Living Standards in a Modernizing World – A Long-Run Perspective on Material Wellbeing and Human Development

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Herman de Jong

Exploring the Change in Real Incomes and the Standard of Living

> The amenities of life that almost all of us take for granted today-including electricity, indoor plumbing, safe public water and sewage systems, instant mass communications, access to technologically sophisticated medical care, a remarkable variety of fresh and ingeniously packaged foods from around the nation and the world, free public education, low infant mortality, and long life expectancy- were all virtually absent a century ago. (Baumol, Blackman, and Wolff 1989, 29)
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> The heart of the matter is 16. Real income per head nowadays exceeds that around 1700 or 1800 in, say, Britain and in other countries that have experienced modern economic growth by such a large factor as 16, at least. (McCloskey 2011, 48)

The Rule of Sixteen

Since the spread of industrialization, which began in England in the second half of the eighteenth century, many countries took off on a development path leading to economic structures that were no longer dominated by agriculture but by mining, manufacturing, and services. This process of modernization resulted in a 16-fold increase in the standard of living of the average world citizen in less than 10 generations. Per person we enjoy 16 times more goods, services, and housing. In the same period world population increased from less than one billion to more than six billion. But not every part of the globe experienced a 16-fold increase; in some countries it was more and in some countries it was less. And some countries experienced a reversal of fortune.

Modern economic growth is a concept that broadly covers the long-term processes of technological development and industrialization and the changes in economic structure and in the physical environment that came with it, such as urbanization. Industrialization started in England, which like other North Sea regions such as Holland, already had a relatively modern economy, with well-developed sectors outside agriculture, such as trade, finance and industry. But even around 1760, still more than 35 % of employment was active in agriculture and thus attached to the land (Broadberry et al. 2013). Technical progress in mining and in cotton and iron manufacturing started a process of industrialization and urbanization. Modernization spread across the Continent, North America and other European offshoots, then Japan and Latin America and only after WWII in the rest of Asia and parts of Africa.[1] Productivity growth and structural change, however, was characterized by uneven development, within and across nations.

H. de Jong (✉)
Faculty of Economics and Business, University of Groningen, P.O. Box 800, 9700 AV Groningen, The Netherlands
e-mail: h.j.de.jong@rug.nl

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[1] For a recent overview of industrialization in the 'periphery' see Bénétrix et al. (2012).

Table 3.1 Gross domestic product per capita in 1800, 1913, and 2010 (in 1990 international dollars) and ratio to 1800 (=1)

	Argentina	China	Germany	India	Japan	South Africa	United Kingdom	United States	World
1800	931	600[a]	986	648	641	959	2,097	1,296	712[a]
1913	3,797	552	3,648	673	1,387	1,157[b]	4,921	5,301	1,543
2010	10,256	8,032	20,661	3,372	21,935	5,080	23,777	30,491	7,814
R.1913	4.1	0.9	3.7	1.0	2.2	1.2	2.3	4.1	2.2
R.2010	11.0	13.4	21.0	5.2	34.2	5.3	11.3	23.5	11.0

Source: Maddison project database. http://www.ggdc.net/maddison/maddison-project/home.htm
Notes: [a]=1820, [b]=average of 1910 and 1918

Table 3.1 shows income per capita levels for selected countries between 1800 and 2010 in constant prices, so adjusted for inflation.

In 1800 the United Kingdom had the highest material standard of living, measured by GDP per capita. Two centuries later it was still one of the richest countries in the world, but surpassed by the United States. Because of its high income level in 1800 the calculated productivity multiple of the U.K. in 2010 is just over 11. Following this definition Britons became 11 times as rich compared to their ancestors in 1800. Inhabitants of the U.S. experienced a factor of 23.5 %, a number that was by and large also reached by Germany. In 1800 both countries had lower levels of income than the U.K. Initial values for Asia were quite low, suggesting that the Great Divergence between East and West has a longer history than only the 200 years since industrialization (Allen et al. 2011). Japan was the first Asian country to industrialize, after the Meiji Restoration of 1868. The country was extremely successful; its ratio of 2010 to 1800 was over 30. Argentina is an example of reversal of fortune; around the turn of the twentieth century its economy belonged to the richest in the world, but in the last century it fell behind in relative terms. Note that, except for Argentina, growth rates during the twentieth century were much higher than in the nineteenth century. In particular the period of 1945–1973 stands out as an exceptional era of worldwide growth, due to WW II reconstruction, the mobilization of the interwar backlog of opportunities, and catch-up growth for industrial newcomers. Material improvements in countries such as Japan, South Korea, and Taiwan were rapid and took less time

to mature than in the early industrializing nations of the nineteenth century. This 'golden age' was a one-off growth spurt in world history (Maddison 2006). But even if we look at the world as a whole and include also those areas where economic modernization is still in an early phase, we find a level of GDP per capita in 2010 that is 11 times as high as the average level around 1800. "The scientific fact established over the past 50 years by the labor of economists and economic historians is that modern economic growth has been astounding, unprecedented, unexpected, the greatest surprise in economic history" (McCloskey 2011, 49).

The Measurement of Price Change

Within countries the increase in availability of goods and services, even for the poor, has been enormous, and could be acquired at much lower costs. A simple comparison of goods being available now as well as in the past may give an idea how much more an average worker can acquire now compared to 100 years ago. Bradford DeLong, an American economist, approached this issue by comparing the prices of similar durable goods in 1895 and 2000. He calculated the number of hours an American worker would have to work to obtain these goods in both years. What you need is a wage rate of an average worker and the price of the commodity, which can be expressed as a multiple of an hourly wage rate. The 1895 data were taken from the catalogue of Montgomery Ward, at the time the largest mail-order retailer in the U.S. that brought products of modern industry to small town

America (See Table 3.2). When we express both multiples as a ratio we get a productivity ratio. It is the combined effect of lower prices through productivity improvements and higher money wages of workers.[2]

Let's take bicycles. Paraphrasing DeLong we see that back in 1895 it took about 260 h of work to buy a bicycle. In the year 1895 a bicycle would cost circa $65. In the year 2000 bicycles were more expensive, on average $130. However, because wage rates have risen much more, it takes only the earnings of around 7 h of work, less than a working day, to buy a bicycle. In terms of bicycles the average American worker has become 36 times richer than a worker back in 1895. Taking the Encyclopedia Britannica as an example the ratio is much less, only 4. But one might also conclude that a household that substitutes the Encyclopedia for one that is freely available on the internet has become infinitely richer, because one hardly has to pay anymore for this kind of information. The example shows that comparisons may easily understate increases in the material standard of living. It also illustrates the difficulties in comparing the services of goods over a very long stretch of time; do their prices contain all the welfare information? And how to apply an appropriate set of weights when we want to aggregate individual expenditure into total national income and consumption?[3]

These issues are all part of the so-called "index number problem", confronting scholars with the question of the interaction of changing volumes, prices and qualities of commodities in composite price indexes. In collecting and using money wages to measure the standard of living we want to know whether movements in prices of goods consumed have allowed workers to keep their level of living. The 'real wage' is the ratio of the money wage to the consumer price index. Consumers buy many things, and the prices of goods and services in their consumption basket inflate at different speed. Comparing the standard of living of today with some period in the past depends on the set of commodities that one views as important. In that sense the weights of the commodities in the basket can vary a lot according to everyone's own preferences. Although statistical offices apply a single official index of consumer prices or a cost-of-living index to adjust money wages and estimate real incomes it still remains difficult to calculate precisely the amount of income growth for an individual or a family.

How to Account for New Goods

Another important problem in measuring real incomes over time is how we include new goods and services in the basket. If we want to measure the development of income properly we cannot just stick to bicycles and we need to include entirely new goods and services like air travel, antibiotics, hip replacement, or the internet. Just consider the following example: Table 3.1 shows that the level of GDP per capita in the U.S. in 1913 was $5,301 at the prices of 1990. In 2010 it was $30,491. This implies that the material standard of living in 1913 was what could be obtained in 2010 with 5,301 dollars spent on goods and services already available in 1913 (such as in the list in Table 3.2) and compares it to the value of the average income of 2010: 30,491. But expenditures in 2010 include smartphones, radios, computers, aspirin, and cardiovascular surgery, which were not available at any price in 1913. New goods of better quality have most certainly held down the true costs of living, and therefore our material standard of living has increased more than the conventional measures indicate.[4] Or, to put it in a

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[2] See for a similar but less detailed description Fourastié 1960, 88 and 124–134, pointing at changes in relative prices of products and the differential effects on real comes for the rich and poor.

[3] Of course the same analysis can be made across countries for one particular year as is being done in the various rounds of the International Comparisons Project for the post-WW II period, see Kravis and Lipsey 1991.

[4] See also Crafts on the measurement of the cost of living with new goods: Crafts 2007, 13–14.

Table 3.2 Time needed for an average American worker to earn the purchase price of various commodities

Commodity	Time-to-earn in 1895 (hours)	Time-to-earn in 2000 (hours)	Productivity multiple
Six novels by Horatio Alger	21	0.6	35.0
One-speed bicycle	260	7.2	36.1
Cushioned office chair	24	2.0	12.0
100-piece dinner set	44	3.6	12.2
Hair brush	16	2.0	8.0
Cane rocking chair	8	1.6	5.0
Solid gold locket	28	6.0	4.7
Encyclopedia Britannica	140	33.8	4.1
Steinway piano	2,400	1,107	2.2
Sterling silver teaspoon	26	34.0	0.8

Source: DeLong (2000, 5)

different way: an income of $5,301 today that can only be spent on commodities that were around at the beginning of the twentieth century would in fact be worth a lot less than $5,301.

