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Human Development in the Age of Globalisation[1]

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Abstract

This paper provides a long run view of human development as a capabilities measure of well-being for the last one-and-a-half centuries on the basis of an augmented historical human development index [AHHDI] that combines achievements in health, education, living standard, plus liberal democracy, and provides an alternative to the UN Human Development Index, HDI. The AHHDI shows substantial gains in world human development since 1870, especially during 1913-1970, but much room for improvement exists. Life expectancy has been the leading force behind its progress, especially until 1970. Human development spread unevenly. The absolute gap between western Europe and its offshoots plus Japan -the OECD- and the Rest of the world deepened over time, though fell in relative terms, with catching-up driven by longevity during the epidemiological transition and by democratization thereafter. This result compares favourably with the growing income gap. Economic growth and human development do not always go hand-in-hand.

JEL Codes: I00, N30, O15

Keywords: Human Development, Well-being, Capabilities, Life Expectancy, Health Transition, Schooling, Income, Liberal Democracy

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"In the present epoch, the domination of material relations over individuals, and the suppression of individuality by fortuitous circumstances, has assumed its sharpest and most universal form, thereby setting existing individuals a very definite task (…) replacing the domination of circumstances and of chance over individuals by the domination of individuals over chance and circumstances" (K. Marx and F. Engels, *The German ideology*)

I. Introduction

Wellbeing is widely seen as a multi-dimensional phenomenon affected not only by material goods, but also health, education, agency and freedom, environment, and security (Fleurbaey, 2009; Stiglitz et al., 2009). Sen (1984) has distinguished three approaches to well-being: utility, opulence, and freedom. The utility approach uses satisfaction and intensity of desire as its criteria. Studies that weight the various non-monetary dimensions of quality of life and focus on life satisfaction exemplify it (i.e., Jones and Klenow, 2016; Clark, 2018). The opulence approach centres on command over commodities as it is the case of real income and wealth studies. The freedom approach stresses capabilities, namely, individuals' ability to choose between various combinations of functionings or achievements (i.e., a consumption bundle, a health condition, a level of education) (Alkire, 2002; Fleurbaey, 2015).[2] Hence, this approach goes beyond market transactions and considers the ranges of opportunities an individual has "to choose a life one has reason to value" (Sen, 1999: 74).

The human development paradigm was inspired in the concept of capabilities. Specifically, human development was defined as "a process of enlarging people's choices", which includes enjoying a healthy life, acquiring knowledge, and achieving a decent standard of living (UNDP, 1990; 10; 1993:105).

In 1990 the United Nations Development Programme [UNDP] introduced the Human Development Index in an attempt to track the evolution of a set of capabilities across countries and over time and to provide, thus, an "inclusive approach to the measurement of human flourishing" (Heckman and Corbin, 2016).

In this paper, long-term well-being is approached with a new augmented historical human development index that combines measures of achievements in

[2] Freedom understood in a positive sense, 'freedom to', not in a negative one, 'freedom from'. Cf. Berlin (1958) and Sen (1987).

health, education, material living standards, and political freedom. The new index provides an alternative to the United Nations Development Programme's HDI.[3]

The time span covered runs from the beginnings of global improvements in health (Riley, 2001) and in mass education (Benavot and Riddle, 1988) in the late nineteenth century to the aftermath of the 2008 Great Recession. The geographical coverage ranges between 115 and 162 countries representing most of the world population.

The rest of the paper is organized as follows. Section II discusses the measurement of human development. Section III proposes an augmented historical human development index [*AHHDI*] that introduces a non-linear transformation of its health and education variables and attempts to incorporate freedom to choose by adding a new dimension, liberal democracy, presents its trends and compare them to those resulting from alternative augmented human development specifications. Section IV examines how has human development spread in the world focusing on the human development gap between western Europe and its offshoots plus Japan -the *OECD*, as it includes most pre-1995 OECD countries- and the *Rest* of the world and looking at its drivers. The closing section recapitulates.

The paper shows that human development achieved substantial gains in the world since 1870, in particular, during 1913-1970, but substantial room for improvement still exists. Longevity has been the leading force behind human development progress, especially until 1970, when the epidemiological transition was largely exhausted. Human development unevenly spread. The absolute gap between the *OECD* and the *Rest* deepened over time, though it fell in relative terms, driven by longevity during the epidemiological transition, and, then, by political freedom. This result compares favourably with the growing income gap. The research findings highlight a development puzzle: economic growth and human development do not always go hand-in-hand. More specifically, human development experienced major gains across the board during the early twentieth century economic globalization backlash, resulting from the advance in longevity and education.

[3] It improves on the 'hybrid' historical index of human development (Prados de la Escosura, 2015)

II. Human Development: from concept to measure.

Since 1990, the United Nations Development Programme (UNDP, hereafter) releases annually the *Human Development Report* with an index of human development (HDI) for world countries (UNDP, 1990-2016, 2018).

In order to provide a synthetic measure of human development proxies for its different dimensions are chosen using objective measures. Thus, a healthy and long life is proxied by longevity, access to knowledge by education, and command over resources needed for a decent living by the logarithmic transformation of per capita income.

An important distinction is to be made between longevity and education, on the one hand, that are measures of achievement but also of capability, namely, avoiding premature death or ignorance, and per capita income, on the other. As income itself is not the ultimate object, it represents an input that turns into a capability, namely, individuals being able to live a full, meaningful life. That is why per capita income enters the index at declining rate, since in terms of capabilities its return diminishes as its level raises (Anand and Sen, 2000: 100).

Although conceptually unaltered, the HDI composition has varied over time. In the early 2010 the *Human Development Report* (UNDP, 2010, 2014) introduced major changes in the indicators used to represent human development dimensions. Thus, for education, the expected years of schooling for a school-age child and the mean years of schooling for population aged 25 and older were combined using an unweighted arithmetic average (UNDP, 2014).[4] In the case of income, purchasing-power-parity [PPP] adjusted per capita Gross National Income (GNI) replaced PPP-adjusted GDP per head. This represented an improvement as GNI captures the income accrued to residents of a country, not just the income produced in the country regardless the

[4] In the 2010 version, the unweighted average was geometric (UNDP, 2010). Previously, mean years of schooling had been used in the Human Development Report (UNDP 1994), with the education attainment index obtained as the result of weighting the mean years of schooling index by one-third and the adult literacy rate index by two-thirds. However, until 2010, education attainment was usually proxied by rates of total (primary, secondary, and tertiary) enrolment and adult literacy combined in index form as a weighted arithmetic average (two-thirds, literacy and one-third, enrolment).

share retained at home.[5] In the case of life expectancy at birth, no changes were introduced.[6]

In order to homogenize the indicators for the different dimensions, its original values (*I*) are transformed into index form,

$$I = (x - M_o) / (M - M_o), \qquad [1]$$

where *x* is the observed value of a given dimension of welfare, and M_o and *M* are the maximum and minimum values, or goalposts, that facilitate comparisons over time. Each dimension ranges, thus, between 0 and 1.

New goalposts were introduced by the UNDP (2014), that substituted for those in place since 2010.[7] For life expectancy at birth, the maximum and the minimum values were established at 85 and 20 years, respectively. For education, maximum values were set at 15 mean years of schooling and 18 expected years of schooling for a school-age child, with the minimum set at 0 for both indicators. In the case of GNI per capita, the maximum and minimum were established in 75,000 and 100 purchasing power parity adjusted [PPP] 2011 dollars.[8]

An unweighted geometric average of all dimensions (longevity, education and income) was used to derive a synthetic human development index, replacing the arithmetic mean used until 2010, in an attempt to reduce the substitutability between its different dimensions, to penalise low and uneven achievements, and to portray each of them as equally indispensable. Thus,

$$HDI = (I_{Health} \cdot I_{Education} \cdot I_{Income})^{1/3} \qquad [2]$$

[5] Thus, GNI (or GNP in the old terminology) represents GDP plus net receipts of primary income from abroad and, thus, includes international flows such as remittances and aid, and excludes income generated in the country but repatriated abroad.

[6] Life expectancy at birth is defined as the average number of years of life that males and females would live if they continued to be subjected to the same mortality experienced in the year to which these life expectancies refer.

[7] The 2010 goalposts were 83.2 and 20 years for life expectancy, 13.2 and 20.6 years as maxima for mean years of schooling and expected years of schooling, respectively, with 0 as the minima. In the case of GNI per capita, 108,211 and 163 PPP dollars were the maximum and minimum goalposts. (UNDP, 2010: 216).

[8] The upper limit was set on the basis of Kahneman and Deaton (2010: 16491) finding that "there is no improvement ... in .. emotional well-being" as per capita income goes beyond 75,000$. The lower limit was supposed to represent a subsistence minimum (UNDP, 2014, Technical Notes: 2).

The human development index aroused criticism since its inception (Srinivasan, 1994). The lack of welfare economics foundations has been highlighted as its main shortcoming (Dowrick et al., 2003), even though the HDI was explicitly defined as a measure of well-being in terms of capabilities, not of utility. Some of the main critiques are addressed here.[9]

The transformation of the original values of the social dimensions (life expectancy, height, literacy, schooling years) into index form provides a challenge. Social variables are often used raw (Acemoglu and Johnson, 2007; Hatton and Bray, 2010; Lindert, 2004; Morrisson and Murtin, 2009). Yet, the fact that these non-income variables are bounded raises concern about the use of their original values to make comparisons over space and time.

In the HDI, the linear transformation of social dimensions' indicators reduces the size of the denominator by introducing maximum and minimum values (goalposts) and, thus, widens the index's range (see equation [1]). Nonetheless, the values assigned to the goalposts have been challenged as discretional. For example, Herrero *et al.* (2012) reject the use of arbitrarily fixed minimum values that penalise poorer performers and may determine countries' ranking and propose, instead, expressing each dimension *x* as a share of some maximum set value, *M*.

$$I = x / M \qquad [3]$$

It can be argued, nonetheless, that as a natural floor often exists lower goalposts simply aim at capturing subsistence levels. For example, historical evidence on life expectancy at birth indicates that 20 years is a most probable floor going back to Neolithic times (Steckel, 2009; Fogel, 2009). This is also so the case of per capita income as human life cannot survive below a basic level of physiological subsistence (Sagar and Najam, 1998).

However, when linearly transformed social variables (as in both the UNDP's HDI and Herrero *et al*., 2012 proposal), are compared, identical absolute change results in a smaller measured improvement for the country (time period) with a higher starting level (as would also be the case when using original values). Consider, for example, a

[9] I will not consider, however, the concern about combining stocks (life expectancy and schooling years) and flows (per capita income) in the HDI, as has already been discussed extensively by Aturupane *et al*. (1994), Sagar and Najam (1998), and Klugman *et al*., (2011).

10-year improvement in life expectancy at birth, in one case, from 30 to 40 years, and in another, from 70 to 80 years. Although these changes are identical in absolute terms, the second is smaller relative to the initial level. Therefore, a linear transformation does not solve the problem of comparability of bounded social dimensions across countries and over time.

Furthermore, in poor countries, the main reduction of mortality takes place among children, as infectious disease declines, whereas, in rich countries, it is among the elderly where mortality falls as a result of a better treatment of cardiovascular and respiratory diseases. Thus, if original values of life expectancy at birth are employed, absolute changes of the same magnitude receive larger weight when the starting level is lower, and, hence, give arbitrarily more weight to saving the life of younger over older people (Deaton, 2006).

A conflict between ethical and measurement aspects seems to emerge here. However, Dasgupta (1990: 23) asserted,

"Equal increments are possibly of less and less ethical worth as life expectancy rises to 65 or 70 years and more. But we are meaning performance here. So it would seem that it becomes more and more commendable if, with increasing life expectancy, the index were to rise at the margin."[10]

The limitations of linearly transformed measures become more evident when quality is taken into account. Life expectancy at birth and years of schooling are just crude proxies for the actual goals of human development: a long and healthy life and access to knowledge. Alas, data on health-adjusted longevity, namely, healthy life expectancy, only exist since 1990. On the basis of the Global Burden of Disease Study 2016 (Hay *et al*., 2017) it is possible to compare healthy life expectancy at birth (HALE) with conventional life expectancy at birth (LEB).[11] Figure 1 shows that healthy life expectancy at birth rises with raw life expectancy at birth between 1990 and 2016.[12] Although morbidity increased in absolute terms, it experienced a relative compression,

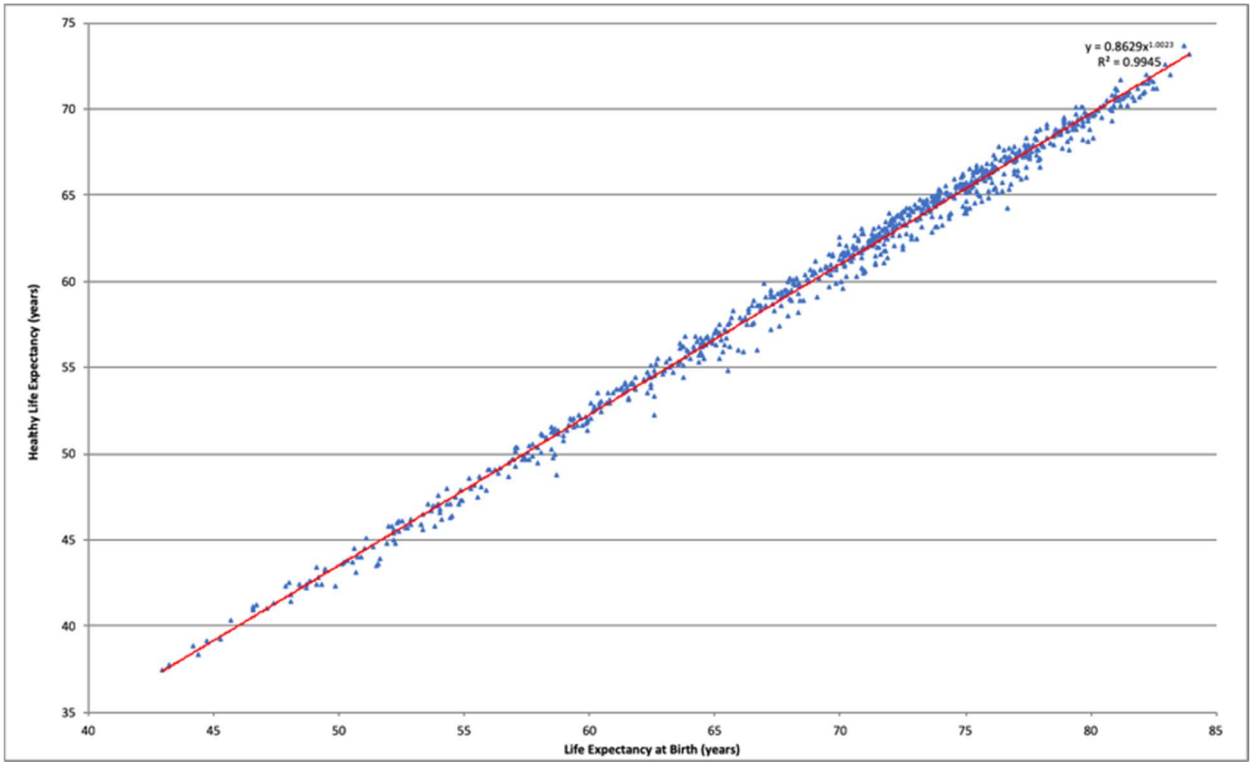
[10] This view concurs with Sen's (1981: 292), "as…longevity becomes high, it becomes more of an achievement to raise it further" and Kakwani's (1993: 312), "as the standard of living reaches progressively higher limits, incremental improvement should require much greater resources than similar incremental improvements from a lower base".

[11] Healthy life expectancy at birth (HALE) is a summary measure of health computed using age-specific death rates and years of life lived with disability per capita (Hay *et al*., 2017).

[12] Canning (2012) reports a similar finding.

that is, the proportion of years lived in disability fell (Hay *et al*., 2017). Thus, as life expectancy raised, disability for each age-cohort declined (Mathers *et al.*, 2001; Salomon *et al.*, 2012; Hay *et al*., 2017).[13] In other words, the quality of life improves for each age cohort as life expectancy at birth increases.[14] Thus, the apparent ethical-measurement conflict fades away.[15]

Figure 1 Healthy Life Expectancy (HALE) and Life Expectancy at Birth (LEB), 1990-2016



Sources: *Global Burden of Disease Study* (2016).

Similarly, the quality of education grows as the quantity of education increases. A measure of quality-adjusted years of education can be derived as the product of

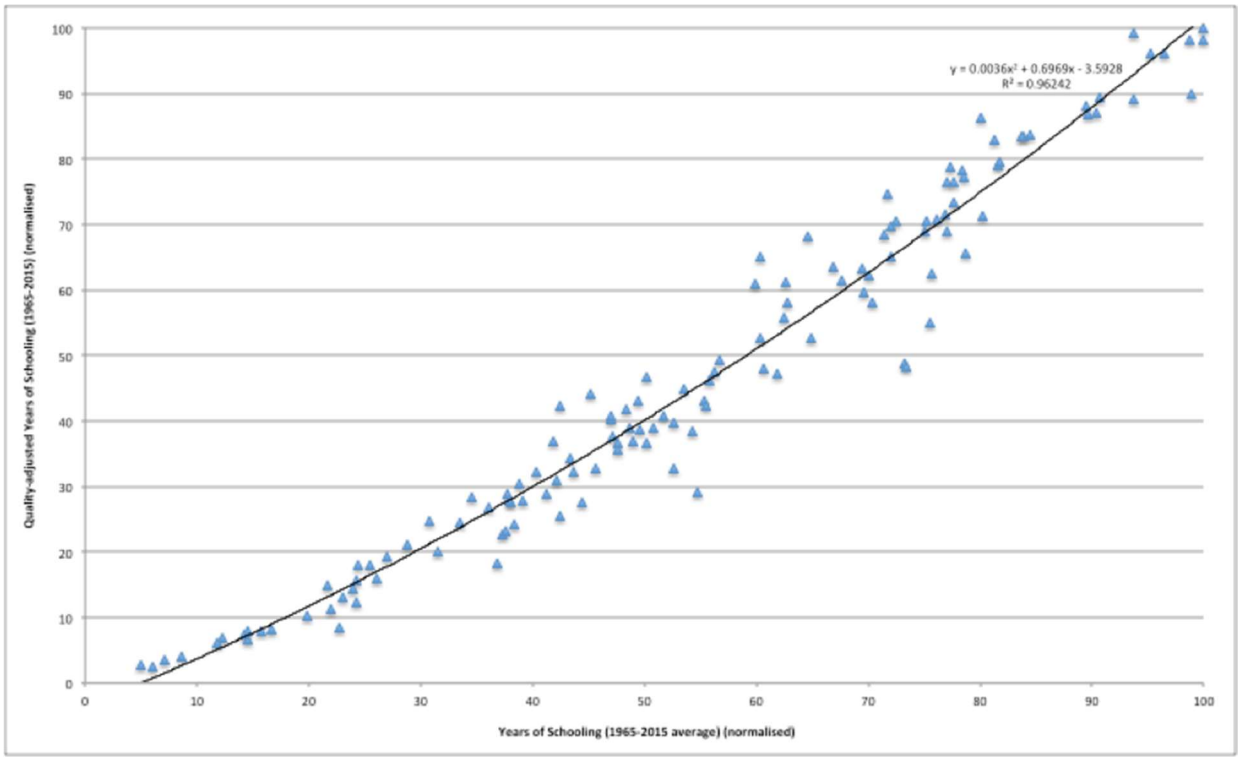
[13] More specifically, longer lives due to a rapid decline in years of life lost (YLL) together with a more modest age-adjusted decline in years lived with disability (YLD) lead to lower age-standardised disability-adjusted life years (DALY) rates across the board (Hay *et al*., 2017: 1331)

[14] The decline in age-specific disability as life expectancy at birth increases is compatible, however, with years lost to disability (YLD) rising with life expectancy because YLD tend to concentrate at the end of life (Salomon *et al*., 2012). So, perhaps, the view that while longevity increases, periods of ill-health can be longer, but are lived in better health and less disability, due to medical technologic advance (Manton, 1982), qualifies Fries (1980) morbidity compression hypothesis (Fries *et al*., 2011; Lindgren, 2016). Nonetheless, Cutler *et al*. (2014) and Chernew et al. (2016) find that the reduction in disabled life expectancy runs parallel to the increase in healthy life expectancy, suggesting a compression of morbidity for the U.S. between 1990 and 2010.

[15] Nonetheless, a note of caution is warranted as evidence on a stable association between death and ill health prior to 1990 is scant and inconclusive (Riley, 1990; Howse, 2006; Bleakley, 2007, 2010; Cutler *et al*., 2010).

normalised indices (namely, expressed relative to its maximum value) of cognitive skills (as a measure of quality), provided by Altinok *et al*. (2018), and years of schooling (as a measure of quantity) for each country's average over 1965-2015 (Appendix B). The comparison between the quality-adjusted and the quantity indices of education suggests a convex association between them, with quality-adjusted education increasing more than proportionally at higher levels (Figure 2).[16]

Figure 2 Quality-adjusted and Raw Years of Schooling (1965-2015) (normalised)



Sources: Cognitive Skills, Altinok et al. (2018); Years of Schooling, see the text

To sum up, on the basis of the available evidence, it can be claimed that more years of life and schooling imply higher quality of health and education during childhood and adolescence. Hence, in the transformation of the original values of health and education variables one needs to allow for the fact that they are bounded and their quality improves along their quantity. The non-linear transformation proposed by Kakwani (1993) provides an option to do it.

Using an axiomatic approach, Kakwani constructed a normalised index from an achievement function in which an increase in the standard of living of a country at a

[16] Again, as in the case of longevity, a word of caution is needed as no evidence about the relationship between quality-adjusted years of education and quantity of education exists prior to 1965.

