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Missed opportunities? Human welfare in Western Europe and the United States, 1913–1950[☆]

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ABSTRACT

GDP suggests that the period 1913–1950 is one of missed opportunities for improving living standards in Europe. However, life in Europe during these years improved significantly, as citizens experienced dramatic declines in mortality, working time and inequality. To measure the contribution of these aspects to broader welfare, I apply a new theoretically-grounded indicator that, contrary to previous measures used in the literature, allows for a direct comparison with GDP across countries and time. I find that income underestimates welfare growth significantly (up to 2.2 percent annually) and that cross-country differences are larger and more persistent than other welfare measures imply. This article calls for a reappraisal of the evolution of living standards during the period 1913–1950 and, more generally, presents an application of a new indicator to measure multi-dimensional welfare in historical contexts.

1. Introduction

The evolution of living standards during the first half of the twentieth century in Europe is characterized by sharp contrasts. On one side, this period is often portrayed as one of missed opportunities in that income per capita exhibited historically-low growth rates due to the effect and persistence of (among others) armed conflicts, misguided macroeconomic policies and increasing protectionism (Roses and Wolf, 2010). As a result, material wellbeing in the old continent fell behind other developed economies less affected by these events such as the United States, Canada or Australia. On the other hand, Europeans witnessed unprecedented improvements in other aspects of wellbeing such as health, leisure or inequality, following the application of the germ theory of disease to private and public life, the development of antibiotics or the introduction of the eight-hour day. The rate of progress in these aspects was so remarkable in Europe that in the decades between the dawn of the First World War and the mid-twentieth century life expectancy at birth increased by 18 years and annual working time declined by more than six hundred hours (Riley, 2005; Huberman and Minns, 2007). To jointly consider the different perspectives conveyed by economic and social indicators during this period, an important part of the literature analyzing historical human welfare has taken a multi-dimensional perspective on wellbeing and has employed a composite indicator that aggregates information on income, health and education: the Human Development Index (United Nations, 1990). The application of this index to Europe during the first half of the twentieth century indicates that, contrary to income per capita, this period should not be characterized as one of missed opportunities in terms of human development for two reasons. First, European welfare growth was neither low in historical perspective nor significantly slower than in North America. Second, differences across countries narrowed greatly as a result of strong growth in countries with low levels of human development (Crafts, 2002; Millward and Baten, 2010). In other words, HDI-based evidence suggests that opportunities to improve wellbeing beyond

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income during the period 1913–1950 in Europe were taken over time and contributed to a more egalitarian distribution of welfare across countries by mid-century.

However, some of the elements underpinning this rather optimistic view of the first half of the twentieth century have been recently called into question because of the critiques of the HDI as a suitable measure for understanding human welfare in the past. Prados de la Escosura (2015) argues that the linear transformation that this index applies to its social dimensions (health and education) introduces a spurious tendency towards convergence and makes comparisons across countries and time difficult. Since these indicators have asymptotic limits, an absolute change in, for example, life expectancy is larger the lower its initial level, thus favouring countries with lower levels of HDI. To overcome this problem, he developed the Historical Index of Human Development (HIHD), which gives higher weight to improvements at high levels of the social indicators than improvements of similar magnitude at low levels. With this new indicator, cross-country variation in human development is larger than implied by the HDI. Another aspect of the HDI (and similar indices such as the HIHD) that has been criticized is the lack of theoretical basis of the aggregation procedure because it arbitrarily assigns equal weight to its three sub-components (Nordhaus, 2003, p. 20).¹ Even if this arbitrary weighting scheme reflected individuals preferences in the present, this issue poses a serious obstacle for long-term comparisons because the relative importance of the HDI components is assumed to be constant over time. This disregards the idea that individuals might value different aspects of their lives differently throughout time, as historical evidence for the case of health suggests (Williamson, 1982; Costa and Kahn, 2004). A more fundamental measurement issue for economic historians concerns the interpretation of the HDI in the past and how it compares to income per capita. Costa and Steckel (1997, p. 73–74) point out that whereas the HDI is a distance measure that shows when modern living standards were achieved, income growth is a measure of velocity that stresses the improvements witnessed by contemporaries. In periods in which income starts from a low level, a modest rate of economic growth (despite being important for contemporaries) has a small relative importance in the index because progress in this aspect represents a very small fraction of modern living standards. On the basis of this argument, the HDI is a retrospective index that may be at odds with contemporaries' views in that the relative importance of its dimensions in history depends on the level of attained living standards in the present. Therefore, although the views provided by this index and income per capita are useful for analyzing historical living standards, a comparison between the two should be made with caution. To overcome the weighting issue and provide a closer perspective of contemporaries' wellbeing, a different strand of the literature has used measurement frameworks grounded in economic theory that are directly comparable to income measures. By combining income, health and leisure, Crafts (1997) reports welfare growth rates for Western Europe during the analyzed period that are (on average) only one percentage point larger than income and that, contrary to the HDI, imply no welfare convergence during the period 1913–1950. This scattered evidence from different indicators of wellbeing brings us back to the pessimistic picture portrayed by income per capita because it does not support the high-performing and egalitarian view of European welfare suggested by the HDI. Taken together, this evidence brings into question whether the first half of the twentieth century can be characterized as a period of taken or missed opportunities for European living standards once we extend their analysis beyond income per capita.

To contribute to this topic, I partially depart from the dimensions analyzed by the HDI and propose a more encompassing framework that better suits the historical context in which Europeans lived by considering four crucial aspects of welfare: material wellbeing, health, leisure time and inequality. I start looking at income per capita to provide a detailed quantification of the extent to which economic opportunities were missed across regions and time. Note that I will not use this indicator to measure material wellbeing as is common in the literature, but rather for discussing and motivating the need to expand the study of living standards beyond national income because it partially neglects non-income aspects of wellbeing. As a more precise (and less used) measure of individuals' economic wellbeing, I will use household consumption per capita. The advantage of this indicator is that it is more closely related to the level of material living standards of the population because it provides information on the share of national income that is actually consumed by households. Furthermore, household consumption is not affected by some unusual dynamics between government spending and gross domestic product (GDP) during this period. For example, rising political tension between the two wars in some countries such as the United Kingdom resulted in increased military spending and therefore increased GDP per capita which did not, at least directly, benefit the population (Barro and Ursúa, 2008). The second aspect of wellbeing not taken into account in historical calculations of the HDI that will be considered is economic inequality, which experienced a substantial decline after the First World War in a number of developed economies, often referred to as the 'Great Leveling', due to war destruction, the expansion of education and the compression of the earnings distribution (Lindert and Williamson, 1985; Atkinson, 2007; Milanovic, 2016; van Zanden et al., 2014). As a result, European citizens lived in a much more equal society by 1950. The third aspect of wellbeing that will be discussed is health. In just a few decades, Europeans' health experienced a revolution due to the application of the germ theory of disease to develop more efficient public health infrastructures and more hygienic practices by individuals, the discovery of antibiotics and improvements in nutrition (Cutler et al., 2006). As a novelty in this type of historical cross-country studies, I will not use life expectancy at birth but age-specific mortality rates. This is particularly relevant during the analyzed period because most of the mortality decrease took place in the youngest part of the population and with these data I can measure the welfare gains from improving health in different parts of the age distribution. The last welfare dimension that will be considered is also not taken into account by other indicators of wellbeing despite it having dramatically changed Europeans' lives during the period 1913–1950: working time. Due to the introduction of the 48-hour week and the increase in vacation and national holidays (Evans, 1969; Huberman and Minns, 2007), the amount of time workers could devote to leisure increased substantially in Europe. Moreover, including this aspect in the

¹ In Appendix E I provide a detailed and formal elaboration about these different welfare indices as well as the source of their differences. Also, I compare the results of using these indices with those obtained with my welfare measure.

analysis is not only relevant from a long-term perspective, as the fall in annual hours worked during this time span is unprecedented, but also because other studies have highlighted that welfare gains derived from reduction in hours worked are comparable to those from health improvements (Crafts, 1997; Jones and Klenow, 2016).