According to Nordhaus the inaccuracy of price indexes can be high in periods of fast technological change or economic transformations, when it is extremely difficult for e.g. statistical agencies to capture the impact of new technologies and new goods on living standards. This was especially so in the period before WW II. He also produces a list with important inventions from aeronautics to the zipper which have only been partly taken up in price indexes (Nordhaus 1996, 56–57). Although the last century witnessed large changes in e.g. transportation, entertainment, indoor plumbing, health care, electronics, lighting, and communications, etc., these are only poorly taken up in the price index. Take the example of the introduction of the cellular telephone in the U.S. in 1984. It took 15 years before it was included in the consumer price index of the Bureau of Labor Statistics. The inclusion of this consumer product had hardly any effect on the index because its price changed only little. In fact, a large part of the price decline already had happened in the previous 15 years, before the cell phone was taken up in the index. Characteristic for new products is that their prices fall rapidly shortly after the introduction. Quality improvements in cell phones were likewise not taken up in the index either. Because of this failure to adjust for these characteristics telecommunications-service prices did not increase at the 'official' rate of 1.1 % per year, but in fact decreased at about .8 % per year in the U.S. in the 1990s. There might have been a further upward bias because the index does not calculate the gains in consumer welfare from new products and services. Consumers do not have a static choice set, which means that new products do not simply substitute for existing products (Hausman 1999, 189). The growth of living standards in the U.S. using the official consumer price index difference is six fold between 1913 and 2010. The Boskin Commission's guesstimate is that unmeasured improvements in quality and new goods have understated growth by 1 % per year. This implies in fact that material welfare has increased not six fold but at least 14 fold since 1913. Six is thus a lower bound estimate (DeLong 2000, 26).

Greater Variety of Goods and Services

New goods can also increase the variety of commodities for consumers which they may value higher than low variety. This is not always visible in measures like real wages. Hersh and Voth (2009) have analyzed the value of variety in the pre-modern period by looking at the impact of sugar and other new colonial goods on living standards in Europe. The problem is that many studies of living standards in the pre-modern and

modern period focus on an unchanging basket of goods. So any change in the actual pattern of consumption and welfare will not show up in real income estimates. The point is that despite the slow movement in measured per capita income in Europe before the Industrial Revolution, Europeans have seen their living standards rise through the gains in the variety of goods that came in as a result of food crops exchange between the New and the Old World. These radical transformations of consumption patterns have been overlooked in the consumption baskets in existing studies. The 'Columbian Exchange' made life for Europeans better through the imports of tea, sugar, coffee, tobacco, and chocolate.[5] Using a variety of methods Hersh and Voth have estimated English gains in welfare from these New World goods of between 10 and 20 % by 1800. The distribution of the new colonial goods among the British public was wide. The average working class household in the 1790s spent 7 % of household income and 10 % of its food budget on tea, coffee, sugar and golden syrup. Starting as luxury goods they became familiar goods for the masses. Overseas expansion thus impacted on European living standards through the arrival of new goods. The downside of these improvements in standard of living was the worsening of the position of African slaves working on the plantations (Nunn and Qian 2010, 181).

This point brings us to a final remark on the effect of higher productivity and variety on real income growth. The benign effects of higher production efficiency, new goods or bigger variety are not always distributed equally within and across countries. National income estimations attach the same weight to a unit of income received by a poor person as to a unit received by a rich person. But if we look at growth the increase of one dollar in income for the poor adds more to total welfare than an increase of one dollar for the rich (Beckerman 1980, 51). For those near the bottom of the income distribution growth looks much less impressive because

many of the new commodities invented are of no use if you cannot afford them. Consumers in Bangladesh also face the worldwide lowering of costs of manufactured products such as bicycles and smartphones (as a result of a long term process that started with the Industrial Revolution), but they cannot buy the same amount as an average Norwegian can because incomes in Bangladesh are lower. The Industrial Revolution brought a wave of new products, processes and gadgets and has continuously changed our consumption patterns (Baumol et al. 1989, 45–50). But one of the important results is that this process also brought on bigger differences in the production and consumption of goods and services, within and across nations. How well have the benefits of structural change and industrialization been distributed? Nobel laureate Simon Kuznets has argued that initially inequality has a tendency to increase when economies modernize because of structural change and increasing income gaps. In the second phase of the much discussed "Kuznets curve" a tendency of convergence of incomes and decreasing inequality can be observed (Kuznets 1955). But there have been and still are important lags between the fruits of efficient production by producers on the one hand and higher real incomes for consumers on the other. These issues are central in the study of economic history and more in particular the study of the standard of living, wellbeing, and inequality through time.

Concepts of Living Standards

Each method for appraising welfare has strengths and shortcomings...While single measures have the advantage that comparisons are easily made over time and across countries, they also have the liability of excluding or failing to incorporate fully some aspects important to the quality of life. Among these, per capita income is the most comprehensive, but it is not always available in the past and it may fail to capture the value of health, education, and other important dimensions of living standards...In particular, it may be difficult to estimate the extent to which expenditures on health are already included in GNP. (Steckel and Floud 1997, 13–14)

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[5] The Columbian Exchange has been used as a broader concept including the transmission of diseases, ideas and populations (Nunn and Qian 2010, 167).

Real Wages

The traditional approach among economists and economic historians to measure the changing state of human welfare has been through the measurement of real wages. Already since the 1890s the development of the working-class standard of living was being studied by comparing real wages through time and across countries (Scholliers 1996). Despite criticism (it does not measure non-market activities, incomes of households depend also on unemployment, earnings of family members are disregarded) the real wage approach has always had strong defenders. For example, declining real wages will result in decreasing material standards of living. To be able to acquire the same amount of goods and services an individual or a family has to supply more labor. Wages are therefore an important 'exogenous' input into the decision making process of the household, whereas anthropometric and demographic data can be viewed as an output, reflecting how households have adapted to relative prices (Scholliers 1996, 311–312; van Zanden 1999, 178–179). Real-wage studies focus on average wages for a large socio-economic group in society like the working class. It precludes any possibility that measurement of living standards is distorted by changes in income distribution (Feinstein 1998, 627). Alternative estimators like GDP involve much reconstruction and assumptions, in particular for the pre-1900 period (Allen 2003, 406). Real wage estimates can be used for many other purposes which may lead to consistent estimates of consumption, output and productivity (Margo 1992, 174–176; Broadberry and Burhop 2010, 402; Ashenfelter 2012, 2). Real wages are still the most important ingredient in the long-standing debate on the British standard of living during industrialization that has been going on for many decades. It is most of all characterized by controversies over different vintages of cost of living indexes. Being an optimist or a pessimist depends on the price series that one wishes to accept.

Gross Domestic Product

The second indicator to measure wellbeing in the long run is the concept of Gross Domestic Product and the underlying relations within the so-called System of National Accounts which measure economic welfare. The primary goal of the SNA was to apply an efficient measure of cyclical changes in the economy. It was developed during the 1930s and 1940s to study the magnitude of the Great Depression to determine appropriate policies and to plan for war time production. During the 1950s and 1960s it became a normative welfare measure for economic and social performance (Engerman 1997; Offer 2000). But ever since the first systematic construction efforts by Kuznets there have been concerns that such accounts were incomplete and that GDP is a measure only of economic activity that passes through the market. Already in the early 1970s Nordhaus and Tobin questioned the central position of GDP and introduced an experimental "measure of economic welfare" (MEW), making imputations for leisure, non-market and household activities and urban disamenities to arrive at a "sustainable MEW" (Kuznets 1952, 63–69; Nordhaus and Tobin 1973). Attention shifted to the costs of affluence, material improvement did not always go hand in hand with similar growth in wellbeing. Human welfare was being viewed more and more as a multidimensional phenomenon, of which income is only one aspect. Moreover, there was critique on the micro-economic foundations of SNA and the implicit assumption that the society which GDP measures is viewed as a unitary actor (Stiglitz et al. 2009). However, the measure of GDP is still defended as an indicator of human welfare, but on pragmatic grounds because movements in GDP correlate to a certain degree with social indicators like health, education, and life expectancy (Offer 2000, 6). It is also a compelling concept for international comparisons. The work of Angus Maddison has been praised for giving a consistent quantitative overview of comparative historical GDP estimates for almost all

countries in the world. After his death in 2010 his work has been continued in the so-called "Maddison Project" which aims to improve and update historical GDP comparisons (Bolt and van Zanden 2014).

Extended accounts ("augmented GDP"), like in the work of Nordhaus and Tobin try to measure welfare, by adjusting the SNA. Similar methodologies have also been applied in long-term welfare analysis. This has not always been without problems. The imputed values for leisure using a so-called willingness-to-pay approach (e.g. to take account of reductions in work hours, or improvements in life expectancy) and non-market activities exceed the value of GDP, dominate the index, and change only slowly, which makes it difficult to analyze growth and cycles in a meaningful way (Usher 1980; Crafts 2007). Various analyses of health improvements in the first part of the twentieth century have shown big effects when this willingness-to-pay approach is applied. Crafts estimated on this basis an imputation for longer life expectancy for a set of OECD countries of 0.8 percentage points extra growth on top of the GDP per capita growth of 1.2 % per year for the period 1913–1950.[6] Hickson calculated for Japan a mortality imputation of about two per cent per year on top of the Japanese GDP per capita growth rate between 1900 and 2000.[7] A related problem is that imputations for increased life expectancy cannot be totally exogenous; if measured consumption also includes investments in health, than there will be double counting (Williamson 1982).[8]

Social Indicators and HDI

Next to "augmented GDP" another approach as an alternative to measurement of general welfare is the "social indicators" movement (Land 1983; Noll and Zapf 1994). It is based on the idea that real welfare is not represented by the SNA indicators but by goods like housing, health, nutrition, life expectation, and poverty levels etc. (Liu 1975).[9] Although this statistical movement was only short-lived in the official statistical agencies and bureaus it became very popular in the field of economic and social history. Anthropometrics proved to be a very valuable source of analysis for periods and countries where historical income and price data were not available. Alternative approaches entered the scene with the study of food intake, literacy, health and longevity and in particular the measurement of human height (Floud et al. 1990; Engerman 1997, 34–38; Crafts 2007, 17–18, 23–25). Recently an OECD study has been published that covers a large number of historical indicators of economic development and wellbeing worldwide (van Zanden et al. 2014).

Anthropometric historians look upon heights as closely correlated with income. On average the poorer strata of a population are shorter than the wealthier. So, when in a low-level economy income rises it will raise average height. It will also increase when the distribution of income

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[6] Crafts 1997, 317. For the period 1870–1913 it was 0.5 %, for 1950–1973 0.4 % and for 1973–1992 0.5 %.