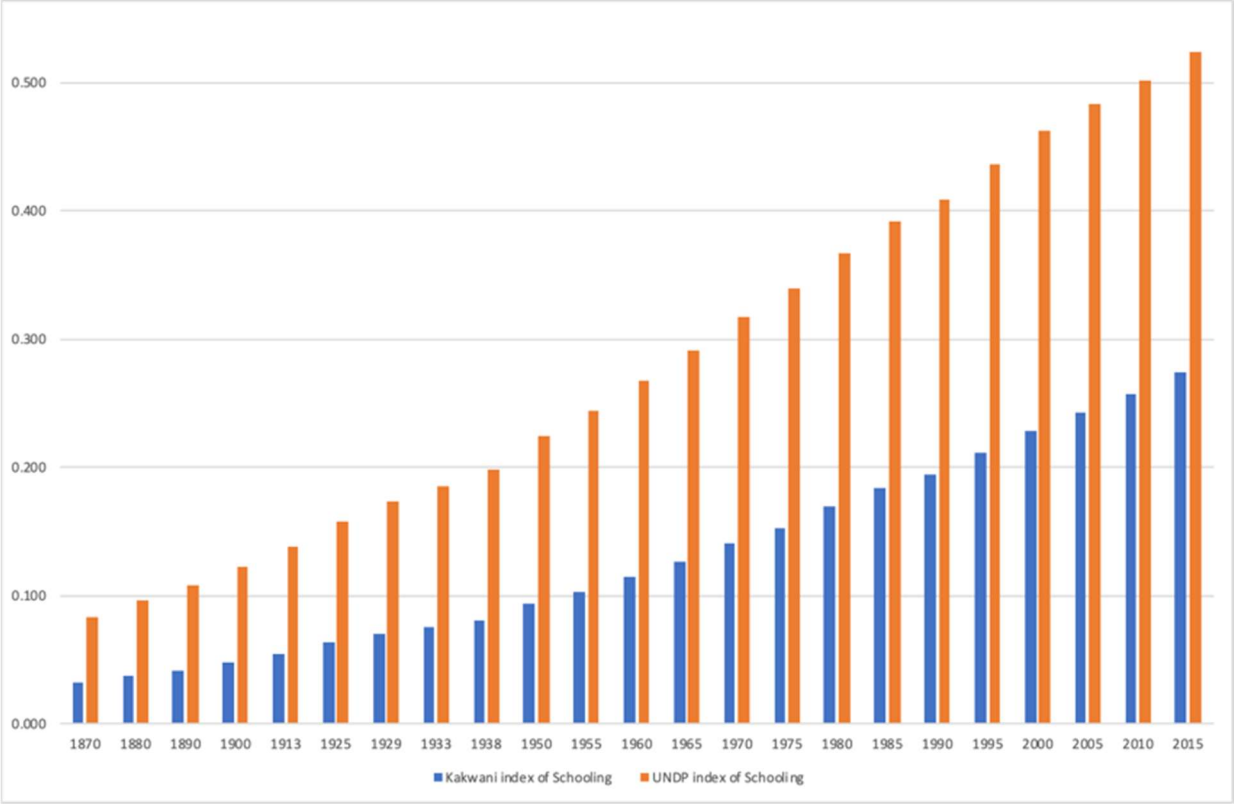
higher level implies a greater achievement than would have been the case had it occurred at a lower level,

$$f(x, Mo, M) = ((M - Mo)^{1-\varepsilon} - (M - x)^{1-\varepsilon}) / ((M - Mo)^{1-\varepsilon}), \quad \text{for } 0 < \varepsilon < 1 \quad [4]$$

$$= f(x, Mo, M) = (\log(M - Mo) - \log(M - x)) / \log(M - Mo), \quad \text{for } \varepsilon = 1 \quad [5]$$

Where the same notation as in equation [1] applies, namely, *x* is an indicator of a country's standard of living, *M* and *Mo* are the maximum and minimum values, respectively, and *log* stands for the natural logarithm. The achievement function proposed by Kakwani is a convex function of *x*, and it is equal to 0, if *x* = *Mo*, and equal to 1, if *x* = *M*, ranging, thus, between 0 and 1. Hence, the UNDP HDI transformation of social dimensions represents a particular case, for $\varepsilon = 0$, which yields equation [1].

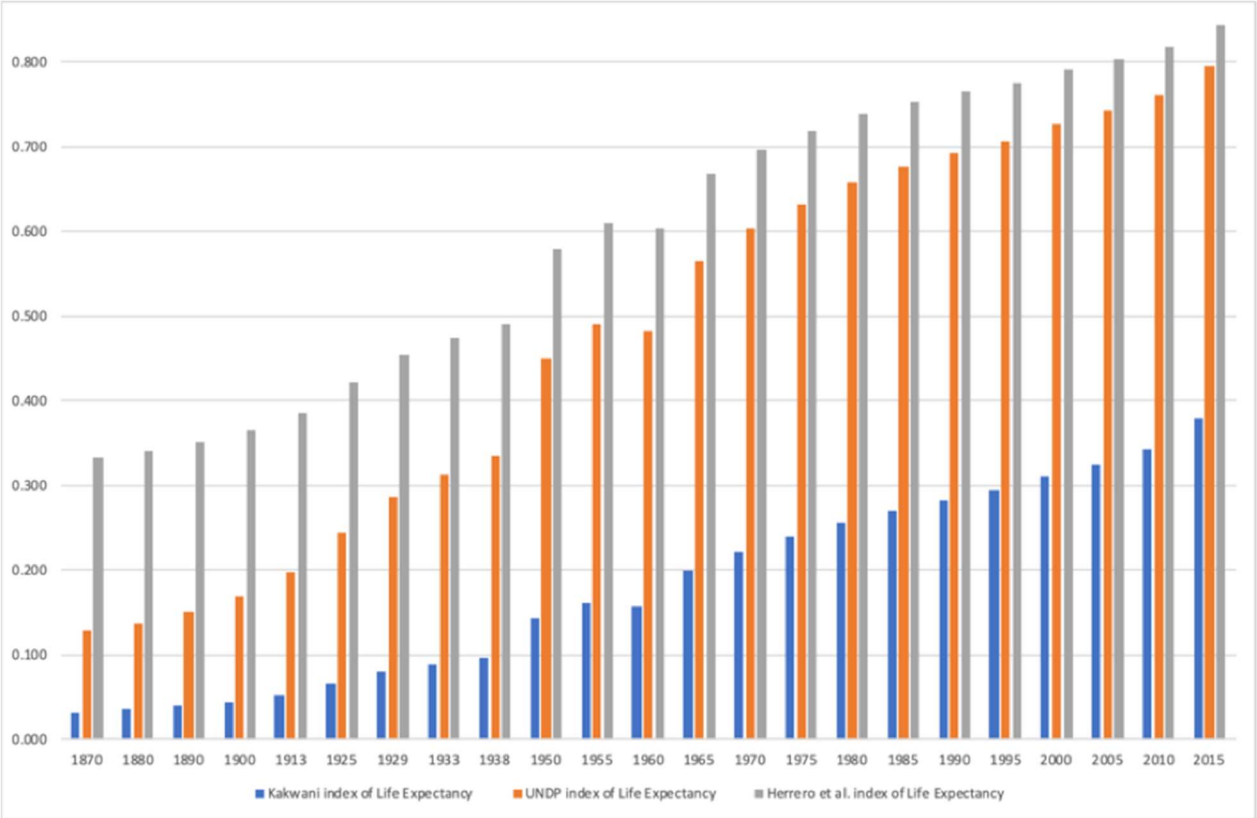
Figure 3 Kakwani and UNDP Indices of Years of Schooling in the World, 1870-2015



How do the non-linearly transformed variables compare to their original, or linearly transformed, values? For world average years of schooling and life expectancy at birth during 1870-2015, respectively, Figures 3 and 4 present the Kakwani indices alongside their conventional UNDP linearly transformed indices and, as suggested by

Herrero *et al*. (2012), linear indices that present their shares of maximum values (computed here using the UNDP 2014 maximum goalposts) that, in the case of schooling is, by construction, identical to the UNDP transformation. It can be observed that the Kakwani indices show systematically lower values but also faster growth (Tables 1 and 2). Interestingly, as original values get higher the difference between the Kakwani and the UNDP and Herrero *et al*. indices declines, implying that the conventional linear transformation favours low levels.

Figure 4 Kakwani and UNDP Indices of Life Expectancy at Birth in the World, 1870-2015



The use of the log of per capita income to proxy a decent standard of living has been challenged since the early stages of the HDI. An alternative proposal has been to use a simple linear transformation without logarithms (equation [1]), which would arguably add another equally valuable dimension of human development and avoid underestimating per capita differences across countries as their levels increase (Sagar and Najam, 1998; Bértola *et al*., 2011). Also, it has been suggested expressing countries' real per capita income as a percentage of an established maximum level (Gormely, 1995; Crafts, 1997b; Herrero *et al*., 2012). Recently, Zambrano (2017: 535)

has proposed a way to normalise per capita without recurring to the logarithmic transformation. Unlike social dimensions (health or education), whose achievements' growth causes a proportional increase in terms of capabilities, Zambrano claims that per capita income growth translates less than proportionally in terms of capabilities, namely, in a fraction of it (r), with r varying within 0 and 1 and being the same for all income levels.

$$I = (x^r - M_o^r) / (M^r - M_o^r), \qquad [6]$$

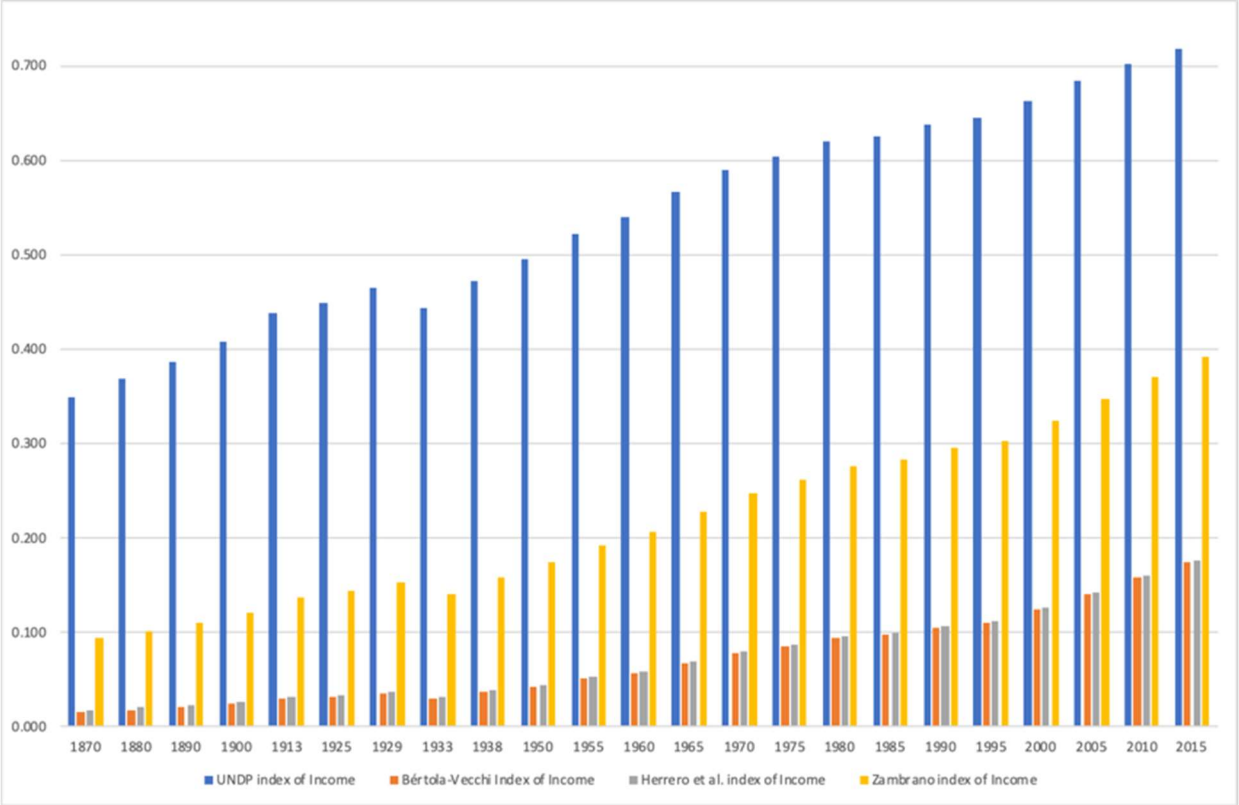
With the particular case that when $r = 0$, the UNDP log transformation of income results. The value assigned to r is largely discretional, though, introducing an element of arbitrariness in the estimates.

The alternatives to the logarithmic transformation of per capita income (with Zambrano's exception) do not address, however, the very different nature of the HDI dimensions: bounded in the cases of longevity and education, and without known upper limit in the case of real per capita income. Thus, some form of compression of the income dimension of human development is required to make it comparable to its social dimensions (Sagar and Najam, 1998).[17] Furthermore, the logarithmic transformation of average income may be interpreted as a multiple of the subsistence level, M_o, that is, in terms of the size of the income gap, M/M_o, to be bridged by a country whose average income is at subsistence level (Zambrano, 2014: 863-864).[18]

Figure 5 presents for the world average over 1870-2015 the conventional UNDP log-linear transformed index of real per capita income along the different alternatives suggested, namely, a linear transformation but without logs (Bértola et al., 2011; Vecchi *et al*., 2017), expressing each country's average incomes as a share of an upper bound (Gormely, 1995; Herrero *et al*., 2012) - that here is UNDP's (2014) maximum goalpost, 75,000 dollars-, and the non-logarithmic transformation proposed by Zambrano (2017) with an r value of 0.5.[19] It can be observed that compared to the UNDP logarithmic transformation, these indices exhibit much lower levels and higher growth rates which imply larger differences across countries and over time (Table 3).

[17] This reasoning leaves aside the interpretation of per capita income in terms of capabilities discussed above.
[18] The original notation has been changed to match that of equation [1].
[19] Zambrano (2017) uses a value of 0.5 as an example and I have accepted it here.

Figure 5. Alternative Indices of Per Capita Income in the World, 1870-2015



An objection to the choice of HDI components has been the absence of the equity dimension.[20] Since 2010, however, the Human Development Report has included an inequality adjusted index, but dearth of reliable historical data on inequality across world countries precludes its consideration here.[21]

A more relevant issue is that, so far, attempts to portray human development in index form have only been made in terms of achievements or functionings.[22] However, the ability to choose between alternative bundles of functionings, a defining feature of human development as a measure of capabilities, is not considered in the HDI. But without agency – that is, the ability to pursue and realize goals a person has

[20] The income dimension was, however, adjusted for inequality in early stages of the HDI but then abandoned for lack of reliable data across countries while no attempt was made to compute inequality for social dimensions (UNDP, 1993). Cf. Hicks (1997).

[21] Cf. Klugman *et al*. (2011) and Herrero *et al*., (2012) for critical assessments. Herrero *et al*. (2012: 257) note that since the available data on longevity and education are unrelated to the social and economic stratification behind income inequality, the inequality-adjusted HDI is difficult to interpret. They introduced, nonetheless, an inequality adjustment to income (an egalitarian equivalent income) that can be interpreted as a "capability measure that transforms income into material wellbeing". See Bértola *et al*. (2011) attempt to include inequality in the three dimensions of human development for a group of Latin American and Western European countries over the long run.

[22] At least, directly, since it could be argued that functionings in health and education imply also capabilities.

reasons to value – and freedom, any index falls short of even a reduced form of human development to simply becoming another 'basic needs' metric (Ivanov and Peleah, 2010). However, attempts to incorporate agency and liberties have been discouraged by threats to the HDI from totalitarian countries (Klugman *et al*., 2011: 265).

Unlike inequality, for which no comprehensive and reliable historical data are available, the inclusion of freedom into a historical human development index is feasible (Desai, 1991). Dasgupta and Weale (1992) added civil and political liberties to a set of demographic and educational indicators in order to provide a comprehensive view of well-being and Crafts (1997a) expanded the exercise to Britain and other western European countries during the industrial Revolution. More recently, Bértola *et al*. (2011) and Vecchi *et al*. (2017) have added a fourth dimension of democratization and political and civil rights, respectively, to their HDI historical estimates.

Agency and freedom cover a wide range, from civil to economic and political liberties, for which unfortunately there is no enough comprehensive data at world level over the last 150 years. A partial solution can be to consider a variable representing political freedom or democracy, which implies that "rulers are held accountable for their actions in the public realm by citizens, acting indirectly through the competition and cooperation of their elected representatives" (Schmitter and Karl, 1991: 76).

A practical issue is the choice of the variables that may proxy democracy. *Varieties of Democracy* [*V-Dem*] (Coppedge *et al*., 2018), the latest and most complete database encompassing 201 countries over 1789-2018, provides an *Liberal Democracy Index*, which follows a 'negative' definition of political freedom, stressing the protection of civil liberties, the rule of law, an independent judiciary, and effective checks and balances, and combines these negative liberties with electoral democracy, a collective and positive freedom. The *Liberal Democracy Index* is more comprehensive than historical indices such as Polity IV Project's *Polity2* index (Marshall *et al*., 2018) and Vanhanen's (2016) *Index of Democratization* (Knutsen *et. al*, 2019).[23]

[23] Polity2 and Vanhanen's Index of Democratization can be depicted as de jure and de facto measures of political institutions, that is, formal rules and outcomes, respectively (Fólvari, 2017: 760).

Figure 6. Liberal Democracy Index in the World, 1870-2015

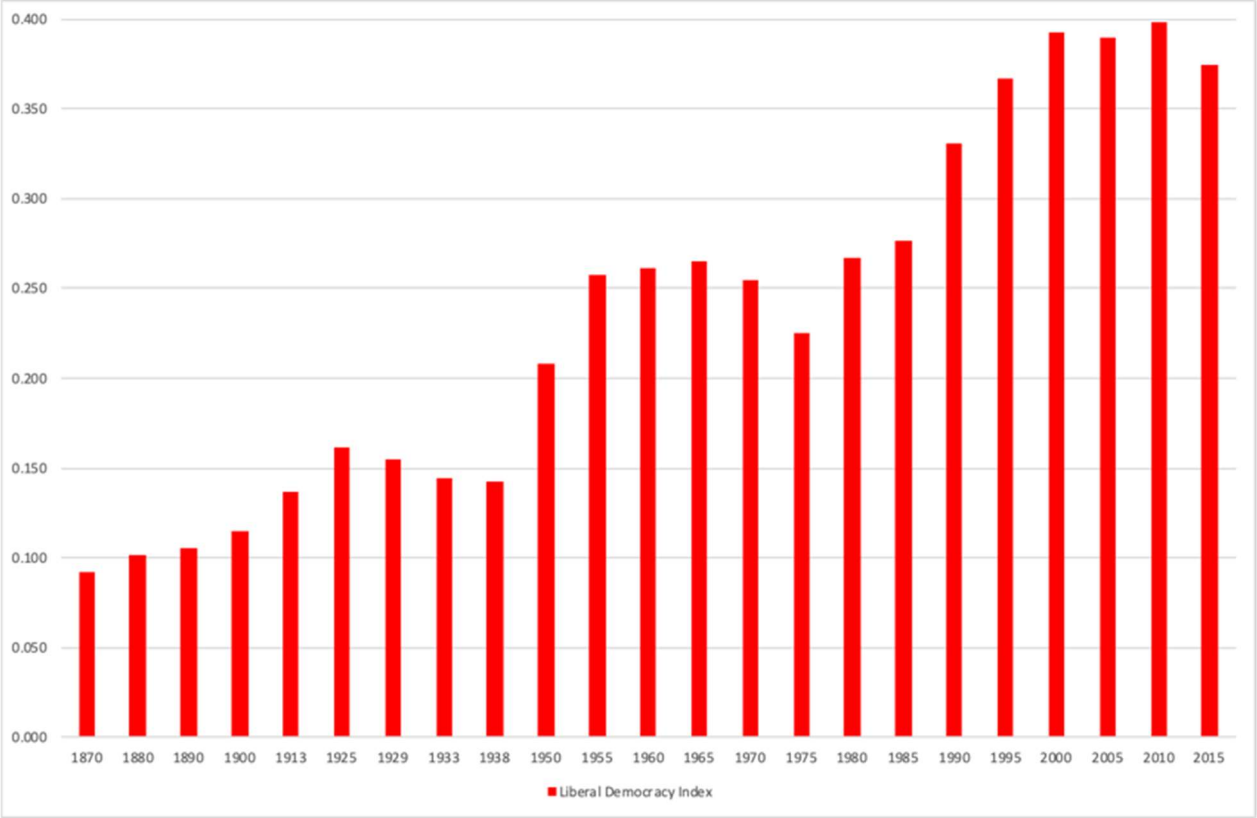


Figure 6 shows the evolution of population-weighted political freedom in the world since 1870 in which main spurts are noticeable in the early twentieth century, in the 1950s, and since 1990 (Table 4).

Aggregating each dimension of human development into a synthetic index has provoked adverse reactions. Ravallion (2012a, 2012b) argued against the use of composite indices due to its low theoretical underpinning and implicit trade-offs. Addressing each dimension's indicator separately (Aturupane *et al*., 1994), resorting to a 'dashboard' of indicators (Ravallion, 2012a), and producing an ordinal, rather than a cardinal measure (Dasgupta and Weale, 1992) have been the proposed alternatives. In defence of an aggregate index of wellbeing it has been argued that it summarises some set of indicators into a single number avoiding the risk of divergence between different well-being dimensions and offers an alternative to per capita income (Barrington-Leigh and Escande, 2018; Krishnakumar, 2017).