The discussion of these four dimensions of wellbeing will highlight the exceptional character of the first half of the twentieth century. Historical opportunities emerged to greatly improve Europeans' lives along with historically-low levels of economic performance which suggests that traditional income measures may be not only significantly underestimating progress in human welfare, but also providing a one-sided perspective on relative levels of living standards - high-income countries did not necessarily perform better in other dimensions, and vice versa. Therefore, to analyze the extent to which welfare opportunities across time and space were missed (or taken), I will apply a new utility-based measure to a sample of ten Western European countries and the United States. With this measurement framework grounded in economic theory, developed by Jones and Klenow (2016), this paper contributes to the literature on comparative historical living standards using the HDI and similar indices in two ways (Crafts, 2002; Prados de la Escosura, 2015). First, in this paper I take into account changes in key dimensions of wellbeing during the analyzed period that are typically not considered in historical HDI-based studies, namely leisure and economic inequality. Second, and more importantly, the new welfare indicator applied in this study tackles the criticisms of the HDI (and some of the HIHD) mentioned above (tendency to convergence, arbitrary weighting scheme and constant weighting scheme over time) by drawing on information about individuals preferences and how, in the case of health, they change over time. Contrary to the HDI, this approach makes possible a direct comparison between the new composite indicator and income per capita since both of them are measured in the same units. This comparison will not only provide a so-far unexplored perspective on historical welfare levels taking a utility approach, but it will also assess the extent to which income per capita underestimates welfare growth by accounting for changes in health, leisure time and inequality.

This research is also related to another branch of the literature that has analyzed welfare growth during the twentieth century with utility indicators that can be traced back to the seminal study of Usher (1973). By incorporating gains from mortality reductions to gross national product, Usher concludes that the contribution of health to welfare from the 1910s to the 1960s is substantial since income growth can be revised up to forty percent upward (e.g. France).² Drawing on Usher's work and Beckerman (1980), Crafts (1997) applies a welfare measure that combines income, health and leisure to a large sample of developed countries for the period 1870–1992. For the first half of the twentieth century, he finds that income per capita underestimates annual welfare growth by 1.2 percentage points on average (health contributes to this differential by two thirds and leisure by one third). While the welfare measure I use is similar to that in Crafts (1997), the approach I take differs from his study in several aspects. First, the analytical framework employed in Crafts (1997) only allows for estimating welfare growth rates. This leaves a number of questions unanswered regarding relative wellbeing levels between different regions in Western Europe (and the United States) that are key to understanding the effect of heterogeneous growth experiences on the distribution of welfare across space. Second, Crafts's analysis does not pay particular attention to the welfare dynamics within the first half of the twentieth century (he only considers the benchmarks 1913 and 1950) as I do by including a further benchmark in 1929. Third, I measure material wellbeing with consumption per capita instead of income. Also, I use Gini coefficients to account for the unequal distribution of the economic status of the population within countries. Fourthly, to measure the contribution of health to wellbeing Crafts used life expectancy at birth and therefore does not take into account the welfare effect of changes in mortality across ages.³ For this purpose, I use age-specific mortality rates.

This article presents three main results. First, welfare in Europe relative to the United States at the turn of the 20th century was 15 percent lower, slightly above half of the American level, than income per capita suggests due to higher mortality and longer working time in the old continent. For most countries, differences in living standards are larger with the new welfare measure except for the Northern European region where high levels of health compensate for lower income levels. Second, income underestimates annual growth in European and American living standards by 1.7 and 1.5 percentage points respectively (ranging from 0.8 to 2.2 percentage points in France and Spain respectively). Taking into account that people's lives changed dramatically by 1950 as a result of more efficient sanitary infrastructures, the discovery of antibiotics, the expansion of workers' rights and a steady increase in equality with the new indicator suggests that wellbeing had doubled by mid-century. Third, progress in human welfare was not equal across space and, contrary to HDI-based evidence, by the end of the period cross-country differences had barely narrowed because countries with low welfare levels in 1913 (e.g. Italy or Spain) experienced similar growth rates as those with high levels (e.g. the United Kingdom or the Netherlands). This pattern is further reinforced if 1960 is chosen as the terminal date for the analysis because relative welfare in Western Europe is the same as in 1913. Looking at cross-sectional welfare dispersion, I find that between 1913 and 1960 it only decreased by 15 percent. These findings suggest that despite living standards improved substantially over the analyzed period, cross-country differences were larger and more persistent than other composite measures of wellbeing such as the HDI suggest.

2. A period of missed opportunities for wellbeing?

In this section I will present the data used to measure the four welfare aspects that will be later considered in the composite indicator. By first discussing material wellbeing, I will establish some basic patterns that will quantify the extent of missed (or taken) economic opportunities across countries and time in Europe. These patterns will then be compared with those of economic inequality,

² Improved versions of Usher's model have been developed and applied to the United States (Costa and Steckel, 1997; Nordhaus, 2003; Murphy and Topel, 2006) and England (Crafts, 2007). See also Becker et al. (2005) for an analysis of world welfare dispersion since 1960 considering income and life expectancy.

³ Crafts (2007) did consider age-specific mortality, but only for the British case.

health and leisure to both highlight their mismatch and the need to use a framework that integrates them, if we are to analyze the evolution of European welfare beyond income during the first half of the twentieth century.

2.1. Material wellbeing

To measure material welfare or economic performance, the most common starting point in the literature is to use GDP per capita. For this purpose, I will use the data from the Maddison Project (Bolt and van Zanden, 2014), which provides abundant information for a large number of countries and, most importantly, has been predominantly used by the economics profession.⁴ Even though these figures are not used in the welfare calculations, I will also consider alternative GDP estimates from Prados de la Escosura (2000) and Bolt et al. (2018). These studies criticize that the backward extrapolation method of present-day purchasing power parities employing volume indices of real product introduces distortions in intertemporal comparisons. Therefore, in Appendix D I will examine how the new welfare measure revises relative income levels with alternative datasets. To measure material wellbeing in the new measure, I will use household consumption instead of income per capita as a more closely related indicator of the economic status of individuals because it captures the share of the national product that is actually consumed by households (e.g. clothing, food, rent, etcetera) from Barro and Ursúa (2008).⁵

Before reviewing the growth experience of Western European economies during the period 1913–1950, it is instructive to know their starting levels.⁶ In Table 1 I present the levels of income and consumption per capita relative to the United States for the benchmark years in my analyzed time span for which data on income could be obtained from the sources mentioned above;⁷ and for Western Europe and three sub-regions: Northern Europe, North-Western Europe and Southern Europe (weighted by population).⁸ At the beginning of the twentieth century, the income level of an average Western European was two thirds of the American level. Within the old continent, citizens in the industrial core enjoyed higher levels of material wellbeing than those living in peripheral economies. Actually, average income in North-Western Europe almost doubled that of the less-industrialized southern periphery, where more than fifty percent of the labor force was employed in agriculture (Buyst and Franaszek, 2010). Using consumption data, these patterns are similar.

The large income gaps with respect to the United States suggest that the growth potential in many European countries was quite substantial. To look at the extent to which this potential was used, Table 1 also shows growth rates for the periods 1913–1929 and 1929–1950. During the first half of the twentieth century, material wellbeing in Europe increased below 1 percentage point yearly, whereas at the other side of the Atlantic it grew more than two times faster (if we consider other countries overseas such as Canada or New Zealand, the same pessimistic pattern emerges). These growth rates also stand out negatively in comparison with other historical periods such as the post-1950 decades or the years leading up to World War I when income growth was five and almost two times faster respectively (Bolt and van Zanden, 2014). This evidence is indicative of a period of substantial missed economic opportunities during the period 1913–1950 in Europe from both an international and a long-term perspective. However, this average should not be taken to summarize this period's economic performance because it masks substantial variation across countries and time. Particularly in Western Europe, the years of the Great Depression up to 1950 stand in sharp contrast with those of the earlier period with the exception of Northern Europe.

Until now, the income and consumption trends I have presented are national averages and do not reflect their distribution within the population. To take this into account, I will employ Gini coefficients, a widely used measure of income inequality. Even though these data are more fragmentary and subject to measurement error than for other aspects of living standards, it was possible to compile information on inequality for the whole sample from a variety of secondary sources (a detailed discussion can be found in Appendix C). As we can observe in Table 2, there is a general downward trend throughout the period known as the 'Great Leveling' due to war destruction, the expansion of education and the compression of the earnings distribution (Lindert and Williamson, 1985; Atkinson, 2007; Milanovic, 2016; van Zanden et al., 2014). By 1950, Western Europeans and Americans lived in a much more equal society than in the early 20th century when the share of national income accrued by the top one percent of income earners in countries such as the United States, Sweden or Germany was around 20 percent (Alvaredo et al., 2013).

2.2. Health and working time

To measure citizen's health, I will use data on age-specific mortality rates. With these data at hand, it is possible to calculate survival rates (i.e. the probability of a person reaching a certain age given the mortality rates of all ages in that same year) or

⁴ Some recent influential works include Piketty (2014), Crafts and O'Rourke (2014), Milanovic (2016) or Jones (2016).

