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The long-run evolution of global real wages

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Abstract

This article reviews the literature on comparative real wages in history that has emerged over the past two decades. Research has shown that unskilled men's real wages were higher in England and the Low Countries than in other parts of Europe and Asia from about 1720. Yet 18th- and 19th-century real wages were even higher in the northern American colonies than they were in the European leaders, while those in Latin America were somewhere in the middle of the global wage ladder. This comparative picture is drawn on the basis of unskilled male day wages and various recent contributions focused on specific countries and time periods noting the variation in wage levels and trends for different groups of workers across urban and rural areas and labor contracts, varying days of labor per year, and the crucial and changing contributions of other family members. The latest research also highlights new ways to compute comparative cost-of-living indices. Building new datasets to take these issues into account in a new global comparative picture of long-run real wages is a major area for future research.

KEYWORDS

consumer price index, economic history, global comparisons, long term, real wages, welfare ratio

1 | INTRODUCTION

How much did the average person earn for a day's work and how did this change over time? What goods could a worker buy on the basis of this wage and was this more or less than that earned by his grandparents or grandchildren? Was an average worker better off in Delhi or in London in the early 1800s and how did this change over time? These basic questions are at the center of a large body of economic historical literature investigating the development of real wages across the globe that has emerged over the last two decades.

Real wages—the purchasing power of an (often unskilled) worker—have long been used as a crucial indicator of living standards and incomes. While Gross Domestic Product (GDP) per capita is the most commonly used measure of average incomes and overall economic performance, there is considerable discussion about alternative measures, especially when investigating and comparing long-run trends further back in history. Real wages provide a viable addition to GDP and the other indicators of well-being discussed in this special issue. Some economic historians have argued for the importance of real wages as an indicator; Clark (2007a, pp. 21–22), for example, notes "the material living standard of the bulk of the population will be determined by the purchasing power of the wages of unskilled workers". Others also observed that "wage rates for unskilled laborers we measure are representative of labor earnings for a substantial part of the population at the relatively low end of income distribution" (Allen et al., 2011, p. 29). There are limitations, however, as most historical real wage studies rely on a specific set of wage workers; (generally unskilled) male laborers (often in the building industry) that may not be representative for all laboring classes, all the more so without any evidence on income generated by other family members.

Certainly, one benefit of real wages as an indicator of historical living standards is that relatively a lot of data are now available on various parts of the world from the late Middle Ages onwards, because economic historians have been gathering evidence on wages and prices since the late 19th century. As since those early days many scholars have further built on these works, there now exists a large database of wages and prices across the globe. While the data still lack standardization in terms of the format of available datasheets, many of the materials are now conveniently deposited in datahubs in the US and Netherlands.[1]

Particularly over the past two decades, the study of real wages has flourished (Table 1). As a result of the seminal work by Robert Allen (2001), much progress has been made in making real wages comparable over time and space. Scholars have now computed internationally comparable "subsistence" or "welfare ratios" (i.e., the ratio of wages to the cost of a basket that reflects subsistence-level consumption) for almost all parts of the globe, from the Middle Ages to the present. These studies have greatly expanded our view in terms of locating periods of wage workers' real income growth and decline throughout history, but also how real wages of workers compare across different parts of the globe. At the same time, many of the assumptions underlying this "welfare ratio" methodology and the implied outcomes of this research for our understanding of comparative trends in global living standards are subject of academic debate. Studies noted the variation in wage levels and trends for different groups of workers across both urban and rural areas and labor contracts, varying days of labor per year, as well as crucial role of contributions of family members; others have pointed that the sober and unchanging consumer basket does not accurately portray consumption patterns. As will be highlighted below, much of the controversy over the methodology and results of the new real wage literature results from the inherent tension between the aims of (1) assessing trends in real wages over long periods of time in one region and (2) comparing real wages across different parts of the globe.

TABLE 1 Survey of historical real wages studies.

Main topic	Country/region	Time period	Studies
Little Divergence	Europe	1200–1900	Allen (2001); Costa et al. (2015); Cvrcek (2013); Federico et al. (2019); Gary (2018); Gary and Radu (2018); Geloso (2018); Lopez Losa and Piquero Zarauz (2021); Malanima (2013); Malinowski (2016); Melacrinis (2023); Mijatovic and Milanovic (2021); Pfister (2017); Ridolfi (2019); Rota and Weisdorf (2020).
Great Divergence	Europe, Asia	1500–1900	Allen (2007); Allen et al. (2011); Allen and Khaustova (2019); Bassino and Ma (2005); Broadberry and Gupta (2006); De Zwart (2012, 2016); De Zwart and Lucassen (2020); De Zwart and Van Zanden (2015); Deng and O'Brien (2016); Kumon (2022); Liu (2022); O'Brien and Deng (2017); Ozmucur and Pamuk (2002); Pamuk and Shatzmiller (2014); Sivramkrishna (2011).
Colonial real wages	Americas, Africa	1500–1900	Allen et al. (2012); Arroyo Abad (2013); Arroyo Abad et al. (2012); Challu and Gomez-Galvarriato (2015); De Haas (2017); De Zwart (2011); Dobado-Gonzales and Garcia-Montero (2014); Frankema and Van Waijenburg (2012); Geloso (2019); Gelman and Santilli (2018); Ronnback (2014); Westland (2021).
Family income	England, Netherlands, Spain, Sweden	1200–1900	Borderias (2013); Boter (2020); Burnette (2008); De Pleijt and Van Zanden (2021); Galvez-Munoz (1997); Gary (2018); Horrell et al. (2021, 2022); Humphries (2013); Humphries and Weisdorf (2015); Sarasua et al. (2023); Van Nederveen Meerkerk (2008).
Cost-of-living indices	England, Senegal, Spain	1200–1900	Claridge (2023); Horrell (2023); Houpt and Rojo Cagigal (2022); Humphries (2013, 2023); Westland (2021).

(Continues)

TABLE 1 (Continued)

Main topic	Country/region	Time period	Studies
Labor contracts and days labor	England, Italy, Sweden		Allen (2019); Allen & Weisdorf (2011); Gary (2018, 2019); Hatcher (2018); Hatcher and Stephenson (2018); Humphries and Weisdorf (2019); Mocarelli (2004); Stephenson (2018; 2019); Whittle (2017).
Wages and poverty	Europe, World	1300–2020	Allen (2013, 2017, 2020); Allen and Khaustova (2019); Moatsos (2016, 2020); Zegarra (2021, 2022).
Contemporary real wages	World	1850–2010	De Zwart et al. (2014); Freeman and Oostendorp (2000); Kunst et al. (2020); Moatsos (2020).

In this survey I will synthesize the main results of the last two decades of historical real wage research. I will discuss the methodology used to assess comparative real wages in Section 2. In Section 3, I will highlight the main trends and comparative levels of men's real wages in global history as they have appeared in studies over the past two decades. In Sections 4–5, I will elaborate on some of the critiques that have been raised regarding the methodology outlined in Section 2. After that, I will reflect on how best to connect historical studies with those that analyze real wages in the contemporary world. Section 7 concludes.

2 | MEASURING REAL WAGES IN THE LONG RUN

When analyzing the real value of wages over time and across space many problems arise: How to compare the real income of a wage laborer in medieval England, who lighted his house using wax-candles and who warmed himself by a fireplace full of firewood, with those of a worker in the 20th century who used electricity and a coal stove? Or how to compare the income of an 18th-century worker in England "who consumed beef, bread and beer, with that of a Chinese laborer who ate rice and fish" (Allen et al., 2011, p. 20)? The current wave of comparative wage studies in economic history can be traced back to Allen's (2001) methodological innovation to relate male wages to a consumer basket that was based on caloric needs. The aim of this methodology was to both analyze purchasing power of workers in the same region over time and to compare the purchasing power of similar workers in different regions. To do so a basket was defined that delivered the necessary nutrients, some 1940 kcal and 40 g of protein per day, mainly from the cheapest available staple in a region, in addition to required clothing and fuel (for heating and lighting). By defining baskets in this way, it was possible to compare the value of the wage relative to a poverty line. In this Section, I describe the original formulation of the methodology, what changes have been made to this over the past decade, and what consumer baskets have been employed across different studies, before discussing the results obtained with this method in the next Section.

Initially, the basket for European workers was relatively luxurious (and therefore later named the "respectability basket") and contained large amounts of bread, as well as substantial volumes of meat, beans, cheese, eggs, and beer. From the first set of real wage comparisons, however,

TABLE 2 BB-baskets across the globe.

Item	Unit/Year	Europe	China	India	Africa	Latin America
Main staple[a]	kg	155–178	171–179	164–209	185–413	132–165
Beans or peas	kg	20	20	20		45
Meat	kg	3	3	3	3	3
Butter or oil or ghee	kg	3	3	3	3	3
Linen or cotton	m^2	3	3	3	3	3
Lamp oil	liter	1.3	1.3		1.3	1.3
Soap	kg	1.3	1.3		1.3	1.3
Candles	kg	1.3	1.3		1.3	1.3
Fuel	mBTU	3	3		3	3

[a]Quantities differ depending on main staple with variant caloric content per kilogram: Rye, oats, wheat, or rice.
Sources: Allen (2007), Allen et al. (2011), Arroyo Abad et al. (2012), Frankema and Van Waijenburg (2012).

it became clear that this basket, while probably fitting with the consumption pattern of 18th-century Britons, was far too luxurious for most other parts of the globe (Allen, 2015, pp. 1–2). Therefore, many recent studies have used the much more modest "bare-bones subsistence" basket (BB-basket), based on unprocessed grains (eaten in porridge) rather than bread and beer, and containing smaller quantities of other necessities. The BB-basket more clearly reflects consumption patterns of those workers in poor societies that were very close to subsistence level. Table 2 shows different such baskets for different places across the globe as employed in some different real wage studies.

These baskets were initially based on an energy requirement of 1940 kcal per day. New research into energy requirements, analyzing the daily nutrients required to perform various intensities of physical labor suggested that this figure was too low (Humphries, 2013). To take this critique into account, Allen (2015) adjusted the BB-basket to include 2100 kcal per person per day rather than 1940 per adult equivalent. Additionally, the original methodology aimed to assess the income of a male laborer relative to the cost-of-living for a household. Therefore, the subsistence baskets were simply multiplied by 3 to take into account caloric needs of a wife and two children (with the latter consuming half a basket each). This assumption was also shown to be too low (Humphries, 2013). In response, the multiplier was revised upwards from 3 to 4. These adjustments to the cost-of-living push down overall real wage levels, but do not influence trends over time or the comparative standards of living across space. Table 3 shows the changed basket of consumer goods for Amsterdam. This makes clear that the total amount of calories needed for a family increased very substantially from 5820 to 8400 kcal; a rise of over 40%. This amount of kcal may still be considered too low, especially for performing intensive physical labor and recent studies have increased amounts of kcal further (e.g., Horrell et al., 2021; Houpt & Rojo Cagigal, 2022; Humphries, 2013).