The equal weighting of the human development dimensions has been questioned. Why should each dimension (longevity, education, and income) receive

the same weights in the index over space and time? (Hopkins 1991: 1471).[24] A substantive objection to the use of fixed weights is that the relative values of the index components are not necessarily the same across countries (or individuals) and over time (Srinivasan, 1994: 240). Moreover, it has been argued that the HDI weights are based on judgment rather than on welfare theory (Dowrick *et al*., 2003: 504). However, the notion that each of them is equally essential in determining its level is the main attribute of the concept of human development (Sagar and Najam 1998: 251).[25] A technical test is offered by Principal Components Analysis (PCA), as it provides optimal weights for each HDI component over time by weighting attributes by their variance. The results derived from using PCA counterintuitively suggest stable one-third weights for each dimension of the index.[26]

A more substantive debate in the aggregation of the HDI dimensions derives from shift from additivity to multiplicativity of the index's components introduced in 2010 (UNDP, 2010). The reason for the change was that the perfect substitution assumption implicit in the arithmetic average was deemed in flagrant contradiction with the notion of each dimension being equally crucial in determining the human development index. Substitutability among the index components could be restricted by using their geometric average (Desai, 1991; Sagar and Najam, 1998). Moreover, the combination of the logarithmic transformation of per capita income in this multiplicative framework makes the HDI, according to Zambrano (2017:864), "very conservative in allowing income to be transformed into capabilities at high income … and very aggressive in allowing capabilities to shrink as income losses take place at very low income levels". In addition, the geometric mean gives the HDI a cardinal dimension that allows comparing its change over space and time (Herrero et al., 2012).[27]

Yet, the geometric average appears less intuitive than the arithmetic average (Klasen, 2018). A harsh criticism to the multiplicative method of aggregation has been

[24] Kelley (1991: 319) argued that the 'production-transformation between income per capita and other human development indicators may be nonlinear, and thus might justify unequal or even variable weights by income level'.
[25] This choice has been justified as human development is a concept that goes beyond the utilitarian calculus deliberately (Desai 1991: 354).
[26] Cf. UNDP (1993), Ogwang (1994), and Nguefack-Tsague *et al*. (2011).
[27] This view is at odds with the characterization of the index as purely ordinal (Vecchi *et al*., 2017: 467).

put forward by Ravallion (2012a, 2012b).[28] Ravallion focuses on the implicit trade-offs between the new index's dimensions measured by their marginal rate of substitution (MRS). The 2010 HDI, he argues, "generates a steep income gradient in the index's implicit valuations of life expectancy and schooling" (Ravallion, 2012b: 206). In particular, the value assigned to longevity relative to average income rises with per capita income reaching for the richest countries a value 17,000 times that for the poorest ones.[29] Ravallion's bottom line is that the embodied social values of the new HDI imply valuing longevity (education) more in rich countries than in poor ones.[30] Thus, the HDI's implicit trade-offs leads him to the unacceptable conclusion that "the most promising way to promote human development in the world would be by investing in higher life expectancy in rich countries" (Ravallion, 2012b: 208).

In response to Ravallion's objection it can be argued that, for the rich countries, a high value of longevity in terms of income simply means that per capita income contributes negligibly to increasing capabilities (Klugman et al., 2011).[31]

III. An Augmented Historical Human Development Index

After surveying the issues at stake in the construction of a synthetic index to capture human development dimensions, a new historical index can be proposed on the basis of a new world dataset of life expectancy at birth, years of schooling for

[28] Ravallion (2012b) claimed that, in comparison with the additive method, the new multiplicative method downgrades life expectancy penalising poor countries. He recommended keeping the arithmetic average and using Chakravarty's (2003, 2011) proposal to reduce substitutability.

[29] Interestingly a similar argument about hidden (and questionable) trade-offs was already used by Ravallion (1997: 633) to criticise the arithmetic aggregation. Specifically, he claimed, the implicit monetary valuation of an extra year of life expectancy rises dramatically with income as, by construction, the UNHDI implicitly values life relatively less in poor than in rich countries. It is also worth stressing that the logarithmic transformation of income is about five times more important than the geometric average in explaining the trade-off between life expectancy and income across countries (Zambrano, 2017: 522). Actually, this point was already made by Ravallion himself long ago when argued that the striking trade-off between per capita income and longevity arises 'from the fact that the marginal effect on the HDI of longer life is a constant', while at the same time, 'the marginal effect of extra income falls very sharply as income increases' (Ravallion 1997: 633).

[30] Interestingly, in their utility approach to welfare, Jones and Klenow (2016: 2439) also find the "implied value of life … substantially lower in poor countries".

[31] Whether a social welfare approach is appropriate to assess human development seems the issue at stake. Canning (2012: 1786) provides a clarifying illustration by comparing two metrics for health status, QALY and DALY. QALY (quality adjusted life years) uses a utilitarian social welfare function in which health is valued in terms of individuals' willingness to trade them off. Alternatively, DALY (disability adjusted life years) depends on adjustments for disability based on objective criteria. In the capabilities approach, well-being is measured by the objective size of the choice set, and not by the utility of the choices, as a healthy lifespan represents a constraint on individuals' choice.

population 15 and older[32], per capita GDP[33], plus a new dimension, political freedom, represented by the Liberal Democracy Index, that aims to capture agency and freedom so the resulting augmented human development index provides a crude measure of capabilities.[34]

In the new index the more recent goalposts (maximum and minimum values), set in the Human Development Report (UNDP, 2014), that replaced those in place since 2010, have been accepted.[35] For life expectancy at birth, the maximum and the minimum values were established at 85 and 20 years, respectively. For education, maximum and minimum values of average years of total schooling (primary, secondary, and tertiary) were set as 15 and 0, respectively. For liberal democracy, 0 and 1 are the lower and upper bounds. In addition, 'floor' values have been arbitrarily accepted in order to allow the inclusion of countries for which no data exist in earlier periods and, at the same time, to avoid zero values in the transformed variables. Thus, 25 years of life expectancy at birth, 0.1 years of schooling, and 0.01 for liberal democracy have been accepted as 'floor' levels. Per capita GDP is expressed in Geary-Khamis (purchasing power parity) dollars of 1990 (G-K 1990$, hereafter), that is, adjusted for the difference in price level across countries, and the goalposts are set at $100 and $47,000, respectively.[36] As an adequate 'floor' I have assumed G-K 1990$ 300, a basic level of physiological subsistence (Sagar and Najam, 1998: 254; Milanovic *et al*., 2011: 262).[37]

Indices for education and life expectancy are obtained following Kakwani (1993), through a convex transformation as in equation [5]. In the case of political

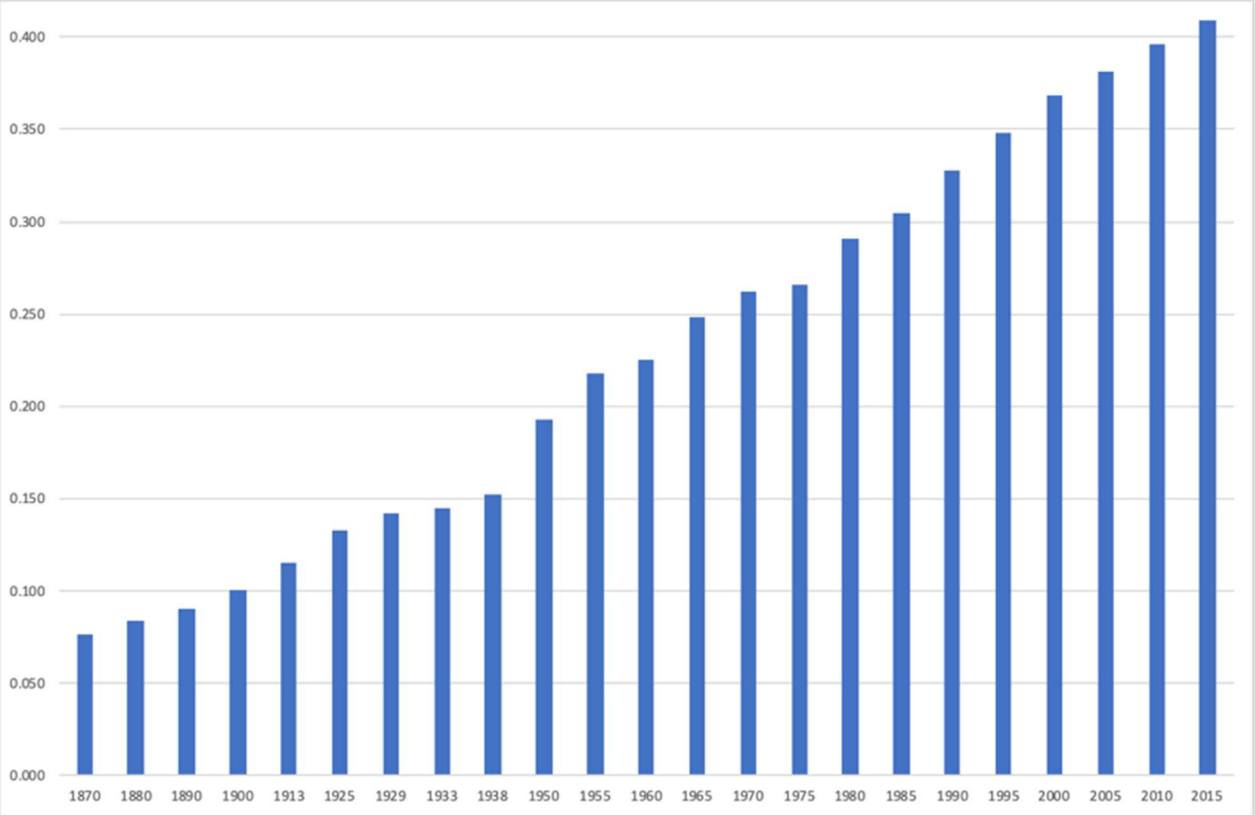
[32] Note that due to dearth of data, this specification differs from that in the UNDP (2010) HDI, which measures education as the unweighted geometric average of the expected years of schooling for a school-age child and the mean years of schooling for population, aged 25 and older. Nonetheless, making virtue out of necessity, I could argue along Herrero *et al*. (2012: 249-250) that using one single indicator for education facilitates the interpretation of the human development index.
[33] This is due to the lack of historical estimates of per capita GNI. It is worth noting that in UNDP estimates GDI is derived for most countries over time by projecting present-day GDI backwards with real GDP rates of variation (UNDP, 2014, Technical Notes 1: 3).
[34] The terms political freedom and liberal democracy are used as interchangeable here.
[35] The 2010 goalposts were used in Prados de la Escosura's (2015) 'hybrid' historical index of human development.
[36] G-K 1990$ $47,000 corresponds to 2011 GEKS $75,000, that is, the maximum set in UNDP (2014). In the case of the minimum, $100, I have kept it without adjusting it for price variation, as a higher 'floor' has been introduced for countries' per capita income.
[37] In general terms, the upward bias the 'floor' introduces for the poorest countries does not vary the overall picture.

freedom, a linear transformation (derived with equation [1]) has been adopted. The reason is that, unlike for the other bounded variables, the *Liberal Democracy Index* does not only measure quantity but also quality. Lastly, the adjusted per capita income index has been derived with equation [1], but with all its terms are expressed in logs.

Then, following UNDP (2014), the indices for each dimension have been combined as an equally weighted geometric average to provide the new Augmented Historical Human Development Index [*AHHDI*] using a modified version of equation [2] in which I_k represented the indices derived with Kakwani's non-linear (convex) transformation for longevity and education.

$$AHHDI = (I_{k\ Health} \cdot I_{k\ Education} \cdot I_{\ Income} \cdot I_{\ Democracy})^{1/4} \qquad [7]$$

Figure 7. Augmented Human Development Index in the World, 1870-2015

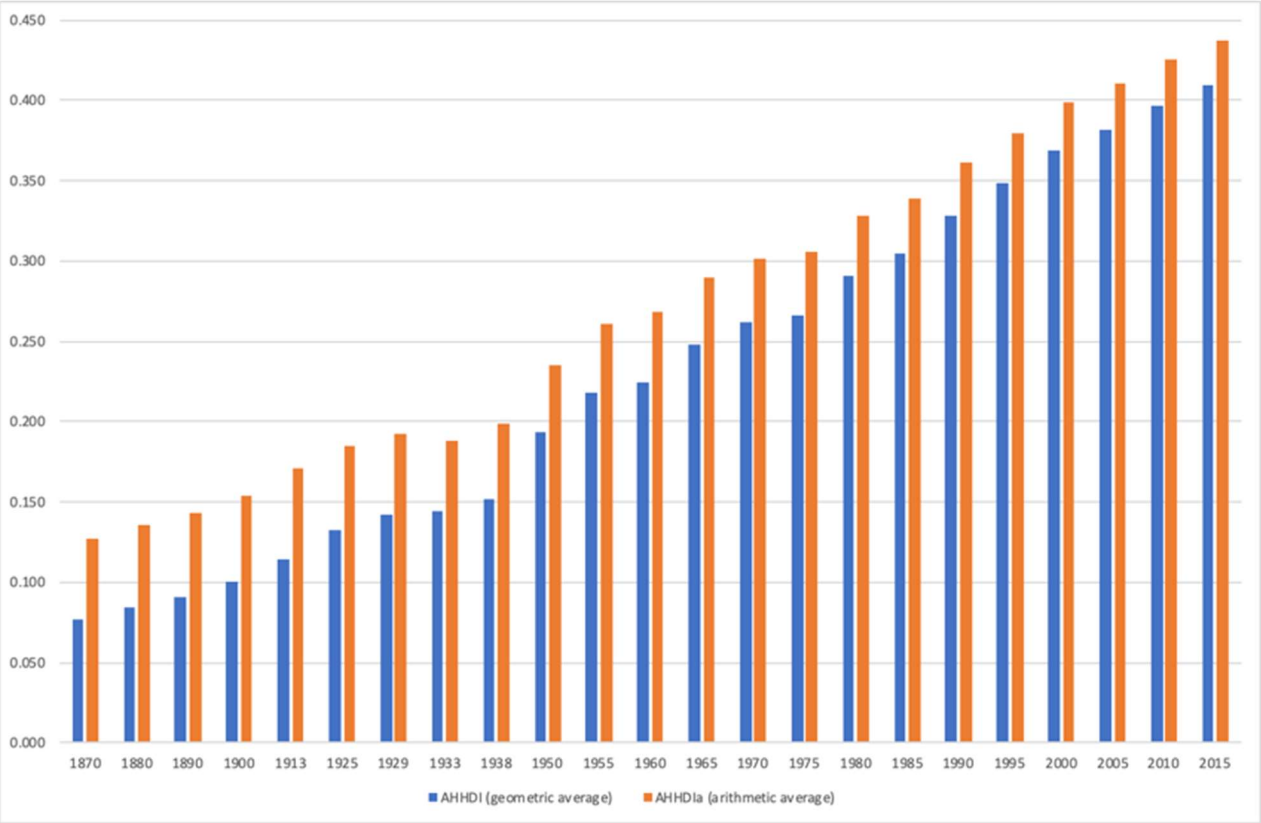


Data constraints make the country coverage to vary over the considered time span, 1870-2015. From 1870 onwards, 115 countries are considered, with its number rising up to 121, 146, 161, and 162 for samples starting in 1913, 1950, 1980, and 1990, respectively. These samples represent above 90 per cent of the world population, and nearly 100 per cent after 1950 (sources and procedures are presented in Appendix B).

Regional and world averages for the original values of each variable have been transformed into indices for each dimension and, then, combined to derive human development indices. When country coverage varied between the five samples, splicing was applied using the more recent period, for which country coverage is larger, as benchmark.

World human development has improved substantially over the last one and a half centuries reaching a level in 2015 that was 5.3-fold that of 1870, which implies a cumulative yearly growth rate of 1.2 per cent. Nonetheless, as the world average level remained below 0.5 in 2015 (on a 0-1 scale), there is still significant room for improvement. The evolution of world human development presents a long-run upward trend punctuated by accelerations in the early twentieth century and the Golden Age (1950-70), and slowdown in the 1930s (Figure 7).

Figure 8. *Augmented Human Development:* Multiplicative and Additive Indices



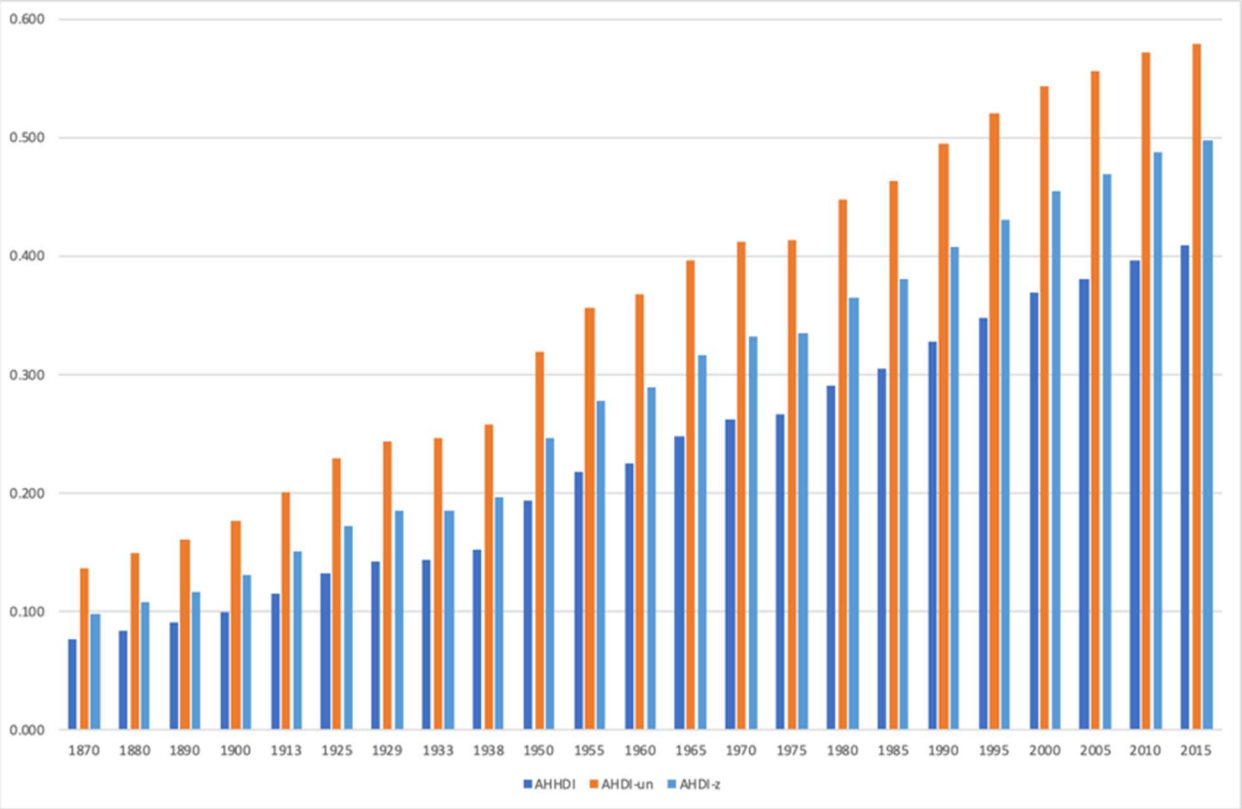
Given the strong reaction against the use of a geometric average to combine human development dimensions into the HDI (see the previous discussion), it appears reasonable comparing indices obtained alternatively as arithmetic and geometric

averages. Thus, I have computed an augmented index using an unweighted arithmetic average of its dimensions [$AHHDI_a$] which implies increasing their substitutability.

$$AHHDI_a = (I_{k\ Health} + I_{k\ Education} + I_{\ Income} + I_{\ Democracy}) / 4 \qquad [8]$$

A comparison between the multiplicative and additive indices for world averages over 1870-2015 is presented in Figure 8. Although both indices share the same trends, the multiplicative index provides lower levels and faster growth (Table 5), and confirms the penalisation of low and uneven levels of the index dimensions when the new geometric formula is used, a feature consistent with the indispensability of each dimension of the human development index.

Figure 9a Augmented Human Development Indices: *AHHDI*, *AHDI-un*, and *AHDI-z*



How does the new historical index compare to alternative specifications of multiplicative human development indices? Figure 9a shows the *AHHDI* along historical indices derived with UNDP and Zambrano specifications for the three conventional dimensions (longevity, education, and income) plus the addition of liberal democracy, labelled *AHDI-un* and *AHDI-z*, respectively.[38] It can be noticed that the *AHHDI* exhibits

[38] Note that *AHDI-z* shares with *AHDI-un* the transformation of all dimensions but that for income in which equation [6] is used.

systematically lower levels as a result of the Kakwani transformation of education and longevity dimensions, which translate into faster growth over time, and *AHDI-z* provides intermediate values between *AHDI-un* and *AHHDI* (Table 6).

Figure 9b offers other alternative indices: *AHDI-b-v*, which is obtained using the UNDP linear transformation of the non-income dimensions and a non-log linear transformation of per capita income, as suggested by Bértola *et al*. (2011) and Vecchi *et al*. (2017) "extended" human development index[39]; and *AHDI-h*, an index that results from Herrero *et al*. (2012) proposal of transforming the original values of human development dimensions by computing their shares of maximum values.[40] Counter-intuitively, the three indices are highly coincidental as the higher values for the transformed non-income dimensions in *AHDI-b* and *AHDI-h* offset the lower value for the transformed income dimension.

In addition, the *AHHDI* is compared to two additional indices (figure 9c). The first one corresponds to Bértola *et al*. (2011) full proposal, namely, a geometric average of Kakwani indices for life expectancy and years of schooling, and linear indices for per capita income, without using logs, and democracy, labelled *AHDI-bk*.[41] The second index, *AHDI-zk*, replicates *AHDI-bk* but for the use of Zambrano's proposed transformation of per capita income. A third index, *AHDI-hi*, includes Herrero *et al*. (2012) "newer" HDI components, which transforms the original values of human development dimensions by computing their shares of maximum values and, in the case of income, adjusted for inequality, to which I have added the Liberal Democracy Index. The *egalitarian equivalent income*, y^e, is derived as $y^e = y * (1- G)$, where *y* represents per capita income and G, the Gini.[42] It can be observed that the *AHHDI* offers higher values, with the absolute difference increasing as the levels get higher, even though their growth rates are similar. The *AHDI-hi* and *AHDI-zk* are close since the 1920s while the *AHDI-bk* level remains the lowest over time.