⁵ To test the reliability of these data, I compare my benchmark results with a set of alternative calculations using consumption figures from Penn World Table 9.0 (Feenstra et al., 2015). As I show in Appendix D, both datasets yield practically the same outcomes.

⁶ In the following, I will focus on a ten-country sample that was chosen on the basis of data availability on household consumption, age-specific mortality, annual working time and Gini coefficients for the analyzed period, 1913–1950. See Roses and Wolf (2010) for a more comprehensive exposition of European economic performance during this period.

⁷ Prados de la Escosura (2000) reports income data for 1913, 1929, 1938 and 1950. Given that information on income inequality for 1938 is very scarce, I will consider 1913, 1929 and 1950.

⁸ This regional classification will be used in the remaining of the paper and it is defined as follows. Northern Europe refers to Sweden and Denmark. North-Western Europe refers to the United Kingdom, Germany, Belgium, the Netherlands, France and Switzerland. Southern Europe consists of Italy and Spain. The regional aggregates are weighted with population data from Maddison (2006).

Table 1

Income and household consumption per capita in Western Europe and the United States, 1913–1950.

	Level (US = 100)						Annual growth rate (in %)					
	Income			Consumption			Income			Consumption		
	1913 (I)	1929 (II)	1950 (III)	1913 (IV)	1929 (V)	1950 (VI)	1913–1950 (VII)	1913–1929 (VIII)	1929–1950 (IX)	1913–1950 (X)	1913–1929 (XI)	1929–1950 (XII)
United States	100	100	100	100	100	100	1.7	1.6	1.7	1.3	0.8	1.7
Western Europe	67	62	49	61	61	47	0.8	1.1	0.5	0.6	0.9	0.4
<i>Sub-regions</i>												
Northern Europe	60	63	69	65	73	75	2.0	1.9	2.2	1.7	1.5	1.8
North-Western Europe	77	70	55	67	66	51	0.8	1.1	0.5	0.6	0.7	0.4
Southern Europe	42	40	30	41	46	32	0.7	1.3	0.3	0.6	1.5	−0.1

Notes: The sources for income and consumption are [Bolt and van Zanden \(2014\)](#) and [Barro and Ursúa \(2008\)](#) respectively. Levels are expressed relative to the United States in that same year and growth rates were obtained by taking the logarithmic difference between benchmark years. Northern Europe refers to Sweden and Denmark. North-Western Europe refers to the United Kingdom, Germany, Belgium, the Netherlands, France and Switzerland. Southern Europe consists of Italy and Spain. The regional aggregates are weighted with population data from [Maddison \(2006\)](#).

Table 2
Gini coefficients in Western Europe and the United States, 1913–1950.

	1913 (I)	1929 (II)	1950 (III)
United States	50	49	40
Western Europe	47	44	43
<i>Sub-regions</i>			
Northern Europe	52	48	39
North-Western Europe	47	43	43
Southern Europe	47	45	43

Notes: See Appendix C for the sources. See Table 1 for the country composition of each sub-regional category.

Table 3
Life expectancy and annual hours of work in Western Europe and the United States, 1913–50.

	Life expectancy at birth			Annual hours of work		
	1913 (I)	1929 (II)	1950 (III)	1913 (IV)	1929 (V)	1950 (VI)
United States	54	59	68	2900	2316	2008
Western Europe	50	57	66	2783	2200	2140
<i>Sub-regions</i>						
Northern Europe	58	62	71	2740	2206	2032
North-Western Europe	51	58	67	2769	2192	2209
Southern Europe	45	51	64	2829	2222	1989

Source: For life expectancy see the text; for annual hours of work see Huberman and Minns (2007).

life expectancies (i.e. the expected life time of an individual at a given age, for example at birth, given the mortality rates across all subsequent ages in that same year).⁹ For most of the countries in the sample, the main source is the Human Mortality Database (HMD) that provides annual life tables with the exception of Germany, the United States and the United Kingdom, for which the series only start in 1956, 1933 and 1922 respectively (Wilmoth, 2013). To fill these gaps, data prior to 1923 for the United Kingdom refers to England and Wales. In the case of the United States and Germany, I used the Human Life-Table Database (HLTD).¹⁰ Table 3 shows (Column I and III), in contrast with material wellbeing, that the improvement of citizens' health during the period 1913–1950 is quite remarkable. In less than four decades, the years a newborn was expected to live in the old continent increased by 16; and by 19 in the case of Southern Europe due to the application of the germ theory of disease to develop more efficient public health infrastructures and more hygienic practices by individuals, the discovery of antibiotics and improvements in nutrition (Mokyr and Stein, 1997; Fogel, 2004; Cutler et al., 2006). In terms of levels, Europeans with the longest expected life span at birth are not necessarily living in the richest region (i.e. the industrial core), but rather in the northernmost area. Northern Europe even outperforms the United States despite having much lower levels of income per capita through-out the whole period.

The last aspect of people's lives that I will consider and that changed dramatically during the first half of the twentieth century (not taken into account in the HDI) is leisure or non-working time.¹¹ For this purpose, I will use information on annual hours of work from Huberman and Minns (2007) for non-agricultural workers.¹² In a context in which the sectoral structure of the labor force changed markedly across countries (Buyst and Franaszek, 2010), I will adjust the figures on working time by country (and over time) to take into account the percentage of workers employed outside agriculture and participation rates

⁹ With these data, I will later consider the age distribution of mortality to isolate health improvements in different parts of the age spectrum. This is particularly important during the analyzed period because infant and child mortality declined enormously as a result of progress against airborne diseases like influenza or pneumonia for children less than five years old, and water-borne diseases such as gastroenteritis for infants (Millward and Baten, 2010).

¹⁰ This dataset is available at <http://www.lifetable.de>. I accessed it in November 2016.

¹¹ Certainly, non-working-time is not the same as leisure. To account for changes in the latter more precisely, one would have to distinguish between activities that involve leisure and home production. However, given the data availability and the focus of this study on other dimensions of wellbeing (not only leisure), I will provide an approximation of the contribution of leisure and home production to welfare by looking at non-market work as done by Crafts (1997).

¹² The unit of measurement is annual hours of full-time production (male and female) workers engaged in non-agricultural activities. Huberman and Minns (2007) interpret their series as the 'approximate usual or normal hours the representative production worker would have been engaged for during the year' (page 543).

(see Table 4C).¹³ As we can see in Table 3, European workers witnessed a sizeable decline in annual working time of roughly 650 hours throughout the period 1913–1950 (for the United States it was even more pronounced). Most of the decline happened between 1913 and 1929 (Column IV and V) due to the reduction of working hours with the introduction of the 48-hour week (or eight-hour day) after the First World War (Evans, 1969). Further declines can be accounted for by the increasing number of vacations and national holidays during the interwar period as the annual paid vacation became a reality in many countries (Huberman and Minns, 2007). If we compare Western Europe with the United States, we see that workers in the old continent worked fewer hours (117 hours per year) at the beginning of the period, although this situation was reversed by 1950. Across regions, there seems to be another reversal. Whereas southern Europeans worked longer hours than in the rest of the continent before the outbreak of the First World War, by mid-century annual working time in non-agricultural activities was the shortest in this region.

The analysis of European material wellbeing at the beginning of this section pointed out that the period 1913–1950 can be characterized as one of missed opportunities in material living standards across time and space because income (and consumption) growth was historically low and significantly lower than in other countries overseas (e.g. United States, Canada or New Zealand). If we extend the analysis of citizens' wellbeing beyond their economic status, these patterns do not match. Taking the United Kingdom as an example, by mid-century citizens lived in a drastically different society than they (or their counterparts) lived in 1913. Their prospects and that of their children of living a healthier life in a more equal society were much higher. Also, if they were employed outside agriculture, they would spend almost two hundred hours less in the workplace than at the beginning of the century. What did these changes mean to British citizens in 1950? If they had been confronted with the choice of living in the same society as their counterparts did in 1913, how would they have valued the achievements in human welfare since then? How does this view compare to the one provided by income per capita? To answer these questions, in the next section I will present a new measurement framework developed by Jones and Klenow (2016) that will be the basis of the welfare calculations.