Recent research investigated to what extent household cost-of-living thus defined accurately depicts a poverty line, also for contemporary low-income countries, and found that calculating the cost-of-living in this way provides a more accurate portrayal of a poverty line than the World Bank's very rough $1.25 line (Allen, 2013, 2017; Moatsos, 2016, 2020). That said, if anything, this cost-of-living index represents a very low standard of living as it contained few vital vitamins and minerals (Allen, 2017). The crucial thing is that the methodology permits comparisons of the value of the wage relative to a poverty line over time and space.

TABLE 3 Change in the BB-basket to include more kcal.

Item	Unit/Year	Allen et al., 2011		Allen, 2015
Energy Target per person	kcal	1940		2100
Main staple (Rye)	kg	180		197
Beans or peas	kg		20	
Meat	kg		5	
Butter	kg		3	
Linen	m		3	
Lamp oil	liter		1.3	
Soap	kg		1.3	
Candles	kg		1.3	
Fuel	mBTU		3	
Household multiplier	x	x 3		x 4
Household energy	kcal	5820		8400

Sources: Allen et al. (2011) and Allen (2015).

3 | THE EVOLUTION OF MALE REAL WAGES ACROSS THE GLOBE AND DEBATES ABOUT ECONOMIC DIVERGENCE

Different views exist on the long-term evolution of incomes across the globe. This section will synthesize the main findings from historical real wage studies using a BB-basket containing 2100 kcal per person based on mainly the cheapest available carbohydrate (as defined in the previous section; see right column of Table 3 for the Amsterdam BB-basket), while allowing for variations in the main staple (see Appendix for the baskets defined for Figures 1–2). What do the long-term trends imply for our understanding of global processes of income divergence and convergence and what has been said about the drivers of these trends in this literature? This research is based on incomes resulting from men's daily wages; contributions of other family members are considered in the next Section.

3.1 | The Little Divergence across Europe

The first set of studies dealt with the divergence of incomes across early modern Europe. Allen (2001) showed that real wage levels across Europe were more or less on a par at relatively high levels in the 14th century. In the centuries that followed, real wages remained stable in the Low Countries and England, while they declined in the rest of Europe, resulting in a "Little Divergence" across Europe from the 16th century onwards. Patterns of global trade and associated urbanization played a role in this divergence, as it was mainly large urban trading centers, like London, Amsterdam and Antwerp, that had more refined divisions of labor and consequently higher wages (Allen, 2009; De Pleijt & Van Zanden, 2016).

In the past few years, various studies reinvestigated the European "Little Divergence" in this period, often using freshly discovered data. These studies challenged the exact chronology of this divergence. Malanima (2013) argues that the use of high wages in London, deflated by prices observed in the surrounding countryside in Southern England, unfairly pushed up British real

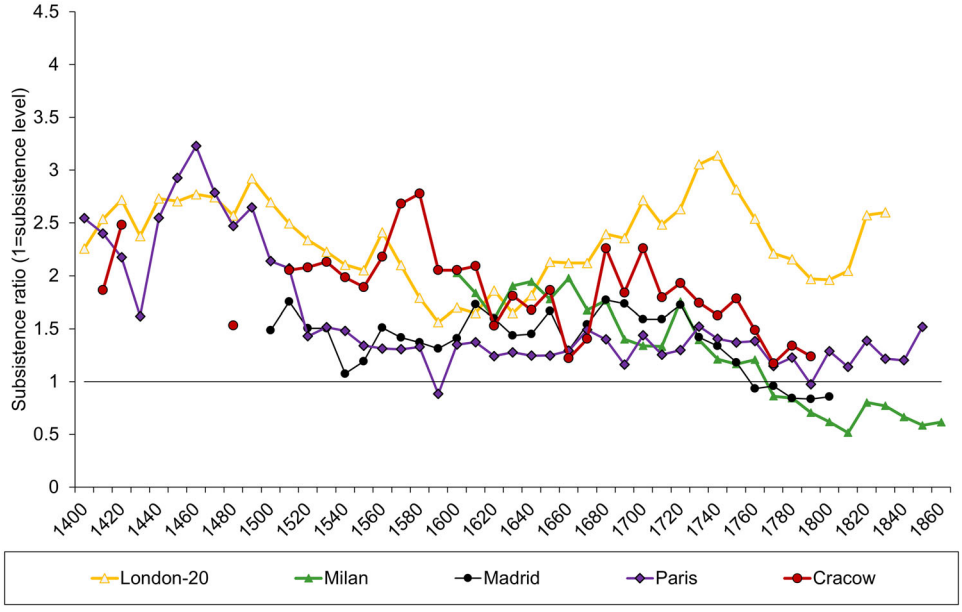

FIGURE 1 The little divergence in men's real wages across Europe, computed using subsistence baskets. Sources: Allen (2001); Malanima (2013); Lopez Losa and Piquero (2021); Ridolfi (2019); Malinowski (2016).[2]. [Colour figure can be viewed at wileyonlinelibrary.com]

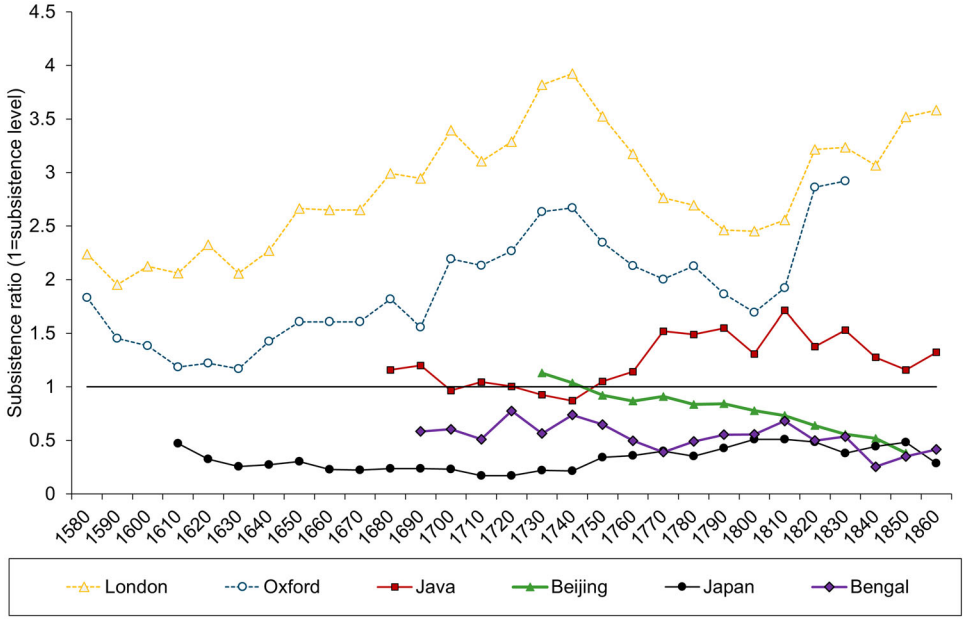

FIGURE 2 The great divergence in men's real wages in Europe and Asia, computed using Subsistence Baskets. Sources: Allen et al. (2011); De Zwart and Lucassen (2020); De Zwart and Van Zanden (2015); Kumon (2022). [Colour figure can be viewed at wileyonlinelibrary.com]

wages. When comparing Southern England (represented by Oxford) with Northern Italy (represented by Milan and Florence), it seems that wage levels only really start to differ from about 1720. Moreover, Malanima's (2013) data actually suggest that Italian real wages were substantially higher than those in England around 1500 and that during the 16th and 17th centuries wages in England and Italy converged (as a result of the latter's decline). Recent real wage figures from Rota and Weisdorf (2020) for Rome confirm the declining trend in Italian urban real wages over the 16th and 17th centuries. Workers in Rome likely enjoyed higher living standards than in other parts of Italy, but when comparing Roman real wages with those in London, the latter surpasses those in the former also from about 1700.

Malinowski (2016) showed that skilled and unskilled workers across Poland may have enjoyed real wages that were similar to those in London until about 1600. It was only thereafter that Polish workers came to lag behind. Malinowski also suggested that the inclusion of more processed foods and manufactured goods in the consumer basket benefitted the comparison in favor of England—suggesting greater productivity in those sectors there. In similar vein, Lopez Losa and Piquero Zarauz (2021) added new data on Spain and concluded that it was not until 1700 that real wages in Spain and England were on a par. Interestingly, they claim that using a basket containing unprocessed grains disadvantages Spanish workers in a comparison, as bread was relatively cheap there as a result of low taxation.

Real wage evidence from France confirm a relatively early divergence between London and Paris from the 15th century on, yet when looking at real wages in England and France outside of those main cities, differences are much smaller and it seems that the divergence may have 18th-century origins (Ridolfi, 2019; Geloso, 2018). New evidence on Portugal, Sweden, and Denmark suggest that real wages had already declined compared with England already before the 1700s (Costa et al., 2015; Gary, 2018; Gary & Radu, 2018). By the 19th century, however, average real wages across various Swedish regions had reached levels similar to Amsterdam and Antwerp, even if they did not attain London levels (Ericsson & Molinder, 2020). For some central and Eastern European countries data become only available from the 19th century, when the gap had already emerged (Cvrcek, 2013; Mijatovic & Milanovic, 2021).

Recent research for a wide range of German towns also suggests the divergence between England and Germany may have taken place later than previously thought (Pfister, 2017). Most cities in southern Germany had relatively low real wages that were substantially below those in northwestern Europe, but northern Germany enjoyed high real wages. Those in Hamburg, for example, were on a par with London and Amsterdam even until the late 18th century. One explanation is that Hamburg was part of the same, thriving, economic system across the North Sea. Those German towns that were lacking behind also generally had higher population densities which suggests that greater labor abundance may have pushed down real wages.

There are some differences in terms of the applied basket in all these studies. The recent study on various Spanish cities contained bread, rather than unprocessed grains, but otherwise defined sober BB-baskets containing no luxuries (Lopez Losa & Piquero Zarauz, 2021). Recent studies on northern Italy, German cities, Rome and Paris used the more luxurious "respectability basket" (Malanima, 2013; Pfister, 2017; Rota & Weisdorf, 2020; Ridolfi, 2019). For this survey, to maintain comparability across regions, and to keep in line with the idea of relating the male wage to a poverty line, the series on Milan, Paris and Madrid shown in Figure 1, use the most recent data, but were recalculated using BB-baskets (defined in the Appendix).

As a result of the addition of new data it seems that the chronology of the Little Divergence is altered and took place later than the initial studies suggested. Somewhere between 1700 and 1720, the Little Divergence really did take off as England, the Low Countries and Hamburg pulled

ahead of the rest. Figure 1 shows that this was also the case when using BB-baskets and when reducing the London series by 20% (see critique on London data in Section 4.2).