[39] Note that as *AHDI-b* employs the UNDP transformation of social dimensions, it actually follows Bértola and Ocampo (2012: 43) Relative Index, RI1.
[40] Note that *AHDI-h* follows Herrero et al. (2012) proposal only partially, since they also adjust income for inequality.
[41] Note that *AHDI-bk* actually follows very closely Bértola *et al*. (2011) and Bértola and Ocampo (2012, Relative Index RI2).
[42] As Herrero *et al*. (2012) establish a maximum level for the inequality-adjusted income of GEKS $ 2011 60,000, over a maximum unadjusted income of GEKS $2011 75,000, I applied their ratio (60/75) to the maximum income in G-K$1990 47,000, obtaining a maximum inequality-adjusted income of $37,600.

Figure 9b Augmented Human Development Indices: *AHHDI*, *AHDI-b-v*, and *AHDI-h*

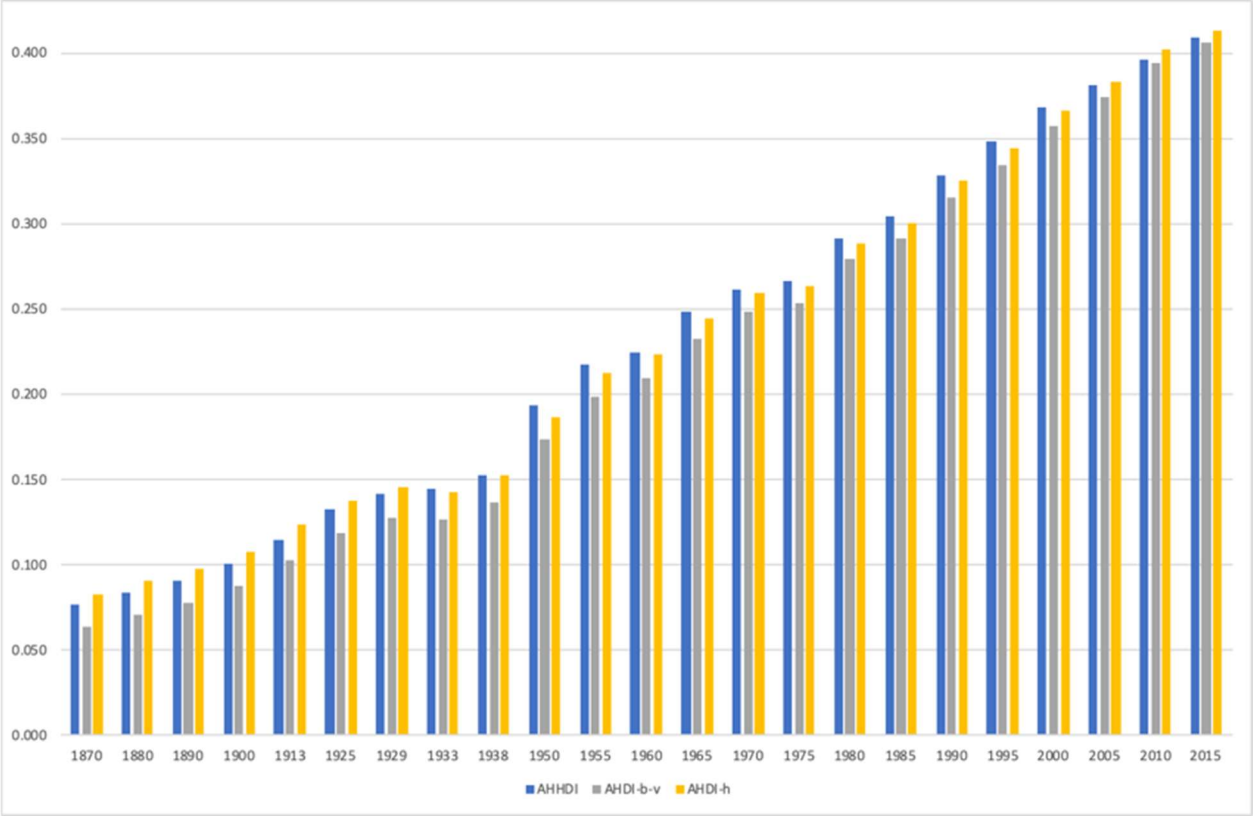
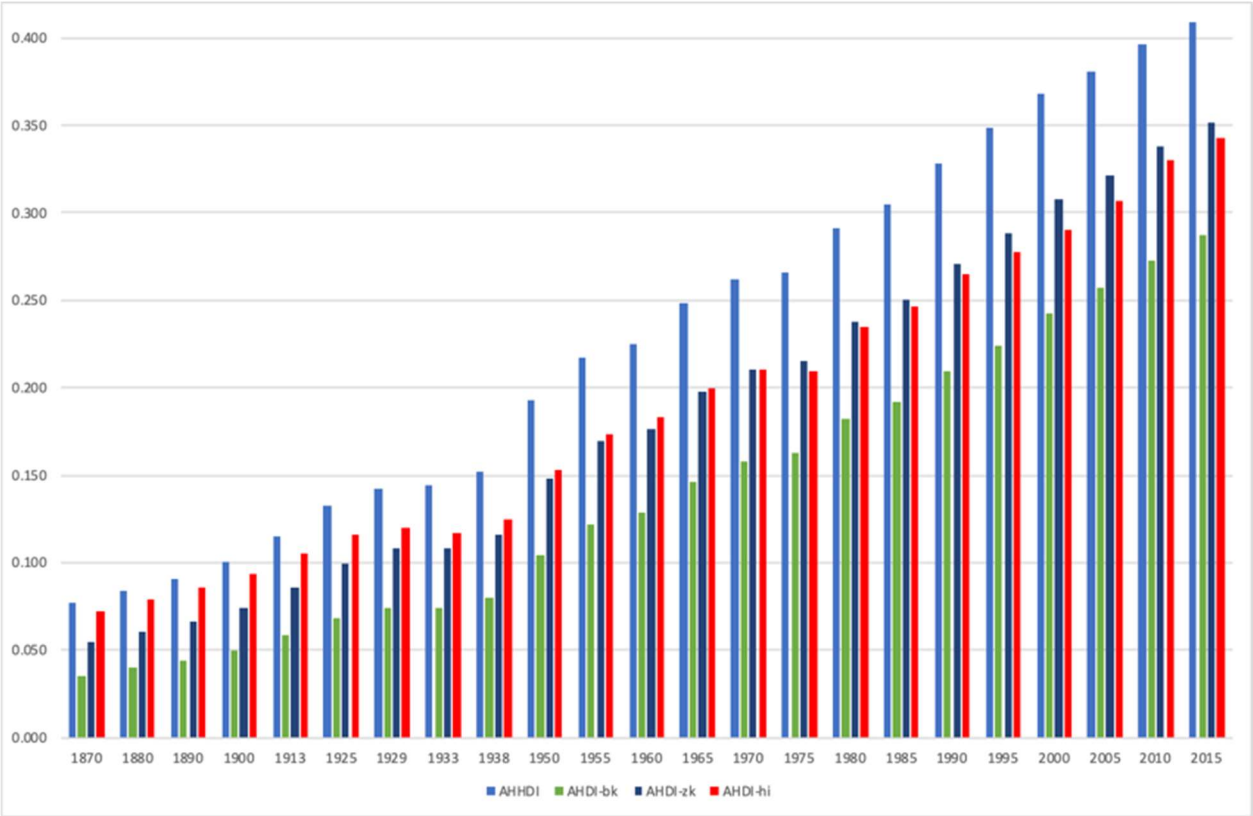
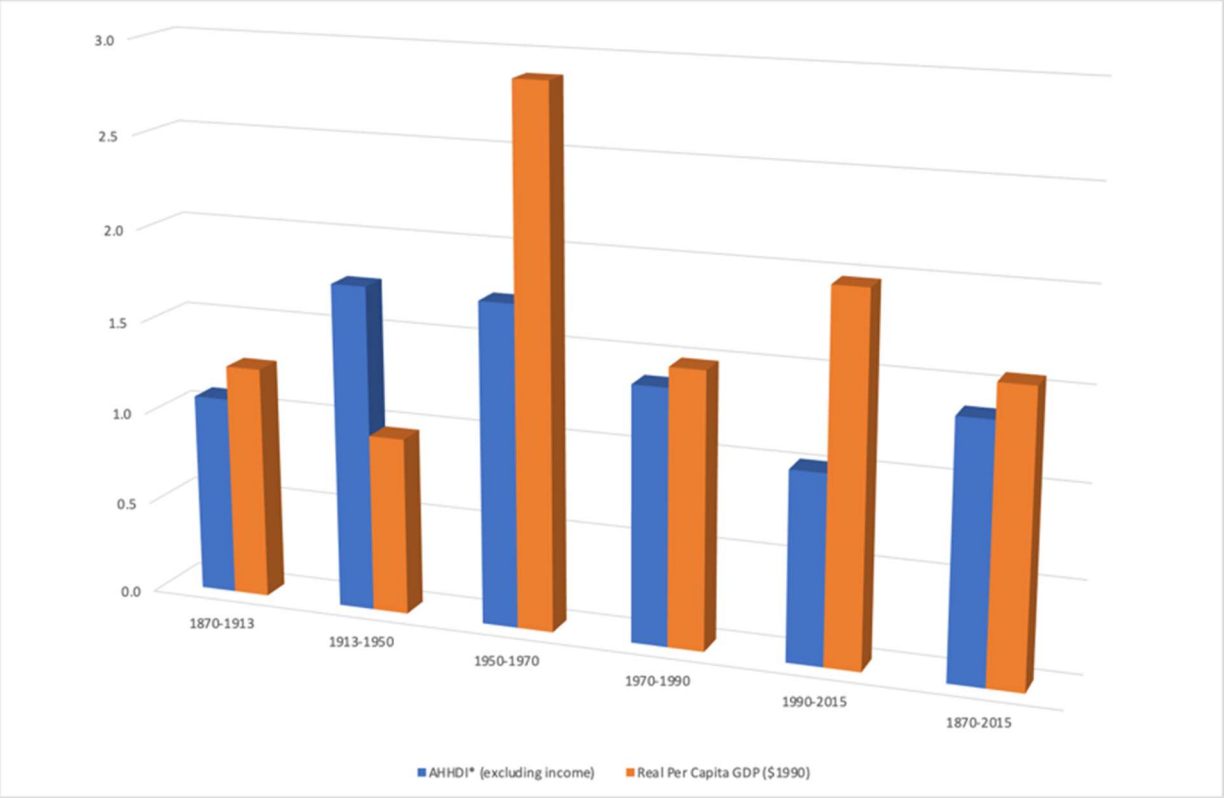


Figure 9c Augmented Human Development: *AHHDI*, *AHDI-bk*, *AHDI-zk*, and *AHDI-hi*



It is widely assumed that real GDP per head captures adequately welfare trends (Oulton, 2012). Is this the case? Human development (excluding the income dimension) exhibits slightly slower long-run growth than GDP per person: 1.4 compared to 1.6 per cent per annum, respectively, throughout 1870-2015.[43]

Figure 10 Augmented Human Development* and Real Per Capita GDP Growth (%)
*** excluding the income dimension**



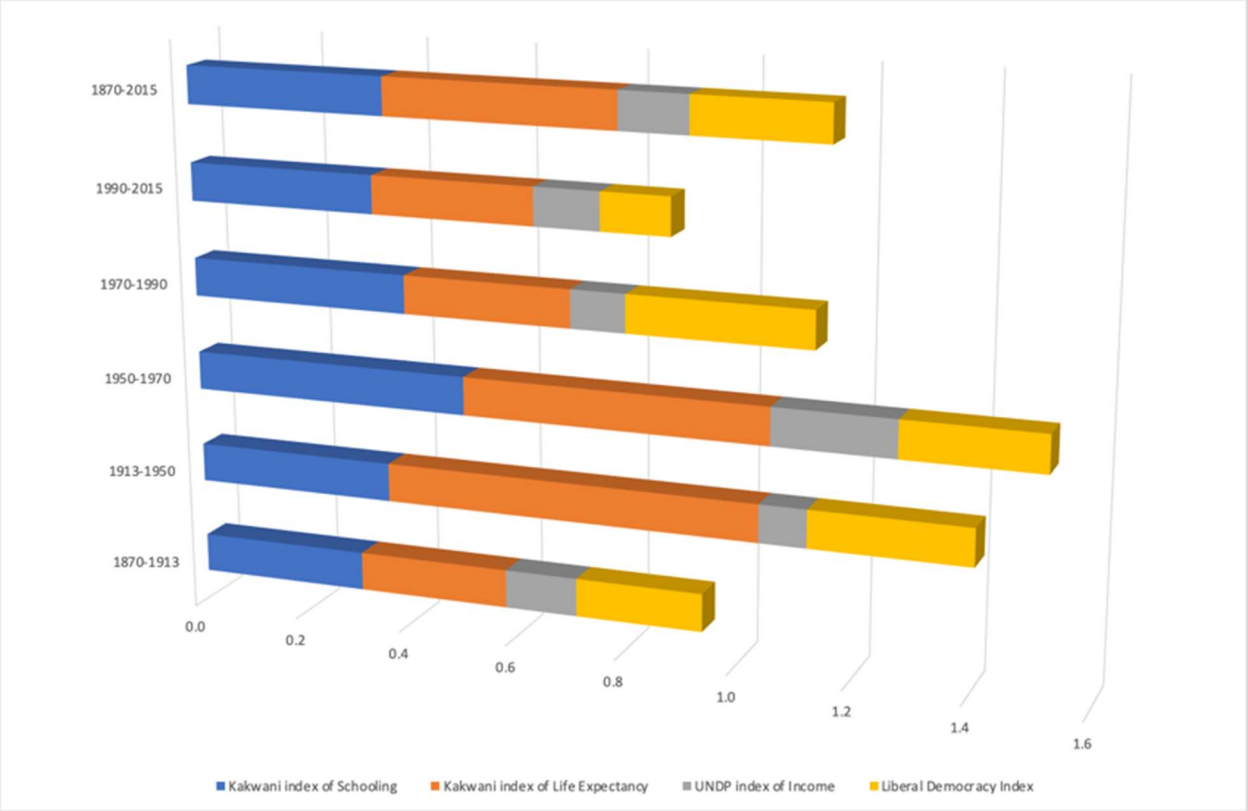
A closer look reveals, however, that the pace at which human development progresses does not match that of real per capita GDP (Figure 10). In particular, substantial discrepancies between 1913 and 1970 and, again, since 2000. During the phase of globalisation backlash (1914-1950), as world commodity and factor markets disintegrated, real per capita GDP growth slowed down across the board; conversely, human development thrived, particularly in less developed regions, driven by the globalisation of health and education practices. In the post-1950 era, human

[43] The rate of growth of human development falls to 1.2 when all dimensions are included. It is worth noting that this result is at odds with Jones and Klenow's (2016) who found faster growth for consumption-equivalent welfare than for per capita GDP between 1980 and the mid-2000s.

development has advanced significantly less than real GDP per head, despite the expansion of health, education and, since 1980, political freedom.

It has been argued that increases in social sharing and public support for social services explain the early twentieth century paradox in the case of Britain (Sen, 1999). A global explanation is, however, required as education and health improved across the board, including countries where public social protection did not expand, while average income growth slowed down (Riley, 2001; Preston, 1975; Benavot and Riddle, 1988).The finding that economic growth and human development were uncorrelated for quite lengthy periods may inform current controversies. Should policy in developing societies have multiple objectives, or just give priority to economic growth on the grounds that the latter will automatically promote access to healthier and longer life, deeper knowledge, and freedom? Exploring the specific drivers of human development over the long run may provide an answer.

Figure 11. ***Drivers of Augmented Human Development in the World, 1870-2015 (%)***



Given the *AHHDI* multiplicative structure, in which dimensions enter with equal weights, a breakdown of its growth rate into the contribution of its four dimensions can be easily performed, with low case meaning rates of variation.

$$ahhdi = i_{k\ Health}/4 + i_{k\ Education}/4 + i_{\ Income}/4 + i_{\ Democracy}/4 \qquad [9]$$

Non-income dimensions have driven world human development gains over time (Figure 11 and Table 7). Life expectancy was the main contributor to human development progress over the one and half centuries considered (37 per cent), closely followed by education (32 per cent) (Table 7, Panel C). Life expectancy's contribution has concentrated in the period 1914-1950 and the 1960s when it provided about half of the human development gains. Education led the late nineteenth century advance and was a steady contributor to human development over the entire time span considered (but for the 1940s). Democracy made substantial contributions in the 1900s, the 1950s, and in the last two decades of the twentieth century.

Do the drivers of human development in the new historical index [*AHHDI*] coincide with those of the augmented index's alternative specifications? *AHDI-un* provides similar patterns to the *AHHDI*. Life expectancy leads during the interwar years and schooling represents the main and steadier contributor, but exhibit slower growth and longevity and education drive long-run human development (Figure 12a and Table A1 in Appendix A). *AHDI-z* also presents a shared leadership of longevity and education and maintains the lead of life expectancy in the first half of the twentieth century, but increases the contribution of per capita income at the expense of life expectancy and, to a lesser extent, education (Figure 12b and Table A2). In addition, *AHDI-b-v* and *AHDI-h* provide similar levels to the *AHHDI* over time (Figure 8b), but the contribution of income increases remarkably and dominates in the long run (Figures 12c and 12d and Tables A3 and A4), becoming the single main driver of human development across the different main phases of its evolution, except for 1914-1950, when life expectancy leads in the *AHDI-b*, and schooling does it in the *AHDI-h*.

When, alternatively, *AHDI-bk* is employed, the results for *AHDI-b* are validated except for the increase experienced in the contribution of the social dimensions, life expectancy, in particular, that becomes the leading driver of human development in the long run. Also, with *AHDI-zk* the results obtained with the *AHDI-z* are corroborated

but with the contribution of schooling and longevity enhanced, and the latter becoming the most influential dimensions over time. Lastly, when *AHDI-hi* is considered the dominance of the income dimension observed for the *AHDI-h* is fully confirmed (Figures 12e-12g and Tables A5-A7). Thus, as anticipated in the previous discussion, income, as a non-bounded variable, will drive the human development index unless it is transformed at a declining rate.