3. Methodology

In the spirit of the veil of ignorance emphasized by John Rawls (1971), the framework developed by Jones and Klenow (2016) theoretically confronts an individual with a lottery. She does not know in which country she will live, the level of consumption she will enjoy, or whether her life will be expected to be long and full of leisure. What is the proportion of her yearly consumption living in the U.S. that would make her indifferent between living there and, say, in the United Kingdom? Equivalently, for time comparisons we could also ask: what is the proportion of her yearly consumption living in the United Kingdom in 1950 that would make her as well off as her counterpart in 1913? The answer to these two questions is a consumption-equivalent measure of the standard of living and this is what I will use to calculate welfare differences across countries and over time.¹⁴

To make welfare comparisons, this methodology draws on historical information about people's preferences. Using this evidence provides a solution to two important critiques of the HDI and the HIHD. First, the consumption-equivalent indicator avoids assuming an arbitrary weighting scheme by drawing on empirical evidence on how people respond to trade-offs between different components of wellbeing. Second, assuming a fixed weighting scheme over time, as the HDI does, has the implication that the relative importance of each dimension does not differ over time. In the case of income and health, this can be problematic because, as Costa and Kahn (2004) show, the value individuals assign to health has increased between 1940 and 1980 in the United States as measured with the compensating differential for job risk. Therefore, assuming constant weights over long time spans can be troublesome in the case of health because its weight in the indicator will be very different if we take the perspective of an individual today or in the past. To take this into account, the methodology used in this paper considers a representative individual with a given set of preferences in 1950.¹⁵ Following Jones and Klenow (2016), the lifetime welfare of our individual is determined as follows:

$$U = E \sum_{a=1}^{100} \beta^a u(C_a, l_a) S_a, \quad (1)$$

where S_a is the probability that the individual is alive up to age a , β is the discount factor, C is annual consumption and l is leisure. In this framework, wellbeing is given by the expected value (due to uncertainty) of things that matter to our individual such as the amount of goods and services consumed and the number of hours spent working throughout her lifetime. At this point, it is important to clarify the aspect of health that is being measured with survival rates. Murphy and Topel (2006) argue that health-related knowledge can affect the quality and (or) the quantity of life. With S_a , I am mainly measuring improvements that affect the quantity of life (i.e. mortality). On the other hand, one could also argue that mortality rates at young ages can capture some aspects

¹³ A further issue that I examine in Appendix D, and that is not captured by the data from Huberman and Minns (2007), is the age distribution of working time and how it changes over time. Using data for the United States on working time across different age groups from Owen (2001, 19) for the period 1921–1950, I find that the results are not affected by changes in the labor supply over the life cycle.

¹⁴ Following Jones and Klenow (2016) I will refer to the consumption-equivalent indicator as welfare, wellbeing or living standards for the sake of simplicity. Also, strictly speaking, the example above refers to one of the two ways of calculating this measure: the equivalent variation. To ease the explanation of the methodology in this section, I will focus on this variation. See the methodological appendix for further elaboration on the differences between the two.

¹⁵ Following the literature, preferences across countries are kept constant. Jones and Klenow (2016, 2429) notes that a similar issue arises in cross-country comparisons using income per capita, since this indicator requires a set of common prices. Moreover, these comparisons become more complicated as we consider countries in very different stages of economic development. Given that income in my sample differs at most by a factor of four, in my analysis this issue is less problematic than in other studies where income can differ by a factor of more than 40.

of the quality of life because children are more vulnerable than adults to the disease environment, and a bad disease environment leads to high morbidity. Nevertheless, measuring improvements in the quality of life is beyond the scope of this paper and for the discussion of the results I will consider that lower mortality rates enhance well-being by increasing the prospects of citizens to have a longer and richer life in terms of consumption and leisure.¹⁶

To assess differences in living standards across countries with this methodology, we first need to choose a benchmark with which welfare comparisons will be made. By doing this, welfare levels are expressed in relative terms in the same manner as the difference in income between two countries can be expressed in percentage terms. Since one of the main purposes of this paper is to put the European welfare experience into perspective with that of other developed countries that were less affected by the disruptive happenings of this period, the benchmark for welfare comparisons will be the United States.¹⁷ With this country as a benchmark, we can extend the previous equation as follows:

$$U_i(\lambda) = E_i \sum_{a=1}^{100} \beta^a u(\lambda C_{i,a}, l_{i,a}) S_{i,a}, \quad (2)$$

where i indexes countries and λ multiplies consumption at every age. Given that our individual lives behind the veil of ignorance and she does not know in which country she will live, what her consumption level, health and leisure she will have: What proportion of the individual's annual consumption in the United States would make her indifferent between living in the United States and the United Kingdom? The answer to this question (λ in the previous equation) can be formally expressed as follows:

$$U_{us}(\lambda_i) = U_i(1). \quad (3)$$

To apply this theoretical framework, we first need to choose the function that will determine an individual's welfare:

$$u(C_i, l_i) = \bar{u} + \log C_i + v(l_i), \quad (4)$$

where $\log C$ is log-transformed consumption in country i (this form reflects diminishing marginal returns as common in other welfare indices such as the HDI or the HIHD), $v(l)$ is the value of non-working time and $\bar{u}$ is a constant.¹⁸ From a pure materialistic point of view, an individual would only care about consumption and therefore annual wellbeing would only depend on C . However, by introducing $\bar{u}$ and $v(l)$ other aspects of the individual's life are considered. To take into account economic inequality, this model makes use of the concept of risk aversion implied by the concavity of the utility an individual obtains from consumption. As noted by Atkinson (1970), this concavity assumption is equivalent to assuming that a person is risk averse, which results in a negative contribution of inequality to individual welfare in the model. On the other hand, one can argue that inequality can also have a positive effect on wellbeing over long periods of time because it provides incentives for catching up or it shows others the way to improve (Deaton, 2013). However, accounting for this channel is beyond the scope of this welfare measure, and in the following I will focus on the risk aversion mechanism, even though it may not reflect the total effect of inequality on wellbeing.¹⁹ If consumption is log-normally distributed (with arithmetic mean c_i and variance σ_i^2) and independent of mortality and age, then: $E[\log C] = \log c - \sigma^2/2$. In other words, expected consumption is a function of average consumption minus its variance.²⁰ Taken together, the expected lifetime utility for an individual is given by:

$$U_i = \left[\sum_{a=1}^{100} \beta^a S_{i,a} \right] \left(\bar{u} + \log c_i + v(l_i) - \frac{1}{2} \sigma_i^2 \right). \quad (5)$$

It is interesting to highlight the interaction between survival rates and the rest of the dimensions. Suppose there is a certain decline in mortality rates. If living conditions in country i are characterized by low levels of material wellbeing and leisure, then the increase

¹⁶ See Murphy and Topel (2006) and Hickson (2014) for such an attempt.

¹⁷ As I discussed in the previous section, European economic performance was not only below that of the United States, but also of other developed economies such as New Zealand, Canada, Australia (or the weighted average of these four countries). Therefore, choosing the United States as a benchmark for welfare comparisons does not misrepresent the relative performance of Europe throughout this period. Furthermore, it is worth highlighting that this choice does not affect comparisons between countries and regions that do not involve the benchmark country (e.g. the percentage income difference between Spain and Denmark is independent of whether we choose the United States or Canada as a reference country). And, more importantly, using the United States to calibrate the model makes my results comparable to other studies in the literature that have used American data to calibrate their indicators (Becker et al., 2005; Murphy and Topel, 2006; Hickson, 2014; Jones and Klenow, 2016).

¹⁸ In the following, I will drop the age subscript for consumption and leisure for simplicity and to ease notation. In the methodological appendix, I provide the relevant equations taking them into account over the life cycle.

¹⁹ Atkinson (1970) also notes that by assuming that the degree of income inequality is independent of the level of income, as traditional measures do, implies a constant relative risk aversion (CRRA) form for the utility function. More specifically: $U(y) = \begin{cases} \frac{y^{1-\gamma}}{1-\gamma}, & \gamma > 0, \gamma \neq 1 \\ \log y, & \gamma = 1 \end{cases}$ where γ is the parameter

of risk aversion. The logarithmic form used in this paper, and other indicators such as the HDI or the HIHD, would imply a risk aversion parameter of one. In this article, I also use this functional form because a unitary value for the risk aversion parameter is in line with the mean estimate found by Chetty (2006) and cross-sectional evidence from Gandelman and Hernández-Murillo (2015). Different parameters would affect the extent to which inequality reduced welfare so that higher degrees of risk aversion (and discounting) give higher weight to the negative effect of income inequality on welfare (Cordoba and Verdier, 2008; Jones and Klenow, 2016).