[7] Hickson 2009a, 498. A study on tuberculosis in England and Wales by the same author finds that the decline and virtual elimination of tuberculosis in England and Wales represents one of the most important and valuable health gains during the twentieth century (Hickson 2009a, b, 1061).

[8] Daly and Cobb (1989) included in their Index of Sustainable Economic Welfare inequality and depletion of

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non-renewables. This has a negative effect on the index because from the 1970s inequality and environmental depletion has increased in a lot of western countries. Recently Jones and Klenow have proposed an alternative to GDP by defining a nation's flow of welfare as a consumption equivalent. Their welfare indicator combines data on consumption, inequality, leisure, and mortality in an expected utility framework. These approaches all share the general notion of diminishing returns to economic growth (Jones and Klenow 2010).

[9] The Physical Quality of Life Index introduced by Morris (1979) is a weighted index of infant mortality, literacy rates and life expectation at age one (infant survival rate). Such estimates are necessarily rough and have foremost a diagnostic value, but they can be extremely helpful for periods and countries when other indicators are not available. For a historical PQLI on Victorian Britain see Jordan (1993), see Ostroot and Snyder (1996) for a historical index on France.

changes in favor of the lower income strata. On the other hand, in the case inequality increases, it might lead to a decrease in average height, even if GDP per capita is rising (Steckel 1995). But there is no simple association between height and income (Easterlin 2000). Changes in height reflect uncompensated shifts in nutritional status during childhood. Indexes of height thus are no substitutes for national income statistics, they report the nutritional status of human life (Gallman and Wallis 1992, 13). Steckel and Floud have documented the long tradition of using human stature to assess the health aspects of human welfare. Already in the 1820s human growth studies were executed, inspired by the idea those environmental conditions influenced stature. "Height at a particular age reflects an individual's history of net nutrition, or diet minus claims on the diet made by maintenance, work (or physical activity), and disease" (Steckel and Floud 1997, 4). There is an important inter-action component, because poor nourishment that may lead to reduced growth may be an effect of a poor diet and medical care, but also of work intensity and variations in labor organization (Fogel 1994). Indeed, human stature can be viewed as a net rather than a gross measure of nutrition. It depends on the nutrition available for physical growth after the claims made by body maintenance needs, illness, and intensity of work performed. There is a whole basket of components underlying these claims, like the disease environment, the state of public health, urban disamenities, the role of transportation and trade spreading diseases, and the distribution of income (Nicholas and Steckel 1991, 940). The mechanisms behind these relationships are com-plex and may differ across countries. Using anthropometric analysis may reveal the specific national relationships between industrialization, living standards and health aspects. Neverthe-less, many studies have found height-income relationships for the late nineteenth and twenty century that are quite strong. They also show cycles, with even loss of stature for certain periods, triggering big debates on the nature of the causality with economic changes like the transportation revolution, the movement of

people from rural to urban areas, and the role of relative prices for food (see the next sections). "Given that a nonlinear relationship between height and income has been found in the past century and that the height-income relationship could shift over time, we conclude that heights and income measure different but related aspects of the quality of life" (Steckel and Floud 1997, 9).

Arguably the most successful alternative indi-cator for GDP per capita has been the Human Development Index (HDI). Building on Morris's Physical Quality of Life Index this index evolved out of the United Nations multiple indicator approach to the standard of living. The HDI consists of three components: income per head, life expectancy and education and is influenced by Sen's capabilities approach. Sen stressed that underdevelopment has to be seen as the lack of basic capabilities rather than the lack of income per se (Sen 1985). Human wellbeing then can be defined as people having the capabilities to achieve valuable 'functioning's'. The HDI tries to measure the escape from poverty, and the process of expanding people's choices. Income is assumed to have an effect on this primarily at low levels of material wellbeing, but, above a certain threshold level, it is making a diminishing contribution. Because all three dimensions were seen as indispensable they were assigned equal weights. This concept had a large impact in pol-icy making, most of all because of its emphasis on components of wellbeing other than income.

But the HDI has also been criticized. The HDI measures relative progress on a scale of minimal measures, it distinguishes most of all among levels of deprivation, or basic needs, and less on gradations of wealth. Furthermore it is diffi-cult to put a price tag on the components of life expectancy and education. Life expectancy as an indicator has asymptotic limits, reflecting physi-cal and biological maxima, so identical changes in absolute terms result in lower increases as the starting level is higher. Therefore, it gives more weight to saving the life of younger over older people. If these indicators reach progressively higher limits, incremental improvements require much more resources, than from a lower base.

Historical applications of the HDI by Crafts (1997, 2002), Costa and Steckel (1997) and Floud and Harris (1997) have shown the importance of life expectancy in overall wellbeing within and across nations.

Studies have revealed that both in cross sections and over time there is a weak linear relation between wellbeing (measured by social indicators) and income per head (Liu 1975, 11; Easterlin 2000, 24; Offer 2000, 17). In general there is a relation that can be fitted with a logarithmic curve: at lower levels of real GDP per capita there is a strong correlation with social indicators, at higher levels it diminishes: additional growth in real GDP does not lead to a same amount of welfare growth. Offer sees the diminishing returns of additional growth in simple welfare measures over time as problematic: "It could be argued that the simple development indices are misleading, in that the measures used are exhausted under affluence. Measures like HDI and PQLI are oriented strongly towards the priorities of indigence" (Offer 2000, 17).

A recently presented Historical Index of Human Development by Prados de la Escosura produces a new vintage of HDI that adjusts for the asymptotic limits of the non-income dimensions of the index, life expectancy and education. This index adjusts in such a way that, in cases where a social indicator reaches higher levels, its increase represents higher achievements than had the same increase taken place at a lower level (Prados de la Escosura 2013, 10–11). Some results of this will be treated in the final section of this chapter.

Subjective Wellbeing

Psychological approaches try to measure the human experience of welfare. There is a curvilinear correlation between measures of subjective wellbeing (SWB) and levels of GDP, with a strong effect at lower incomes; however, above a certain level of income there is no increase in SWB. This effect is stronger in cross-section comparisons than over time. The influence of the level of absolute incomes is not very large,

but relative incomes do matter. Consumption norms adapt very easily to higher incomes.[10] One of the mechanisms is the so-called "hedonic treadmill" suggesting that to sustain a certain level of satisfaction, income has to rise permanently.

The important message to take away from the curvilinear relationship between income and welfare is that they are historically contingent; incomes grow and produce welfare and later on GDP goods and services deliver welfare returns that are diminishing. Why? We can point to some historical examples like the co-movement of rising incomes and urbanization. Economic production and growth may cause urban disamenities. Although these can be overcome through e.g. 'benign' public policies and/or institutions, additional growth will create new demand for services that take away negative effects like congestion or pollution. The affluent economy produces more than it can absorb, both in terms of ecology and in terms of psychology (Offer 2000, 27–28).[11] Because of this historical 'cyclicality' it is extremely difficult to make long-term analyses of welfare growth based on social indicators. Offer therefore proposes to shift the focus on measuring unhappiness instead of happiness, but that brings us close to the HDI indicator that is based on a scale of minimal measures. It may well bring us back to the issue whether to choose for a broad (wellbeing, happiness) or a narrow definition of the standard of living (economic welfare). For long-term analysis we should start from the basic assumption that changes in the ability to acquire goods and services are key to analyze changes in people's welfare and general wellbeing (Scholliers 1996, 311). We will focus on Western Europe and its major offshoot the U.S., because these

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[10] As incomes increase over time the impact of happiness is offset by an increase in material aspirations (Easterlin 1974; Easterlin 2001; Crafts 2007, 17), this is also known as the "Easterlin paradox".

[11] This argument is not the same as the much repeated claim that GDP is a bad metaphor of wellbeing for the reason that it also reflects spending on negative externalities, to avoid damage caused elsewhere in the economy.

regions have the most complete historical records to study the precise timing and underlying mechanisms of economic growth and human welfare.

Welfare Growth Before Industrialization

> There are essentially two measures of economic wellbeing for which we have long time series extending well before the nineteenth century: the real wage and GDP per capita. Each can lay claim to a long history of scholarly effort and important improvements in their methodologies over time, and surprisingly, each of them shows a very different trend over the pre-industrial period. (Angeles 2008, 148)

GDP Per Capita Before 1800

Less than 40 years ago there was a consensus among scholars that the early modern economy of Europe was stagnant in the long run (like e.g. in the publications of the French Annales school). But new research has revealed that countries in Northwest Europe showed dynamic growth long before the classic period of the British Industrial Revolution starting in the second half of the eighteenth century. According to new reconstructions of economic development in England income per capita started to increase in the second half of the seventeenth century (Broadberry et al. 2013). The rise in income was caused by a long-term process of labor moving out of the agricultural sector into industry and services. As production and income levels per capita in agriculture were lower than in services and industry such a shift causes total per capita income to rise. Calculations reveal that average labor productivity (output divided by the total labor input) increased with 0.15 % per year between 1381 and 1700 (Broadberry et al. 2013, 23). This structural transformation of the labor force was accompanied by urbanization and a disproportionate growth of the city of London acting as an engine of pre-industrial growth. Early growth was also visible across the North

Sea in Holland, the most urbanized part of the Netherlands (de Vries and van der Woude 1997). New estimates show that the structural transformation of the Dutch economy since the second half of the fourteenth century after the Black Death has led to a long-term increase in income per capita. The agricultural sector switched to more market–oriented activities, at the same time its share in the economy declined, and people moved to cities. The net effect being a growth of income per capita of almost 0.2 % per year between 1347 and 1807, leading to a doubling of per capita income in 450 years (van Zanden and van Leeuwen 2012, 123). Although these rates are low by present standards, it indicates that European countries have witnessed rising living standards before the period of industrialization through a mechanism of structural change of the labor force. Growth however, was volatile, due to an inherent instability of the economy that was very vulnerable to exogenous shocks. The acceleration of technological change, starting with the British Industrial Revolution would change the character of growth; it became modern, with new drivers, like efficiency, human capital and larger stocks of physical capital and machines.