Figure 12a. ***Drivers of Augmented Human Development (%): AHDI-un***

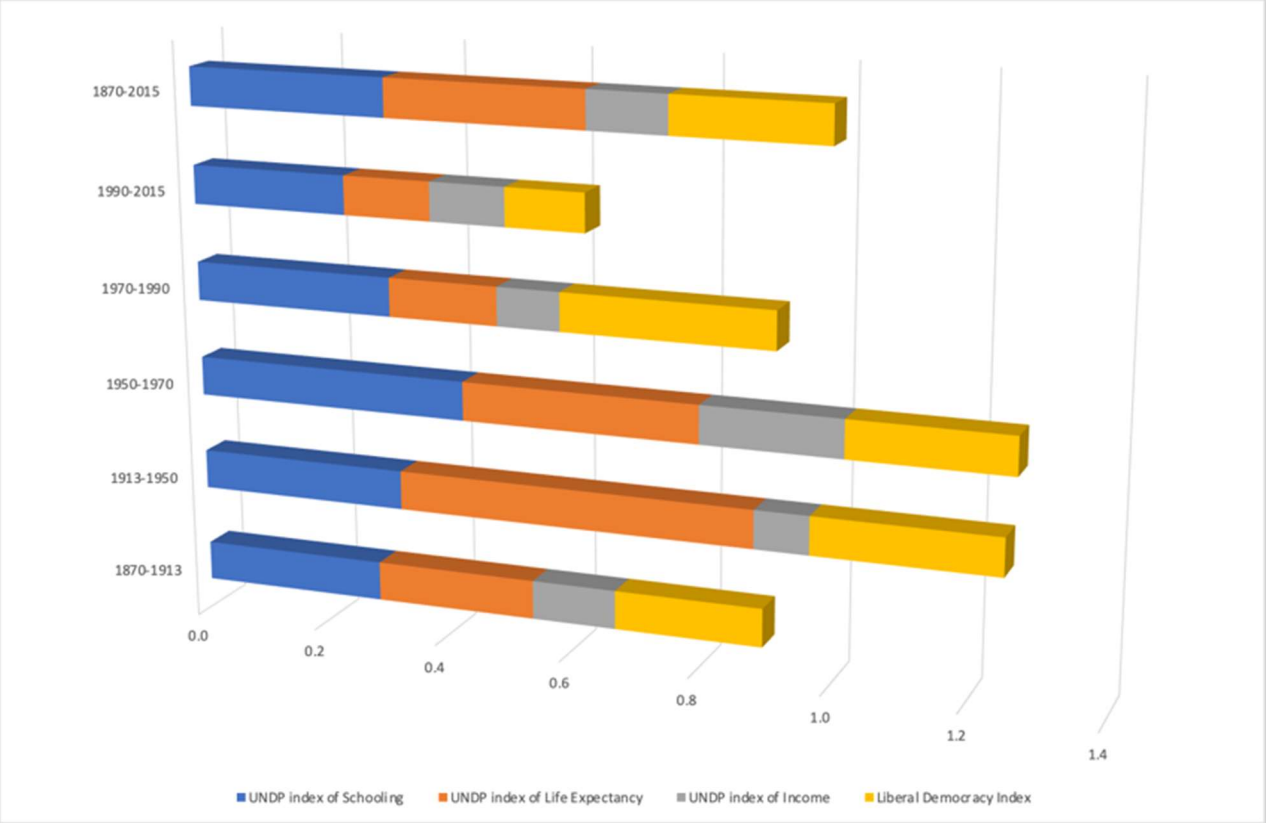


Figure 12b. ***Drivers of Augmented Human Development (%): AHDI-z***

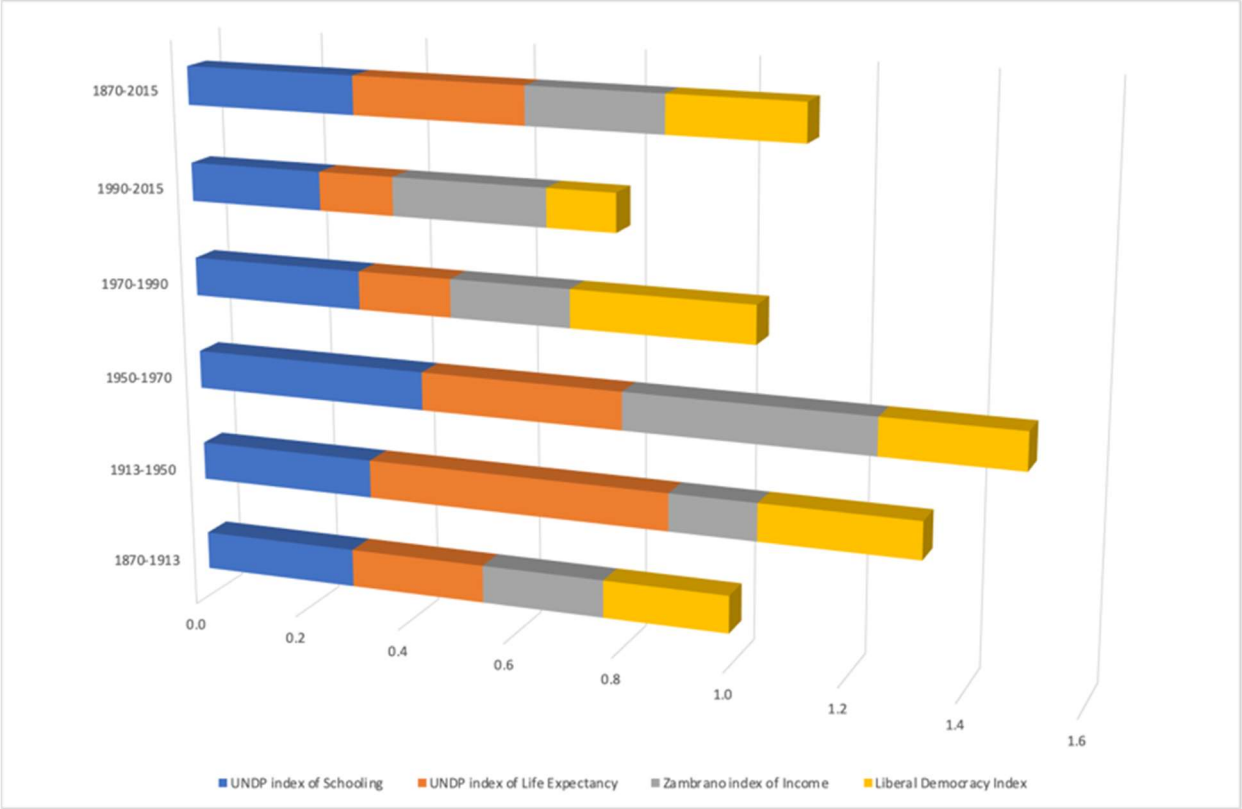


Figure 12c. ***Drivers of Augmented Human Development (%): AHDI-b-v***

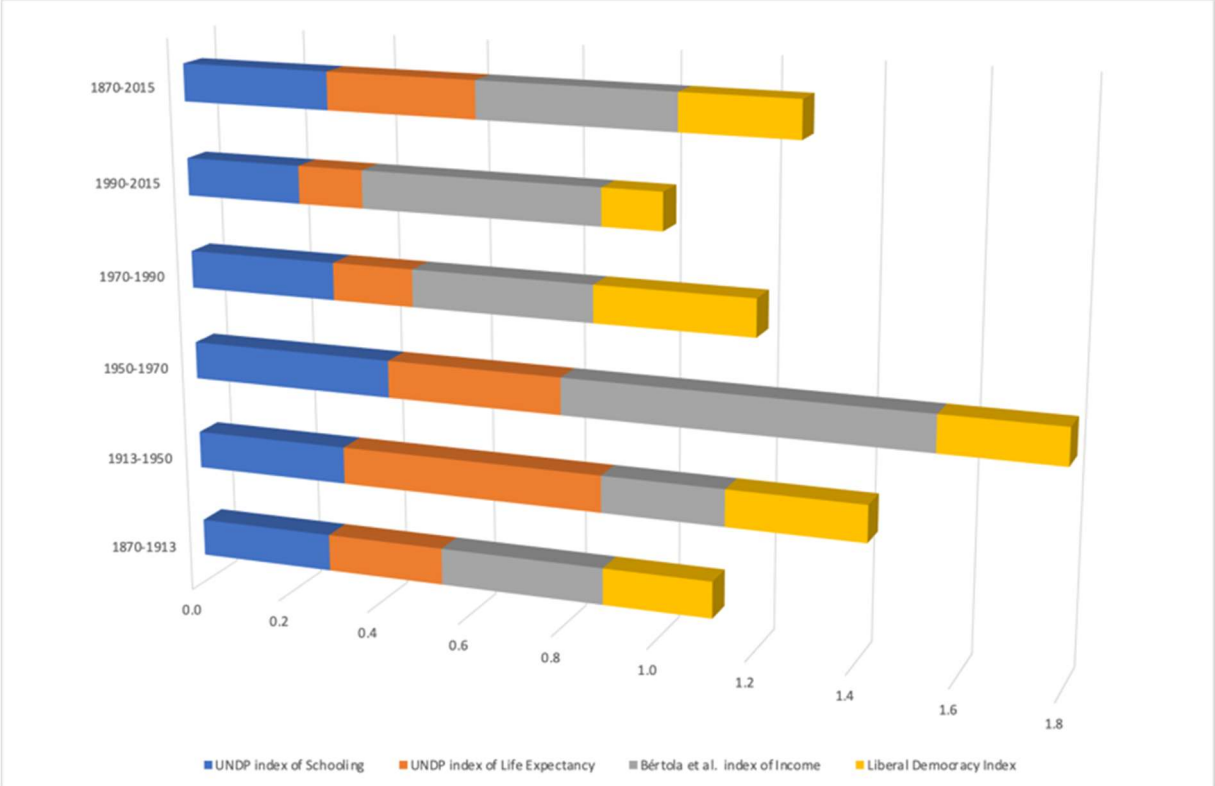


Figure 12d. ***Drivers of Augmented Human Development (%): AHDI-h***

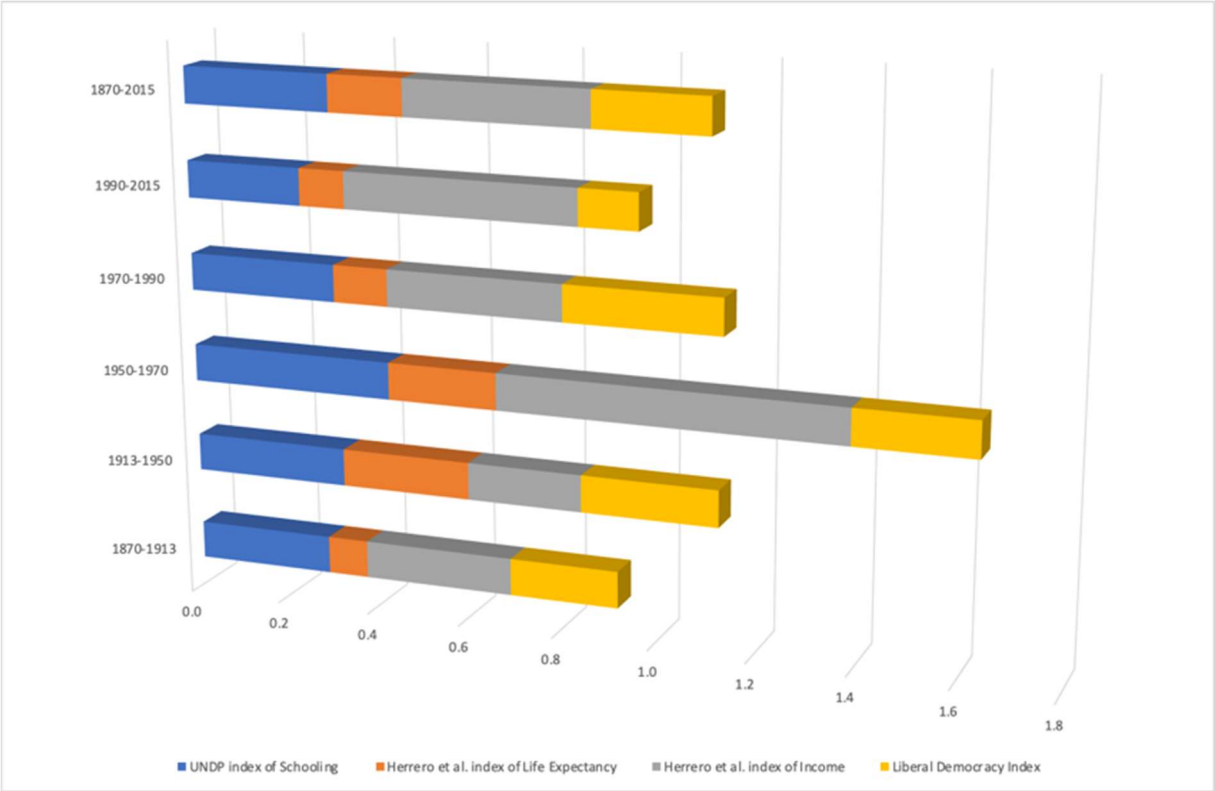


Figure 12e. ***Drivers of Augmented Human Development, 1870-2015 (%) AHDI-bk***

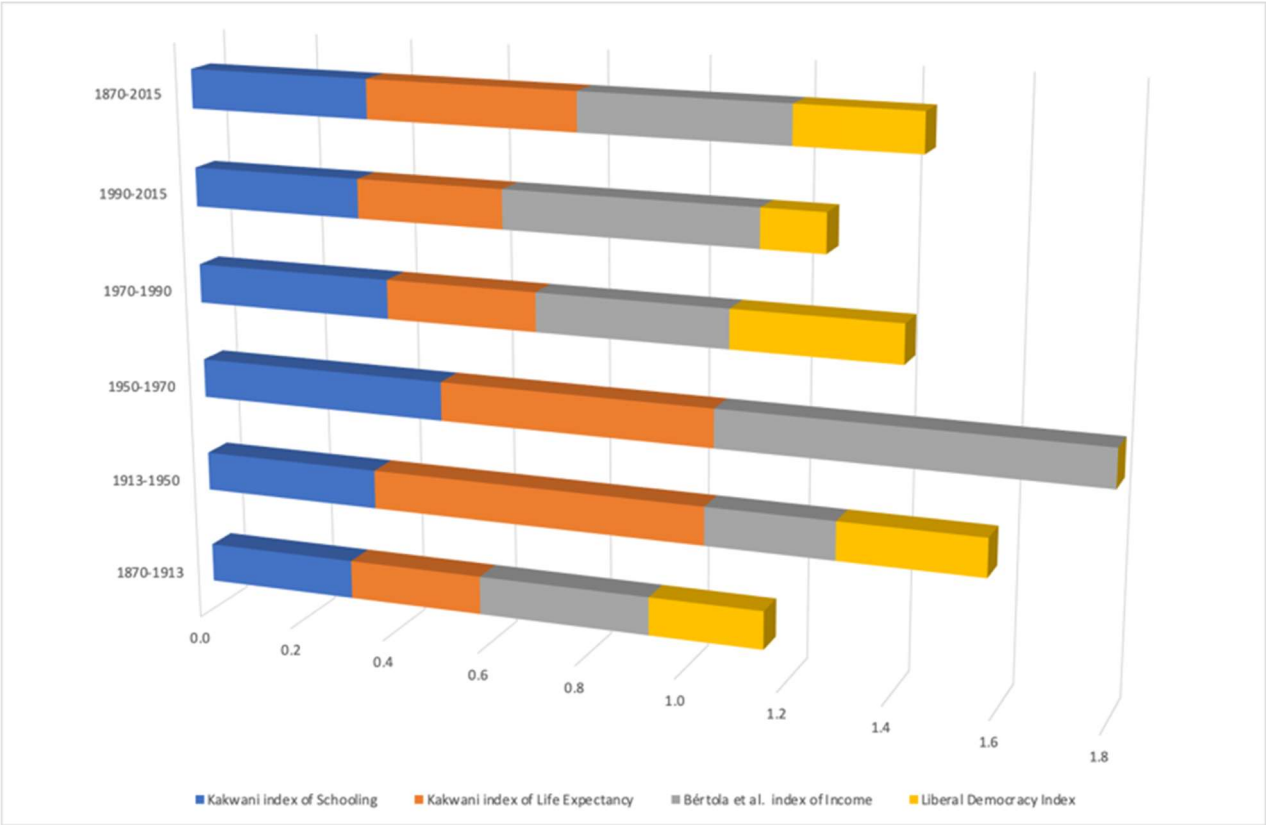


Figure 12f. ***Drivers of Augmented Human Development, 1870-2015 (%) AHDI-zk***

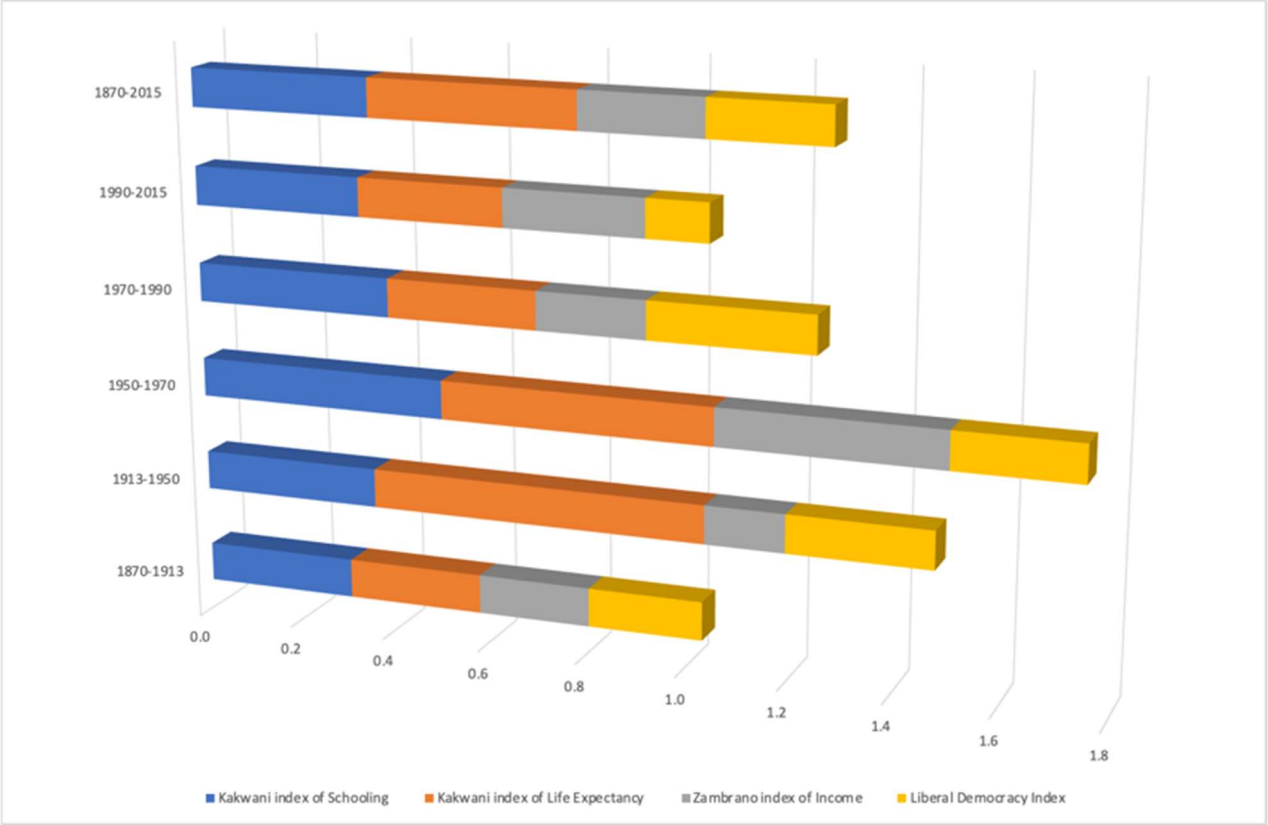
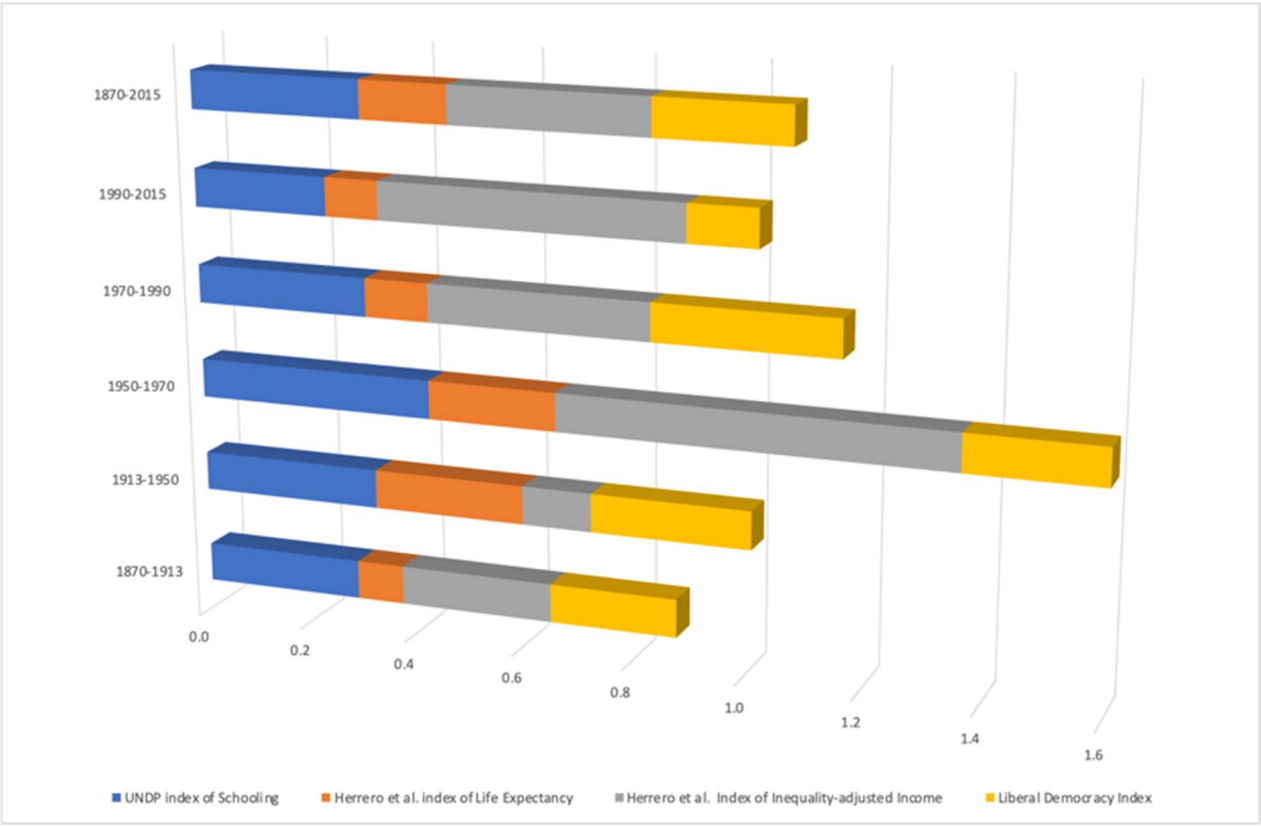


Figure 12g. ***Drivers of Augmented Human Development, 1870-2015 (%) AHDI-hi***



Why was the contribution of longevity to improving human development largely concentrated in the half a century 1920-1970? Health improvements can be depicted in terms of a health function (Preston, 1975; Easterlin, 1999). Movements along the function represent gains attributable to economic growth and result in improving nutrition -which strengthen the immune system and reduce morbidity (Stolnitz, 1955; McKeown et al., 1962, 1975; Fogel, 2004)- and increasing the public provision of health (Loudon, 2000; Cutler and Miller, 2005). Outward shifts in the health function represent improvements in medical knowledge and have been the main source of the sustained increase in life expectancy since the late nineteenth century (Riley, 2005; Cutler et al., 2006).

The outward shift in medical knowledge that explain the major improvement in longevity over 1920-1970 originated in the discovery and diffusion of the germ theory of disease (Preston, 1975) that led to the epidemiological or health transition in which persistent gains in lower mortality and higher survival were achieved as infectious disease gave way to chronic disease as the main cause of death (Omran, 1971; Riley, 2001). The germ theory of disease led to the introduction of new vaccines (since the 1890s) and drugs to cure infectious diseases (sulphonamides since the late 1930s, and antibiotics since the 1950s) along chemicals such as DDT, instrumental in battling malaria (Easterlin, 1999; Jayachandran et al., 2010; Lindgren, 2016; Desowitz, 1991). A less stressed consequence of the diffusion of the germ theory of disease, but with deep impact in less developed regions, was the diffusion of preventive methods of disease transmission and knowledge dissemination through schooling and introduction of low cost improvements in public health, as low incomes precluded the purchase of the new drugs. The result was to reduce mortality throughout the life course, but especially infant mortality and maternal death (Riley, 2001). Such diffusion process was largely exhausted by 1970 helping to explain the weakened contribution of life expectancy to improving human development at the turn of the century.[44]

[44] The deceleration of life expectancy gains, thus, started later than frequently assumed, the 1950s (see, for example, Cardona and Bishai, 2018), and is less intense when a Kakwani transformation, rather than a linear one or original values are used (Table 2).

IV. How has human development spread in the world?

Advances in longevity, access to knowledge, political freedom, and material progress spread unevenly across the world. When and to what extent different world regions shared the described trends in human development? Figure 13 suggests that human development gains were unevenly distributed as absolute differences widened between the most advanced regions, namely, Western Europe, the European offshoots -or regions outside Europe largely from European stock-, and Japan, labelled here the *OECD* for its resemblance of this organization membership before 1995, on the one hand, and the rest of the world regions (the *Rest*, hereafter), on the other.