²⁰ As common in the literature, the Gini coefficients are converted into the standard deviation of log consumption inverting the formula suggested in Aitchison and Brown (1957): $G = 2\Phi\left(\frac{\sigma}{\sqrt{2}}\right) - 1$, where Φ is the cumulative distribution function of the standard normal distribution.

in welfare (U_i) would be lower than if the individual lived in a rich country with high levels of leisure. As a result, and similar to the HIHD, health improvements at high levels of other dimensions of wellbeing represent higher achievements than at low levels. Furthermore, notice that non-working time, $v(l)$, in the welfare calculations is considered throughout the life cycle so that individuals younger than 15 and older than 64 are not affected by changes in working time. Related to this, the leisure component also takes into account that participation rates are different across countries and time, and that the annual hours of work reported by Huberman and Minns (2007) refer to non-agricultural workers (see Equation B10). In addition, these adjustments are aimed at reflecting that, similar to health improvements, changes in leisure time are also age-specific and concentrated among workers employed in the manufacturing and service sector (in Appendix C I present the sources used for this correction).²¹

Finally, to calculate the consumption-equivalent measure (λ) we use the following equation:

$$\log \lambda_i = \sum_a \frac{\beta^a [S_{i,a} - S_{us,a}]}{\sum_a \beta^a S_{us,a}} \left[\bar{u} + \log c_i + v(l_i) - \frac{1}{2} \sigma_i^2 \right] + \log c_i - \log c_{us} + v(l_i) - v(l_{us}) - \frac{1}{2} (\sigma_i^2 - \sigma_{us}^2). \quad (6)$$

This equation shows that welfare in country i relative to the United States consists of four components. The first measures the contribution of differences in health to relative welfare, the second term captures differences in consumption and the last two measure differences in leisure and inequality.

For comparisons of welfare over time, I use the same equation. However, instead of comparing countries with the United States in a given year, a country is compared with itself in two points in time. If we, for example, want to calculate welfare growth in the United Kingdom during the period 1913–1950, λ in the previous equation would answer the question: by what percentage must the individual's consumption be adjusted in France in 1950 so that she is as well off as her counterpart in 1913? In other words, by which factor do we have to adjust our individual's consumption in 1950 so that she is willing to give up on working much shorter hours and living in a society where infectious diseases have almost disappeared?

One of the strengths of the presented methodology is that it allows for a direct comparison with GDP. In terms of growth rates, it is possible to calculate the extent to which income per capita underestimates welfare growth and provide a decomposition of the sources for the discrepancy between the two measures (i.e. consumption, health, leisure or inequality). If we perform this exercise in terms of levels, it would show whether the welfare measure shows a higher or lower level of wellbeing in a certain country than income and, as before, the contribution of each dimension to the difference between them.

The last step to apply the model presented above is to calibrate it according to the preferences of a representative individual in 1950 to value changes in leisure and health.²² For calculating the contribution of leisure to welfare, first we measure the amount of time that workers spent in non-market work annually with respect to their total time endowment from working-time evidence. To illustrate how this calculation is made, consider the following example. In 1913, annual hours worked in the United States were 2900. Given that workers' time endowment (ignoring sleeping time) is 5840 hours (16 hours per day multiplied by 365 days), annual leisure amounts to 50 percent of their time. The second step is to choose a functional form for leisure. Following Jones and Klenow (2016), I use a form that implies that the percentage change in hours worked due to a percentage change in wages is constant (keeping the marginal utility of consumption fixed), and calibrate it in the same way by assuming that the elasticity of labor supply (i.e. how working hours respond to wage changes) is one and using the observed annual working time in 1950 for the United States.²³ The motivation for choosing this unitary elasticity is twofold. First, it is in the middle of the estimates in the literature ranging from 0.5 to 1.9 (Jones and Klenow, 2016). Therefore, the welfare calculations based on it can be interpreted as the middle-range effect of leisure on wellbeing. And second, this calibration yields similar results as other studies in the literature such as Crafts (1997) or Nordhaus and Tobin (1972).

As we saw before, welfare differences across countries (and over time) depend on annual consumption, leisure, inequality and a constant to be calibrated ($\bar{u}$). A value for this parameter (and similar ones in other studies) has been traditionally chosen on the basis of empirical evidence from trade-offs involving risk and money. This particular trade-off exists when a certain decision involves a health risk. Since such risk is undesirable, the individual has to be compensated in some other aspect (e.g. money) to accept that choice; from this compensation we can infer the value individuals put into mortality risk to get estimates of the so-called value of a statistical life (VSL). A historical example of this trade-off has been examined by Williamson (1982). In this study, the author observed that British workers during the industrial revolution had to be "bribed" (or compensated in monetary terms) in order to move from small market towns with low population density and relatively low mortality rates to densely-populated industrial towns where mortality was much higher. To obtain an estimate for $\bar{u}$, I have used the same benchmark VSL (\$6 million) as

²¹ The resulting figures from this adjustment in Table 4C imply that hours of work in agriculture are invariant across countries and over time because they are assumed to be zero. Consequently, this assumption tends to underestimate welfare growth during this period, if agricultural working time declined. This data-driven limitation is likely to barely have an impact on the main results because, as shown in Table D1, assuming that annual hours of work in the primary sector followed that of manufacturing and services does not alter the main findings.

²² Also, a value has to be chosen for β to measure preference for present and delay satisfaction. For the main results I will assume that there is no discount rate. The reason for this choice is that by assuming that $\beta = 1$, Eq. (5) becomes much more intuitive in that welfare in a given country is determined by the accumulated expected value of realizing the consumption and leisure levels observed in one particular year (the results are the same if discounting rates are applied as the robustness tests in Appendix D show).

²³ See Appendix B and D for a more comprehensive explanation of this parameter as well as several tests showing the robustness of the analysis to using different values.

Table 4
Living standards in Western Europe and the United States in 1913.

Countries	Measures of living standards (USA = 100)			Welfare decomposition				
	Welfare (I)	Income (II)	Consumption (III)	Difference (IV)	Health (V)	Consumption (VI)	Leisure (VII)	Inequality (VIII)
United States	100	100	100	0	0 (54)	0 (1.00)	0 (1152)	0 (50)
Western Europe	57	67	61	−0.17	−0.11 (50)	−0.10 (0.90)	−0.02 (1277)	0.06 (47)
Northern Europe	72	60	65	0.18	0.12 (58)	0.07 (1.08)	0.02 (1096)	−0.03 (52)
– Sweden	57	53	57	0.07	0.11	0.08	0.05	−0.17
– Denmark	104	74	79	0.33	0.13	0.06	−0.02	0.16
North-Western Europe	63	77	67	−0.19	−0.08 (51)	−0.13 (0.88)	−0.04 (1408)	0.06 (47)
– United Kingdom	88	93	93	−0.05	−0.02	0.00	−0.06	0.01
– Germany	50	68	50	−0.30	−0.13	−0.32	−0.02	0.17
– Netherlands	68	76	63	−0.12	0.06	−0.20	−0.04	0.06
– Belgium	74	81	85	−0.09	−0.07	0.05	−0.06	0.00
– France	48	66	62	−0.32	−0.09	−0.06	−0.05	−0.11
– Switzerland	108	137	94	−0.23	−0.01	−0.38	−0.06	0.22
Southern Europe	37	42	41	−0.12	−0.23 (45)	−0.01 (0.99)	0.06 (908)	0.06 (47)
– Spain	34	39	42	−0.14	−0.35	0.06	0.12	0.02
– Italy	38	43	41	−0.12	−0.17	−0.05	0.01	0.08

Notes: The sources for Columns II and III are Bolt and van Zanden (2014) and Barro and Ursúa (2008) respectively. The values in Column I, IV–VIII were obtained using Eqs. (B8) and (B9) in Appendix B. Since the difference between the welfare measure and GDP per capita in Column IV is measured in logarithmic points, the contribution of each welfare dimension to this difference is measured in the same units so that Columns V–VIII add up to Column IV. At the regional level (in brackets) I provide the underlying raw data on life expectancy at birth; consumption divided by income (Column III and II); annual hours worked adjusted for participation rates and the percentage of the labor force employed in non-agricultural activities; and Gini coefficients.

in Murphy and Topel (2006) and Jones and Klenow (2016), which in turn is in line with the range suggested by Viscusi and Aldy (2003). Despite there is some agreement in the literature concerning this estimate, drawing on current evidence of individuals preferences to choose a value for $\bar{u}$ in 1950 can be problematic because ample evidence in the literature points out that the value that people put into health was lower in the past (Costa and Kahn, 2004; Fishback, 1992; Kim and Fishback, 1993; Williamson, 1982). For this reason, I will draw on the work by Costa and Kahn (2004), who calculate an income elasticity of VSL of 1.6 using evidence from American workers for the period 1940–1980 to adjust my model to people's preferences in 1950 (in Appendix D, I show the results are robust to changes in parameter).^{24,25}

4. Results

4.1. Main results

How does our view of the early 20th century change with the new welfare measure? To answer this question, we can look at the left panel of Table 4, where I provide relative levels of living standards using the consumption-equivalent measure (Column I), income per capita (Column II) and consumption per capita (Column III). Column IV shows the difference between income and the welfare measure (in logarithmic points), and the remaining columns the extent to which each aspect of wellbeing contributes to this difference. To put it in another way, Columns V–VIII convey information on the contribution (in logarithmic points) to higher or lower relative welfare as measured with the new welfare so that their sum add up to Column IV. To make sense of the sign and magnitude of their contribution to this difference, I also present the underlying raw data for each aspect considered at the regional level: life expectancy at birth for health, consumption over income, annual working time for the lack of leisure (adjusted for participation rates and for the sectoral structure of the labor force), and the Gini coefficient for inequality.

