied work year of women is greater than that for men (49/59 decades), we compute the difference as a percentage of the men's work year and then

reduce the men's work year by this percentage to find the women's work year. This is not a perfect measure of women's days of work but it will pick out movements in the work year that capture the amount of work available. To elucidate, if married women needed to work 320 days to match the remuneration of their annually contracted sisters and men only 250 days to match their service brothers, this would imply that women's rates of pay in the casual labour market were relatively low and possibly depressed by oversupply; too many women looking for too few jobs. Adjusting the male days of work downwards by the implied excess days worked by women ensures that underlying trends observable in men's days of work are maintained, but comparing married with single women's pay, and similarly for men, means that we do not have to make further adjustment for any changes that might occur in the gender pay ratio over time. The available work for women measure is shown in figure 12 below.

Figure 12. Implied number of days of work available to women 1270-1850

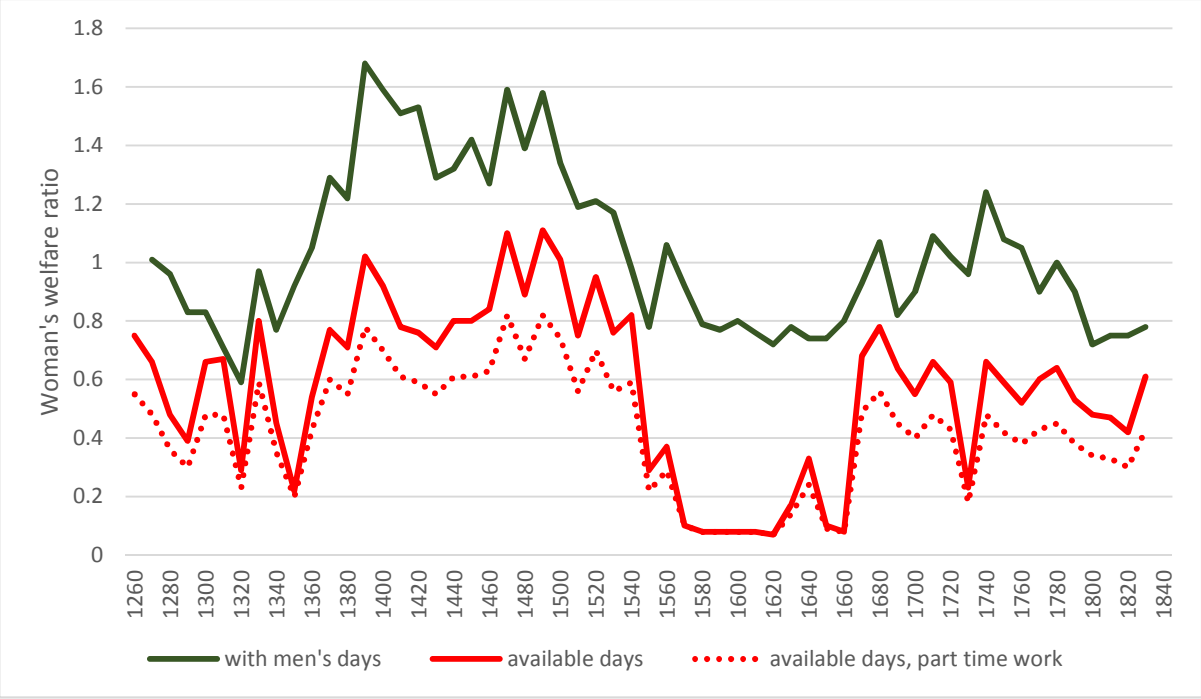


How feasible are the resultant number of days of work available to women implied by this method? Until 1550 days worked are in line with what is known from other work; days of paid work available to women were highly variable until the Black Death, but the labour scarcity caused by the plague resulted in higher and more constant demand for women's labour. Indeed, the period 1390-1510 is the one for which the annual-casual comparison yields days of work for women that are less than those for men and it is these unadjusted figures that are reported in figure 12 above. The paucity of work available to women from the mid-C16th to the late-C17th confirms the severe constraints placed on married women's work at this time (McIntosh 2005). Women were barred from weaving in many towns in the

C15th, indeed both women and boys under 14 years of age were precluded from weaving wool on looms in Norwich in 1511. Through the C16th economic and cultural changes reduced the opportunities open to women. Women were denied access to many professions (Norton 2016). They couldn't sign contracts, had difficulties in obtaining loans or credit, couldn't use land as security and were denied the ability to pursue debtors through courts. Operating as an independent economic agent to take advantage of the expanding activities in trade and manufacturing was denied. Women were confined to low paid, intermittent work in overstocked labour markets (McIntosh 2005). Subsequent centuries saw increased involvement of women in paid work although interruptions during the English Civil War (1642-51) and agricultural change accompanied by a series of poor harvests (1690-1740) are evident (Hoskins 1968 p.23).