A glance at the regions in the *Rest* shows that, by 2015, Latin America and Eastern Europe matched the *OECD* level in 1960 and early 1970s, respectively, while East Asia achieved that of 1950 and the Middle East and South Asia were still close to that of 1938. Africa was even further behind. The Arab north reached the *OECD*'s level of the late 1920s, but Sub Saharan Africa only attained that of pre-World War I *OECD*, an unenviable position shared by China (Tables and 9). On average, by 2015, the *Rest* had not reached the level of human development in the *OECD* in 1950 (Tables 9-10).

Figure 13. ***Augmented Human Development across World Regions, 1870–2015***

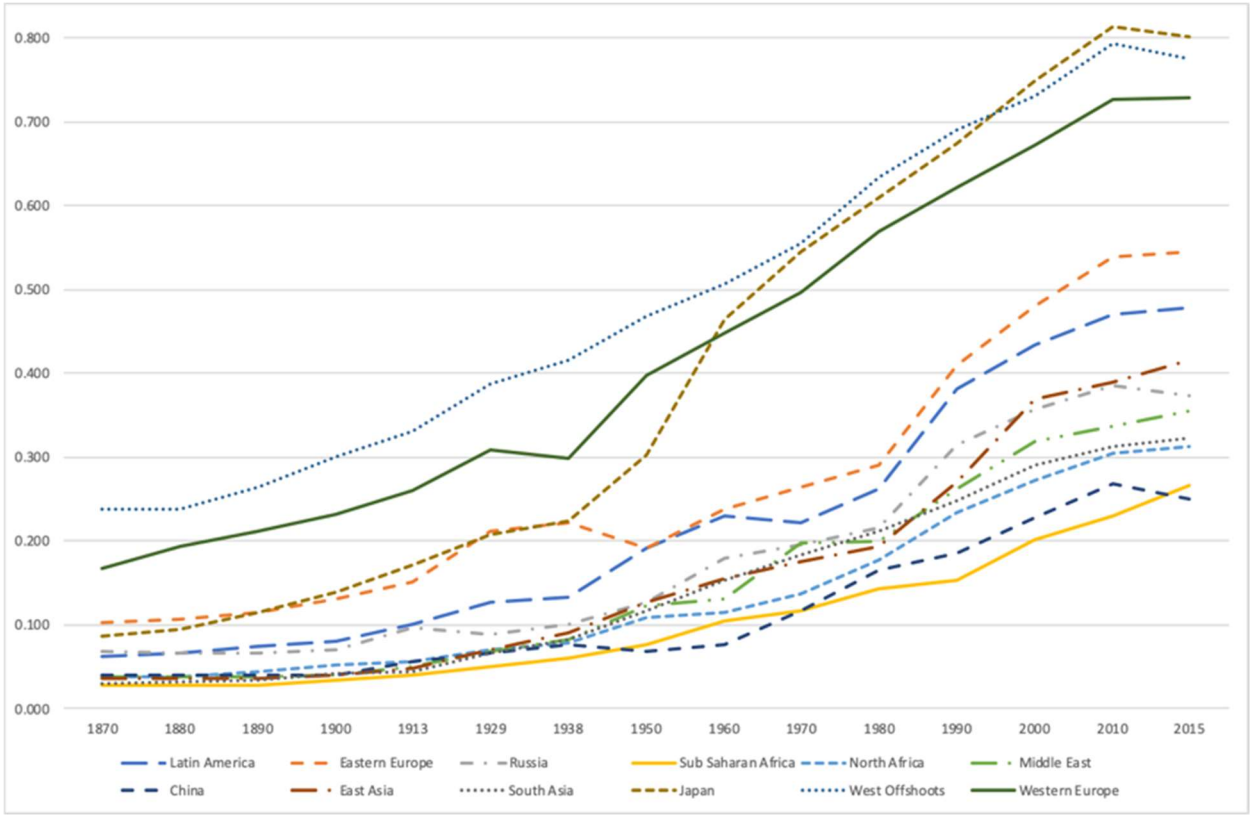


Figure 14a. *Augmented Human Development in the* OECD *and* The Rest, 1870–2015

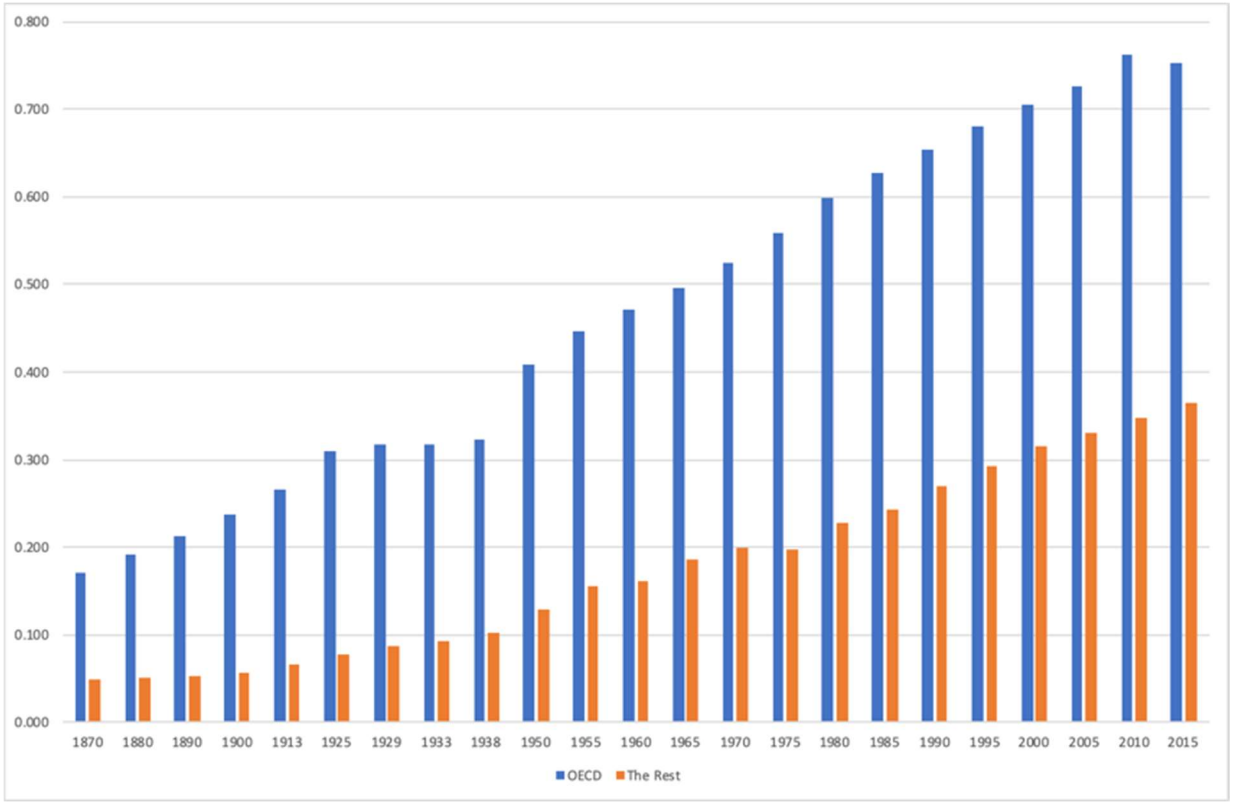
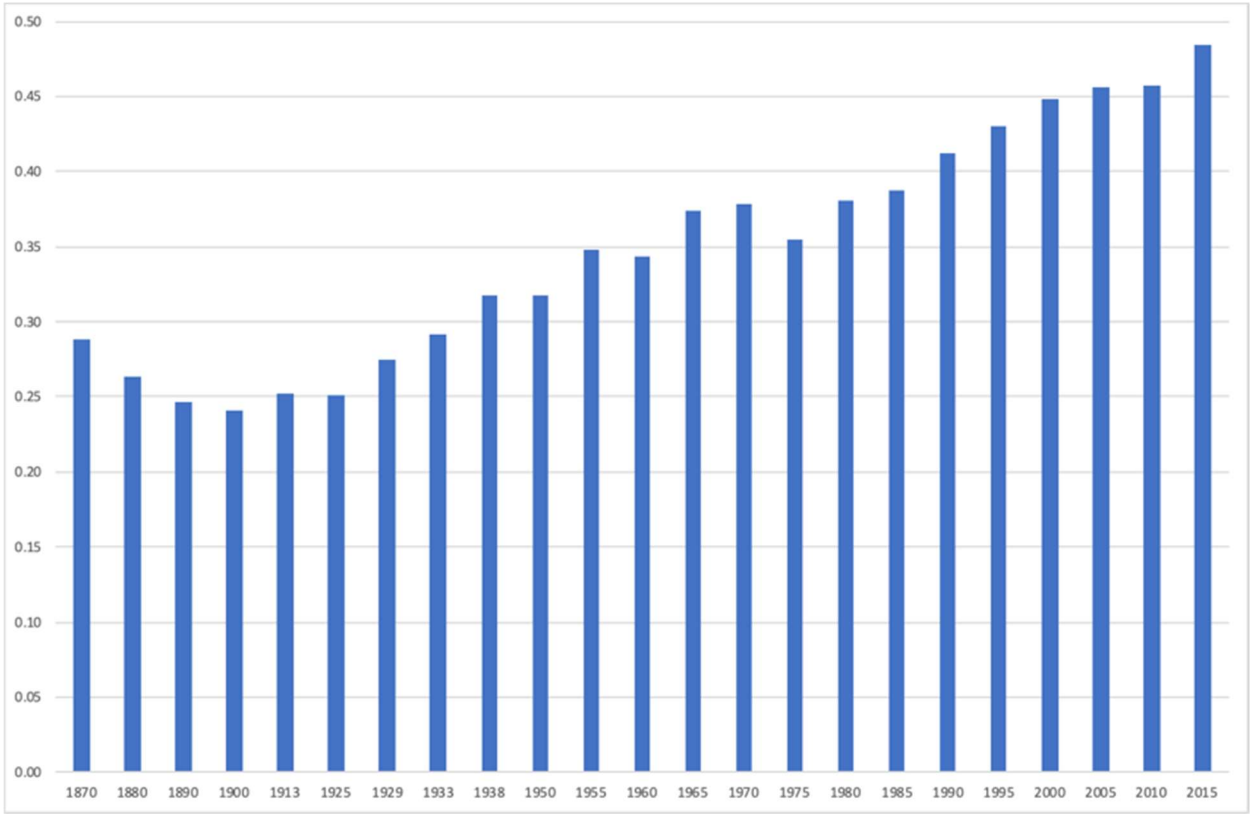


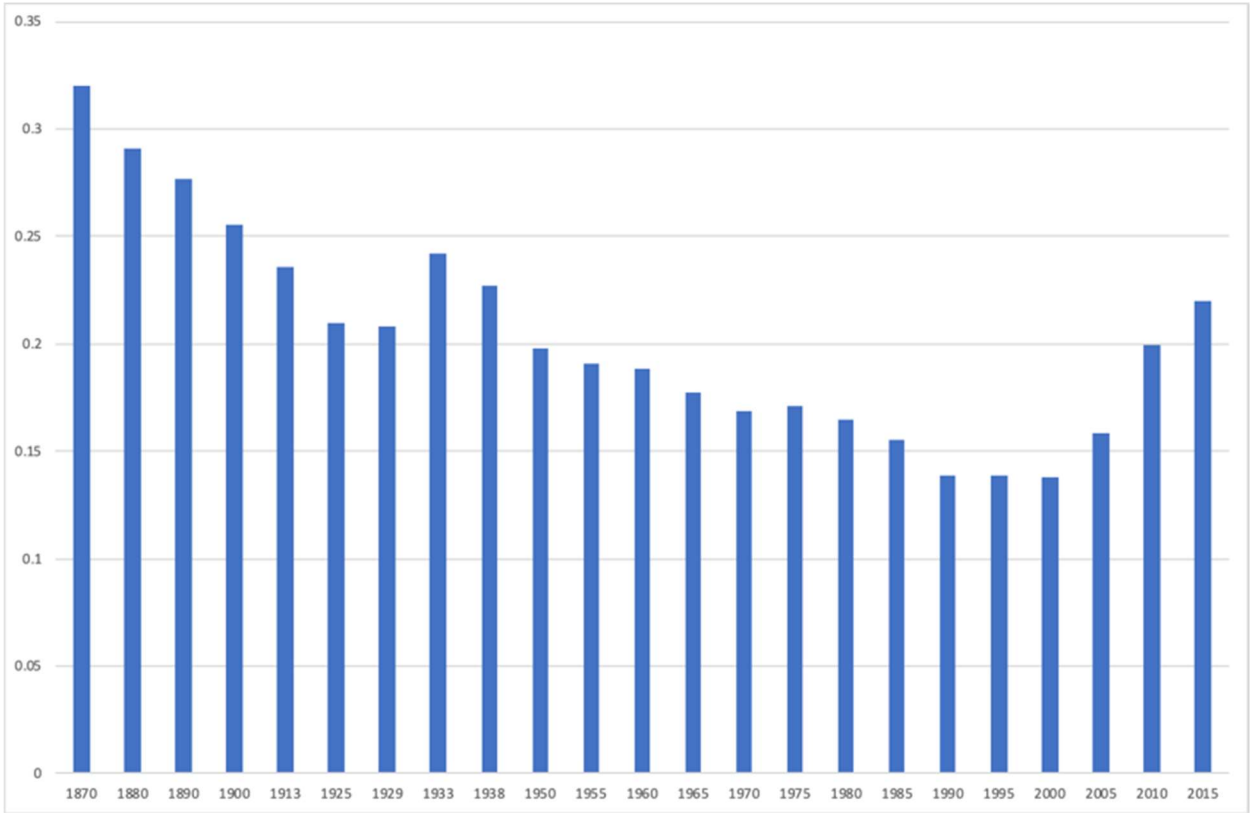
Figure 14b. *Augmented Human Development in* The Rest, 1870–2015 (*OECD*=1)



How does the *OECD* compare to the *Rest* during the last hundred and fifty years? Figure 14a confirms the broadening absolute gap between the *OECD* and the *Rest* throughout 1870-2010. In relative terms, however, the gap waned since the beginnings of the twentieth century, especially in its central decades and, again, from 1990 onwards so, by 2015, human development in the *Rest* represented over half that of the *OECD* doubling its share a century earlier (Figure 14b).[45]

If, alternatively, a glance is taken at the evolution of the *Rest* vis-à-vis the *OECD* in terms of per capita income, a sustained deterioration emerges, but for a reversal in the 1930s, from nearly one-third of the *OECD* level in 1870 to less than 15 per cent in 2000 (Figure 15), that is, an inverse evolution to that of human development. In the early twentieth-first century, however, a strong process of catching-up has taken place.

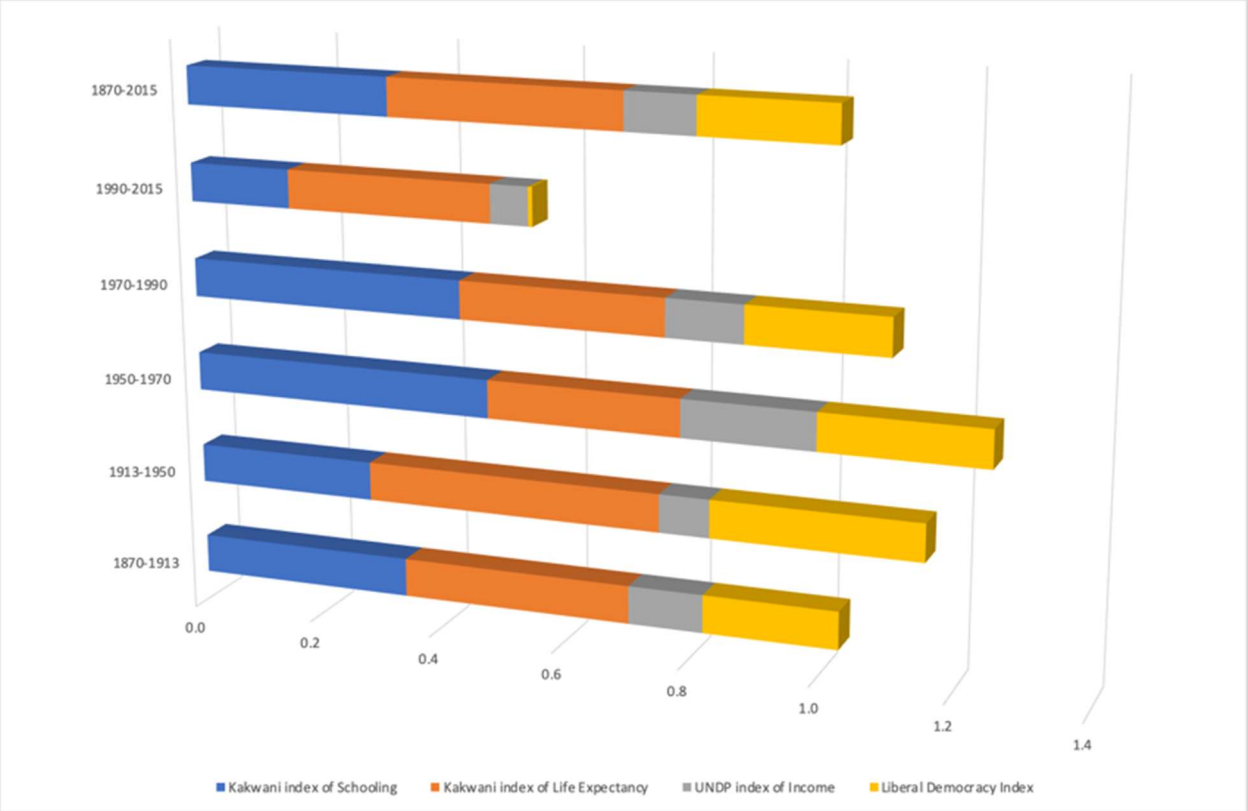
Figure 15. *Per Capita GDP in* The Rest, 1870–2015 (*OECD* = 1)



[45] Interestingly, Jones and Klenow (2016) find that between 1980 and the mid-2000s Western countries performed better in terms of consumption-equivalent welfare than in terms of per capita income, while the opposite happened in the case of developing countries. This implies that the relative gap between rich and poor countries increased more in terms of welfare than in terms of income. Such result is at odds with what I get here.

A closer look at the drivers of human development in the *OECD* and the *Rest* may help to explain their differences. Longevity has been the main driver of human development in the *OECD* during the last 150 years contributing 36 per cent of its gains (Figure 16). Improvements in life expectancy associated to the first health or epidemiological transition drove human development advance between 1880 and 1950, although democratization took over after World War II (Table 9). Then, advances in education made the main contribution to human development until 1990. Since then, life expectancy have led, again, the moderate gains in human development.

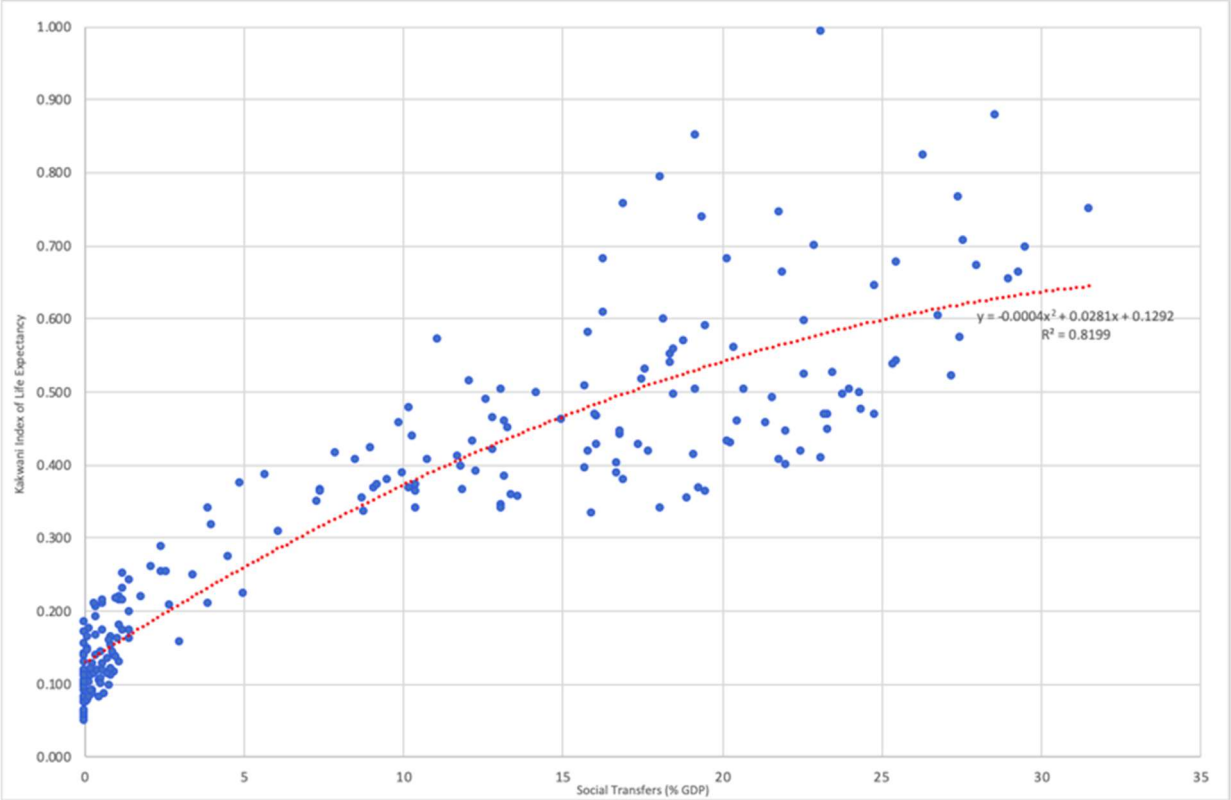
Figure 16. ***Drivers of Augmented Human Development in the OECD, 1870-2015 (%)***



Why the advance in human development has been so pervasive in *OECD* countries since 1950? It has often been argued that during the regulated phase of capitalism the success in lifting well-being was largely due to public intervention, as markets would not have contributed to universal provision of health services or stimulated medical research (Easterlin, 1999). But has government intervention and, in particular, the expansion of social spending, really played such a distinctive role in the *OECD*? A positive non-linear association may be observed between social transfers

-that is, all social spending less except that in education-, expressed as a share of GDP, and the Kakwani index of life expectancy at birth (Figure 17), with larger longevity gains corresponding to increases of social transfers at low levels and the association flattening at higher levels.[46] Thus, social spending seems to have contributed to improving life expectancy only up to a point leaving room for the contribution of medical technological change and new social values.