These views have not remained undisputed. Clark has argued that the economy of England between 1200 and 1800 can be characterized by a Malthusian equilibrium (Clark 2013, 4). England in 1800 was not much richer than in 1200. This long-run Malthusian equilibrium is in fact a pessimistic view on the possibilities for economic development in pre-modern society. It has been mainly based on estimates of national income series for England and assumes that a much larger part of the population was attached to the agricultural (low-productive) sector. However, working back from the present with the assumption of no trend growth results in an implied level of living during the middle ages in England which is at least twice as high as the recent estimates made by Broadberry et al. (2013). It is clear from the new estimates that around the year 1450 the level of GDP per capita in prices of today would amount to circa $1,100, which is far above the absolute subsistence minimum of $400 per capita. Many pieces of qualitative evidence, however, point in the

direction of increasing levels of living, or even a "consumer revolution", characterized by improvement in the variety and quality of household items (Allen 2001, 411). The "pessimist" standpoint is thus not one of low levels, but of low growth, where incomes and thus standards of living did not trend upwards until the Industrial Revolution.

Real Wages and International Welfare Ratios

The differences in findings can also be ascribed to differences in methodology. Comparing these aggregate income per capita estimates with information on real wages – the other measure for which we have long time series – has revealed that for specific periods these different measures of economic wellbeing do not present the same picture and therefore tell different stories about pre-industrial economies. The recently produced income reconstructions of the English and Dutch economies are based on a systematic measurement of output and labor input by sector and estimations of average productivity and income levels of workers and other professions. These reconstructions are based on the system of national accounts, described in the previous section. The big advantage of this method is that it tries to make a consistent and logical framework of national aggregates that need to fit together. But this is also one of its weaknesses (besides those already mentioned) because it involves making assumptions about variables that are not always well documented in historical records.

For many European countries real-wage series show hardly any positive trend between the late middle-ages to the early nineteenth century, which contradicts the evidence of the reconstructions of national income (van Zanden 1999; Allen 2001; Angeles 2008). For this reason researchers have criticized the use of real wage information. It not only should give a too simplistic and narrow view of economic developments but it is also too static and not representative for the total population (de Vries 1994). But let's have a closer look at the evidence from a comparative viewpoint.

In Allen (2001) real wages have been put in a standardized international perspective. He used the wages of one category of workers, building craftsmen and laborers, in about twenty European cities. Standardization comes at a cost. There is no absolute certainty whether such an historical indicator is representative for the standard of living measured over a year, or whether city size has an effect on wages, or whether wages of building workers are representative for labor income for workers in general. The results, however, are extremely informative for the long-term development of economic wellbeing since 1500. Nominal wages converted into grams of silver per day (the so-called silver wage) reveal a pattern of increasing divergence between the north and the south of Europe since the second half of the sixteenth century. Wages in South Europe dropped to very low levels, while in North Europe wages remained constant. English wages were exceptional, however, and rose to very high levels, indicating that Britain was transforming into a high wage economy.

To calculate real wages in terms of purchasing power Allen introduced the concept of so-called welfare ratios. The nominal wage is divided by the costs of a standard basket of goods representing subsistence: the "bare bones" minimum for survival. Because the prices of these consumption goods differ per region the exercise gives country specific price developments. The welfare ratio is defined as the average annual earnings of a worker divided by the cost of a poverty line consumption bundle for a family. The poverty line is defined by a minimum level of caloric intake (Allen 2001, 425). When the welfare ratio is greater than one the worker has an income above the poverty line and there is room for expenditures on 'luxury' goods like higher-quality food and durable consumption goods. When it is less than one the family is in poverty and living below what is socially en biologically acceptable. In that case the basket of goods can only be consumed if the male breadwinner's income is supplemented by labor income of other family members. The intra-European pattern of welfare ratios is similar to the pattern of silver wages. Building workers

in Northwest Europe had incomes well above the poverty line, but in South Europe the welfare ratio fell below the poverty line after 1550 to reach a low around 1800. Families could only survive by shifting their diet to bread, the cheapest source of calories. The logical implication is that large parts of Europe were in a situation of deprivation, characterized by bad nutrition, and high mortality. This is backed by evidence of anthropometrical indicators like heights.

During the late eighteenth century the British were the tallest people of Europe. People in France, Spain, Italy, Austria and Hungary were shorter. Low real wages stunted growth (Allen 2001, 431). His study suggests that the widening of the north-south gap was already there before the Industrial Revolution, and must be ascribed to divergent economic and structural developments in the seventeenth and eighteenth century.[12] An important implication of this is that South Europe was still caught in a Malthusian regime. Only from the second half of the nineteenth century, when industrialization sets in, do we find rising living standards. The second important implication is that the high wage economy in England, being a reflection of growing productivity, remained in place despite a sevenfold increase in its population. It preceded the Industrial Revolution and maybe even was its cause. But as we shall see the real break in levels of living standards is only visible after 1850–1870. Only then can we find a trend that is really breaking away from the cyclical pattern that characterized British real wages since 1300

(Allen 2001, 435). It took a long time before average Britons could reap the benefits of economic change.

In Allen et al. (2011), the real wage analysis has been broadened to Asia and in particular China. Contrary to the revisionist view that the advanced parts of China, like the Yangzi Delta, had similar welfare levels than the European core around 1800 (Pomeranz 2000), this study presents a different picture from comparative real wage estimates. Real wages in Suzhou, Beijing, or Canton, and India and Japan were much lower than in the advanced parts of West Europe in the eighteenth century. Standards of living in the major cities of China and Japan resembled more the lagging parts of South Europe. Wages measured in grams of silver were already much lower in India and China than in Britain around the late sixteenth century. Measured in kg wheat or rice the Asian levels were closer to British levels (ca. 80 %), but falling behind (to 30–40 % of the British level) in the nineteenth century (Gupta and Ma 2010, 268). One of the main reasons for this relative decline is technological stagnation. Although Asia had cultivation methods that were characterized by relatively high land productivity, the traditional technology of e.g. wet-rice cultivation was labor intensive, holding labor in the agricultural sector. In Northwest Europe labor-productivity growth in agriculture made it possible for labor to move into industry and services. A comparison of real wages based on a broader basket of products than only grain or silver would be more meaningful. But it is very difficult to make reliable comparisons of consumption baskets of average workers for the pre-1800 period. Not only is it hard to compare the quality of housing between both continents, it is likewise not easy to deal with differences in factors like climate and cultural preferences. Allen et al. estimated a consumption basket in North China that was circa 15 % lower in costs than in Europe. Deflating nominal wages with the consumption basket reveals that welfare ratios in Asia were far behind Northwest Europe (circa 30–40 % during the eighteenth century). Welfare ratios, although increasing during the latter half

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[12] Özmucur and Pamuk (2002) found a long-term upward trend in Ottoman real wages since 1600 of 0.3 % per year, pointing at a modest trend for productivity increases, ascribed to learning-by-doing and diffusion of new technology from West Europe. Nevertheless, also Ottoman wages were in the same league as South Europe, that is, lower than 50 % of Northwest Europe. Cvrcek calculated levels of welfare ratios for the Habsburg Empire 1827–1910. Living standards only started to rise in the second half of the nineteenth century and remained at much lower levels than those of British farm workers, let alone London construction workers (Cvrcek 2013).

of the nineteenth century, even fell relatively vis-à-vis Northwest Europe. Until 1900 China had on average the same welfare levels as the non-industrializing countries in Central and South Europe (Allen et al. 2011, 30).[13]

Explaining Conflicting Evidence from GDP Per Capita and Real Wages

Only in England real wages maintained their high levels. There is conflicting evidence of the development of wellbeing when analyzed from the perspective of GDP per capita on the one hand and the concept of real wages on the other. Real wages and GDP per capita are not the same. Firstly, there may be variations in the labor supply of individuals and households, responding to changes in wage rates. A second factor is the development of relative prices in different markets of the economy, e.g. price differentials across product markets and the housing, capital, and labor markets. Thirdly, from this follows that wages are only a part of national income, there is also income from e.g. ownership of property or other productive capital. Income per capita may not be a good indicator of the standard of living of the working population when the income distribution changes rapidly. In fact, this is the central argument of the Kuznets curve (see next section).

In the British case the first factor has been of great importance for the pre-industrial period. Angeles estimated that in eighteenth century England the increase in the number of hours worked (labour supply per capita) accounted for three quarters of the difference between the real wage level and the level of GDP per capita.

Although the trend in wage levels did hardly change, income per capita increased because of higher labor input. Increasing labor input per person has been documented by Voth, who found that in the last 40 years of the eighteenth century the average Briton was putting in 25 % more working hours per year than before, from 2,576 h annually in 1760 to 3,328 in 1800 (Voth 2001, 1078). Labour intensification was mainly due to a rise in the number of days worked. People raised their income by working more hours; productivity gains did not lead to higher real wages in this initial phase of industrialization (Angeles 2008, 158). Whether this intensification was a result of the spread of factory production (supply) or the result of a change in workers' attitudes (demand) is still a question. Jan de Vries has tried to explain stagnant or declining real wages and rising incomes from changes in the pre-industrial household. New consumer goods became available and may have changed the preferences of households leading to an increase of work effort. The amount of time devoted to leisure was reduced and the activities for the market increased. This "industrious revolution" explains not only the intensification of proto-industry, child labor, and female labor but also agricultural specialization. De Vries finds proof of this in the increasing volume of material wealth and the number of durable consumer goods in British households (de Vries 1994, 254–256). A more pessimistic story would tell that the labor supply of families can be described by a backward sloping supply curve: there was more supply of labor to compensate for lower wages. Intensification of work and suppression of leisure went hand in hand with the exploitation of family members and a neglect of education. The elimination of holy days and of "Saint Monday" increased the length of the working year by 25–39 % (Voth 1998, 40). This must obviously have had a negative impact on the standard of living, despite increasing GDP per capita. Voth estimated that the rise in annual labor input per person over the half century between 1750 and 1800 (between 585 and 738 h) was roughly as large as the reduction in working hours between 1870 and 1938

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[13] See Baten et al. (2010) for an integrative narrative of living standards and human capital in China in the eighteenth to twentieth centuries. Human capital in China and Japan measured by literacy rates were comparatively high (Gupta and Ma 2010, 275). For a study of prices and wages in Spanish Latin America between the Conquest and Independence see Arroyo Abad et al. (2012). New evidence from real wages in British Africa between 1880 and 1965 is given by Frankema and van Waijenburg (2012).