Women's days of work so far reflect the number available to a woman who could work regularly. As we have seen above, only a limited proportion of married women were able to undertake this much work, we assume two thirds of the women working. The remaining third are assumed to work many fewer days, we assume 25 in the year throughout. We recompute the wife's contribution to household income under these more realistic assumptions.[13] The downwards adjustment this makes to our previous estimate of women's welfare from paid work is shown in figure 13 below.

Figure 13. Married woman's welfare ratio: varying number of days worked equivalent to those of men; adjusted number of days work to reflect availability of work; adjusted days with one third working only intermittently



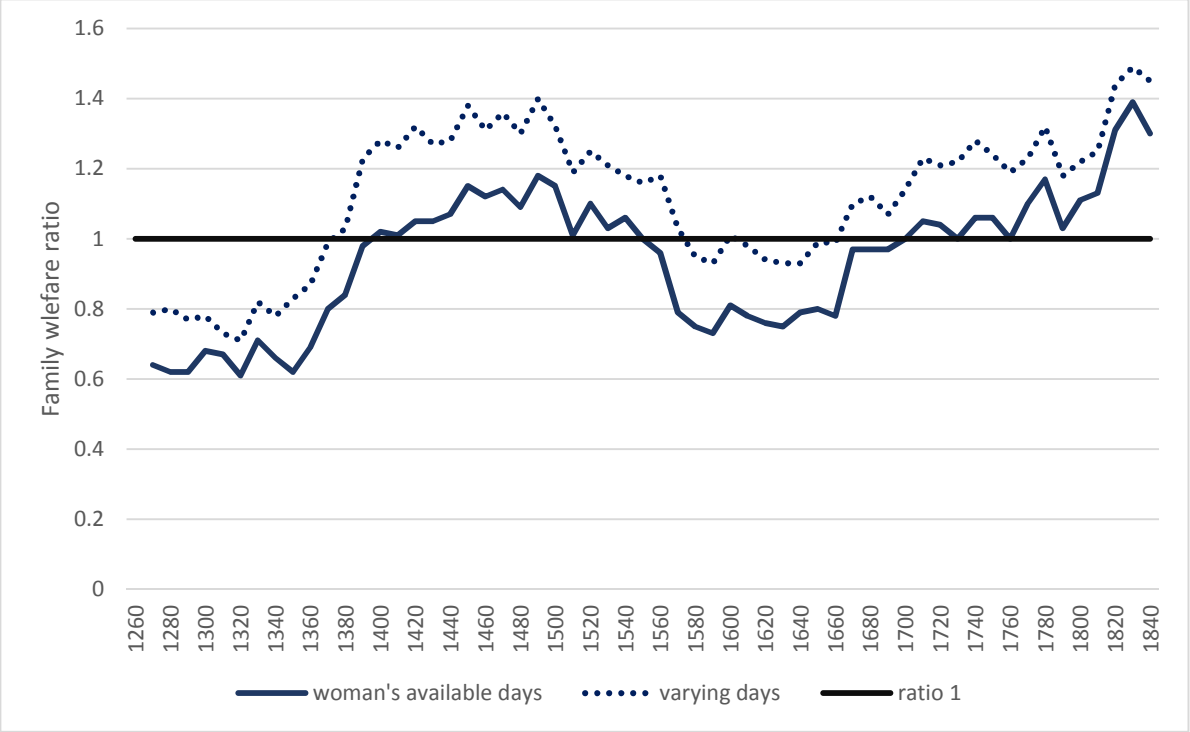
[13] Specifically woman's welfare ratio for those participating in the labour market in each decade assuming 250 days worked in the year multiplied by (2/3 * available days/250) + (1/3 * 25/250)