Figure 17. ***Kakwani Index of Life Expectancy and Social Transfers (% GDP) in the OECD, 1880-2013***

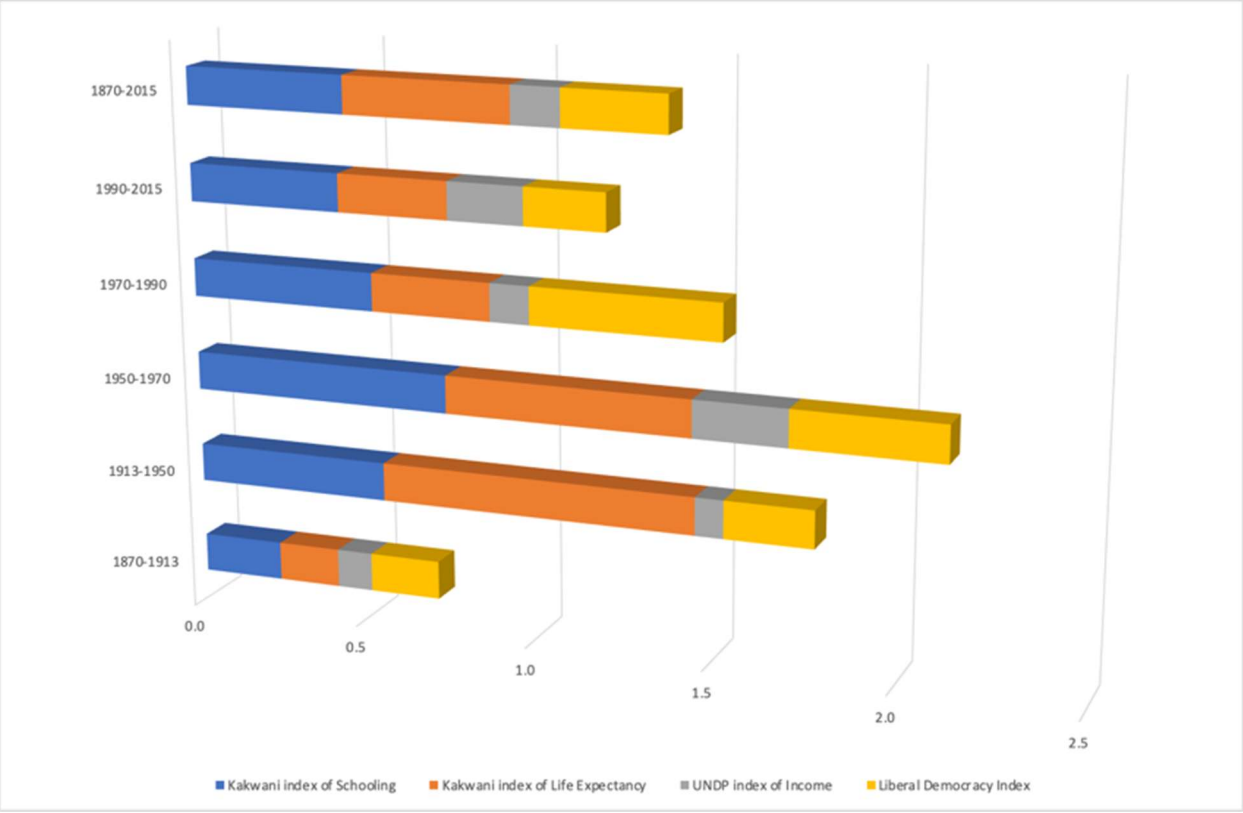


The renewed contribution of life expectancy to human development since 1990 is associated to a *second health transition* which has led to mortality falling among the elderly as a result of better treatment of respiratory and cardiovascular disease and vision problems, helped by better health and nutrition in their childhood (Eggleston and Fuchs, 2012; Deaton, 2013). The diffusion of new technologies has resulted in longer and healthier life years (Mathers *et al.*, 2001; Hay *et al.*, 2017).

[46] If instead of the Kakwani index the original values of life expectancy at birth are used, the association has a concave shape and the positive association experiences a reversal for social transfers above 25 per cent of GDP.

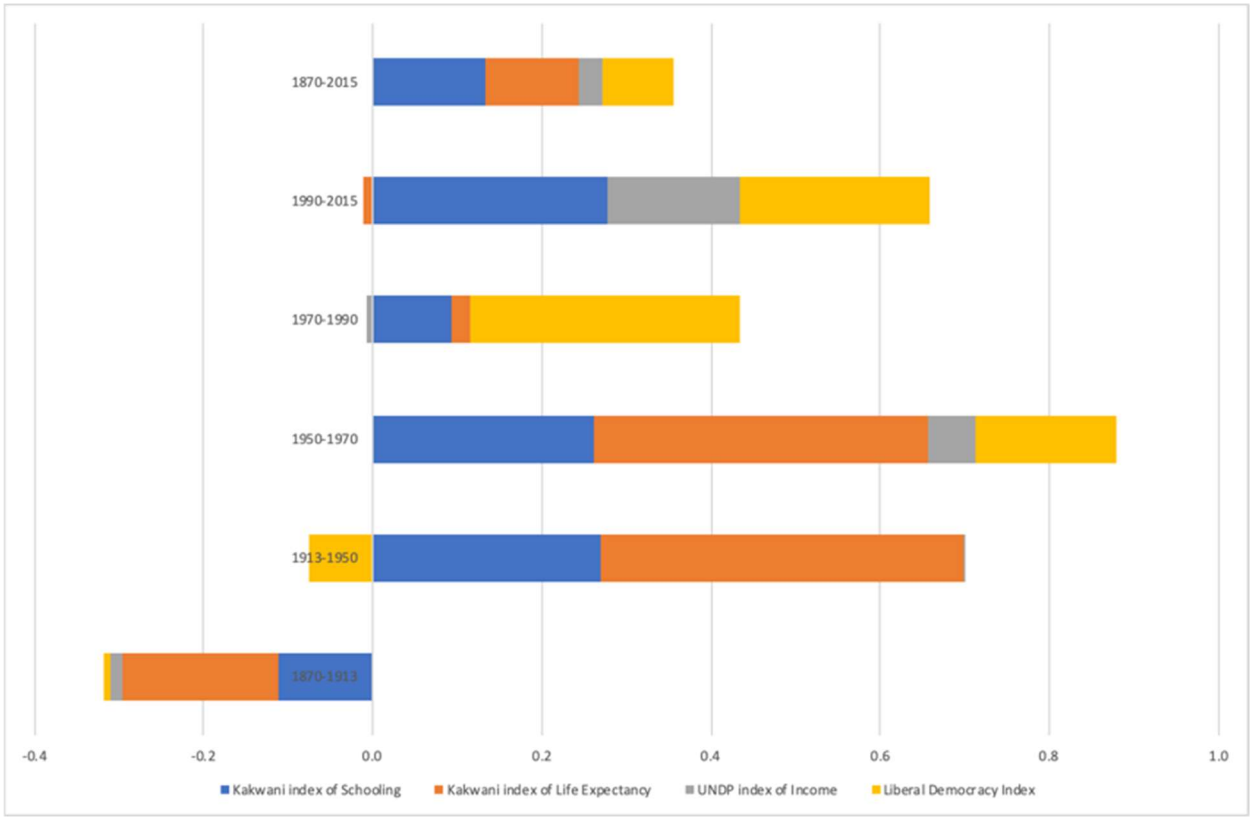
The contribution to human development progress from its different dimensions differed in the *Rest* from the *OECD* (Figure 18). Life expectancy was also its leading contributor over time, but almost on pair with schooling. Between 1914 and 1950 provided half the gains in human development (Table 10). The diffusion of the epidemiological transition had, therefore, an impact beyond the *OECD* earlier than has been presumed, a finding at odds with the view that health improvements outside the western world only took place after since the 1940s because the absence of drugs and the lack of concern of colonial rulers prevented it beforehand (Acemoglu and Johnson, 2007). A second episode of massive longevity contribution to human development happened in the 1960s. However, unlike in the OECD, longevity did not have a leading role in the *Rest* at the turn of the century, even though the recent increase in life expectancy opens new possibilities. Schooling contributed regularly to human development becoming its main driver during the late nineteenth century, the 1930s, 1970s, and 2000s, while democratization led human development gains in the 'long' decade up to World War I, the 1950s, and 1980-2000.

Figure 18. ***Drivers of Augmented Human Development in*** **The Rest*****, 1870-2015 (%)***



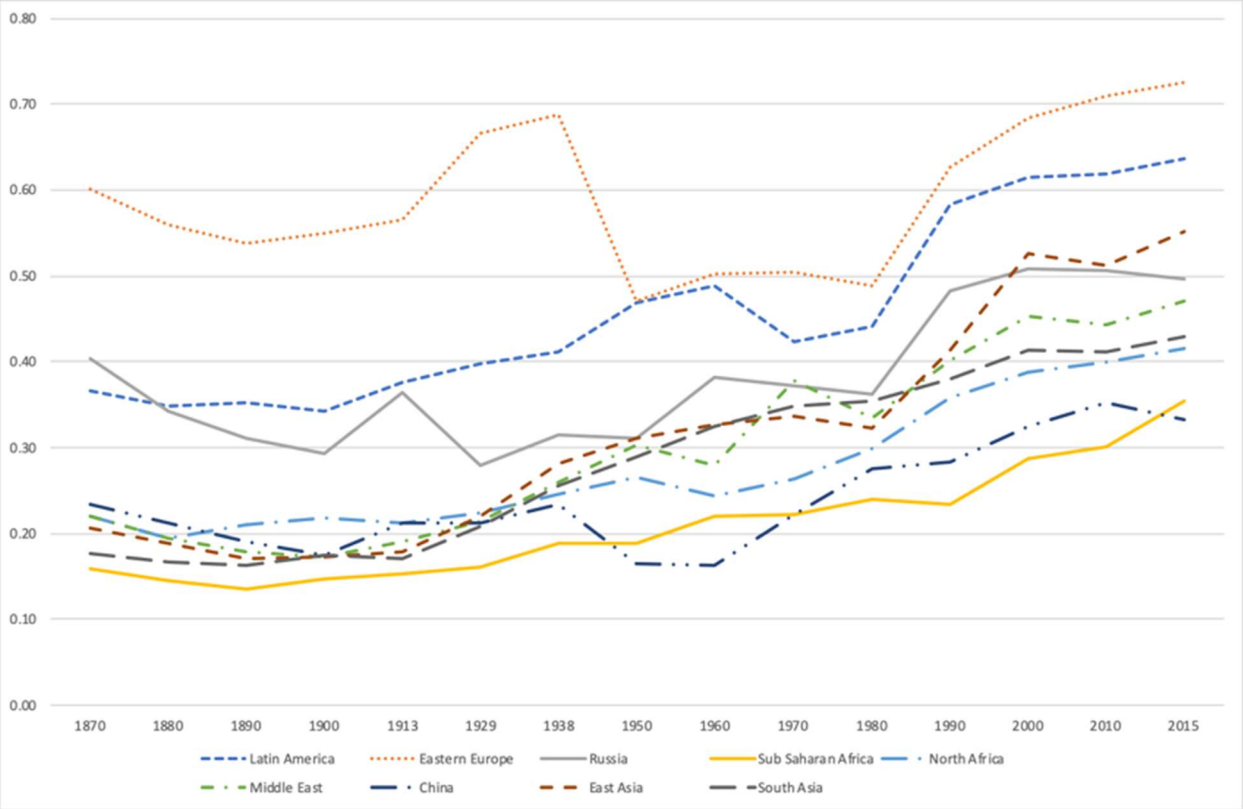
Catching up to the *OECD* in terms of human development -measured by its differential growth rate- has taken place in the *Rest* since 1900 and, especially, in the 1930s, the Golden Age (1950-70), and during the last two decades of the twentieth century, with education making the single most important contribution over the long run (Figure 19). Longevity emerges as the main dimension behind catching up in the early twentieth century, the 1920s particular, when a large proportion of the *Rest* was under colonial rule, and especially, in the 1960s, at the time of active public policies across the board and China's recovery from the Great Leap Forward debacle (Table 11). The fact that the *Rest* has not participated in the second health transition yet, along the AIDS-HIV pandemic in Sub Saharan Africa and the collapse of socialism in large areas of the world, help to explain life expectancy's negative contribution to catching up during 1990-2010. Political freedom was the leading force behind catching up prior to World War I, in the 1930s and 1950s, and over 1980-2000.

Figure 19. ***Augmented Human Development Catching-up in*** **The Rest** ***1870–2015 (%)***



A more nuanced perception of human development catching up in the *Rest* derives from comparing its regions performance relative the *OECD*. A wide variance is observed within a common tendency to catch up since 1900 (Figure 20). Four 'clubs' seem to have gradually emerged in the *Rest*. At the top, Eastern Europe and Latin America and at the bottom, China and Sub Saharan Africa, and, less neatly defined, East Asia and Russia in the second tier, and the Middle East, South Asia, and North Africa, in the third tier. Such a counterintuitive clustering requires a closer look at the main sources of catching up in the developing regions.

Figure 20. ***Augmented Human Development across Developing Regions (OECD = 1)***



A breakdown of catching up into its sources across the *Rest* regions for each of the main phases of human development performance is provided in Figures 21a-21e. In the late nineteenth and up to World War I, the relative position of the *Rest* vis-à-vis the *OECD* was, on average, falling behind largely as a result of life expectancy and schooling poorer performance. A regional breakdown confirms that with the exception of Latina America all regions in the *Rest* fell behind (Figure 21a).

Figure 21a. ***Augmented Human Development Catching-up in the Rest, 1870–1913 (%)***

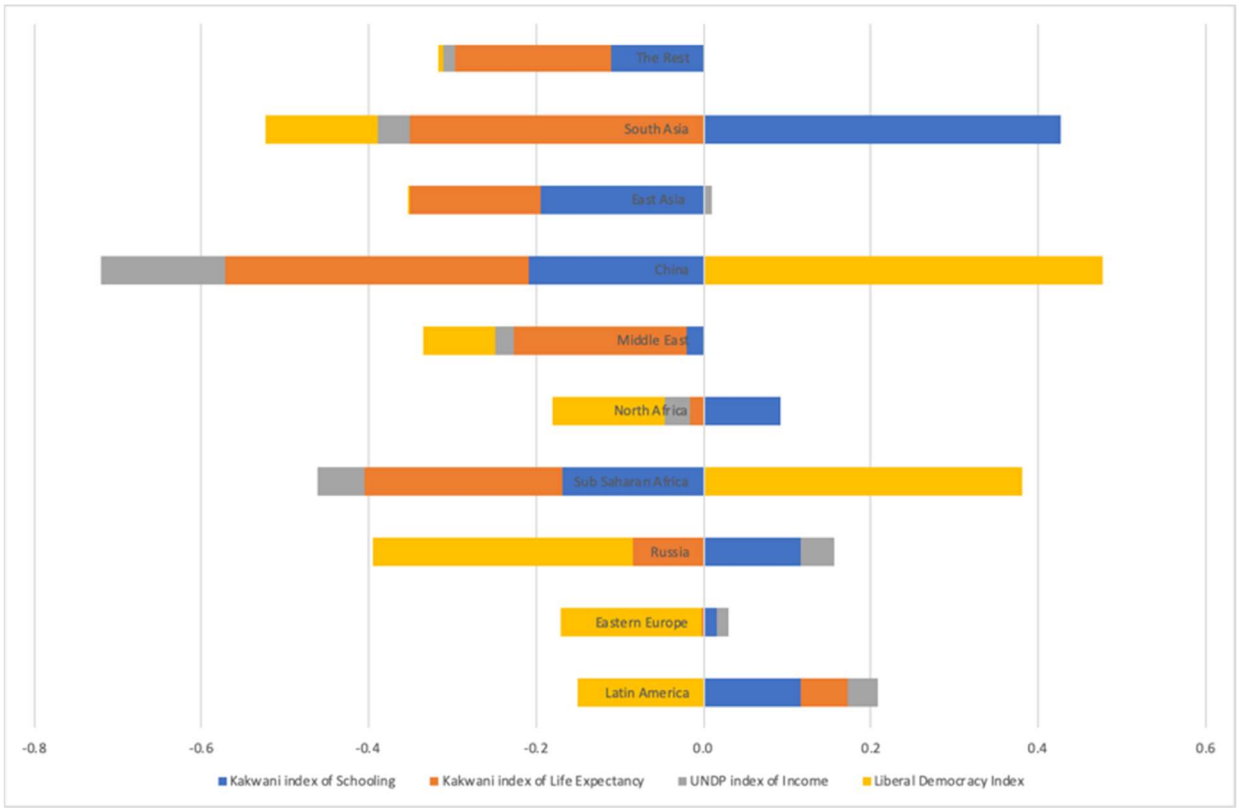
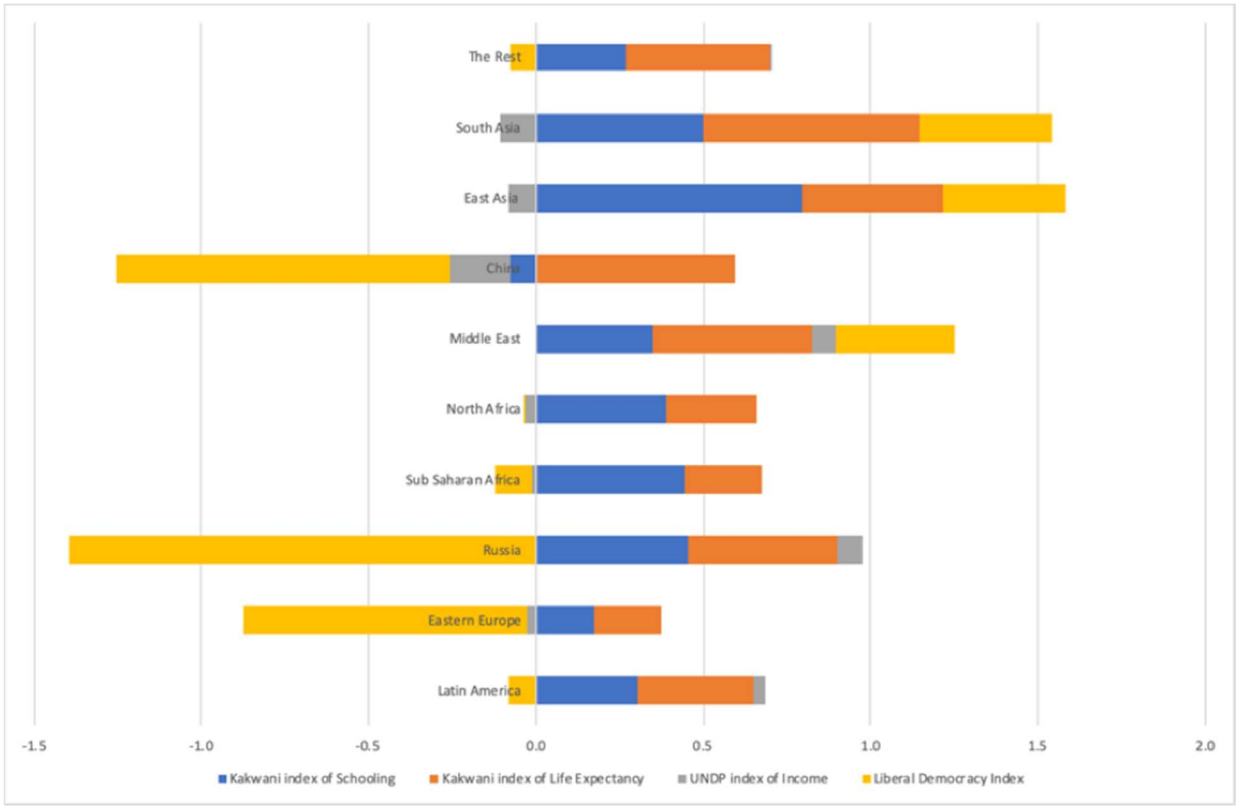


Figure 21b. ***Augmented Human Development Catching-up in the Rest, 1913-1950 (%)***



The period 1913-1950 represents, on average, a phase of moderate human development catching up, driven by longevity and, to less extent, education, just at the time of economic globalisation backlash. In the case of longevity, its catching up is associated to low-cost public health measures and the diffusion of hygienic practices that played a major role in eradicating communicable diseases -as sulphonamides and antibiotics remained largely inaccessible to low-income population-, contributing to the reduction of infant and maternal mortality and, hence, increasing life expectancy (Riley, 2001, 2005). The spread of mass primary education is behind the education catching up.