3.2 | The Great Divergence between Europe and Asia

Secondly, the study of real wages has become central to discussions about the so-called "Great Divergence" in incomes between Europe, Asia, and other parts of the world. This debate was kickstarted by scholars like Hanley (1997) and Pomeranz (2000) who questioned conventional views (often based on Maddison's GDP estimates) that Europe was already richer than Japan or China since the late Middle Ages. The 'revisionists' argued, for example on the basis of evidence on luxury consumption, that standards of living in various regions of East Asia were not significantly below those in Europe. Similarly, arguments of relatively high living standards and economic development in India have been made on the basis of evidence on wages for textile weavers by Parthasarathi (2011) and Sivramkrishna (2011). These contributions suggest that it was only with the Industrial Revolution that Western Europe forged ahead in terms of economic development and living standards: A fortuitous combination of easily accessible coal and land obtained through the colonization of the Americas allowed for Europe's ascent, these scholars suggest.

Studies on comparative male real wages that appeared over the past decade, however, generally supported the conventional view of an early lead for north-western Europe, certainly from about 1700 onwards. There is some early evidence for the Middle East—Cairo, Baghdad and Istanbul—that points to long-run stagnation of real wages between 700 and 1800, albeit with strong fluctuations in response to disease outbreaks (Pamuk & Shatzmiller, 2014). From a comparative perspective, the standard of living these wages represented were substantially below those measured for north-western Europe (Ozmucur & Pamuk, 2002).[3] Regarding the other end of Asia, Allen et al. (2011) found that real wages in Beijing and Suzhou were relatively low compared with levels prevailing in north-western Europe (also see Figure 2 below). Chinese real wages declined steadily over the eighteenth and first half of the 19th century. This picture was recently reconfirmed on the basis of some 5,600 observations from newly unearthed private and public sources on Beijing and the Yangtze delta (Liu, 2022). Only after the 1850s did wages trend upward again. In Japan, real wage rates for unskilled rural workers were very low between 1600 and 1870, with one contribution calling these workers "the poorest people recorded in history" (Kumon, 2022, p. 398). Evidence going back to 1400 is thinner but also suggests long-term stagnation at very low levels (Kumon, 2022). In terms of long-term trends, it seems Japanese wages were clearly in decline up to about 1720 after which they recovered to 1800. From about 1800 to 1900 they fluctuated heavily, but the long-run trend remained more or less stagnant, before increasing after industrialization in 1900.

A recent investigation of real wages in northern India (De Zwart & Lucassen, 2020), using a newly compiled dataset of over 7500 wage observations confirms the earlier suggestions of relatively low Indian real wages, which were based on a handful of observations (Allen, 2007; Broadberry & Gupta, 2006). Indian real wages declined over the 18th century and stagnated in the 19th century. Real wages in Ceylon (present-day Sri Lanka) were stagnant and around subsistence level throughout the 18th century (de Zwart, 2012; de Zwart, 2016). For Southeast Asia, De Zwart and Van Zanden (2015) showed that wages earned by "free" urban workers in 18th-century Batavia (present-day Jakarta) were higher than in Japan or China, but still below those in north-western Europe. At the same time, the majority of Javanese, who lived in rural areas and had to perform *corvée* labor services for small enumerations, had much lower real

wages that were below subsistence level. For comparative purposes only non-coerced urban workers were included in Figure 2. In the 19th century, Javanese real wages, both urban and rural, continued to stagnate and the gap with Europe further increased.

Overall, the latest evidence suggests that the Great Divergence was well underway prior to the Industrial Revolution. Presently available data suggest a gap in worker's real incomes had already emerged by the 15th (Japan), 16th (China) or 17th (India) century. Yet more data investigating the 15th and 16th centuries will be crucial to establish the chronology with more confidence. Malthusian dynamics, in which population growth in the absence of agricultural productivity gains eroded real wages, have been put forth as cause of declining Asian real wage trends (De Zwart & Lucassen, 2020; Gupta, 2019; Kumon, 2022).

3.3 | Real wages in the Americas and Africa

A final set of studies evaluated the development of real wages in Europe's (former) colonies in the Americas and Africa (see also Arroyo Abad & Gary, 2023). Data for Mexico are most abundance and cover the 16th to the 18th centuries. Real wages increased substantially between the 1530s and early 1700s (Arroyo Abad et al., 2012). Those in Mexico City peaked somewhere in the 18th century at levels of over 3 times subsistence level, above those in most parts of Europe (Challu & Gomez-Galvarriato, 2015). Data for Bogotá and Potosí suggest levels of living somewhat below that: between 1.5- and 2-times subsistence level (Allen et al., 2012). An additional study in real wages in Bogotá, Potosí and Mexico City on wages expressed in kilograms of grain and meat highlight that without the inclusion of other goods contained in the BB-basket, levels are similar to England (Dobado-Gonzáles & Garcia-Montero, 2014). Research on post-colonial Lima suggests that over the 19th century, real wages failed to increase consistently (Arroyo Abad, 2013). While some workers—doormen and mailmen—experienced a substantial, but temporary, rise in the mid-19th century, this increase was not shared by other unskilled laborers and servants (Zegarra, 2020). Real wages in Argentina seem to be a special case and in the late 18th century and much of the 19th century it had real wage levels above those recorded anywhere else in the world as a result of very high land/labor ratios (Arroyo Abad et al., 2012; Gelman & Santilli, 2018).[4]

In northern America, real wages were generally higher than those in the south. In the 17th and 18th centuries worker real incomes there were above those prevailing even in England (Allen et al., 2012). Real wages in French Canada in this period were somewhat below those in the American colonies and London (Geloso, 2019). Comparative real wage levels in Quebec were somewhat higher than in France and Southern England when making calculations based on respectability baskets, but on similar level in calculations that used the BB-basket, pointing to the importance of basket definitions.

Demography and patterns of migration influenced levels of real wages in these regions. The Mexican real wage increases of the 16th and 17th centuries was likely the consequence of the great population decline as a result of the spread of Old-World diseases that greatly diminished the available pool of labor (Arroyo Abad et al., 2012). Both North and South America had to attract labor from Europe by offering wages that were at least on a par with those in the Old Country plus some extra to cover the cost of travel and induce workers to leave their friends and family. Since wages were lower in Iberia than in Britain, this also translated in a wage gap in the Americas as the colonies in the South drew labor from the former and those in the North from the latter (Allen et al., 2012).

Frankema and van Waijenburg (2012) was one of the first studies systematically evaluating urban living standards in a variety of British African colonies. They found that real wages in West Africa, in the cities of Accra, Bathurst, Lagos and Freetown in the late 19th and early 20th centuries were substantially above subsistence level and often higher than those in Tokyo and Beijing. Real wages increased substantially in most of these cities over this period. In British East Africa, like Nairobi, Dar es Salaam and Kampala, real wages were substantially lower, but still generally above subsistence level and they also increased between the 1900s and 1960s. While these series refer to urban wage laborers, a relatively small group compared to the larger group of peasants in these societies, the results do show the dynamism of African living standards. Ronnback (2014) pushed estimates for free African workers back into the 18th century by drawing on wage quotations for canoemen hired by the Royal Africa Company. These data show that real wages were just below subsistence level, but the figures are difficult to interpret as they seem to be a lower bound estimate. South African real wages were more towards the upper end of the African wage scale at the end of the 19th century (De Zwart, 2011).

3.4 | Global real wage trends

A few things stand out. Contrasted with earlier research, the latest literature suggests that a divergence across Europe, with the north-west (particularly Amsterdam, Antwerp, Hamburg, and London) pulling ahead of the rest, took place from about 1700/1720. This is substantially later than was originally suggested in the real wages literature some two decades ago. The massive improvements in labor productivity resulting from industrialization allowed real wages after 1800 in England (and later in other parts of Europe) to really increase and substantially surpass levels of the late medieval period. Real wages in Asia were lower than those in Europe, declining over most of the early modern period and hovered around (or even below) subsistence level in the 18th and 19th centuries. The fact that male earnings allowed for incomes insufficient for survival for extended periods of time implies that other family members also had to contribute to household income, which will be further discussed below. In Latin America, real wages were higher than Asia, while those in Northern America were even higher than in Europe's leading economies and they were generally increasing over time (in contrast to the declining trend observed for most of Europe and Asia). In 19th-century Africa, urban wages were often higher than those in Asia at the time and they were rising throughout the colonial era. Main factors affecting long-run trends in men's real wages were population growth and decline, migration, trade opportunities and labor market institutions. This picture—drawn from men's daily wages—has not been universally accepted across the field as scholars raise questions pertaining to both the numerator (wages) and denominator (prices and baskets). These are discussed in the remainder of this survey.

4 | WAGES AND LABOR MARKETS

In this section, I discuss issues relating to the wage data: Who's wages are being compared and to what extent are these representatives for the population at large? How did real wages of urban workers compare to rural ones? How did systems of labor coercion affect real wages? To what extent did remunerations differ depending on labor contracts and what part of wages were pocketed by labor organizers?

4.1 | Labor relations and urban-rural wage differences

Many comparisons of historical real wages compare those of building laborers in the major cities. The reason for focusing on urban unskilled building wages is that for these workers the wage represented the main source of income, thus providing an accurate guide to their standard of living. The building industry is often considered an appropriate industry to study because the kind of work it entails remained more or less stable for centuries (i.e., building a church required more or less the same kind of skills in the year 1000 as in the year 1900). Before the more recent past, however, most people lived in the countryside and for many workers wages were only one source of income and additional earnings were generated by their farms or gardens. Because it is hard to estimate, let alone compare, income generated in such a way, urban wages were often preferred in long-run international comparisons. How do those relate to incomes in societies more broadly?

Deng and O'Brien (2016) argue that wage rates cannot be compared across Eurasia because the ratio of wage-dependent workers is very different: In Qing China wage workers represented about 3% of the total workforce (whereas in the 16th-century Holland this was about 50%; Van Bavel, 2008). Basic supply and demand theory suggests that wages may still reflect incomes of the masses if local labor markets are competitive and there are suggestions that they were in 18th-century China (Bin Wong, 1997; Pomeranz, 2000; Van Zanden & Ma, 2017). Therefore, various scholars have assumed the existence of a long-run relationship between real wage levels and average incomes more generally (Rosenthal & Wong, 2011). If wages represent a far lower standard of living than that earned by agriculture, simply not enough workers would show up to perform the necessary work and this labor scarcity would then increase wages up to the level that it provides a sufficiently attractive alternative to other activities. Similarly, wages cannot consistently represent a far higher standard of living than that earned by the average peasant in the countryside as that would likely cause an abundance of labor offered on the market which would put downward pressure on wages. Such suggestions assume the existence of free migration from the countryside to towns. Yet, it is clear that in many historical labor markets systems of coercion, such as slavery and corvée, were important and may have hindered the operation of such market mechanisms. The comparison across the Americas by Allen et al. (2012) excludes wages that were influenced by coercion, however, and Arroyo Abad et al. (2012) demonstrated that in those places in Latin America where coercion was a central element of the labor market, such as in Potosí, there was substantial wage inequality between free and coerced workers, with the former earning between 2 and 3 times as much as the latter. While it makes sense to compare wages of similar 'free' workers, it must be kept in mind that in those areas characterized by coercion this implies that for a large group of people the 'free' real wage will not accurately depict their standard of living. Clearly, the context from which reported wages were taken matters a lot (Arroyo Abad & Gary, 2023).