According to the welfare measure, living standards in Western Europe were slightly below two thirds of the American level, which represents a 15-percent downward revision. What accounts for this? First, life expectancy in the old continent is four years lower, which reduces welfare by eleven percent (Column V). And second, lower consumption reduces wellbeing relative to income by a further ten percent (Column VI).²⁶ These two welfare-reducing forces are partially offset by higher equality in the old continent

²⁴ In Table 1D I show that the results are roughly the same when assuming values of the VSL in the range suggested by Viscusi and Aldy (2003).

²⁵ Data and replication files are available through open ICPSR (Gallardo-Albarrán, 2018).

²⁶ This figure was obtained by taking the logarithmic ratio of consumption and income with respect to the United States (thus the ratio for the United States is zero by definition). For the European aggregate, we can calculate it as: $\log(60.83/67.44) = \log(0.9) = -0.1$.

Table 5

Living standards in Western Europe and the United States in 1929.

Countries	Measures of living standards (USA = 100)			Welfare decomposition				
	Welfare (I)	Income (II)	Consumption (III)	Difference (IV)	Health (V)	Consumption (VI)	Leisure (VII)	Inequality (VIII)
United States	100	100	100	0	0 (59)	0 (1.00)	0 (957)	0 (49)
Western Europe	63	62	61	0.01	−0.06 (57)	−0.02 (0.98)	−0.01 (1044)	0.10 (44)
Northern Europe	81	63	73	0.25	0.09 (62)	0.14 (1.15)	0.00 (975)	0.02 (48)
– Sweden	70	58	65	0.19	0.09	0.11	0.02	−0.04
– Denmark	101	72	86	0.34	0.09	0.17	−0.03	0.11
North-Western Europe	71	70	66	0.01	−0.01 (58)	−0.06 (0.94)	−0.02 (1163)	0.11 (43)
– United Kingdom	97	81	91	0.19	0.00	0.12	−0.06	0.12
– Germany	62	60	47	0.03	0.02	−0.24	−0.01	0.28
– Netherlands	78	84	61	−0.08	0.11	−0.33	0.01	0.13
– Belgium	70	75	82	−0.07	−0.06	0.09	−0.03	−0.07
– France	41	66	63	−0.47	−0.09	−0.05	−0.01	−0.33
– Switzerland	119	124	100	−0.05	0.04	−0.21	−0.05	0.17
Southern Europe	42	40	46	0.05	−0.21 (51)	0.15 (1.16)	0.04 (727)	0.07 (45)
– Spain	41	40	50	0.05	−0.29	0.24	0.04	0.05
– Italy	42	40	43	0.05	−0.17	0.09	0.05	0.08

Note: see Table 4.

(Column VIII). Leisure does not seem to play an important role since workers in both regions are expected to work a similar amount of hours outside agriculture. Across regions, we can see further revisions. For instance, the industrial core does not exhibit the largest level of living standards because of lower health levels, longer working time and less consumption relative to income. Instead, Northern Europe takes the lead at three quarters of the American level with its higher levels of life expectancy and leisure that increase relative welfare by twelve and seven percent respectively. In the south of Europe, living standards are slightly revised downwards, mostly due to the heavy mortality toll paid by its citizens.

The differences between Europe and the United States are consistent with the HDI rankings by Crafts (2002) in portraying North Americans ahead of Europeans in terms of wellbeing. However, the implied percentage relative differences are very different. For instance, whereas Italian wellbeing using the HDI is 75 percent of the American level in 1913 (and therefore much higher than what income per capita shows), the welfare measure suggests that Italian living standards were (roughly) a third of those in the other side of the Atlantic. This downward revision is unsurprising and seems more realistic, if we take into account that life expectancy in Italy was seven years lower than in the United States. Another interesting case is the welfare gap between the United States and the United Kingdom, which looks slightly larger with the consumption-equivalent measure because British workers were expected to work almost four hundred hours more than Americans and their mortality rates are higher. This health premium is consistent with the idea of Williamson (1982) that British workers living in unhealthy towns had to earn more to accept the more hazardous conditions in 1905.

Even though migration decisions are the consequence of a large number of factors such as wage levels, unemployment or demographic pressures, it is worth noting that the levels of wellbeing in Table 4 are overall in line with some of the migration flows around the turn of the 20th century presented by Hatton and Williamson (1998). For instance, the downward revision of Southern Europe further reinforces the idea that migrants at the beginning of the 20th century had a lot to gain from moving to a different country not only in material terms, but also in their health status. Also, if we consider the European aggregate, we can see that migrating to the United States and achieving its average consumption, health and leisure levels was practically welfare-enhancing across the whole continent. In line with HDI-based evidence, the only exceptions in which, on average, moving to the United States could result in a decrease in wellbeing is Denmark and Switzerland. However, this view only holds for risk-averse individuals since in the absence of the inequality component in Table 4, the Swiss and Danish welfare levels would be slightly below the American one. Interestingly, in the case of Switzerland the welfare measure seems to yield a lower level than GDP, which is more in line with the income estimates of Prados de la Escosura (2000) and Bolt et al. (2018).

Within Europe, it is interesting to highlight how relative differences look wider in some cases. Consider France and the United Kingdom. Whereas income shows that French living standards were around 70 percent of the British level in 1913, the welfare measure reduces this number to 50 percent because French life expectancy is three years lower and inequality is higher. Moreover, the higher investment rate of the French economy relative to Britain in 1913 further reduces relative welfare (Levi-Levoy, 1978; Feinstein, 1972), although future wellbeing may have increased via increasing productivity.

If we focus on how relative welfare evolved until mid-century in Tables 5 and 6, we can see some interesting patterns. Beginning with the Western European aggregate, up to 1929 there is some catching up with North America as the life expectancy gap declines by two years, inequality decreases and the share of consumption in national income increases. This is also true for the British welfare gap that further narrows in 1929 as inequality decreases faster than in the United States (Lindert and Williamson, 2016). Similar

Table 6

Living standards in Western Europe and the United States in 1950.

Countries	Measures of living standards (USA = 100)			Welfare decomposition				
	Welfare (I)	Income (II)	Consumption (III)	Difference (IV)	Health (V)	Consumption (VI)	Leisure (VII)	Inequality (VIII)
United States	100	100	100	0	0 (68)	0 (1.00)	0 (963)	0 (40)
Western Europe	42	49	47	−0.14	−0.03 (66)	−0.03 (0.97)	−0.03 (1080)	−0.05 (43)
Northern Europe	81	69	75	0.16	0.08 (71)	0.08 (1.08)	−0.02 (1086)	0.02 (39)
– Sweden	77	69	72	0.11	0.09	0.04	−0.01	−0.01
– Denmark	89	70	80	0.24	0.07	0.14	−0.03	0.06
North-Western Europe	45	55	51	−0.19	−0.01 (67)	−0.07 (0.94)	−0.06 (1256)	−0.05 (43)
– United Kingdom	76	73	76	0.05	0.02	0.05	−0.07	0.05
– Germany	28	39	32	−0.34	−0.03	−0.20	−0.09	−0.02
– Netherlands	59	61	52	−0.05	0.08	−0.16	−0.03	0.06
– Belgium	56	56	60	−0.01	−0.04	0.06	−0.07	0.03
– France	31	53	48	−0.54	−0.04	−0.11	−0.02	−0.37
– Switzerland	83	96	86	−0.14	0.02	−0.11	−0.04	−0.01
Southern Europe	29	30	32	−0.02	−0.09 (64)	0.07 (1.07)	0.04 (682)	−0.04 (43)
– Spain	24	24	28	0.00	−0.12	0.15	0.05	−0.07
– Italy	32	33	34	−0.02	−0.07	0.03	0.04	−0.02

Note: see Table 4.