(717 h on average). British output growth in this period was driven by more labor input, to overcome the effects of rapid population growth. Improvements in the standard of living became only visible after the middle of the nineteenth century, when British industrialization was already underway for almost 100 years.[14]

The second important explanation for the discrepancy between real wage estimates and GDP per capita can be found in relative price changes. Hoffman et al. have argued that relative price movements favored higher-income groups and increased income inequality in West Europe from 1500 to 1800. The mechanism that they describe is simple: "The rich, the poor, and the middle-income ranks consume very different bundles of goods and services. By definition, staples bulk large in the consumption of the poor, whereas luxury goods and services comprise a bigger share of what the rich consume, generation after generation. Any strong historical trend that makes staples more expensive relative to luxuries should widen the inequalities in real living standards" (Hoffman et al. 2002, 322). So there may have been an important effect on domestic inequality. At the same time it may also be an explanatory factor in the Great Divergence debate, because real purchasing power must have increased faster in countries where consumption patterns favored the goods that showed a fall in relative price level (Hoffman et al. 2002, 350; Broadberry and Gupta 2006). Not taking into account other prices than food prices (luxuries became relatively much cheaper) results in an underestimation of the relative purchasing power of West European countries. Changing relative prices resulted in higher real income gains for richer nations and within the countries itself for a greater gain for the richer classes.

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[14] See also Clark and van der Werff who find no proof of intensification of work input per capita and therefore question the idea of an "industrious revolution" (1998, 830).

The Early Growth Paradox

> Very few questions in economic history have been the focus of such prominent and persistent attention as the controversy about the impact of early industrialization and capitalism on the standard of living of the British working class. From contemporary discussions of the "condition of England" in the 1830s to the modern writing of economic and social historians, the issues have been vigorously contested, stimulating both fuller clarification of the economic and philosophical concepts and greater ingenuity in the search for new sources of information. But a consensus still remains elusive. (Feinstein 1998, 625)

The British Standard of Living Debate

Ever since the days of Toynbee, Marx, and Engels the consequences of the British Industrial Revolution (and associated urbanization) for the health and wellbeing of the mass of the population have been intensively debated. The core question of the "early growth paradox" is whether the standard of living of the working classes have stagnated or even worsened between 1750 and 1850, when national income per head was growing, first slowly, and after 1830 more rapidly (Pamuk and van Zanden 2010). The measurement of real wages has been central in this debate, which got a new twist when Lindert and Williamson (1983) for the first time derived an economy wide nominal wage index together with a cost of living index based on worker's budget shares and prices. Their view was optimistic, with almost a doubling of real wages after the end of the Napoleonic Wars. Later revisions by Feinstein revealed a more pessimistic picture with a stagnation of real wages between 1780 and 1830 and only a 30 % increase in the longer period 1780–1850. Later on these estimates were revised by Clark (2001) and Allen (2007), who used different price series. Although the evidence is still "a medley of conflicting verdicts", it is clear, also from the latest revisions, that real wage increase was only half of the output per worker increase (62 %)

during this phase of industrialization (Feinstein 1998, 626).[15] Substantial gains in welfare became visible after the post-1870 downturn in food prices with the imports of cheap cereals and livestock products from across the Atlantic.

Slow welfare growth seems to be reflected in anthropometrical sources. Floud, Wachter, and Gregory (1990) used military records to measure average heights of conscripts, as an indicator of nutritional status. They found that the mean height of British recruits fell during the second quarter of the nineteenth century and recovered only slowly during the second half. Their explanation for this decline in stature is the unhealthy disease environment of cities in Britain; urban-born men were shorter than rural-born men (Floud et al. 1990, 326). Furthermore there is ample evidence of a decline in nutritional status since 1740, lasting for at least 100 years (Nicholas and Steckel 1991, 937). A reconstructed historical human development index by Floud and Harris (1997) shows that improvements in the HDI arrested a bit during the second quarter of the nineteenth century. However, there is no decline visible, as with the heights of recruits. Since the 1850s a dramatic improvement in the standard of human welfare became visible (Crafts 1997).

The international dimension of recent research puts this 'growth puzzle' of declining standards of living during British industrialization into a new perspective. We have already seen that British levels of living were not low by international standards. In fact, the British industrial revolution took place in a high wage economy.[16] Expensive labor and cheap fuel (indigenous coals) paved the way for the well-known British inventions in the coal mines, the textiles industry and in engineering. The reason for lower stature in England can be explained as an effect of structural change in the economy that impacted on the pattern of relative prices and the personal income distribution, creating winners and losers. Mechanization may have led to technological unemployment and lower wages for those who remained in the declining sectors, like handicraft (Allen 2013, 8). The decline in heights can therefore partly be explained by the social deterioration of workers in the declining cottage industry (Brown 1990, 594; Cinnirella 2008, 350).

There was a critical change in relative prices of food and housing. And working class families were confronted with this in the early phase of industrialization. Rents of housing rose dramatically, being bid up by increasing numbers of workers entering cities. Prices of manufactured goods like clothing and textiles fell (because of mechanization and productivity growth) in comparison with prices of nutrients. This led to a relative drop in food consumption; consumers shifted their expenditures from nutrients to clothing, resulting in a decline in per capita calorie consumption and a decline in stature. Worker's families experienced no increase in food consumption, longevity or better housing. Decreasing health indicators also match evidence of rising infant mortality in the industrial North of England (Huck 1995, 535).[17]

We might hypothesize that British society was facing big lags in the timing of economic and social modernization: the growth process during industrialization was characterized by technical progress that increased the demand for capital, raising the profit share and leading to higher inequality. But the important investments in capital outlays in the initial stages of industrialization 'squeezed' consumption (Weir 1997, 162).

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[15] See Crafts and Mills (1994) for an econometric analysis of trends in British real wages between 1750 and 1913.

[16] See Humphries (2013) for a recent critique on the high wage interpretation of British industrialization.

[17] Huck stresses also that outcomes are sensitive to distribution of resources in a society. For families that are on the bare bones minimum, losing a portion of their resources will lead to a worsening of their health status that is not exactly mirrored by the groups who gain. So, the effect of income on biological results/outcomes is not linear, and the movement in the mean outcome of the distribution may not be representative for what really is happening (Huck 1995). See also Mokyr (1988, 87) who uses a proxy implied by consumption of some key commodities like sugar, tea, tobacco, and coffee. The proxy variable remains practically unchanged before the late 1840s.

In the second half of the nineteenth century, however, wages could rise in line with labor productivity, once levels of capital were in accordance with the level of technology. This reminds us of the Kuznets curve. It also puts forward the question what would have happened in Britain if technical progress and capital accumulation would not have taken place. Probably the economy of the U.K. would have fallen back to the welfare levels in South Europe and China at the time (Allen 2001, 433, 2009, 429).

The Antebellum Puzzle in the U.S.

Industrialization in the U.S. was later than in Great Britain. But economic historians have also debated on the biological effects of fast structural change and modernization for workers in nineteenth century America. This is the so-called "antebellum puzzle".[18] During the early stages of growth the economic standard of living for workers developed faster than their biological standard of living. The puzzle in this debate is not so much an issue of optimism or pessimism, but about the exogenous or endogenous nature of this discrepancy. The American rate of growth of real per capita income was at least as fast as in the U.K., and accelerated in the last two decades before the Civil War. The transformation of the economy resulted in a big relative decline in agricultural employment already before 1860. There was a shift of population from rural to urban areas, albeit slower than in the U.K. The real surge in city growth took place with the large-scale immigration from Europe after the Civil War. But pre-war industrialization brought on a longer working week, with more intense, insecure, and monotonous work. Therefore income and wage data may overstate the true gains in living standards achieved by economic growth in the decades before 1860 (Gallman and Wallis 1992, 9). There is ample information that the health status of workers began to decline, while income continued to rise around 1830. Average heights declined after 1830, reaching a low point

in 1890. Research by Nobel laureate Robert Fogel pointed at rising prevalence rates for chronic conditions of men born since 1840–1849. The impact of chronic disease on labor productivity may have been substantial (Costa and Steckel 1997, 59).[19] The timing of height decline was close to the U.K. pattern. But more importantly, in the U.S. height decline also took place in the country side. Bad working conditions in factories, higher risk of exposure to infectious diseases in overcrowded cities therefore cannot be the only cause. An important endogenous explanation of health decline has been given by Komlos (1987), who stressed the deterioration in the diet of Americans. The sectorial shift in production during industrialization led to an expansion of the labor force in more urbanized centers. At the same time agricultural productivity and the labor force in agriculture grew only slowly. This resulted in a decline in food production and a decline in per capita consumption of meat; the American population substituted carbohydrates for proteins. This could lead to maternal malnutrition and anemia and to fetal malnutrition resulting in shrinking Americans (Costa and Steckel 1997, 66).

Welfare Effects of Industrialization Elsewhere

Evidence of similar mechanisms on the European continent is mixed. Ewert reports a German growth puzzle with declining biological standards of living in Wuertemberg and Saxony.[20] Bekaert concluded that emerging

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[18] For an extensive overview of this debate see Komlos (2012).

[19] A similar point about the decline on the quality of Britain's work force and a poor productivity performance in the late nineteenth century has been made by Allen (2013, 9).