There is some evidence that suggests that rural and urban wages followed more or less similar *long-run* patterns of growth and decline (e.g., Clark, 2007b; De Zwart & Van Zanden, 2015). Rural workers generally earned somewhat lower nominal wages than urban ones, which was partially compensated by lower consumer prices prevailing in agricultural areas (e.g., Gary, 2018). There is also evidence on earnings of smallholders in medieval England that imply a "close correspondence" between smallholder incomes and male annual earnings from wages (Horrell et al., 2022, p. 536). For India, data suggests that urban employers attracted wage labor from a very wide region as workers travelled from (rural) areas that were hundreds of kilometers away, which may hint at an integrated rural-urban labor market (De Zwart & Lucassen, 2020,p. 648).

At the same time, it is clear that there are also episodes during which urban and rural real earnings diverged. For example, urban real wages seemed to increase more (and earlier) during the Industrial Revolution causing a rise in 19th-century wage inequality (Allen, 2015; Clark, 2007b). For Uganda in the 20th century, it was shown that incomes of urban wage laborers and smallholders could diverge substantially for a period of some three decades before converging again (De Haas, 2017). In the Ugandan case the divergence is explained by the fact that the bulk of unskilled wage labor was being done by migrants from Ruanda-Urundi, so that wages rather reflect living standards there. Comparisons between real wages and other evidence of household earnings can shed light on the extent to which data on real wages can provide indications of earnings in a society more broadly (Horrell et al., 2021). More research should investigate comparative rural peasant incomes and urban wage incomes in a variety of historical contexts to see how they relate.

4.2 | Labor contracts and days worked

Real wage studies often used data on daily rates to estimate annual real wages, but this requires assumptions about the length of the working year. 250 work days per year have been put forth as a crude assumption in the literature, but we know that for some places that the working year probably contained more days (e.g., early modern India and Japan, De Zwart & Lucassen, 2020; Kumon, 2022), while for other regions and time periods the number of days was considerably less than that (Allen & Weisdorf, 2011). Moreover, number of days worked changed substantially over time (Hatcher, 2018; Humphries & Weisdorf, 2019). To circumvent this problem, studies by Humphries and Weisdorf (2015, 2019) moved away from using reported daily wage rates and instead analyzed data on wages for those workers who were on annual, rather than casual, contracts. On the basis of these figures, they estimated trends in English real wages between 1250 and 1850. They find that annual real incomes earned by these workers did not increase as much during the "Golden Age of Labour" between 1350 and 1500 as suggested by day wages. Moreover, after about 1600, trends and levels of real wages from daily and annual contracts diverged as annual workers saw much more substantial gains than day laborers (Humphries & Weisdorf, 2019). Discrepancies between day and annual wages in Sweden suggest that day laborers probably did not obtain work for 250 days per year, but that the working year may have been substantially shorter; not reaching beyond 150 days annually (Gary, 2018, 2019). Moreover, a clear seasonality in building labor can be observed in these data as most work was done during summer. At the same time, the Swedish series do not show substantial divergence in trends between annual and day wages over time.

More research into annual wages in other parts of the world will be crucial for future research (e.g., Melacrinis, 2023). This may point out whether the divergence in annual and day wage trends in England also occurred in other cases. More investigations are necessary to highlight what share of the wage laboring population was on annual rather than casual contracts. For England, educated guesses on the relative shares of these group suggest that workers on annual contracts were always a minority and declined substantially from 46% in the 13th century, down to 25% in the 1680s and 16% in the 1850s (Humphries & Weisdorf, 2019, p. 2882). This implies that understanding movements of wages for both groups of workers remains important. In general, it seems that workers on annual contracts were young, unmarried men and women who lived, without families, with their employers as servants (Humphries & Weisdorf, 2015; Kumon, 2022; Whittle, 2017, p. 1), yet the characteristics of this group in terms of sex and age

distribution changed over time (e.g., Hayhoe, 2017, p. 157) and differed across space (Whittle, 2017, p. 18).

Other ways to circumvent assumptions about the number of days worked is to estimate how many days, or hours, of labor it cost to purchase one (BB or respectability) consumer basket (or, alternatively, how many baskets one day of work purchases) and compare this figure across space and time (e.g., Allen & Weisdorf, 2011; De Haas, 2017; De Pleijt & Van Zanden, 2021; De Zwart et al., 2014; Kumon, 2022). Such different computations matter for our interpretation of the figures, but do not add insight to international comparisons of real labor incomes as those would still fluctuate over time as a result of varying and changing labor times.

An additional issue concerns the extent to which the wages observed in the sources reflect the actual incomes of laborers rather than reflect rates paid out to contractors (Hatcher & Stephenson, 2018). One recent study suggests, for example, that building contractors may have siphoned off some 20% to 30% of the stated wage rates in early modern London (Stephenson, 2018, 2019). These practices were probably not confined to Britain, however. In Paris, contracts similarly took a margin of some 25 and 30% (Stephenson, 2018), while in Italy wages paid out through contractors may understate the actually received remunerations (Mocarelli, 2004). There is no consensus on these percentages and another investigation suggests that the percentage difference between the pay to the contractor and that of the worker was 18% in case of unskilled laborers and only 9% in the case of craftsmen (Allen, 2019). In India, the *sardar, maistry* or *kangany* performed a similar role as the London contractors (Roy, 2008), but the impact on observed wage rates remains unknown. Lacking data about the premium paid to labor organizers and recruiters across the globe, it is difficult to say how these practices differed, how large the share was that these recruiters pocketed, and what it would imply for global comparisons. Stephenson (2018) observed that even a reduction of wages in London by a third would still put those rates substantially above most other parts of Europe (with the exception of Antwerp and Amsterdam), as well as the rest of the world, in the 18th century. This issue is also linked to a broader critique of the source materials often used to estimate real wage trends (Hatcher, 2018). Both wage and price data are often taken from the bookkeeping of large institutions (governments, large companies, churches etc.), that may not have paid market rates. Yet most workers at the time were not employed on such large projects paid for by institutions, but rather on smaller projects (Hatcher, 2018, p. 17). The fixed rates agreed with contractors could have concealed seasonal fluctuations in wages, but it is not clear how seriously this would affect annual averages.

Another problem with the observations of cash wages is that they fail to capture payments in kind (for both annual and day workers), as was observed for England (e.g., Hatcher, 2018; Humphries, 2023), France (Geloso, 2018) and China (O'Brien & Deng, 2017). Allen et al. (2011)'s study on Chinese wages explicitly excluded wages with in-kind payments that could not be enumerated. Yet many laborers received such payments, like board and lodging, and it often represented a substantial element of their total remuneration. One strategy to deal with this is to assume board and lodging equals the cost of a subsistence or respectability basket and to add the monetary value of this to the cash wage (e.g., Humphries & Weisdorf, 2019). When data on the actual goods that were part of the in-kind payments (such as kilograms of rice or wheat) are given, these can also be translated into monetary values using prevailing market prices and added to the nominal cash wage (Claridge, 2023). Research on India has shown that substantial payments in grain were more prevalent when it was cheap, whereas in periods when it was dear employers switched to more cash payments (Lucassen, 2022). One way to deal with all such issues is to include the upper- or lower bounds of in-kind payments and include those in the comparisons as a robustness check (e.g., Humphries & Weisdorf, 2019; Ronnback, 2014).

4.3 | Family incomes

Much of the real wage literature has focused solely on incomes generated by male wages, but the male breadwinner was not the norm throughout history. Scholars pointed out that not including earnings from other family members is historically inaccurate and results in a misleading picture of both levels and trends in living standards (e.g., Boter, 2020; Burnette, 2004, 2008; Horrell & Humphries, 1992, 1995, 2019; Horrell et al., 2021, 2022; Humphries & Weisdorf, 2015; Lindstrom et al., 2017; Van Nederveen Meerkerk, 2008). This research has indicated not only that earnings generated by women and children could be very substantial, but also fluctuated significantly over time and over space—further complicating long-run comparative analyses.

In terms of longer-run trends the best data comes from England. Available figures suggests that wages of women on casual contracts showed more or less similar trends to men's wages until the late 15th century. Then twice a divergence between female and male wages takes place, first in the sixteenth and then in the 18th century (Humphries & Weisdorf, 2015). The ratio between adult men and children's wages was not stable either, as the latter fell behind from the later 16th century (Horrell & Humphries, 2019). Number of days worked by women and children, as well as participation rates, changed over time. From a low point just preceding the Black Death, working days may have increased substantially in the centuries thereafter. For women, restrictions on women's work implied much lower numbers of potential days worked between the mid-16th and later 17th centuries. Evidence on participation rates for both women and children suggest a declining trends from the late 16th to the 19th centuries (Horrell et al., 2021).

By taking into account these changes in wages, days labor, and participation over time into account a different picture of long-run household income emerges than that based solely on men's earnings (Horrell et al., 2021). It seems that the high real incomes enjoyed during the "Golden Age of Labour" in the two centuries following the Black Death, was driven largely by the contributions of other family members (see Figure 3). In the 15th century, over 50% of total household income was generated by women and children. Real household income declines in the late 16th and 17th centuries were primarily driven by the lower contributions by women. In the original study by Horrell et al. (2021), who use the respectability basket containing 2500 kcal, family living standards fall below subsistence level in those centuries. Figure 3 shows that the BB-basket lifestyle provided an alternative in this period of hardship caused by low female labor participation.[6] This picture does not yet take into account the fact household compositions, incomes and expenditures changed over time depending on the lifecycle which can further highlight which groups were particularly vulnerable during which periods in history (Boter, 2020; Humphries et al., 2022). Furthermore, contributions of women and children to household income also differed within countries and per economic sector (Burnette, 2004). In early 20th-century Netherlands, earnings of women and children represented a larger share of household income for families engaged in the textile sector than for agricultural families (Boter, 2020, p. 1064).