Table 7

Dispersion in living standards using various indicators, 1913–1960.

	1913	1929	1950	1960
CV (welfare)	0.38	0.36	0.46	0.32
CV (HDI)	0.13	n.d.	0.07	n.d.
CV (GDP)	0.37	0.34	0.39	0.31

Notes: values for welfare and GDP per capita dispersion were taken from Tables 4–6 and 1A (Column I and II respectively). For the HDI, I used the values of Crafts (2002, 396–397).

developments can be seen in countries such as Germany and the Netherlands that come closer to the United States due to improving health levels and increasing equality. In the particular case of Germany, the loss of rents by owners during the hyperinflation years and the narrowing skill and gender differences contributed to a marked inequality decline by 1929 (Gómez-León and de Jong, 2018). In Sweden, not only did inequality drive convergence as the share of national income accrued by top earners declined from 24 to 14 percent (Piketty, 2014: 317), but also increasing productivity due to a major shift towards higher value-added industries in the structure of the economy (Roses and Wolf, 2010).

By 1950, most of the relative progress during these decades had vanished. As Table 6 shows, the welfare gap between the United States and Europe widened substantially despite health, leisure and inequality levels were relatively similar in both sides of the Atlantic. The impact of the war on the European economy was tremendous as labor productivity levels dropped (Bergeaud et al., 2016), and aggregate relative consumption fell from 61 in 1929 to 47 percent of the American level in 1950. In countries such as Germany or France, relative welfare levels in 1950 were at their lowest (around a third of the American level) close to those of southern European countries in a context in which part of the stock of physical capital was destroyed during the war (Kirner, 1965; Maddison, 1994). In the case of Northern European countries such as Sweden, the 1939–1945 period brought a temporary decline in GDP and consumption that rapidly recovered after 1945 (Edvinsson, 2005). In Table 1A we can see that the post-war bleak situation did not last long since by 1960 the welfare level of Germany, France or Western Europe with respect to the United States had increased substantially, which suggests that choosing 1950 as the end date of the analysis can have large impact on our view of their post-1929 performance. However, choosing a benchmark 15 years after the end of the war does not override the idea that relative welfare differences were quite persistent throughout the period since the gap in living standards between the United States and the European aggregate was very similar to that in 1929 (and even wider in some cases such as in Denmark or the United Kingdom).

A further aspect of the level analyses that can be explored is the degree to which countries converged (or diverged) in their levels of welfare, thus causing a decline (or an increase) in cross-sectional welfare dispersion. In the context of economic growth, this phenomenon, also called sigma convergence, takes place when poor economies grow faster than rich economies as they approach their steady states. If this is the case for welfare, then achievements in medicine, sanitation and workers' rights created a more equal Europe in terms of welfare as the HDI-based evidence suggests (Crafts, 2002; Millward and Baten, 2010). To look at this, in the first row of Table 7 I present the coefficient of variation for the benchmarks considered until now. Between 1913 and 1929, we can

Table 8

Growth in living standards in Western Europe and the United States, 1913–1950.

Countries	Measures of living standards (in annual percentage terms)			Welfare decomposition				
	Welfare (I)	Income (II)	Consumption (III)	Difference (IV)	Health (V)	Consumption (VI)	Leisure (VII)	Inequality (VIII)
United States	3.1	1.7	1.3	1.4	1.1 (54–68)	–0.4 (1.7–1.3)	0.3 (1152–963)	0.5 (50–40)
Western Europe	2.4	0.8	0.6	1.7	1.4 (50–66)	–0.2 (0.8–0.6)	0.2 (1277–1080)	0.2 (47–43)
Northern Europe	3.3	2.0	1.7	1.3	0.9 (58–71)	–0.4 (2.0–1.7)	0.2 (1096–1086)	0.6 (52–39)
– Sweden	3.8	2.4	1.9	1.4	0.8	–0.5	0.1	0.9
– Denmark	2.7	1.5	1.3	1.2	0.9	–0.2	0.2	0.2
North-Western Europe	2.3	0.8	0.6	1.5	1.3 (51–67)	–0.2 (0.8–0.6)	0.2 (1408–1256)	0.2 (47–43)
– United Kingdom	2.8	1.0	0.8	1.8	1.2	–0.3	0.2	0.6
– Germany	1.7	0.2	0.1	1.6	1.6	–0.1	0.1	0.0
– Netherlands	2.8	1.1	0.8	1.7	1.2	–0.3	0.3	0.5
– Belgium	2.4	0.7	0.4	1.7	1.2	–0.3	0.3	0.6
– France	1.8	1.1	0.6	0.8	1.1	–0.5	0.4	–0.2
– Switzerland	2.4	0.7	1.1	1.7	1.2	0.4	0.3	–0.1
Southern Europe	2.7	0.7	0.6	2.0	1.7 (45–64)	–0.2 (0.7–0.6)	0.2 (908–682)	0.2 (47–43)
– Spain	2.6	0.3	0.2	2.2	2.0	–0.1	0.1	0.2
– Italy	2.9	1.0	0.8	1.9	1.5	–0.2	0.3	0.2

Notes: see Table 4, although there are two differences. First, the underlying raw data for Column V is the rate of growth of GDP and consumption per capita. Second, Column IV now conveys information about the difference in percentage (or logarithmic) points between the welfare measure and income per capita.

observe a slight decline in welfare dispersion and then a rise up to 1950. Actually, the increase after 1929 was so dramatic that the level of welfare dispersion in 1950 was higher than in 1913, which suggests that the 1930s and 1940s are characterized by welfare divergence. This pattern is in line with Williamson (1996) and Lindert and Williamson (2003) who argue that the eruption of the First World War and the disintegration of the world economy during the interwar era broke with a convergence trend in wages and GDP that can be tracked back to the late 19th century. However, inferring welfare performance after 1929 on the basis of the 1950 benchmark may be misleading because of the large impact of the war on consumption discussed above. If we look at welfare dispersion in 1960 instead, we can see that it is lower than in 1929, thus indicating that convergence forces were probably at play after 1929 and then were temporarily interrupted by the war. These forces, although somewhat weak as the coefficient of variation in 1960 is only slightly lower than in 1929, have their roots in the widespread health improvements up to 1960 and economic convergence during the interwar era (Milanovic, 2006; Roses and Wolf, 2010).

It is worth noting that the evolution of cross-country differences in human development (see Table 7, second row) seems to be at odds with all the patterns described above. In line with the idea that this indicator tends to show convergence (Prados de la Escosura, 2015), welfare spread declined by roughly a half between 1913 and 1950 despite the enormous disruptions of the Second World War. A further noticeable difference between HDI-based dispersion in living standards and the consumption-equivalent measure or GDP is that the degree of dispersion is much lower with the former. Actually, in 1913 and 1950 the coefficient of variation is three times and six times higher for the consumption equivalent measure, thus implying that differences in living standards across countries were not only much larger than the HDI shows, but also more persistent.

Having shed light into relative welfare levels throughout the 20th century with the new indicator, we can now address the question whether the first half of the twentieth century in Western Europe can be characterized as one of missed or taken opportunities for improving broader wellbeing. For this purpose, I present annual growth rates of welfare using the consumption-equivalent measure in Table 8 (Column I). To put these into perspective, I also provide income and consumption growth rates in Columns II and III. Moreover, in the right panel I provide a welfare breakdown to look at the reasons why welfare and income per capita growth differ (the only difference with Table 4 is that Column VI is now interpreted as the percentage growth difference between income and consumption). Does income growth underestimate welfare growth in Western Europe during the period 1913–1950? According to the consumption-equivalent measure, the answer is clearly affirmative and the magnitude is sizeable. To continue with the previous example of the United Kingdom, if we take into account that British citizens in 1950 lived in a much safer country where the incidence of infectious diseases was nowhere near that in 1913 and life expectancy had increased by 16 years; that they were expected to spend almost two hundred hours less in the workplace; and that they lived in a more equal society, then welfare growth during the period 1913–1950 is almost three times higher than what income per capita suggests. This is not an isolated case since whereas average European income per capita grew below a percentage point annually, the welfare measure suggests a yearly increase of 2.4 percentage points. The implications of this difference are very substantial: in almost four decades income per capita only grew by less than 30 percent and welfare growth points to a doubling of wellbeing at the end of the period. This difference is mainly explained by welfare gains derived from the decline of mortality and the expansion of leisure. The 16-year increase in life expectancy and the almost

two-hundred-hour decline in annual working time add 1.4 and 0.3 percentage points to European welfare growth respectively (Column V and VII). The decrease in inequality also contributed positively, but to a much lower extent (0.2 percentage points). If we consider the whole sample, the growth differential between the consumption-equivalent indicator and income ranges from 0.8 to 2.2 percentage points annually in France and Spain respectively.