[20] Ewert combined height trends from Bavaria (Baten 1999) with new estimates of Wuertemberg and Saxony and found declining heights for birth cohorts 1770–1849 during early industrialization in Germany. The biological standard of living declined, the reason for this being a mix of relatively bad climatic conditions, rising food prices (partly because of population pressure) and falling real incomes leading to a nutritional crisis, in particular in Saxony where there was less self-sufficiency because of urbanization (Ewert 2006, 82).

industrialization in Belgium may have aggravated the nutritional constraint by making income and caloric distribution more unequal and the poverty problem more acute (Bekaert 1991, 653). France had a later start of industrialization than the U.K., with lower levels of real wages and with less demographic growth (because of low fertility) and a slower rate of urbanization. No proof has been found of a decline of the standard of living during industrialization, it is also not visible in anthropometric evidence like heights and life expectancy (Weir 1997). A nationwide survey in 1852 revealed that average French families spent more than 60 % of their budget on food items. The poorest among the farm laborers lived well above subsistence (Postel-Vinay and Robin 1992). Sweden was also a late industrializing nation and showed a late urbanization at a point that public health measures already were more effective. During the nineteenth century the historical HDI has been increasing continuously (Sandberg and Steckel 1997, 156). A study based on a micro dataset of Italian household-level data for the years 1874–1906 finds that in the early phase of Italian industrialization the level of nutrition went up for the bulk of the population. This includes the poorest among the poor who lived on average on 2,466 cal per head per day, exceeding the threshold defined by nutritionists. This information is in line with macro information of the national accounts statistics revealing clear proof of economic growth. The Italian industrial revolution coincided, unlike e.g. Belgium, with more efficiency and more equity (Vecchi and Coppola 2006, 441).

In Japan, also a latecomer, welfare growth was characterized by a specific segmented development between the industrial and the agricultural and traditional sector. Higher productivity growth in the manufacturing sector resulted in higher real wages for industrial workers, whereas the other sectors showed much slower wage growth. This was also reflected in gaps in health indicators like nutritional status, mortality and fertility. On top of that public health investments in the early twentieth century remained quite low because of heavy investments in military expansion. This explains the failure of Japanese life expectancy to keep up with that of European countries (Honda 1997).

Economic growth as measured by GDP per capita and material living standards (including health) diverged in the early industrializing nations in the nineteenth century. There were important differences in the timing of economic growth and human development, caused by forces of structural change, relative price change and urbanization. The next section will focus on the mechanisms of early urbanization on welfare levels.

Urban Disamenities, Health, and Public Policies

> Economic growth is not always benign, however. Industrialization was generally associated with increasing urbanization, crowded factories and tenements, and the pacing of the workers by machines. Economic growth might therefore lead to deterioration in health. (Costa and Steckel 1997, 47)

Do the traditional measures of standard of living reflect or incorporate the value of health status? It does, when people spend additional income on clean water and better diets. Health benefits will be reflected in higher GDP per capita. But it is difficult to establish such a relation for the nineteenth century. In contrast, if we look at the twentieth century we see that the normal living standard indicators are overshadowed by the consumer surplus of increasing health expenditure. In the nineteenth century however, declining health was independent of total consumer expenditures; it occurred despite income growth.

The quality of life has played a central role in the living standard debate. Already during the 1830s and 1840s social reformers like Frederick Engels looked at migration of rural labor to the British industrial centers as "social murder." William Blake's Dark Satanic Mills form the symbol of the human hardships and urban disamenities associated with the Industrial Revolution. Jeffrey Williamson tried to find a way to estimate these disamenities. According to the

approach of Nordhaus and Tobin, some portion of higher earnings can be viewed as a compensation for the urban penalty. Williamson combined a proxy for disamenities, the infant mortality rate, with levels of pay, and estimated how much compensation workers wanted for city life. "It does indeed appear that urban disamenities- at least in the form of high infant mortality rates- did require a pecuniary bribe to induce the low-wage working class family to locate in cities with the lowest quality of life" (Williamson 1982, 221–224). The premium during the 1830s and 1840s, however, was only 7 to 13 %. Williamson concluded that it was not industrialization that created the disamenities, but rather urbanization. Brown was more pessimistic about the costs of inadequate public health and the deleterious effects of poor housing in the British cities: "High living costs and poor sanitation in the cities prompted compensation that approached one-third of adult weavers' earnings" ... "Urbanization of the industry dampened the growth in living standards most strongly during the two decades following the end of the Napoleonic Wars" (Brown 1990, 606, 609).

Szreter (1997) showed that the poor demographic record can be ascribed to lack of investment in social overhead capital, which clearly did not increase with urban growth. According to Szreter and Mooney (1998) only from the 1870s onwards sustained improvement in British urban life expectancy can be found, with a complex pattern of alternating periods of deterioration and recovery between 1820 and 1870. They conclude that the second and third quarter of the nineteenth century was a key period of discontinuity and stresses in general patterns of the standard of living for the working population (1998, 109). So, this revision views the 1830s and 1840s not as an end of pessimistic levels of living standards, but as a the beginning of a serious deterioration in the standard of living of the British working class through the impact of the Industrial Revolution and urbanization, despite probable rises in the male real wage rates. Huck's conclusion is also pessimistic. Infant

mortality is a reliable indicator of public health and sanitation standards and often reflects differences in income across social classes and countries. Infant mortality in English worker's families rose during first part of nineteenth century (Huck 1995, 529, 545). A large part of the burden of fast urbanization was carried by infants.

Oxley used the rate of infection of smallpox as a proxy for urban overcrowding. The more faces there are per square kilometer, the greater the risk of contracting smallpox. There is a potential link with economic wellbeing in the commercial and industrial cites of England. Rapid urbanization created a crisis in accommodation (Oxley 2003, 647). The association of people being infected by smallpox and stunting may in fact be an effect of the worst disamenities of urban life. Public health movements and investments in public health between 1870 and 1930, such as the cleaning of water supply, sewage facilities, cleaning of milk supply, the setting of housing standards and the clearing of slums have led to declining rates of mortality and rising levels of life expectancy that only became visible in the first decades of the twentieth century (Costa and Steckel 1997; Leonard and Ljungberg 2010).

Ferrie and Troesken (2008) found that clean water has been extremely important for the mortality transition in the nineteenth century. They estimated that one-third or one-half of mortality declines that occurred in Chicago between 1870 and 1925 were related to water purification. Water intakes were moved far from sewage outflows. Pure water had diffuse health effects; it not only reduced typhoid, but also the diseases that the typical typhoid survivor would later succumb to, like tuberculosis or kidney or heart failure (Ferrie and Troesken 2008, 15).

Mokyr and Stein have observed that better health was produced within the household and that it was essentially technological: There was growing knowledge about the effects of cleanliness, giving recipes to the household regarding food, hygiene, and personal and medical care. There was more understanding of diseases, especially with the emergence of the germ theory.

"How did households learn about what makes them sick and how to stay well? The most dramatic change in medical history occurred in the half century before 1914: the understanding and gradual extinction of infectious disease from Western society. This transition was not complete by 1914, but had made enormous progress – decades before the development of effective antibiotics" (Mokyr and Stein 1996, 145–146).

Household Consumption and Child and Female Labor

> Much as the comforts and conveniences of life can contribute to enjoyment, something more than material possessions is necessary if people are to feel that life is really worth living. One is sometimes tempted to believe that at the same time their standard of living was rising and the amount of their leisure increasing the Americans were becoming a less happy people. If this is true, it does not mean that we should return to 'the good old days'. It does mean that it is fully as important for us to learn how to use what we have as it is to get more. (Edgar W. Martin commenting on American subjective wellbeing in 1860: Martin 1942, 404)

During the nineteenth century the family household accumulated many new products that increased their standard of living. There is evidence of growth of consumption of non-essentials even in working-class families. Church reports increasing ownership among British miners' families of harmoniums, pianos and other consumer durables like sewing machines and watches in the second half of the nineteenth century (Church 2000, 637). Soltow calculated the value of dwellings in nineteenth century America: "The family's wellbeing, in housing, was enhanced materially in terms of flooring, ceilings, fireplaces, windows, and doors" (Soltow 1992, 133). The average value of a dwelling increased tenfold between 1798 and 1875. In a study of antebellum America between 1770 and 1840 Walsh mentions how higher living standards impacted on different groups in society. From studies of probate inventories it becomes clear that there were higher standards of comfort for the wealthy and middle classes who had access to hired or bound labor, as measured by the quantity and variety of household equipment (Walsh 1992, 218). For the well-to-do there was improved lighting, more vehicles, more furniture etc. There is also proof of a more refined middle class culture and a larger role for women in the household through reallocation of labor time. On the other hand, working conditions of ordinary farm men and women, laborers, and slaves showed no evidence of major improvements (Walsh 1992, 228, 252).

Industrialization transformed women's status within the family and economy. It is a much debated issue whether it improved or worsened women's living standards in the United Kingdom. An important proof of this transformation can be found in qualitative evidence e.g. from parliamentary papers, and studies of household accounts. Labor market segmentation increased during industrialization and women's position in the labor market worsened. Between 1795 and the mid-nineteenth century there was a decline in the participation of married women in the labor force, and the proportion of working-age females fell rapidly between the 1820s and the 1890s. Aside from the rise of the patriarchal family and the ideology that women need not work, it also had effects on women's standard of living, because female wage rates declined. There is evidence that the nutritional status of working-class women was deteriorating after 1825. Mortality data show a female excess mortality gap (Johnson and Nicholas 1997, 204–205, 215–216). Nicholas and Oxley (1993) found that around 1800 English rural female heights were falling more rapidly than urban female heights and rural-born male heights. Obviously women did not share household resources equally with men. This may point to gender-based nutrient inequality which reflects unequal labor-market opportunities between men and women. Women were segmented into unskilled work with low pay. This was also visible in the agricultural sector where there were big changes from livestock production into grain with the application of new technologies which intensified gender specialization. With the enclosures women lost their role as the primary

exploiters of the commons (Nicholas and Oxley 1993, 736–738, 746).[21]

Horrell and Humphries (1992, 872) have extended these changing roles to the discussion of family budgets by stressing that one should not look only to the income of the male-breadwinner. Real family incomes grew less than male earnings, so one has to be careful to measure living standards movements only from the perspective of male wages. In fact, women's and children's earnings were less able to contribute to family income, especially during crises.