Relevant for international comparisons is the question pertaining to the extent to which wage gaps, participation rates, and days worked for different household members differed across the globe. For wage gaps we have some information, but for the other variables we are almost entirely in the dark. Recent investigations on China and India suggest that the gender wage gap was somewhat smaller there, taking those incomes into account may not close the gap in living standards observed in Figure 1 (see also Allen et al., 2011; De Zwart, 2016; De Zwart & Lucassen, 2020). For the "Little Divergence" the story might be more complicated as gaps were smaller and differences in labor participation rates may have closed the gap. Recent studies have observed, for example, the importance of women's contribution to household income in Spain, noting high women's wages

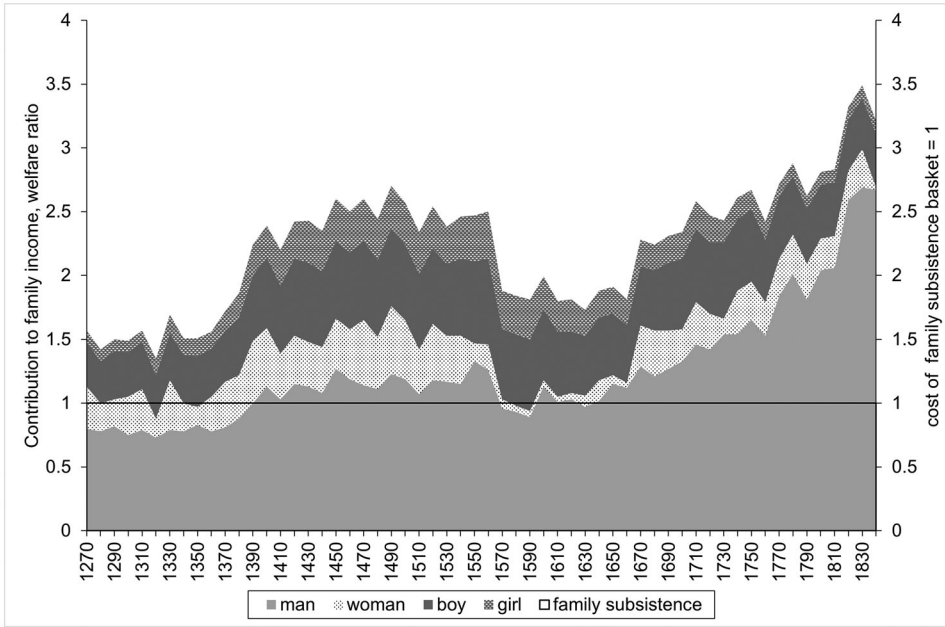

FIGURE 3 Real wages in England showing contributions of family members, computed using BB-Subsistence Baskets. *Source*: Horrell et al. (2021).[5].

in the 18th century (Galvez-Munoz, 1997; Sarasua et al., 2023). Another study, however, showed that female relative to male wages in the period c. 1300–1800 were generally lower in Italy, Spain than in the Low Countries and England, but that those in southern Germany were comparable or higher (De Pleijt & Van Zanden, 2021). Participation rates differed widely across Europe and showed different trends over time, as shown by studies that include data on England, the Netherlands and Spain (Borderias, 2013; Humphries & Sarasua, 2012; Sarasua et al., 2023; Schmidt & Van Nederveen Meerkerk, 2012), so that inclusion of such evidence will crucially shape the picture of comparative household incomes.

Before we understand how this will feature into comparative family incomes, however, we must not only have much more data on women's and children's wages, but also on varying participation rates over time. The available evidence suggests that women and children contributed significantly to household income throughout many periods in history. Crucially, however, as earnings opportunities for different family members changed over time—and differed across space—including such information in long-run comparisons may alter chronologies (and thus potential drivers) of global divergences and convergences of living standards as outlined above.

5 | WHAT PRICES?

Most contributions over the past decades focused on issues pertaining to wages, but there is no consensus on the cost-of-living estimator either. In this section, I will highlight issues that have been raised as regard the construction of the cost-of-living index, thereby noting issues pertaining to the use of a Laspeyers index, housing costs, global temperature variations and the use of Linear Programming (LP).

The subsistence basket methodology is a Laspeyres index as it includes a fixed set of goods, and quantities of those goods, and only fluctuates over time with changes in prices. This is ahistorical because we know that consumption patterns changed over time as new goods became available and relative prices changed. Horrell (2023) establishes household budgets across 8 benchmarks between 1260 and 1860 to create a chained-Laspeyers index that more accurately traces historical changes to consumption in England.[7] She finds that fixed-weighted "respectability" basket and the chained-Laspeyers index show very similar trends over time, but that differences with the BB-basket are somewhat larger as it tends to overstate inflation due to its heavier reliance on the main staple. Various recent studies used the more luxurious "respectability basket" over the BB-basket in their comparisons across early modern Europe. For comparisons including other parts of the world for which the BB-basket is more suited, it must be kept in mind that may reduce accuracy. This shows the tensions between assessing changes in the real value of wages over time vis-à-vis comparing them across space. An alternative way to estimate the cost of BB-subsistence, or respectability, lifestyle is to exploit historical information available on the monetary values of in-kind payments as they pertain to food, or board and lodging, over time, which takes into account potential changes in consumption patterns (Humphries, 2023).

Another issue pertains to housing costs. Lacking data on rent for most countries throughout history, it was assumed that in pre-industrial times, housing was good for about 5% of households total expenses per family member on average. Without good data on housing costs this assumption was necessary to make, but it may not hold once more data appear. Recent studies have suggested that the 5% per person may not be accurate. In 18th- and 19th-century Mexico City, rent was substantially higher than the 5% assumed per family member and the subsistence cost-of-living increased by about a tenth when including such information (Challu and Gomez-Galvarriato 2015, p. 99). Westland (2021) investigated worker's spending on rent in 20th-century French West Africa and also found that it was much higher than the 5% of household expenses assigned in the conventional methodology (even citing evidence where housing costs represent over 25% of the cost of the BB-basket). He shows that including data on actual housing costs implied a reduction in the calculated 'subsistence ratio' for Dakar (Senegal) of between 25 and 75%. As more data on housing costs become available, it is imperative to include the costs for of housing in the budget, as such large differences in both levels and trends in housing costs may affect global comparisons.

An additional innovation to the methodology that will imply large changes for the global comparisons but that still waits widespread adoption is the incorporation of climate adjustments. It is clear that someone who lives in a tropical climate will, on average, need much less firewood for heating and less clothing than someone who lives near the arctic. Allen (2017) found substantial differences in spending on clothing, fuel, and lighting in surveys of workers' consumption in early 20th-century St. Petersburg and Bombay. While workers in St. Petersburg required twice as much lighting and 3 times as much clothing, they consumed even 8 times more energy for heating and even over 30 times more footwear (see Table 4). In line with this, a study comparing real wages in different parts of Italy also reduced amount of firewood in the basket for southern regions (Federico et al., 2019). Geloso (2019), in similar vein, demonstrated that fuel needs were far higher in Canada.

Data on actual expenses on heating and lighting are often missing, but we do have data on temperatures across the globe starting in the 19th century. Pioneering work has been done by Moatsos (2016, 2020) who used those data to calculate average required mBTUs needed for families per country. The idea is to compute the number of days per year in which indoor

TABLE 4 Clothing and energy requirements for societies in different climates.

		Bombay	St. Petersburg	St P./Bombay
Clothing	Meter eq.	23	63	3 times more
Footware	Meter eq.	1	31	31 times more
Bedding	Meter eq.	3	21	7 times more
Fuel	mBTU	3	25	8 times more
Light	mBTU	.4	.9	2 times more

Sources: Allen (2017).

heating is required. The threshold is an outside temperature of 15.5°C, corresponding to an inside temperature of 18°C, which is recommended by the World Health Organization (WHO) (Moatsos, 2020). Days on which temperatures drop to below that figure, indoor heating is required, and scholars have come up with models to estimate the energy required to keep an indoor space at desired temperatures.[8] The results from such an exercise suggests that in Russia on average some 13 mBTUs are needed, while in countries closer to the equator, like Mexico or India, this figure is closer to 1 and 0 respectively as temperatures throughout the year are high enough that (almost) no additional heating is required. Compared with Mexico, societies in Europe and the US need some 4–5 times as much mBTUs annually.

If we then adjust the subsistence cost using this information on energy needs and plug this into the global real wage comparisons, one can view how much the picture changes (Figure 4). Indian real wages are hardly affected, but energy requirements for workers in Amsterdam had to be increased from 2 to 6 mBTU per annum. Depending on the price of firewood and coal, this significantly lowered real wages there: From some 2.5 to 1.5 times subsistence level around 1800. With declining energy prices, this gap declined somewhat in the course of 19th century with unadjusted real wages 1.75 times subsistence in the 1860s and adjusted ones 1.25 times subsistence. Allen and Khaustova (2019) show that when including higher energy costs for Russia, real wages there were more on par with India than north-western Europe. The impact of climate adjustments for the picture of global disparities in worker's real wages is substantial, but currently awaits implementation for a wider set of countries.

A final recent development in the methodology of calculating real wages that yet awaits widespread adoption among economic historians is the use of Linear Programming (LP) to estimate the cost of a Basic Needs Poverty Line (see Allen, 2013, 2017; Allen & Khaustova, 2019; Moatsos, 2020; Zegarra, 2021, 2022). Using LP, one can establish a set of basic needs in terms of calorie and nutrient requirements, as well as heating and clothing needs, and on the basis of such parameters the model chooses a combination of goods that delivers these in the cheapest possible manner. Depending on local price developments, such a diet could consist for a large part of either maize, rice, or wheat (Allen, 2017). This diet can change from year to year depending on shifts in relative prices. There are important advantages to this methodology, as diets can differ across the globe, and over time, but they are always based on the same set of requirements and thus remain comparable conceptually. Furthermore, changes in these requirements can be

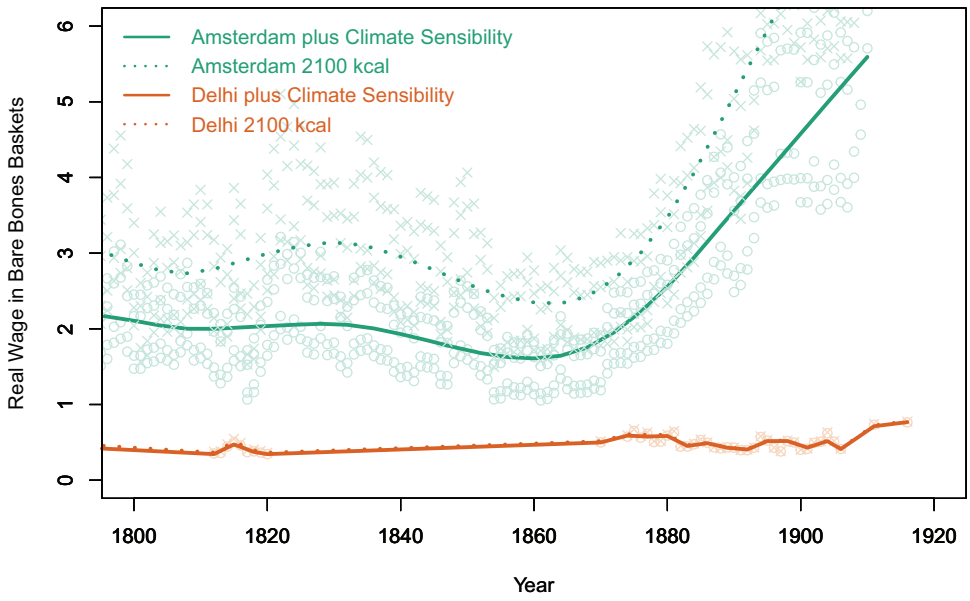

FIGURE 4 Real wages in Amsterdam and Delhi with adjustments for climate differences. Sources: Moatsos (2020); Allen (2007). [Colour figure can be viewed at wileyonlinelibrary.com]

transparently implemented and it can be easily reviewed how that changes the diet and the cost of living.