The consequence of this adjustment for women's contribution to family material welfare reiterates the pattern discerned earlier but at a generally lower level (figure 14).[14] The picture is less rosy. The family existed at just above survival level prior to the Black Death but those remaining afterwards benefitted from labour shortage so that respectability was afforded.[15] Tudor times (1485-1603) brought turbulence and turmoil. Economic expansion was evident: London grew, some commercialisation of agriculture occurred and trade increased around the production of woollen cloth. But there was also population growth, manorial lords began to enclose land causing upheaval and resistance in rural areas, and inflation, due to debasement of the coinage to pay for wars and increased demand, was rampant. The cost of the respectability basket rose 143 percent over five decades, 1540-50 to 1590-1600 (see Humphries and Weisdorf 2015, pp.431-2), real wages fell, the Dissolution of the Monasteries (1536-40) removed traditional forms of assistance for the poor, heavy rains led to harvest failures (1556-7) and epidemic outbreaks of 'sweating sickness' (1551-2, 1556, 1558) resulted in extremely high death rates (Matusiak 2005). Dubbed the 'Mid-Tudor crisis', 1539-63 witnessed increasing inequality between rich and poor and distress for many at the lower end of the socioeconomic scale. Our representative family suffered in this precipitous decline, respectability was denied even if bare survival alone was avoided.

Figure 14. Family welfare, allowing the number of days worked in a year to vary. (Women's and children's remuneration adjusted for participation, women's days calculated as those available and allowing for a proportion to be working only intermittently).

[14] We consider whether comparable adjustments might be required for children's days of work. Evidence on children living with parents for the C18th and C19th (Horrell and Humphries 1999; Humphries 2010) and information on days observed working by sector and according to the period for which payment was made (year, month, week, day) in the children's remuneration dataset (Horrell and Humphries 2019) shows that most 10-14 year old boys who were working, worked as intensively as men, although a reasonable proportion were working fewer days than their fathers and 5-9 year old girls tended to work only ¼ to 2/3 the days worked by men. For comparison with fig.11 we adjusted downwards children's earnings by 25% and 46% respectively. The resultant contributions to family welfare reflecting both less work for married women and this reduced contribution from children is shown in Appendix fig.A.1. As already noted, family welfare is severely impacted by utilising a more realistic measure of married women's monetary contribution but is less significantly affected by fewer days being worked by some children.

[15] The bare bones basket cost about one half of the respectability basket in this period.



The situation persisted for a century. Elizabeth I's reign (1558-1603) saw costly wars against the Spanish and Irish and continued socioeconomic distress. Rural depopulation and enclosures caused disorder in agrarian districts and led to three Commissions being set up in the 1630s. Those who lived through the Civil War and Commonwealth suffered ten harvest failures in just 15 years (Hoskins 1968 p.18). Not until the late 1600s was the family again able to achieve respectability, then economic expansion offered greater gains, although this was by no means uninterrupted.[16]

Family living standards for all ordinary families.

Until this point our analysis has focussed on the situation of an ordinary, rural family with the father, mother and son predominantly engaged in agricultural work. As the economy expanded, occupations diversified and urban areas grew our rural family would become less representative of the situation of all households. Indeed, we know from later work that the situation of the agricultural labourer represented one of the lowest paid groups and increasingly diverged from those in other sectors of the economy (Horrell and Humphries 1992; Clark 2001).

We extend our analysis to capture both the premia that might be paid to workers in other sectors and the shifting occupational structure. We adjust the man's and boy's remunerations accordingly, but leave those of the woman and girl unchanged. Cottage industry and agricultural work often offered similar rates of pay for young children (see

[16] Unemployment and destitution occurred alongside high grain prices 1695-8, 1708-11 were recognised as 'famine years' with deaths from malnutrition, and the winter of 1739-40 was one of the worst known resulting in an embargo on corn export in 1741 (Hoskins 1968).