Child labor in early nineteenth century was widespread. Cunningham mentions percentages between 20 and 30 of children under age of 16, not only in England but also in early industrializing Belgium. Juveniles were employed in a broad range of manufacturing industries, but also in coalmining and cokes production. Juvenile labor was not just a transitional phase in industrialization that would later on disappear through technological advance; the type of labor was significant for many reasons, it was cheap and it had perceived skills (Cunningham 2000, 412).[22] But during the late nineteenth and early twentieth centuries child labor had declined strongly, not only in the early industrializing economies, but in many countries. Children had been excluded from sectors such as mining and textiles or glass manufacture. The explanation for this lies in a variety of factors, like the decision making within families, state action (child labor and schooling laws and laws raising the school leaving age), technological innovation, and cultural change and cultural values. Another reason was the sanctification of childhood. After WW I children gradually came to be valued not for what they could contribute to the family economy but for the emotional gratification they brought to adults. Parents worked in order to provide a better life and opportunities for their children. So children have seen their standards of living raised by far more than adults (Cunningham 2000, 417, 424).[23] But we have to remember that early industrialization and urbanization had lowered children's living standards as indicated by high mortality in the industrial cities.

Working Hours and Leisure

Clearly, the modern preoccupation with recreation and leisure activities such as sports, cultural events, vacationing and vacation travel, television viewing, and the like is a vast change from life in the nineteenth century…It was also virtually unknown in the nineteenth century for members of the laboring population to enjoy a period of retirement in their later years; people literally worked themselves into the grave. (Baumol, Blackman, and Wolff 1989, 48)

Higher productivity and incomes have increased the amount of leisure time. The long term decline in working hours that took place in the first half of the twentieth century reflects an income-elastic demand for leisure and is a reflection of technological change in the sense that the purchasing power of an hour of work has risen substantially. Clearly a considerable part of the increase in the real hourly wage was used to reduce hours at work which points at a negatively sloped long-run labor supply function (Crafts 2007, 14). The reason is that workers then had little opportunity to shift leisure over time and therefore took lower hours instead of more days off or a shorter work life (Huberman 2004). The strongest reductions in work hours took place in the twentieth century. Estimated hours of work for 1870–1913 were on average 10–12 h per day during six days a week in most sectors and most countries. However, trends in weekly work hours varied a lot across nations. Around 1870 it varied

[21] See also Clark (2001) and Cinnirella (2008).

[22] See Logan (2006) for an elaboration of the differences in child labor between British and American families. Child labor in the United States was less extensive than on the Continent during the nineteenth century. See also the analysis of Nardinelli (1990), which is based on the new household economics.

[23] Likewise Gratton has found that American industrialization has not impoverished the elderly. On average the elderly fared relatively well by contemporary standards, and their standard of living improved fast during the early twentieth century (Gratton 1996, 57).

between 2,755 in Great Britain to almost 3,500 h in Belgium (Huberman 2004, 982). Around 1913 annual work hours in European countries and the New World were between 2,200 and 2,950 h. Shortly after WW I, around 1919, the 8-h working day or 48-h working week was introduced in many countries. It was the largest reduction ever in industrial working hours in such a short time span. In many countries the reduction in work time was accompanied by holding on to the existing weekly money wages of workers, which implied a rise in time or piece rates. Given the positive complementarities in the enjoyment of leisure, workers faced a social multiplier- the marginal productivity of leisure increasing with the number of people having access to it – and increasing returns to the provision of leisure infrastructure.[24] Without taking into account this social multiplier we probably would underestimate the gains from reductions in market work time.[25] During the twentieth century hours declined further to a range between 1300 and 1900. Workers have used their increasing incomes to buy more and better products, but most was spent on purchasing leisure.

Higher productivity and mechanization potentially reduced the non-market work time within households. Joel Mokyr has tried to answer the puzzle raised by Ruth Cowan, why (female) homemakers worked longer hours in their homes after 1870, while growing mechanization of household activities would suggest otherwise (Cowan 1983). Labor saving technical progress made American housewives in 1950 to produce the same amount of services as three to four servants a century before, a number that could be attained by only few Americans in 1850.[26] Besides the 'normal' explanations for the paradox, such as offsetting labor saving effects or a shift from market purchases toward home-production, Mokyr comes with the alternative explanation that the perceived marginal product of housework increased sharply in the last third of the nineteenth century. The reason is that the economic significance of housework was growing. It was seen as a way of improving living standards. Specialization in the household thus can be seen as a conscious choice, driven by the perceived benefits of clean homes and better nutrition for repressing disease and improving health of the family members. The germ theory, the sanitary movement etc. increased knowledge about cleanliness and propagated good household practices (Mokyr 2000). This answer is also consistent with the decline in infant mortality and with the initial divergence of infant mortality between middle class and working class families at the turn of the twentieth century. Middle classes adopted these new practices first, but gradually these habits worked their way down the social ladder (Leonard and Ljungberg 2010).

Closely connected to increasing non-market time is the diffusion of domestic appliances. Bowden and Offer (1994) have studied time-saving and time-using technology for households. Domestic appliances only take a small fraction of disposable income, increasing from 0.5 % in 1920 to about 2 % in 1980 in the U.S. But it has changed the activities and life styles of families. Significant differences occurred in the diffusion of on the one hand entertainment appliances like radio and television, and household and kitchen machines on the other. Bowden and Offer defined appliances as time-saving when they reduce the time to complete a certain household task (e.g. the

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[24] Scott and Spadavecchia (2011, 1271), Crafts (1997, 315).

[25] Beckerman makes a distinction between time not spent in the market measured as natural hours versus effective hours. Effective hours allows for productivity increases in the enjoyment of leisure or performance of non-market work (Beckerman 1980, 47). This problem was already mentioned by Nordhaus and Tobin (1973, 554): ". . .One conceptual issue is how to count leisure in estimating the absolute increments of total consumption between two dates. The contribution of leisure is obviously greater if technical progress is assumed to have augmented leisure time than if an hour of leisure is assumed always to be the same hour".

[26] Not only new durable products were labor saving, but also better provisions like central water supply. This saved probably more household labor than the washing machine (Leonard and Ljungberg 2010, 123).

washing machine or the vacuum cleaner) and potentially increase the quantity of discretionary time. Time-using goods require the use of discretionary time in conjunction with the product and enhance its perceived quality. Both classes of goods had diffusion patterns that differed. Items like the washing machine, the vacuum cleaner and the refrigerator were introduced around WW I, and it took several decades before they reached a penetration level of 50–75 % in the U.S. Time-using appliances like the radio and television, introduced in respectively 1923 and 1948, took less than 10 years to reach a penetration level of 50 %. Because U.K. incomes lagged about 30 years behind the U.S. the mass diffusion of household appliances occurred circa 30 years later than in the U.S. The authors conclude that "...consumers have apparently given greater priority to enhancing the quality of discretionary time than to increasing its quantity" (Bowden and Offer 1994, 732). Substantial amounts of discretionary time been taken over by entertainment appliances. Household appliances did hardly change the time spent on housework, due to rising standards of house care. Although they may have been substituted for the services by servants or other household members, many tasks devolved back to the housewife; cloths were washed more often, floors were cleaned more frequently. "Technology has not saved women's time because it has not been accompanied by any substantial rearrangement of the gender division of labor at home". A study of time-budget diaries in the U.K. has shown that a decline in housework time only began in the early 1960s (Bowden and Offer 1994, 725–734).

Aguiar and Hurst have documented on the basis of time-use surveys between 1965 and 2003 that leisure for (non-retired) men has increased by between six to nine hours per week within the U.S. For women it amounted to four to eight hours despite growing participation in market working hours. The decline was mainly driven by decreasing home production work hours of more than ten hours per week. The increase in leisure was economically large. The gain between 1965 and 2003 was an increase of between 15 and 27 % of the average core market work week in 1965 depending on the precise measure of leisure. On the basis of a 40–hour work week it would be an equivalent of roughly 6–10 additional weeks of vacation per year. This is probably an underestimation because individuals are living longer and retiring earlier. The increase in lifetime leisure has therefore been much larger (Aguiar and Hurst 2007, 987–988).

Long Term Inequality and Comparative Standards of Living in the Twentieth Century

> Overall, viewing the twentieth century through the lens of the HDI rather than on a national accounts basis gives a distinctly more optimistic picture of the experience of economic development in the third world. Improvements in life expectancy were a major achievement worth a great deal to the average person and should be given much more prominence by economic historians. (Crafts 2002, 404)

In the preceding sections it has become clear that there is not a straightforward relation between rising inequality on the one hand and industrialization and movements in standards of living on the other. Hoffman et al. (2002) have demonstrated that rising inequality has not been a special characteristic only of the nineteenth century with its fast structural changes. There was large inequality within European countries already before the period of industrialization. The concept of real income inequality, e.g. inequality adjusted for movements in relative prices of the consumption basket and different consumption styles across different social groups is important here. Engel's law defines the inverse correlation between level of income and the share of income spent on food products. The poor spend more of their budget on food than the rich.

We have seen that in the very period that Northwest Europe really took the lead over other countries there was a disappointing

performance of the working class. In the period before 1815 inequality within and between European countries was larger than perceived until now. One of the reasons is that between 1500 and 1815 prices of staples rose much more than the prices of luxury goods. In the course of the nineteenth century the opposite happened. Real wages increased and the relative price of grains started to decline, making the lower classes better off, but not everywhere. There were protective grain duties in countries like Italy, France and Germany during the last quarter of the nineteenth century that denied large groups of society the benefits of cheap grain (Hoffman et al. 2002, 348). After 1914 trends in income inequality remained relatively unaltered, because the effect of relative price movements on bundles of goods and services between the rich and the poor were less pronounced.

Nevertheless, Bourguignon and Morrisson have stated that the inequality among world citizens has increased dramatically since 1820 until after WW II. Only after 1950 there seems to be a turning point towards less inequality. An important stylized fact in their quantitative analysis, however, is that the driver of inequality was most of all the increasing divergence in national economic growth rates between "the West and the rest". Within countries there were forces of equalization of income during the first half of the twentieth century (Bourguignon and Morrisson 2002, 737–738, 742). Recent work of Thomas Piketty reveals a long wave of rising income and wealth inequality within countries during the nineteenth century. In the first decades of the twentieth century wealth and income distributions within countries contracted because of war efforts and government policies to redistribute incomes. After 1970 inequality within countries rose again. The author perceives this as an effect of an inbuilt tendency in capitalist systems for income from capital to grow faster than income from labor (Piketty 2014).