A major hurdle for the adoption of this method for historical real wage studies is that it requires a lot of data on prices of goods across the globe that are all consistently entered in a single database. As a result, the currently published work only covers 7 markets. Allen (2020) estimated LP diets for medieval and late 18th-century London and found that these were very similar, with the main change that potatoes—a new world crop—were a more important source of calories by the late 18th century. His figures suggest that almost all British households from the 13th century on were able to afford subsistence level. Zegarra (2021, 2022) extends these estimates to include Amsterdam, Paris, Strasbourg, Munich, Leipzig, and Lima. He sets a benchmark for basic needs where workers do not only require calories and protein, but also fat, iron, and vitamins and as a result overall estimated real wages are slightly lower than in preceding studies. His estimates uphold London as the European city with the highest real wages; while Amsterdam is still on a par in the early 18th century, by the latter decades of the 18th century, London forges ahead (Zegarra, 2022). Even when he reduced the London wage series by 20% to take into account possible earnings of labor contractors, London male workers still had higher real earnings than their colleagues in other parts of Europe, although they now remain on a par with Amsterdam until the late 18th century. Estimates with linear programming for 19th-century Lima suggest male real wages were generally similar to those in Europe (Zegarra, 2021).

Moatsos and De Zwart (2022) assess the implications of LP based on a wide variety of data, as well as making adjustments for climate, for comparative male real wage levels. Figure 5 uses data for Amsterdam for the period between ca. 1500–1900. Including LP increases real wages levels, but climate adjustments strongly push them down. Real wage estimates computed using LP, but not containing the adjustments for energy and clothing requirements, are occasionally double those levels that do contain those adjustments. The original series using the unchanging basket

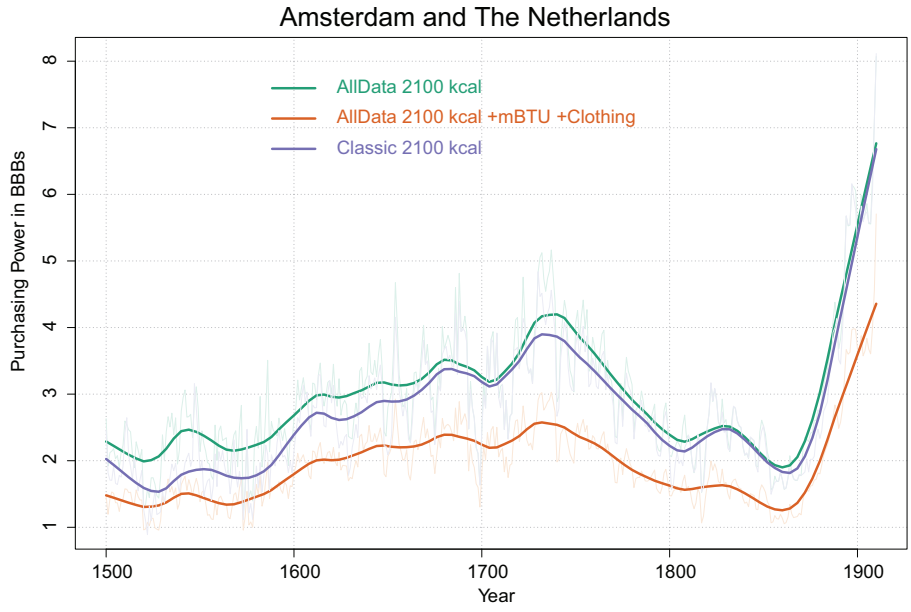

FIGURE 5 Real wages in Amsterdam, classic data, adjusted using linear programming using full dataset and adjusting for differences in climate (heating and clothing requirements). *Source*: Moatsos and De Zwart (2022). [Colour figure can be viewed at wileyonlinelibrary.com]

of goods over time, and with similar needs in terms of heating and clothing as in the "classic" methodology, generally is somewhere in the middle of those series. The effects of using LP and climate adjustments will have different effects on real wage estimates across the globe and will change over time as a result of shifting relative prices.

Finally, in terms of improving the underlying data for the comparisons, efforts have often been geared towards the wage data, yet the price series on which many real wage studies relied were generally obtained from large institutions that did not pay market prices. Additional research into additional sources, such as price currents, may pinpoint how these relate to market rates.

6 | FROM THE PAST TO THE PRESENT

Much of the current economic history literature on real wages aims at assessing living standards over long periods of time and making comparisons across the globe. As a result, the basket used for calculations is relatively simple, being defined as the amount of nutrients and a few other necessities for survival. Therefore, the methodology is less suited to compare real wages across modern high-income societies, where people have a very different consumption pattern (including the purchase of many electrical appliances, cars, and various other luxuries). In doing long-term comparative research, economic history work on real wages has moved away from many wage analyses in economics. In economics, when examining the real value of wage trends, there are wage estimates in PPP (purchasing power parity) terms available that can be used in international comparisons (e.g., Freeman & Oostendorp 2000; Kunst et al., 2020). PPP figures have two great disadvantages for historical real wage research, namely (1) they do not exist for the period

before the 1960s and (2) they do not accurately reflect the consumption pattern of those at the bottom end of the income distribution, especially relevant for historical societies, as well as today's developing (and possibly middle-income) countries (see Allen, 2017; Moatsos, 2020).

A recent attempt to bridge the gap between historical real wage studies and current real wage trends suggested the problems involved in such an exercise. De Zwart et al. (2014) gathered wage and price data for a large number of countries for the period between 1924 and 2008 from the ILO October Inquiries and used these data to calculate comparative male real wages series employing the BB- basket methodology. This basket is so basic and approximating absolute poverty, however, that in Western Europe and North America, for example, one male unskilled wage could buy over a 100 of these baskets in the later 20th century. The higher this number gets, the more meaningless, as certainly no one in high-income countries purchases several of such subsistence baskets. Instead, they would consume more high-quality and processed foods and non-food luxury products, and the prices of such products need to be included in the cost-of-living. For a comparison of living standards in high income countries after the Second World War, the subsistence basket methodology is clearly not appropriate and instead one could use PPPs to compare wage levels. At the same time, there were also countries where real wages were not far above subsistence level even by the 1980s, such as those in South and Southeast Asia and Sub-Saharan Africa, and where the methodology still yields a meaningful figure, and possibly more meaningful than comparing PPPs that do not have a strong relationship with the actual consumer patterns of those at the bottom end of the income distribution. Despite these issues, the exercise of De Zwart et al. (2014) did make clear the massive divergence in the real incomes of unskilled laborers since WWII between the West and many parts of the Global South, suggesting the rise in global inequality in unskilled male real wages was even greater than in any previous era in history. Whether to use PPPs or the subsistence basket methodology for calculating real wages depends on the topic of research. For economists and economic historians interested in comparative standards of living in low- (and possibly middle-) income countries, or in long-run patterns of development across the globe before the Second World War the comparative subsistence basket methodology remains relevant.

7 | CONCLUSION

Over the past two decades, progress has been made in developing a methodology that allows comparisons of real earnings of laborers over time and across space by relating nominal wages to a subsistence level of consumption (based on the costs of obtaining enough nutrients and some other basic necessities). New data were gathered for a wide range of regions across the globe and employed this methodology. As a result of this research, we now have a much better picture of comparative long-run trends in the purchasing power of male day wages across the globe. These figures show that it was from about 1700/20 that a divergence took place in men's real wages between England and the Low Countries on the one hand, and most of the rest of the world on the other. Many other parts of Europe, as well as various areas across Asia had real wages that showed declining trends over the course of the 17th and 18th centuries, and stagnation in the nineteenth. Real wages were higher in the northern American colonies than they were in the European leaders, while those in Latin America were somewhere in the middle of the global real wage ladder. In terms of driving forces behind levels and trends of male day real wages across the globe, demographic trends, labor market institutions and rising trade were put forth.

While the purchasing power of male day wages relative to a subsistence or poverty line is often considered an important indicator for long-run changes to material living standards, current

research has suggested its shortcomings as a measure of living standards across history. As a result of recent investigations on long-run wages in England, additional refinements to the methodology and further avenues for investigation have been suggested. First, in terms of the numerator, scholars have highlighted the changing number of days worked overtime and differing long-run trends in wages for those working on casual *vis-à-vis* those on annual contracts. Moreover, including information on the changing contributions and employment opportunities of women and children into the calculations of household income substantially alters both levels and trends. Taking into account the share of wage income pocketed by labor organizers may further influence comparisons as this may differ over time and across different countries. Second, it was found that the BB-basket tends to overstate inflation as compared to chained price indices that take into account actual changes in consumption patterns. Making adjustments for differences in climates to the cost-of-living index may imply substantial changes in computed real wage ratios, with countries closer to the equator being disadvantaged in assessments that do not include such adjustments. Furthermore, linear programming methods are a step forward in terms of transparently estimating wages relative to a poverty line that is consistent with the conceptual foundations of the methodology. Taking these issues into account in global comparisons may alter the picture of comparative real wages as outlined in Section 3. The current state of evidence does not allow to sketch such a picture.

Here lies an important agenda for future research. To get at a new picture of global comparative household real earnings requires a major research effort that gathers more information not only on wages (for men, women, and children on different contracts and in rural and urban contexts), but also on days worked and participation rates, as well as rents and consumer market prices. It will also require deeper investigations into the functioning of wage labor markets, contracts and the money received by intermediaries. All of this for different parts of the world and in different time periods. The issues raised in the literature reflect the fundamental tension between (1) the best method to accurately assess trends in household living standards in one particular region over time, and (2) that most capable to assess the purchasing power of wages in a global comparative perspective. While this tension is unlikely to be resolved for the foreseeable future, it is clear that scholarly work on historical real wages is thriving and that estimates are continually being improved, by bringing in new data and through further innovations to the methodology.