Across countries, growth experiences differ substantially as the case of Germany and Sweden illustrate. While in the former economy welfare grew at 1.7 percentage points yearly because progress in material wellbeing was near zero, in the latter country citizens saw the four wellbeing aspects considered improve and contribute to a yearly growth rate of 3.8 percentage points. Despite the underestimation of welfare growth by income is sizeable in both countries, the ending point in 1950 may have a particularly large impact on growth rates in some countries such as Germany and France as discussed above. Actually, if we compare their performance with that of the European aggregate, Germany and France exhibit roughly 30 and 25 percent lower welfare growth rates respectively. Choosing 1960 as the end point of the analysis instead (see Table 4A), we can see that the experiences of France and Germany are much more in line with those of other countries. This later benchmark reinforces the previous findings that the analyzed period is one of significant welfare improvements despite the low growth rates of GDP per capita.

Before proceeding further to analyze the drivers of welfare growth by period, it is worth putting the results of Table 8 into perspective with the literature to assess the calibration of the model. Beginning with Crafts (1997, 317), we can see that our calculations are in line on average. For instance, his (unweighted) rate of average welfare growth of European countries for the 1913–1950 period is the same as in this study: 2.4 percentage points. Also, looking at the same sample of countries considered in both articles, welfare revisions by Crafts (1997) range from 0.6 to 1.8 percentage points and in Table 8 they range from 0.8 to two percentage points. At the same time, country specific cases can exhibit some important differences. Considering the United Kingdom, Crafts presents a growth rate of 1.8 percentage points and in this study it is 2.8. Health and inequality, a dimension not included in Crafts (1997), accounts for the difference. In the Danish case, leisure does not contribute to welfare growth in Crafts' calculations, whereas in mine it adds 0.2 percentage points yearly as result of the two-hundred hour decrease in annual working time (this difference may seem small, but over a period of almost 40 years it becomes very sizeable).

The results are also in line with those of Usher (1980, 246) who calculates that between 1911 and 1972 health improvements in France and the United States added up to one and 0.75 percentage points to welfare growth (my calculations imply a contribution of 1.1 and 1.05 percentage points respectively). The welfare gains from health improvements in the other side of the Atlantic in Table 8 are also similar to the range provided by Nordhaus (2003, 27) for the period 1900–1950: between 0.9 and 1.7 on average. In the case of leisure, Nordhaus and Tobin (1972, 10) calculate that it contributed to higher American growth by 0.4 percentage points between 1929 and 1965, which is close to the 0.3 percent reported in Table 8. Jones and Klenow (2016, 2455) has similar values for a more recent period.²⁷ Finally, to have a sense of the extent to which the results can change when calibrating the model differently, I present in Table 1D a set of alternative results with a parameter specification using evidence from the literature that yields the lowest relative importance of health and leisure in the model.²⁸ As we can see, welfare growth rates are revised on average by only 0.5 percentage points, and relative welfare levels remain almost unaltered. All in all, the robustness and the consistency of my results with those of other studies in the literature not only shows that the calculated growth rates of welfare and the model calibration are plausible, but also provides support for the results of the level analyses.²⁹

In order to look at the drivers of welfare growth over time, in Tables 2A and 3A I consider the periods 1913–1929 and 1929–1950 separately. If we focus on the first one, we can see that the growth trajectory of Western Europe is steeper than the American as growth is 25 percent higher in the old continent. Despite the negative effects of WWI in the old continent (Roses and Wolf, 2010), consumption grew by 0.9 percent, its distribution became more equal in a number of countries (Piketty, 2014; Milanovic, 2016), and the introduction of the eight-hour working day after WWI brought significant improvements for workers' wellbeing (Evans, 1969; Huberman and Minns, 2007), which contributed to welfare growth by 0.6 percentage points annually. The most important source of welfare gains, though, stems from health improvements due to the establishment of more efficient sanitary infrastructures and dietary improvements (Cutler and Miller, 2005; Millward and Baten, 2010), which contributed to annual welfare growth by 1.4 percentage points. This welfare-enhancing wave caused by health developments was not unique in Europe as non-OECD countries also benefitted from it (Prados de la Escosura, 2015). In the years from 1929 to 1950, welfare growth is unsurprisingly lower than in the previous period because the contribution of consumption halves (and even becomes negative in some specific countries), and the one-time largest reduction in working time was not realized again. Still, average welfare growth in Western Europe is two percent thanks to further progress in sanitation and medicine (e.g. antibiotics), that allowed treating major infectious diseases (Cutler et al., 2006; Jayachandran et al., 2010; Costa, 2015). Irrespective of the initial income level of a certain country, these innovations diffused rapidly and contributed to improve the lives of millions (Preston, 1975).

4.2. Welfare across the age distribution

The decline in mortality did not happen in the same way across the age distribution. Instead, progress against diseases such as pneumonia or gastroenteritis disproportionately increased the survival probabilities of children between their birth and fifth birthday.

²⁷ For instance, they calculate that a 150-hour reduction in working time in Japan during the period 1980–2007 increased welfare growth by 0.23 percentage points (a similar decrease in working time in North-Western Europe between 1913 and 1950 yields a similar value).

²⁸ More specifically, I assume a discount rate of 2 percent given that there is discounting included due to mortality, a Frisch elasticity of labour supply of 2 (Jones and Klenow, 2016) and the lower range of the VSL suggested by Viscusi and Aldy (2003): 5.5 million dollars.

²⁹ Moreover, in the Appendix D I perform a number of robustness tests showing that changes in the calibration do not alter the main results.

Fig. 1. Welfare growth across the age distribution in Western Europe and the United States, 1913–1950.

To look at this in more detail, I will quantify the effect of health improvements in different parts of the age distribution and test the robustness of the patterns described until now. For this purpose, I can take advantage of the richness of the age-specific mortality data to perform the same exercise as in Table 8 but considering the counterfactual that mortality improvements only happened after certain age thresholds. The results of this exercise are presented in Fig. 1 where I provide welfare growth rates for the period 1913–1950 when considering mortality changes from birth until age 60 for the United States, Western Europe and its sub-regions. Unsurprisingly, welfare growth falls as the age threshold increases because mortality declined less at older ages. The drop in welfare growth is especially visible in the age range 0–5. In fact, according to these estimates, not taking into account progress in child mortality lowers welfare growth between 0.5 and one percentage points annually in Northern and Southern Europe respectively. While these growth differentials are important, they do not override the idea that the period 1913–1950 is one of strong welfare growth for Europeans and Americans.

To sum up, these results suggest that income per capita is significantly underestimating welfare growth during this period and that it provides a one-sided view of welfare development by not taking into account changes in health and leisure (and to some extent inequality). If we extend the concept of living standards beyond their material component to include the gains from the advent of modern medicine and the rise in leisure, welfare in Western Europe by 1950 doubled with respect to 1913, despite the negative effects that armed conflicts, financial crises and the like had on material wellbeing. According to the new welfare measure, opportunities to increase wellbeing in health and leisure were taken over time, and their impact on people's lives was sizeable.

5. Conclusions

The lenses through which we look at society greatly influence our perception and narratives of the past. In the study of historical living standards, this is particularly relevant and challenging when a focus on different indicators present wildly different paths of human development. The study of European living standards during the period 1913–1950 is a perfect example of this: while historically-low rates of economic growth would characterize this period as one of missed opportunities for improving people's welfare, unprecedented achievements in levels of health and leisure due to the spread of modern medicine, the implementation of large-scale sanitation infrastructures or the introduction of the eight-hour working day indicate the opposite.

To examine whether the idea of missed opportunities for living standards beyond pure material component is supported by a larger basis of measures, I have applied a new composite indicator of welfare that integrates material wellbeing, health, leisure time and inequality. Contrary to previously-used composite indicators that look at this period, this measure is more comprehensive in the aspects of wellbeing considered and, more importantly, it is grounded in economic theory which allows for welfare calculations across countries and time that are directly comparable to GDP. The main findings show that income per capita underestimates welfare growth significantly—up to 2.2 percentage points yearly—and that therefore many of the opportunities that emerged during the first half of the twentieth century to improve people's wellbeing were not missed. However, these opportunities were not taken (or did not arise) equally across countries since, as opposed to what other measures of human welfare such as the HDI imply, differences across countries were large and persistent throughout this period.

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Supplementary materials

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