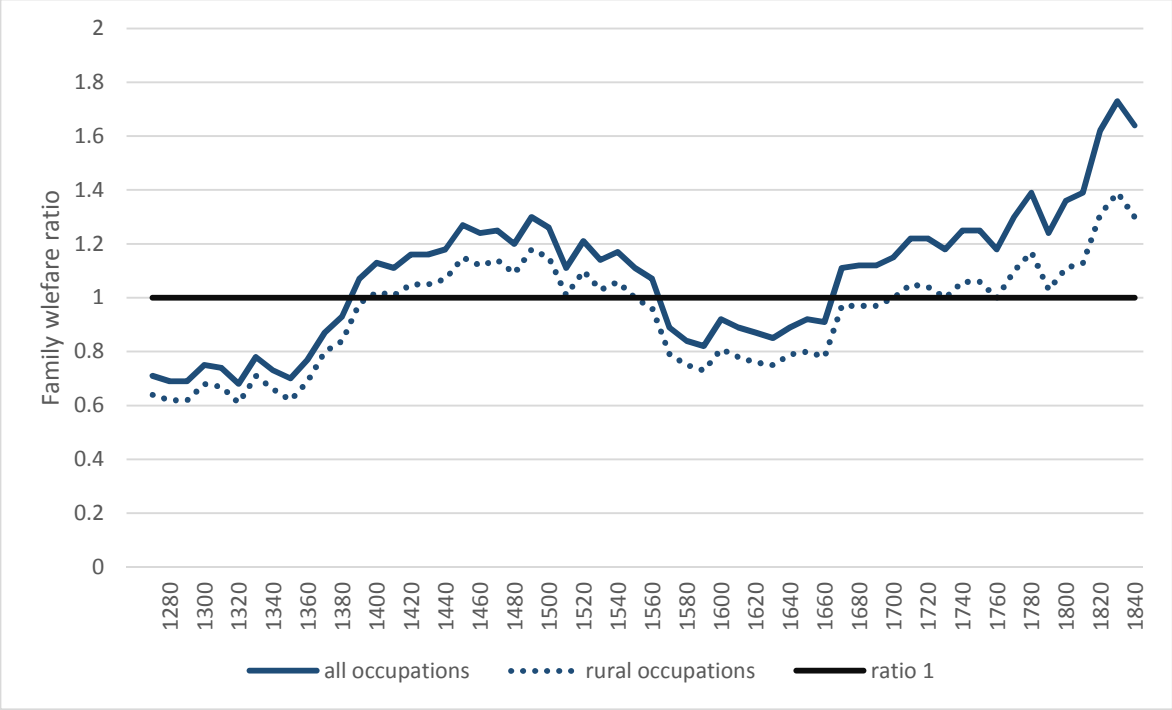
regression analysis Horrell and Humphries 2019) and it is unlikely that a 7 year old girl would be employed in either manufacturing or distribution. Our adult female too might be constrained in her ability to take on other forms of work however, here our omission is more pragmatic. We have limited information on either the sectoral distribution of women's employment over this whole period or the rates of pay received for different types of work. We retain detailed knowledge on one sector rather than substituting assumption about others. For both men and boys we utilise the information provided on the sectoral distribution of the labour force by Wallis et at (2018) for 1540-1780 and the point estimates provided by Shaw Taylor and Wrigley (2014) for 1815-19 and 1850-4, the latter interpolated to provide decade shares. For the decades before 1540 we have, possibly unrealistically, assumed the sectoral shares observed in 1540 pertained in the earlier years too. We have detailed information on the premia received by boys in different sectors of the economy from our regression of children's welfare ratios (Horrell and Humphries 2019).[17] We have less information on men's pay in other sectors. Robert Allen's work suggests a mark up of about 55% for building craftsmen over building labourers. Household budgets for 1780-1860 also record men's earnings by occupation (Horrell and Humphries 1992 t. 1, p.855). We compute the average premium paid over agricultural work (both high- and low-wage averaged) for mining, factory and casual work.[18] Assuming these wage premia to be constant through time, we adjust men's and boy's standard of living per day in the year by the sectoral shares and the premia attached to different sectors to obtain an estimate of the standard of living of an ordinary working family throughout the economy (figure 16).[19] While a higher standard of living is observed throughout, notable is the improvement in living standards as the occupational structure of the economy shifts from 1600 onwards.

Figure 16. Family welfare: rural family and family representative of all occupational groups (women's and children's work adjusted for participation and a variable number of days worked in the year)

[17] 0.722 added to the standard of living per day in the year based on a variable number of days worked for construction; 0.21 for manufacturing, 0.226 for service occupations and 0.434 for distribution occupations. Cottage industry is not significantly different to agriculture. The adjustment to pay for the service sector is calculated as the average for service and distribution.

[1818] Premia are 0.72 for mining, 0.57 for factory and -0.14 for casual work, a sector less well remunerated than agriculture.

[19] Shares are 0.05 for mining (men) construction (boys) throughout; agricultural share less 0.05; manufacturing share using the appropriate premia; and service share with service/distribution premium for boys and the negative premium attached to casual work for men. It is maybe not unreasonable to expect that service and distribution work might also attract a negative premium for adult men, relative to regular agricultural work.