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DATA AVAILABILITY STATEMENT

Data underlying these figures stem from other research and are referred to as such. For this reason, the data shown in this article are not published.

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ENDNOTES

[1] Global Price and Income History Group: http://gpih.ucdavis.edu and Historical Prices and Wages: http://www.iisg.nl/hpw.

[2] Figure 1 shows "original" London series, not lowered by 20% as is now sometimes done to deal with critique voiced in section 4.2.

[3] The study by Ozmucur and Pamuk (2002) still made calculations based on "respectability baskets", all other contributions to the "Great Divergence" debate analysed real wages while computing BB-baskets.

[4] For additional work on Argentinian real wages for a variety of workers see Olguin and Bragoni (2021), for a discussion of real wages in Uruguay see Moraes and Thul (2018).

[5] Data kindly provided by Sara Horrell, Jane Humphries and Jacob Weisdorf. The figure differs slightly from that in the original publication (Figure 13; Horrell et al., 2021), because the figure here is computed using the barebones basket instead of the respectability basket.

[6] Humphries (2013) puts forth the evidence that suggests the BB-basket is inaccurate and insufficient.

[7] This is similar to the approach taken in a paper assessing Spanish family standard of living in early 20th-century Spain (Houpt & Rojo Cagigal 2022).

[8] Besides outside temperatures, such calculations are of course depending on the size and characteristics of the housing construction. See Allen (2017) and Moatsos (2016) for further information.

REFERENCES

Allen, R. C. (2001). The great divergence in European wages and prices from the middle ages to the first world war. *Explorations in Economic History*, *38*, 411–447.

Allen, R. C. (2007). India in the great divergence. In T. J. Hatton, K. H. O'Rourke, & A. M. Taylor (Eds.), *The new comparative economic history: Essays in honor of Jeffrey G. Williamson* (pp. 9–32). MIT Press,.

Allen, R. C. (2009). *The British industrial revolution in global perspective*. Cambridge University Press.

Allen, R. C. (2013). Poverty lines in history, theory, and current international practice. *Oxford Economics Discussion Paper*, *685*, 1–33.

Allen, R. C. (2015). The high wage economy and the industrial revolution: A restatement. *Economic History Review*, *68*, 1–22.

Allen, R. C. (2017). The absolute poverty: When necessity displaces desire. *American Economic Review*, *107*, 3690–3721.

Allen, R. C. (2019). Real wages once more: A response to Judy Stephenson. *Economic History Review*, *72*(2), 738–754.

Allen, R. C. (2020). Poverty and the labor market: Today and yesterday. *Annual Review of Economics*, *12*, 107–134.

Allen, R. C., Bassino, J.-P., Ma, D., Moll-Murata, C., & van Zanden, J. L. (2011). Wages, prices, and living standards in China, 1738–1925: In comparison with Europe, Japan, and India. *Economic History Review*, *64*, 8–38.

Allen, R. C., & Khaustova, E. (2019). Russian real wages before and after 1917. *Explorations in Economic History*, *72*, 23–37.

Allen, R. C., Murphy, T., & Schneider, E. (2012). The colonial origins of the divergence in the Americas: A labour market approach. *Journal of Economic History*, *72*, 863–894.

Allen, R. C., & Weisdorf, J. (2011). Was there an 'industrious revolution' before the industrial revolution? An empirical exercise for England, c. 1300–1800. *Economic History Review*, *64*(3), 715–729.

Arroyo Abad, L. (2013). Failure to launch: Cost of living and living standards in Peru during the 19th century. *Revista de Historia Economica*, *32*, 47–76.

Arroyo Abad, L., Davies, E., & van Zanden, J. L. (2012). Between conquest and independence: Real wages and demographic change in Spanish America, 1530–1820. *Explorations in Economic History*, *49*, 149–166.

Arroyo Abad, L., & Gary, K. (2023). A window to the past: Living standards in historical perspective. In C. Diebolt & M. Haupert (Eds.), *Handbook of cliometrics*. Springer. (forthcoming).

Bassino, J. P., & Ma, D. (2005). Japanese unskilled wages in international perspective. 1741–1913. *Research in Economic History*, *23*, 229–248.

Bin Wong, R. (1997). *China transformed. Historical change and the limits of the European experience*. Cornell University Press.

Borderias, C. (2013). Revisiting women's labor force participation in Catalonia (1920–36). *Feminist Economics*, *19*, 224–242.

Boter, C. (2020). Living standards and the life-cycle: Reconstructing household income and consumption in the early twentieth-century Netherlands. *Economic History Review*, *73*(4), 1050–1073.

Broadberry, S., & Gupta, B. (2006). The early modern great divergence: Wages, prices and economic development in Europe and Asia, 1500–1800. *Economic History Review LIX*, *59*(1), 2–31.

Burnette, J. (2004). The wages and employment of female day-labourers in English agriculture, 1740–1850. *Economic History Review*, *57*, 664–690.

Burnette, J. (2008). *Gender, work and wages in industrial revolution Britain*. Cambridge University Press.

Challu, A. E., & Goméz-Galvarriato, A. (2015). Mexico's real wages in the age of the great divergence, 1730–1930. *Revista de Historia Economica—Journal of Iberian and Latin American Economic History*, *33*, 83–122.

Claridge, J. (2023). 'It's not just about the money: A reappraisal of Medieval English agricultural wages'. *LSE Research for the World*. https://www.lse.ac.uk/research/research-for-the-world/economics/its-not-just-about-the-money-a-reappraisal-of-medieval-english-agricultural-wages Last visited May 8, 2023

Clark, G. (2007a). *A farewell to alms. A brief economic history of the world*. Princeton University Press.

Clark, G. (2007b). The long march of history: Farm wages, population, and economic growth, England 1209–1869. *Economic History Review*, *60*, 97–135.

Costa, L. F., Palma, N., & Reis, J. (2015). The great escape? The contribution of the empire to Portugal's economic growth, 1500–1800. *European Review of Economic History*, *19*(1), 1–22.

Cvrcek, T. (2013). Wages, prices, and living standards in the Habsburg Empire, 1827–1910. *Journal of Economic History*, *73*(1), 1–37.

De Haas, M. (2017). Measuring rural welfare in colonial Africa: Did Uganda's smallholders thrive? *Economic History Review*, *70*, 605–631.

Deng, K., & O'Brien, P. (2016). Establishing statistical foundations of a chronology for the great divergnce: A survey and critique of the primary sources for the construction of relative wage levels for Ming-Qing China. *Economic History Review*, *69*(4), 1057–1082.

De Pleijt, A., & van Zanden, J. L. (2016). Accounting for the "Little Divergence": What drove economic growth in pre-industrial Europe, 1300–1800? *European Review of Economic History*, *20*, 387–409.

De Pleijt, A., & van Zanden, J. L. (2021). Two worlds of female labour: Gender wage inequality in western Europe, 1300–1800. *Economic History Review*, *74*(3), 611–638.

De Zwart, P. (2011). South African living standards in global perspective, 1835–1910. *Economic History of Developing Regions*, *26*, 49–74.

De Zwart, P. (2012). Population, labour and living standards in early modern Ceylon: An empirical contribution to the divergence debate. *Indian Economic and Social History Review*, *49*, 365–398.

De Zwart, P. (2016). *Globalization and the colonial origins of the great divergence*. Brill.

De Zwart, P., & Lucassen, J. (2020). Poverty or prosperity in northern India? New evidence on real wages, 1590s-1870s. *Economic History Review*, *73*, 644–667.

De Zwart, P., van Leeuwen, B., & van Leeuwen-Li, J. L. (2014). Real wages. In J. L. van Zanden, J. Baten, M. M. d'Ercole, A. Rijpma, C. Smith & M. Timmer (Eds.), *How was life?* (pp. 73–85). OECD.

De Zwart, P., & van Zanden, J. L. (2015). Labour, wages and living standards in Java, 1680–1914. *European Review of Economic History*, *19*, 215–234.

Dobado-Gonzales, R., & Garcia-Montero, H. (2014). Neither so low nor so short: Wages and heights in Bourbon Spanish America from an international comparative perspective. *Journal of Latin American Studies*, *46*, 291–321.

Ericsson, J., & Molinder, J. (2020). Economic growth and the development of real wages: Swedish construction workers' wages in comparative perspective, 1831–1900. *Journal of Economic History*, *80*, 813–852.

Federico, G., Nuvolari, A., & Vasta, M. (2019). The origins of the Italian regional divide: Evidence from real wages, 1861–1913. *Journal of Economic History*, *79*, 63–98.

Frankema, E., & van Waijenburg, M. (2012). Structural impediments to African growth? New evidence from real wages in British Africa, 1880–1965. *Journal of Economic History*, *72*, 895–926.

Freeman, R. B., & Oostendorp, R. (2000). 'Wages around the world: Pay across occupations and countries.' *NBER working paper 8058*.

Galvez-Munoz, L. (1997). Breadwinning patterns and family exogenous factors: Workers at the tobacco factory of seville during the industrialization process, 1887–1945. *International Review of Social History*, *42*, 87–128.

Gary, K. (2018). 'Work, wages and income. remuneration and labor patterns in Sweden 1500–1850.' [PhD Dissertation, Lund University]. Lund Studies in Economic History 91.

Gary, K. (2019). "The distinct seasonality of early modern casual labour and the short durations of individual working years: Sweden 1500–1800". Working Paper.

Gary, K., & Radu, C. (2018). The impact of border changes and protectionism: wages in early modern Scania'. Working Paper.

Gelman, J., & Santilli, D. (2018). Wages and standards of living in the 19th century from a comparative perspective. Consumption basket, bare bon e basket and welfare ratio in Buenos Aires, 1825–1849. *Investigaciones de Historia Economica*, *14*, 94–106.

Geloso, V. (2018). Were wages that low? Real wages in the Strasbourg region before 1775. *Journal of Interdisciplinary History*, *48*, 511–522.

Geloso, V. (2019). 'Distinct within North America: Living standards in French Canada, 1688–1775. *Cliometrica*, *13*, 277–321.

Gupta, B. (2019). Falling behind and catching up: India's transition from a colonial economy. *Economic History Review*, *72*, 801–1126.

Hanley, S. (1997). *Everyday things in premodern Japan: The hidden legacy of material culture*. University of California Press.

Hatcher, J. (2018). Seven centuries of unreal wages. In. J. Hatcher & J. Stephenson (Eds.), *Seven centuries of unreal wages: The unreliable data, sources and methods that have been used for measuring standards of living in the past* (pp. 15–70). Macmillan.

Hatcher, J., & Stephenson, J. (2018). Introduction. In J. Hatcher & J.Stephenson (Eds.), *Seven centuries of unreal wages: The unreliable data, sources and methods that have been used for measuring standards of living in the past* (pp. 1–14). Macmillan.