Observations made for the pre-WW I period are only partly in line with the Kuznets curve, which presumes increasing inequality during early industrialization and a resurgence of a more equal income distribution in a maturing industrial society.[27] But for this era the open economy forces and globalization and de-globalization tendencies must also be taken into account. E.g. for some countries emigration may have contributed to increasing income equality and may have pushed up wages.[28] The First World War itself seems to stand out as a period with fast leveling in earnings, compressing skill differentials and lowering the skill premium between workers and employees. The combination of union wage-bargaining strategies together with developments in the war-time labor market resulted in a system where increases in pay mainly occurred through the granting of flat-rate bonuses for both skilled and unskilled workers. It was also the period where we find a dramatic increase in the role of social spending, redistributive transfers and public policies towards better insurance and housing (Lindert 1994). Nineteenth century investments in public health and better practices in households began to pay off in the first half of the twentieth century. Ironically, this coincided with a long depression in Europe between 1914 and 1945, with disappointing economic performance.[29] But we can also observe that Europeans became healthier, taller, and older. Historical research into the human condition and level of living has revealed high growth trends in the general biological standard of living of European citizens. For those who survived the atrocities of the World Wars, health status, such as infant mortality and life expectancy, but also literacy- and education levels

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[27] See also Nafziger and Lindert on Russian inequality before the revolution. They show that in the early twentieth century Russia was not exceptionally unequal. Presently Brazil, China, the United States, and Russia itself are more unequal than Tsarist Russia. (2012, 25).

[28] In Italy there is no evidence of an increase in inequality during the first phase of industrialization between 1896 and 1913. An important reason for this is the emigration of laborers from the South to the North and to the Americas (Rossi et al. 2001, 922).

[29] Between 1900 and 1950 growth per capita was about 1.0 %, against a long term rate of 1.7 between 1870 and 2000. See Maddison 2006.

improved rapidly. The rate of improvement during the interwar period was much faster than during the period 1870–1913. Between 1913 and 1945 there was a steep decline in birth- as well as death rates. By the late 1940s many European countries had a rate of 9–14 deaths per 1000 of population, coming down from 16 to 27 in 1900. Infant mortality decreased from 90 per 1,000 births to 25 in 1945. Life expectancy at birth rose from around 50 to 65 in the majority of European regions. In 1950 men were on average 5.8 cm taller than in 1900 (Millward and Baten 2010, 234–242). At the same time, as we have seen, average annual working hours decreased by more than 500 h, expanding leisure time for the majority of European workers significantly.

How do these experiences compare with other regions in the world? Recently new estimates of long term HDI have been published that give new insights in the driving forces of relative standards of living across nations and regions. If one compares HDI levels of the early industrializing nations in the nineteenth century with developing countries now it becomes clear that the latter have higher living standards or human-development levels. Today's values of less-developed countries are higher than the HDI of West Europe in 1870. This is mainly an effect of much higher life expectancy of developing countries now than in the rich countries in the nineteenth century. Furthermore there has been a large convergence of HDI worldwide. Gaps between leading economies and Africa and Asia were reduced between 1913 and 1999. However, the gap in real GDP per capita between the poorest and the richest countries has widened (Crafts 2002, 403).

Concluding Comments: Human Development and Health Care Expenditures

Public policy should not be aimed at suppressing the demand for health care. Expenditures on health care are driven by demand, which is spurred by income and by advances in biotechnology that make health interventions increasingly effective. Just as electricity and manufacturing were the industries that stimulated the growth of the rest of the economy at the beginning of the twentieth century, health care is the growth industry of the twenty-first century. (Fogel 2004, 95)

In a recent study Leandro Prados de la Escosura has presented an adjusted Historical Index of Human Development. This index consists of the familiar components: an income index, a life expectancy index, and an education index based on literacy and enrolment rates. The HIHD has different ingredients based on achievement functions that take away the problems related to the asymptotic limits, and calculate a geometric average of the three components. The most important conclusions are the following: Between 1870 and 2007 levels of HIHD moved from 0.175 to 0.809 in the richest (OECD) area and from 0.027 to 0.220 in the poorest area being sub-Saharan Africa. Figure 3.1 shows that since 1870 (the first year of the index) all areas face major improvements in human development. In the early phase of nineteenth-century development there has been a discrepancy between income (which was increasing) and schooling and longevity rates, which remained underdeveloped because of the impact of urbanization and lack of public policies on education and health. This pattern has turned around in the period 1920–1950; during the globalization backlash the underlying indexes (not shown here) reveal low growth of GDP per capita, but at the same time substantial gains in longevity and education.

In contrast to the traditional HDI, however, the gap between OECD countries and the rest became wider in absolute terms. First, there was an incomplete catching up of non-OECD countries between 1913 and 1970. Second, during the last four decades there has been a deceleration in human development in non-OECD countries, resulting in a widening gap between the OECD and the rest. This can be illustrated by the experiences of Latin America in the twentieth century. Social indicators like literacy and life expectancy improved at high rates during the middle decades of the century. Two major transitions of increasing expenditures in health
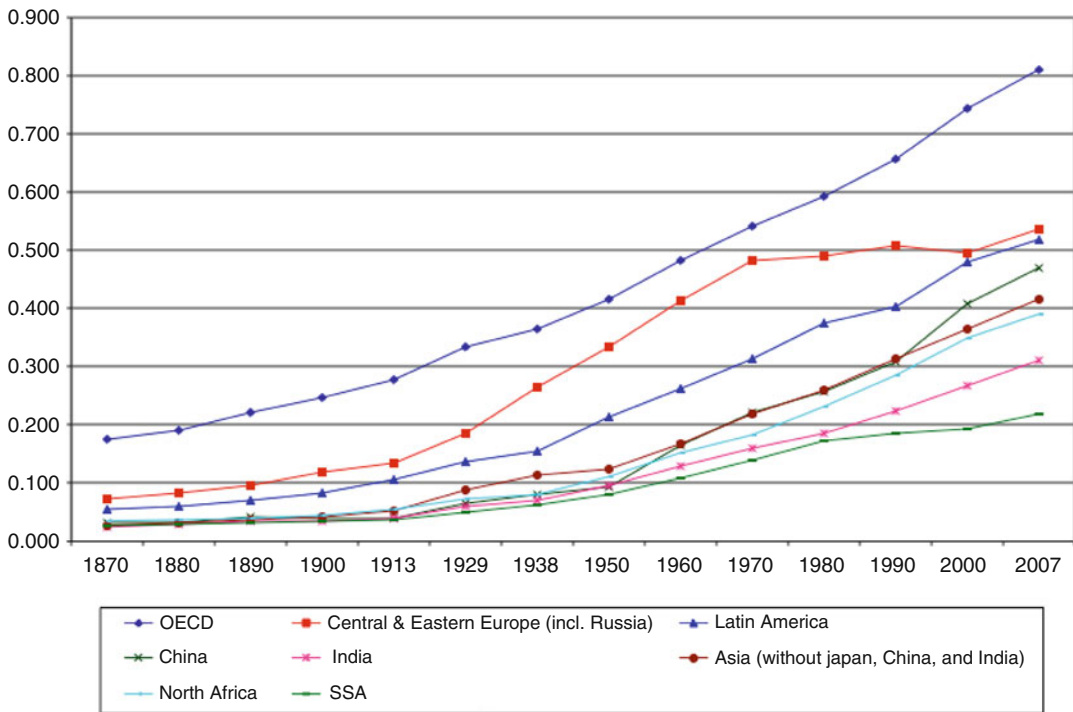
Fig. 3.1 HIHD across world regions, 1870–2007 (*Source*: Prados de la Escosura 2013, 51)

and the process of rapid urbanization (which offered a better social infrastructure for the population) explain this catching up. Note the difference with the nineteenth-century urbanization experience of the European countries. It also shows that progress in health and education has been largely independent of economic growth, which in fact was disappointing, in particular after 1970 (Astorga et al. 2005, 772, 784).

Around 2007 human development levels in Central and Eastern Europe and Latin America matched those of the OECD in the late 1960s; in 2007 China and India had achieved levels of OECD in respectively 1960 and 1929. Some regions fell behind after 1970, like Central and Eastern Europe and Sub-Saharan Africa. The main reason for this is that life expectancy at birth in the OECD area increased faster than in other areas. OECD countries experienced the so-called second health transition, characterized by a falling rate of mortality among the elderly as a result of better treatment and better general health and nutrition circumstances, and gains in

healthy life years. Although there was educational expansion and recovery of income growth at the end of the twentieth century in many areas in the world, the non-OECD areas failed to catch up because of lagging life expectancy. Many non-OECD areas are either still in the first epidemiological transition or waiting for the second health transition which probably is more dependent on higher income levels. The new health technology and knowledge was introduced in the rich part of the world (Prados de la Escosura 2013, 23). It may be the case that improved health of the elderly in society has become an income-elastic good. The same is happening to higher education. If these social indicators are becoming more dependent on income growth and less on public policies, like it was in the early twentieth century, this may lead to higher inequality of welfare levels across nations in the future.

But this is not the whole story, because it will depend on the nature of the lag. Indeed, annual per capita expenditures on health vary

enormously across countries, from around 40 dollar per capita (in Ethiopia, Nepal, and Haiti) to more than 3,700 dollar (in the U.S.) in the beginning of the twenty-first century (Fogel 2004, 98). Health care per capita spending in the U.S. is about three times higher than in the U.K., which is not reflected in differences in life expectancy. Probably the saving of lives is still mainly an effect of (past) public health measures, better nutrition, access to education and less the result of clinical medicine and interventions. Distribution of drugs and vaccines in the developing world and impoverished nations to combat tuberculosis, malaria, measles, and all kinds of infections will have positive effects on life expectancy at modest costs. Minimizing the exposure to environmental insults during infancy will increase longevity. This is a historical process; it takes time, but it will finally show up in the health statistics. At the same time we find that the increasing demand for more health care to make our longer life more bearable ('healthy ageing') reflects higher real incomes. Like in the past it faces societies with the question how these services need to be distributed, resulting in many national variations in the mix of private and public components of health care. But it reveals most of all the unprecedented economic and social progress enjoyed by the majority of world population.

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