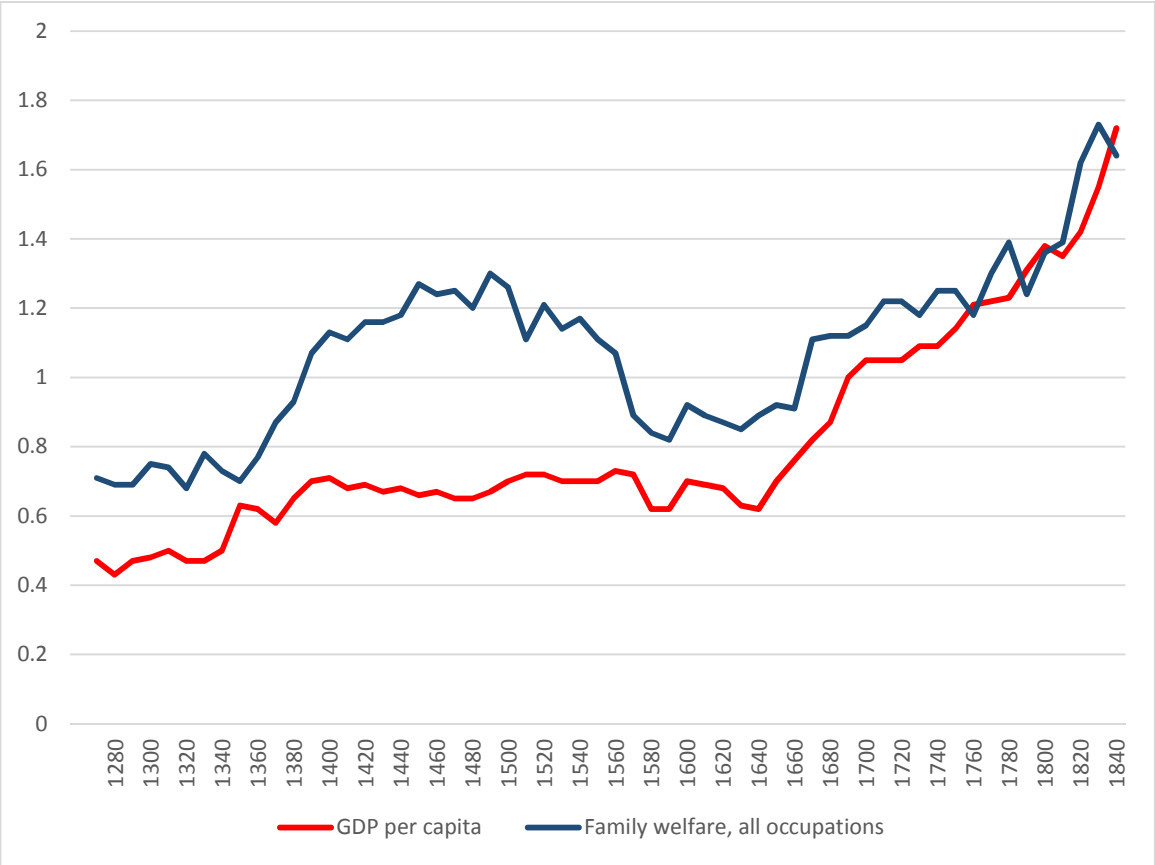


Family living standards over the long run in historical perspective.

We have identified impermanent post-plague prosperity in our family's welfare, but seen continuous, albeit gradual improvement, after the mid-C15th to mid- C16th dislocation. How does this fit with economic growth and demographic transition over this long-run time period?

Elsewhere we have used the data on men's, women's and children's remuneration to explore when the economy allowed population growth and economic growth to coincide (Horrell, Humphries and Weisdorf 2019). An indicator of a 'Malthusian world' is constructed based on the direction and extent of change in the variables: where population grows and wages decrease we identify a Malthusian world; where both move in positive directions we classify this as 'Boserupian', small population growth coexisting with, and maybe essential for, small amounts of economic growth. Analysis of the trend in these movements reveals escape from the Malthusian world around the middle of the C17th. This is consistent with our welfare measure that also shows ordinary households' material welfare steadily increasing from this time. Family welfare also evolves along similar lines to real GDP per capita over the long run (figure 17). Indeed, shifting the focus from the peak family formation stage to the development of more detailed family life-cycle scenarios questions the existence of some of the remaining prosperity observed for the Golden Age (Horrell, Humphries and Weisdorf 2019b).