Hayhoe, J. (2017). Rural servants in Eastern France 1700–1872: Change and continuity over two centuries. In. J. Whittle (Ed.), *Servants in rural Europe* (pp. 149–165). Boydell and Brewer.

Horell, S. (2023). Household consumption patterns and the consumer price index, England, 1260–1869. *Economic History Review*, *76*(4), 1023–1050.

Horrell, S., & Humphries, J. (1992). Old questions, new data, and alternative perspectives: Families' living standards in the industrial revolution. *Journal of Economic History*, *52*, 849–880.

Horrell, S., & Humphries, J. (1995). Women's labour force participation and the transition to the male-breadwinner family, 1790–1865. *Economic History Review*, *48*, 89–117.

Horrell, S., & Humphries, J. (2019). Children's work and wages in Britain. 1280–1860. *Explorations in Economic History*, *73*, 1–1.

Horrell, S., Humphries, J., & Weisdorf, J. (2021). Family standards of living over the long run, England 1280–1850. *Past and Present*, *250*, 87–134.

Horrell, S., Humphries, J., & Weisdorf, J. (2022). Beyond the male breadwinner: Life-cycle living standards of intact and disrupted English working families, 1260–1850. *Economic History Review*, *75*, 530–560.

Houpt, S., & Rojo Cagigal, J. C. (2022). Sustenance and strife. Standards of living and family vulnerability during Spain's industrialization. The Bilbao Estuary, 1914--1935. *Revista de Historia Economica*, *41*(2), 273–304.

Humphries, J. (2013). The lure of aggregates and the pitfalls of the patriarchal perspective: A critique of the high wage economy interpretation of the British industrial revolution. *Economic History Review*, *66*, 693–714.

Humphries, J. (2023). 'Respectable Standards of living: The alternative lens of maintenance costs, Britain 1270–1860. LSE Economic History Work Papers No. 353 (April).

Humphries, J., & Sarasua, C. (2012). Off the record: Reconstructing women's labor force participation in the European past. *Feminist Economics*, *18*, 39–67.

Humphries, J., & Weisdorf, J. (2015). The wages of women in England, 1260–1850. *Journal of Economic History*, *75*, 405–447.

Humphries, J., & Weisdorf, J. (2019). Unreal wages? Real income and economic growth in England, 1260–1850. *Economic Journal*, *129*, 2867–2887.

Kumon, Y. (2022). The labor-intensive path: Wages, incomes, and the work year in Japan, 1610–1890. *Journal of Economic History*, *82*(2), 368–402.

Kunst, D., Freeman, R. B., & Oostendorp, R. (2020). 'Occupational skill premia around the world: New data, patterns and drivers'. *NBER Working Paper* 26863.

Lindstrom, J., Hassan Johansson, K., Fiebranz, R., Jacobsson, B., & Agren, M. (2017). Mistress or maid: The structure of women's work in Sweden, 1550–1800. *Continuity and Change*, *32*, 225–252.

Liu, Z. (2022). 'Wages, labour market, and living standards in China, 1530–1840. LSE Economic History Working Papers No. 339 (May).

Lopez Losa, E., & Piquero Zarauz, S. (2021). Spanish subsistence wages and the Little Divergence in Europe, 1500–1800. *European Review of Economic History*, *25*(1), 59–84.

Lucassen, J. (2022). Wage labour and other forms of remuneration in the Deccan in the 1820s. In J. Lucassen & R. Seshan (Eds.), *Wage earners in India (pp*. 1500–1900). Sage.

Malanima, P. (2013). When did England overtake Italy? Medieval and early modern divergence in prices and wages. *European Review of Economic History*, *17*, 45–70.

Malinowski, M. (2016). Little Divergence revisited: Polish weighted real wages in a European perspective, 1500–1800. *European Review of Economic History*, *20*, 345–367.

Melacrinis, F. M. S. F. (2023). Annual wages in the Kingdom of the Two Sicilies from 1800–1860 and the beginning of the Italian regional divide. *European Review of Economic History*, (advance access).

Mijatovic, B., & Milanovic, B. (2021). The real urban wage in an agricultural economy without landless farmers: Serbia, 1862–1910. *Economic History Review*, *74*(2), 424–448.

Moatsos, M. (2016). Global absolute poverty: Behind the veil of dollars. *Journal of Globalization and Development*, *7*, 1–28.

Moatsos, M. (2020). *Global absolute poverty*. *Present and past since 1820* [PhD thesis, Utrecht University].

Moatsos, M., & de Zwart, P. (2022). 'Real wages across the globe, 1300–1900: New methods and data'. *Paper Presented at WEHC, Paris, August 2022*.

Mocarelli, L. (2004). Wages and the labour market in the building trade in 18th century Milan. *Jahrbuch für Wirtschaftsgeschichte*, *45*(2), 61–82.

Moraes, M. I., & Thul, F. (2018). Los Salarios Reales y El Nivel de Vida en Una Economía Latinoamericana Colonial: Montevideo entre 1760–1810. *Revista de Historia Economica*, *36*, 185–213.

O'Brien, P., & Deng, K. (2017). Quantifying the quantifiable. A reply to Jan-Luiten van Zanden and Debin Ma. *World Economics*, *18*(3), 215–223.

Olguin, P., & Bragoni, B. (2021). Salarios reales y subsistencia de los Trabajadores de Mendoza durante la Gran Expansión (Argentina, 1890–1914)'. *Revista Historia Economica*, *39*(3), 537–564.

Ozmucur, S., & Pamuk, S. (2002). Real wages and the standard of living in the Ottoman Empire, 1489–1914. *Journal of Economic History*, *62*(2), 293–321.

Pamuk, S., & Shatzmiller, M. (2014). Plagues, wages, and economic change in the Islamic Middle East, 700–1500. *Journal of Economic History*, *74*(1), 196–229.

Parthasarathi, P. (2011). Why Europe grew rich and Asia did not: Global economic divergence, *1600–1850*. Cambridge University Press.

Pfister, U. (2017). The timing and pattern of real wage divergence in pre-industrial Europe: Evidence from Germany, c. 1500–1850. *Economic History Review*, *70*, 701–729.

Pomeranz, K. (2000). *The Great Divergence. China, Europe and the making of the modern world economy*. Princeton University Press.

Ridolfi, L. (2019). Six centuries of real wages in France from Louis IX to Napoleon III. *Journal of Economic History*, *79*(3), 589–627.

Ronnback, K. (2014). Living standards on the pre-colonial Gold Coast: A quantitative estimate of African laborers' welfare ratios. *European Review of Economic History*, *18*(2), 185–202.

Rosenthal, J. L., & Wong, R. B. (2011). *Before and beyond divergence: The politics of economic change in China and Europe*. Harvard University Press.

Rota, M., & Weisdorf, J. (2020). Italy and the Little Divergence in wages and prices: New Data, New Results. *Journal of Economic History*, *80*(4), 931–960.

Roy, T. (2008). Sardars, Jobbers, Kanganies: The labour contractor and Indian economic history. *Modern Asian Studies*, *42*(5), 971–998.

Sarasua, C. P. E., Erdozain, P., & Hernandez, R. (2023). Nursing babies to fight poverty: Wages of wet nurses of Spanish foundling hospitals in the 18th and 19th centuries. *Revista de Historia Economica*, *41*(2), 243–271.

Schmidt, A., & van Nederveen Meerkerk, E. (2012). Reconsidering The "First Male-Breadwinner Economy": Women's labor force participation in the Netherlands, 1600–1900. *Feminist Economics*, *18*, 69–96.

Sivramkrishna, S. (2011). Ascertaining living standards in erstwhile Mysore, southern India, from Francis Buchanan's journey of 1800–01: An empirical contribution to the Great Divergence debate. *Journal of the Economic and Social History of the Orient*, *5*, 695–733.

Stephenson, J. Z. (2018). "Real" wages? contractors, workers, and pay in London building trades, 1650–1800. *Economic History Review*, *71*(1), 106–132.

Stephenson, J. Z. (2019). Mistaken wages: The cost of labour in the early modern English economy, a reply to Robert C. Allen. *Economic History Review*, *72*(2), 755–769.

Van Bavel, B. (2008). The transition in the low countries: Wage labour as an indicator of the rise of capitalism in the countryside, 1300–1700. *Past and Present*, *195*, 286–303.

Van Nederveen Meerkerk, E. J. V. (2008). Couples cooperating? Dutch textile workers, family labour and the "industrious revolution", c. 1600–1800. *Continuity and Change*, *23*, 237–266.

Van Zanden, J. L., & Ma, D. (2017). 'What makes Maddison right?'. *Maddison-Project Working Paper* 7.

Westland, T. (2021). 'The fruits of the boom: Real wages and housing costs in Dakar, Senegal (1914-1960)'. African Economic History Working paper 60.

Whittle, J. (2017). Introduction: Servants in the economy and society of rural Europe. In J. Whittle (Ed.), *Servants in rural Europe* (pp. 1–18). Boydell and Brewer.

Zegarra, L. F. (2020). Living costs and real wages in nineteenth-century Lima: Levels and international comparisons. *Australian Economic History Review*, *60*, 186–219.

Zegarra, L. F. (2021). Economic growth, nutrition and living standards in 19th century Lima: New estimates of welfare ratios using a linear programming model. *America Latina en la Historia Economica*, *28*, 1–32.

Zegarra, L. F. (2022). Living costs and welfare ratios in Western Europe: New estimates using a linear programming model. *European Review of Economic History*, *26*(1), 38–61.

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APPENDIX

TABLE A1 : Subsistence baskets used in Figures 1 and 2.

		London/Oxford	Milan	Madrid	Paris	Cracow	Japan	Beijing	Bengal	North/West India	Java
Wheat	Kg	195		195	195					57	
Rye	Lit		197			197					
Barley	Kg						77				
Buckwheat	Kg						82				
Rice	Kg						33		162		175
Millet	Kg									60	
Sorghum	Kg							197		60	
Beans/peas	Lit	20	20	20	20	20		20		20	35
Soy beans	Lit						23				
Gram	Kg								30		
Meat	Kg	5	5	5	5	5		5			
Fish	Kg						5				6
Sugar	Kg								2	2	2
Butter/ghi	Kg	3			3	3			3	3	
Edible oil	Lit		3	3			3	3			
Soap	Kg	1.3	1.3	1.3	1.3	1.3					3
Linen/cotton	M	3	3	3	3	3	3	3	3	3	3
Candles	Lit	1.3	1.3	1.3	1.3	1.3		1.3			
Lamp oil	Lit	1.3	1.3	1.3	1.3	1.3	2.6	1.3	2.6	2.6	2.6
Heating	Mbtu	3	3	3	3	3		3	3	3	3