Figure 17. Family standard of living (welfare ratio) all occupations compared with real GDP per capita



Source: GDP per capita (indexed at 1700=1), Broadberry et al (2015).

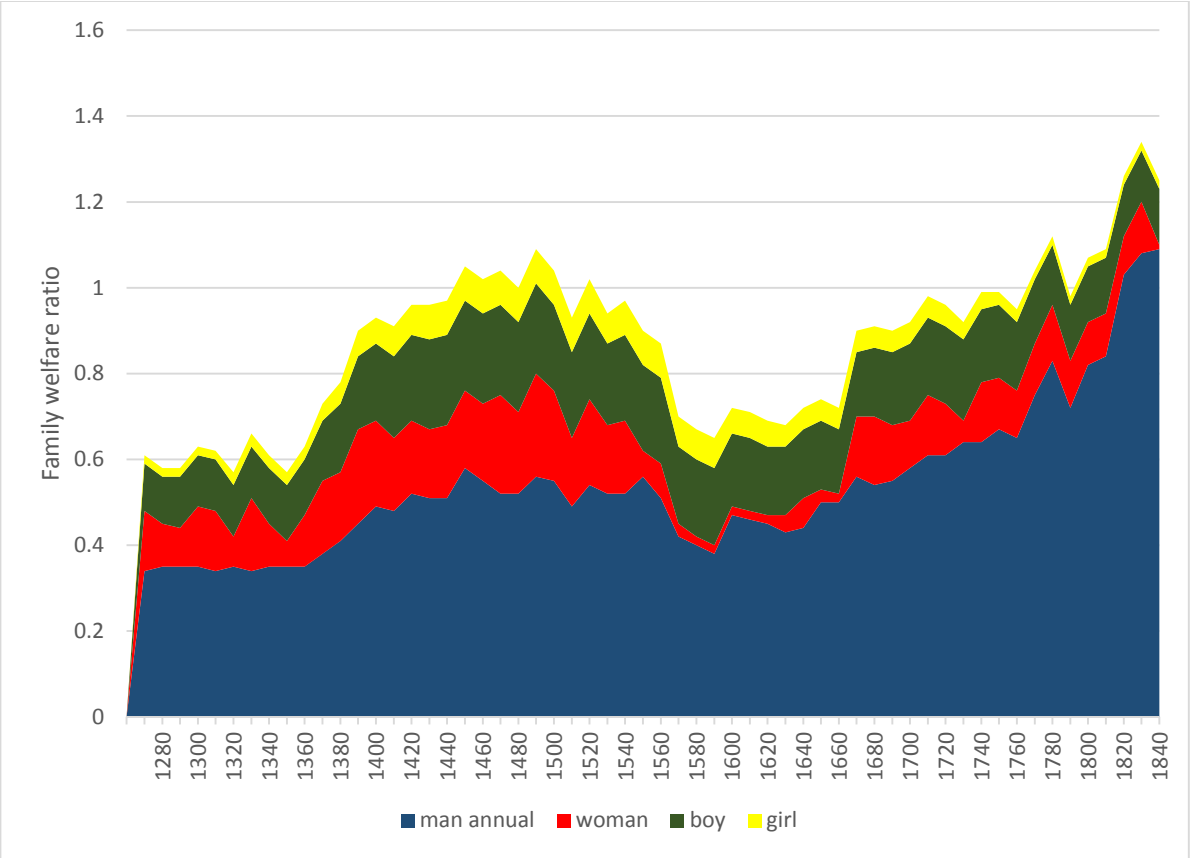
Conclusion

The findings from our study do not disrupt the meta narrative of long-run English economic growth, indeed the trends in family incomes serve to reconcile some inconsistencies in accounts of the evolution of GDP per capita and male wages. Our family income series provides a better fit with the growth in output than the established series for male wages. However, the importance of our work is not only that it confirms the pattern of long-run growth, but that it does so from a more comprehensive and satisfactory basis. It provides a perspective that is not limited to men and their wages, nor marginalised women and children but uses an evidence-based construction of realistic historical families. It provides a firmer grounding from which to discuss the position of a labouring family within the changing economy. It also demonstrates that the work of women and children is crucial to our understanding of both living standards and the growth of the economy not in a particular individual time period but over the long run, a finding that we need to follow up in further research.

Appendix

Figure A1.

Composition of family income adjusted for woman's days to be more demand constrained (as described in text of paper); boy aged 10-14 to be doing man's variable days x 0.75, girl aged 5-9 to be doing man's variable days x 0.46.



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