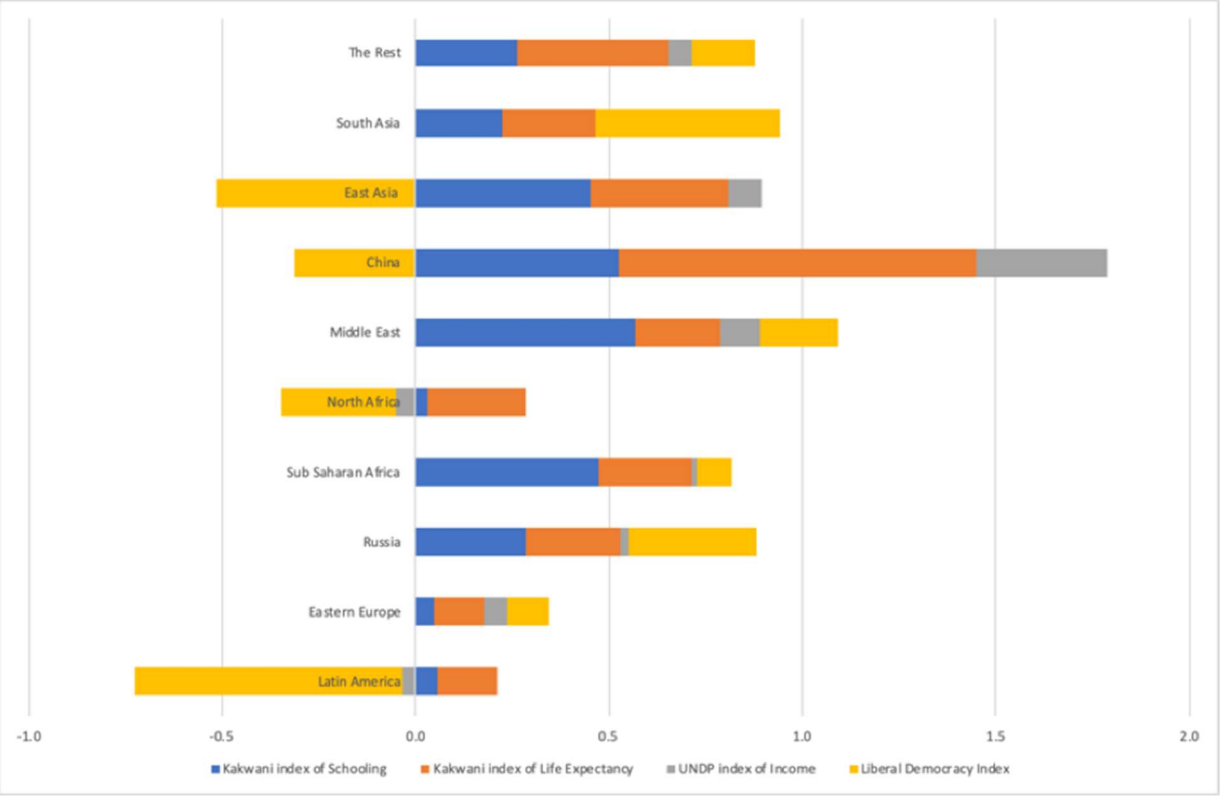
At regional level, catching up was widespread but for Eastern Europe, Russia, and China, which fell behind as political freedom collapsed under socialism (Figure 21b). Life expectancy and schooling were the main drivers of regional catching up and mitigated falling behind in China, Eastern Europe, and Russia. In Soviet Russia, the expansion of health care succeeded in fighting infectious disease and child mortality leading to increasing longevity (Brainerd and Cutler, 2005; Brainerd, 2010a). East and South Asia and the Middle East, helped by additional democratization gains, excelled in this period.

Catching up in the *Rest* intensified on average during the *Golden Age* (1950-1970) largely based on life expectancy and schooling. A mixed balance emerges, however, at regional level, with China, the Middle East, and Russia cutting distance to the *OECD*, and Latin America lagging behind (Figure 21c). Gains in life expectancy, especially, but also education and income, account for China's success. Lower restrictions to political freedom in South Asia and Russia, as a consequence of colonial independence and de-Stalinisation, respectively, also helped catching up, while the contraction in political liberties accounted for Latin America's falling behind. The modest contribution of life expectancy to catching up in Russia conceals an early phase of convergence up to the mid-1960s followed by another one of divergence provoked by the increase in male adult mortality as a consequence of cardiovascular diseases, deaths by accident, suicide, and alcoholism (Dutton, 1979).

Between the end of the *Golden Age* and the collapse of the Soviet Union catching up, on average, slowed down, but took place unevenly across the board (Figure 21d). North Africa's remarkable performance results from the relative advance

in education, particularly, and longevity. Spread of mass schooling also largely accounts for catching up in the Middle East and Sub Saharan Africa. In Latin America, Eastern Europe, and Russia democratization gains drove catching up. It is worth noting that life expectancy fell behind, rather than catching up, in Russia and Eastern Europe, prior to the demise of socialism.

Figure 21c. ***Augmented Human Development Catching-up, 1950–1970 (%)***



During the post-1990 era, stronger and more evenly distributed catching up has taken place in the *Rest* largely on the basis of education, although the spread of political freedom made a special contribution Sub Saharan Africa, East Asia, and Eastern Europe and income, to less extent, in China and South Asia (Figure 21e). In Russia and Eastern Europe life expectancy continued falling behind after the demise of socialism (Shkolnikov et al., 2001; Brainerd and Cutler, 2005; Brainerd, 2010b), though uneven recovery and catching up episodes have occurred in Central and Eastern Europe in the new century (Stillman, 2006; Gerry *et al.*, 2018).

Figure 21d. ***Augmented Human Development Catching-up, 1970–1990 (%)***

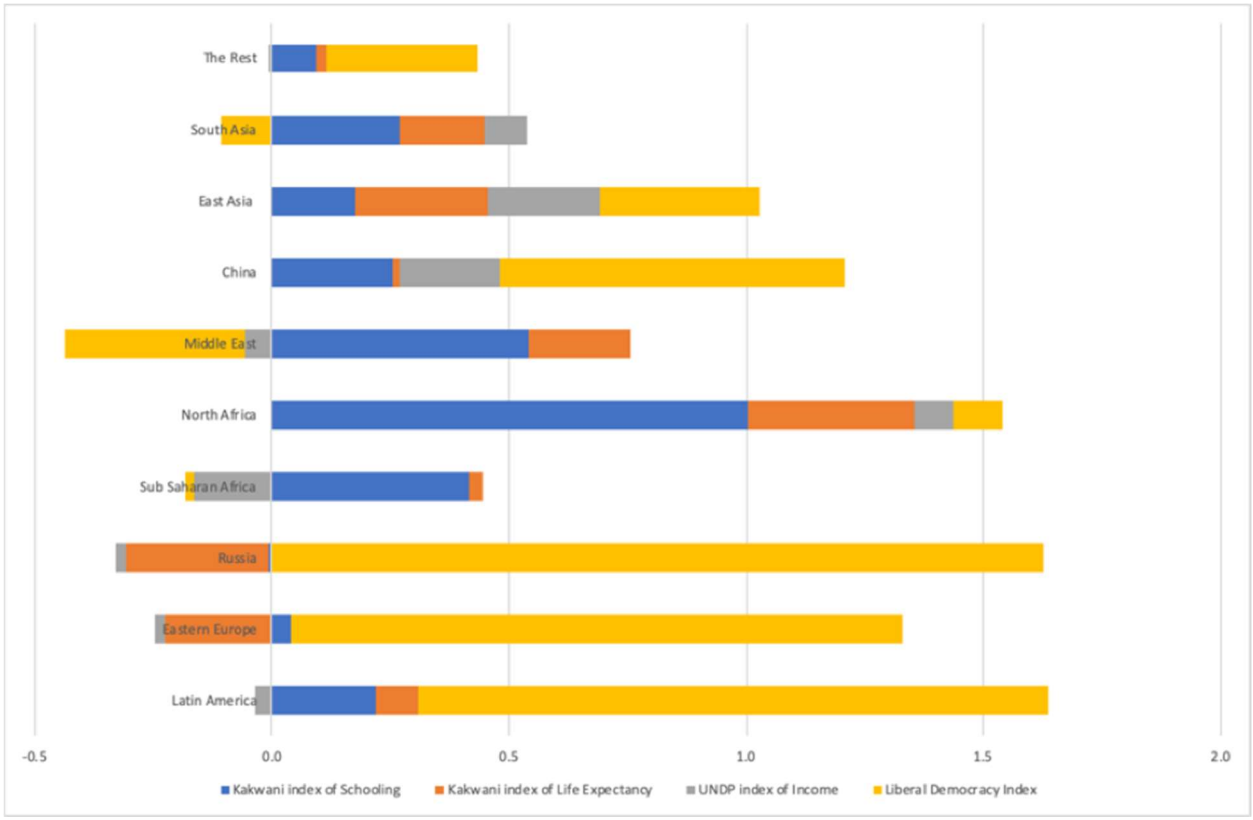
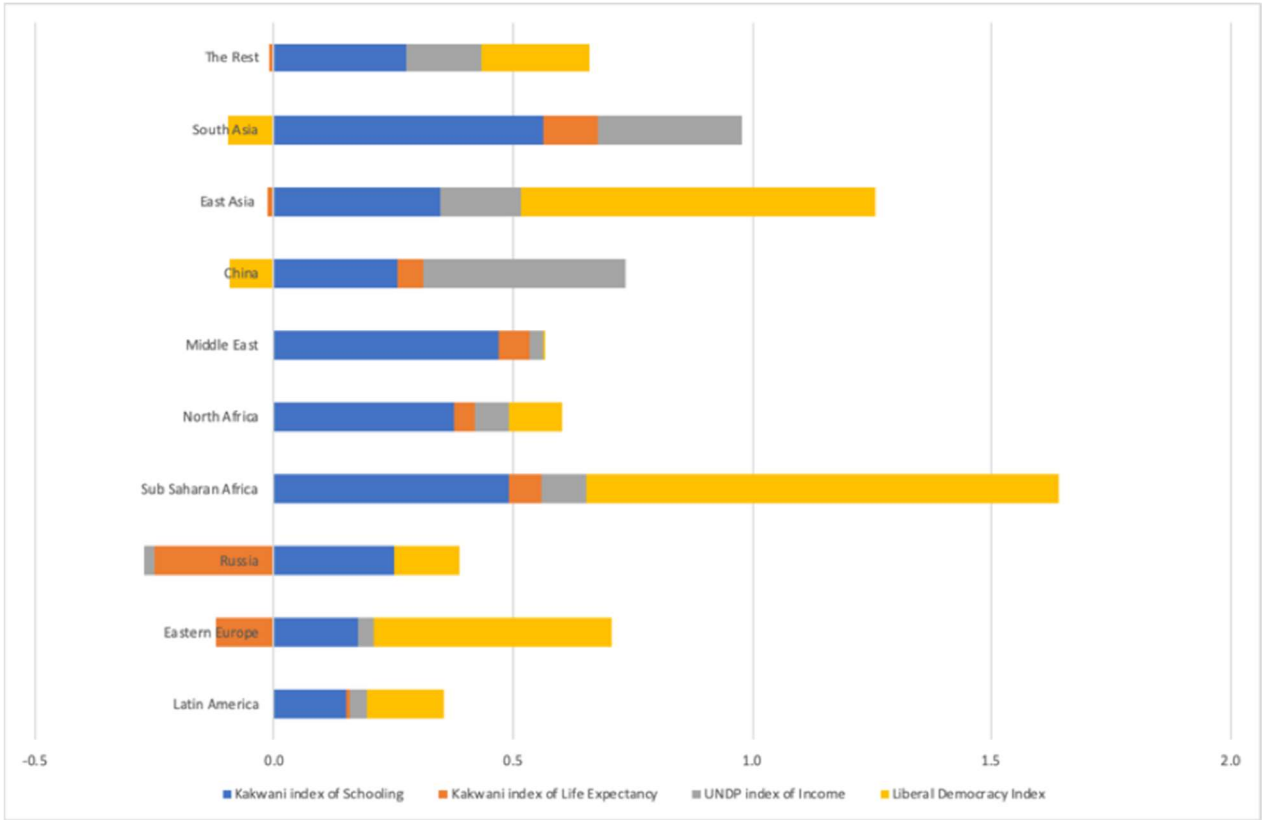


Figure 21e. ***Augmented Human Development Catching-up, 1990–2015 (%)***



Conclusions

This paper presents a long run view of human development as a capabilities measure of well-being over the last one and a half centuries on the basis of a new augmented index that adds liberal democracy to the conventional dimensions, longevity, education, and living standard.

World human development achieved substantial gains, especially over 1913-1970, but substantial room for improvement still exists. Longevity has been the leading force behind long run progress in human development even though its contribution weakened after 1970, once the epidemiological or health transition was exhausted, passing the lead to democratization. Human development advance was unevenly spread. The absolute gap between the *OECD* and the *Rest* of the world deepened over time, but the gap fell in relative terms, with life expectancy during the epidemiological transition, and, later, democratization, as its main drivers. This result compares favourably with the growing income gap until the end of the twentieth century.

This provides a development puzzle: economic growth and human development do not always go hand in hand even if increases in income per head contribute to better health and education. The spread of medical progress, especially, and public policies account for the mismatch. The major advance across the board in human development during the economic globalization backlash of 1914-1950 evidenced it.

A pressing question emerges as the paper closes, why a second health transition that would contribute to catching up has not begun yet in the *Rest*? Lack of public policies and the polarizing effect of new medical technologies are potential explanatory hypotheses that deserve further investigation.

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Table 1. Years of Schooling: UNDP and Kakwani Indices

Panel A. Levels

	Kakwani index	UNDP index
1870	0.032	0.084
1880	0.037	0.096
1890	0.042	0.108
1900	0.048	0.123
1913	0.055	0.138
1925	0.063	0.158
1929	0.070	0.173
1933	0.076	0.186
1938	0.081	0.198
1950	0.094	0.225
1955	0.104	0.245
1960	0.115	0.267
1965	0.127	0.291
1970	0.141	0.317
1975	0.153	0.340
1980	0.169	0.368
1985	0.184	0.392
1990	0.194	0.409
1995	0.212	0.436
2000	0.229	0.462
2005	0.244	0.483
2010	0.257	0.502
2015	0.274	0.524

Panel B. Growth Rates (%)

	Kakwani index	UNDP index
1870-1880	1.4	1.3
1880-1890	1.3	1.2
1890-1900	1.3	1.3
1900-1913	1.0	0.9
1913-1929	1.5	1.4
1929-1938	1.6	1.5
1938-1950	1.2	1.1
1950-1960	2.0	1.7
1960-1970	2.0	1.7
1970-1980	1.8	1.5
1980-1990	1.4	1.1
1990-2000	1.6	1.2
2000-2010	1.2	0.8
2010-2015	1.3	0.9
1870-2015	1.5	1.3
1870-1913	1.2	1.2
1913-1950	1.5	1.3
1950-1970	2.0	1.7
1970-1990	1.6	1.3
1990-2015	1.4	1.0

Table 2. Life expectancy at Birth: UNDP, Herrero et al., and Kakwani Indices

Panel A. Levels

	Kakwani index	UNDP index	Herrero *et al*. index
1870	0.033	0.128	0.334
1880	0.036	0.138	0.341
1890	0.039	0.151	0.351
1900	0.045	0.170	0.365
1913	0.053	0.198	0.387
1925	0.067	0.244	0.422
1929	0.081	0.286	0.454
1933	0.090	0.312	0.474
1938	0.098	0.335	0.492
1950	0.143	0.450	0.579
1955	0.161	0.490	0.610
1960	0.157	0.482	0.604
1965	0.200	0.565	0.668
1970	0.222	0.604	0.697
1975	0.240	0.633	0.719
1980	0.257	0.658	0.738
1985	0.271	0.677	0.753
1990	0.283	0.693	0.765
1995	0.294	0.707	0.776
2000	0.310	0.726	0.791
2005	0.325	0.742	0.803
2010	0.342	0.760	0.817
2015	0.380	0.796	0.844

Panel B. Growth Rates (%)

	Kakwani index	UNDP index	Herrero *et al*. index
1870-1880	0.8	0.7	0.2
1880-1890	1.0	0.9	0.3
1890-1900	1.3	1.2	0.4
1900-1913	1.3	1.2	0.4
1913-1929	2.7	2.3	1.0
1929-1938	2.1	1.8	0.9
1938-1950	3.2	2.5	1.4
1950-1960	1.0	0.7	0.4
1960-1970	3.4	2.3	1.4
1970-1980	1.5	0.8	0.6
1980-1990	1.0	0.5	0.4
1990-2000	0.9	0.5	0.3
2000-2010	1.0	0.5	0.3
2010-2015	2.1	0.9	0.7
1870-2015	1.7	1.3	0.6
1870-1913	1.1	1.0	0.3
1913-1950	2.7	2.2	1.1
1950-1970	2.2	1.5	0.9
1970-1990	1.2	0.7	0.5
1990-2015	1.2	0.6	0.4

Table 3. Income per Head: UNDP, Bértola-Vecchi, Herrero *et al*., and Zambrano Indices

Panel A. Levels

	UNDP index	Bértola-Vecchi index	Herrero et al. index	Zambrano index
1870	0.350	0.016	0.018	0.094
1880	0.368	0.018	0.020	0.102
1890	0.386	0.021	0.023	0.110
1900	0.408	0.024	0.026	0.121
1913	0.438	0.029	0.031	0.138
1925	0.450	0.032	0.034	0.145
1929	0.465	0.035	0.037	0.154
1933	0.444	0.031	0.033	0.141
1938	0.471	0.037	0.039	0.158
1950	0.496	0.043	0.045	0.174
1955	0.522	0.051	0.053	0.192
1960	0.540	0.057	0.059	0.206
1965	0.566	0.067	0.069	0.228
1970	0.589	0.078	0.080	0.248
1975	0.604	0.085	0.087	0.262
1980	0.619	0.094	0.096	0.277
1985	0.626	0.098	0.100	0.283
1990	0.638	0.106	0.108	0.296
1995	0.645	0.111	0.112	0.303
2000	0.663	0.124	0.126	0.323
2005	0.683	0.141	0.143	0.347
2010	0.702	0.158	0.160	0.371
2015	0.718	0.175	0.176	0.392

Panel B. Growth Rates (%)

World

	UNDP index	Bértola-Vecchi Index	Herrero *et al*. index	Zambrano index
1870-1880	0.5	1.2	1.1	0.8
1880-1890	0.5	1.2	1.1	0.8
1890-1900	0.6	1.5	1.4	1.0
1900-1913	0.5	1.5	1.4	1.0
1913-1929	0.4	1.1	1.0	0.7
1929-1938	0.2	0.5	0.4	0.3
1938-1950	0.4	1.3	1.3	0.8
1950-1960	0.9	2.8	2.7	1.7
1960-1970	0.9	3.1	3.0	1.9
1970-1980	0.5	1.9	1.8	1.1
1980-1990	0.3	1.2	1.1	0.7
1990-2000	0.4	1.6	1.5	0.9
2000-2010	0.6	2.5	2.4	1.4
2010-2015	0.4	1.9	1.9	1.1
1870-2015	0.5	1.6	1.6	1.0
1870-1913	0.5	1.4	1.3	0.9
1913-1950	0.3	1.0	1.0	0.6
1950-1970	0.9	3.0	2.9	1.8
1970-1990	0.4	1.5	1.5	0.9
1990-2015	0.5	2.0	2.0	1.1

Table 4. Liberal Democracy Index

Panel A. Levels

	Liberal Democracy Index
1870	0.093
1880	0.102
1890	0.105
1900	0.115
1913	0.137
1925	0.161
1929	0.154
1933	0.144
1938	0.143
1950	0.208
1955	0.257
1960	0.262
1965	0.265
1970	0.254
1975	0.225
1980	0.267
1985	0.277
1990	0.331
1995	0.366
2000	0.392
2005	0.390
2010	0.398
2015	0.374

Panel B. Growth Rates (%)

	Liberal Democracy Index
1870-1880	0.9
1880-1890	0.3
1890-1900	0.9
1900-1913	1.3
1913-1929	0.7
1929-1938	-0.9
1938-1950	3.2
1950-1960	2.3
1960-1970	-0.3
1970-1980	0.5
1980-1990	2.2
1990-2000	1.7
2000-2010	0.1
2010-2015	-1.2
1870-2015	1.0
1870-1913	0.9
1913-1950	1.1
1950-1970	1.0
1970-1990	1.3
1990-2015	0.5

Table 5. Augmented Human Development: Geometric and Arithmetic Indices

Panel A. Levels

	AHHDI	AHHDIa	AHHDI/AHHDIa
	Geometric Average	Arithmetic Average	Geom. Ave/Arith. Ave Ratio
1870	0.077	0.127	0.60
1880	0.084	0.136	0.62
1890	0.091	0.143	0.63
1900	0.100	0.154	0.65
1913	0.115	0.171	0.67
1925	0.132	0.185	0.71
1929	0.142	0.193	0.74
1933	0.144	0.188	0.77
1938	0.152	0.198	0.77
1950	0.193	0.235	0.82
1955	0.218	0.261	0.83
1960	0.225	0.269	0.84
1965	0.248	0.290	0.86
1970	0.262	0.302	0.87
1975	0.266	0.306	0.87
1980	0.291	0.328	0.89
1985	0.305	0.339	0.90
1990	0.328	0.361	0.91
1995	0.348	0.379	0.92
2000	0.369	0.399	0.92
2005	0.381	0.410	0.93
2010	0.396	0.425	0.93
2015	0.409	0.437	0.94

Panel B. Growth Rates (%)

	AHHDI	AHHDIa
	Geometric Average	Arithmetic Average
1870-1880	0.9	0.7
1880-1890	0.8	0.5
1890-1900	1.0	0.7
1900-1913	1.0	0.8
1913-1929	1.3	0.8
1929-1938	0.8	0.3
1938-1950	2.0	1.4
1950-1960	1.5	1.3
1960-1970	1.5	1.2
1970-1980	1.1	0.8
1980-1990	1.2	1.0
1990-2000	1.2	1.0
2000-2010	0.7	0.6
2010-2015	0.7	0.5
2000-2015	0.7	0.6
1870-2015	1.2	0.9
1870-1913	0.9	0.7
1913-1950	1.4	0.9
1950-1970	1.5	1.2
1970-1990	1.1	0.9
1990-2015	0.9	0.8

Table 6. Alternative Augmented Human Development Indices

Panel A. Levels

	AHHDI	*AHDI-un*	*AHDI-b-v*	*AHDI-h*	*AHDI-z*	*AHDI-bk*	*AHDI-zk*	*AHDI-hi*
1870	0.077	0.137	0.063	0.083	0.098	0.036	0.055	0.072
1880	0.084	0.149	0.071	0.091	0.108	0.040	0.061	0.079
1890	0.091	0.160	0.077	0.098	0.117	0.044	0.066	0.086
1900	0.100	0.177	0.087	0.108	0.131	0.049	0.074	0.093
1913	0.115	0.201	0.102	0.123	0.151	0.058	0.086	0.105
1925	0.132	0.230	0.119	0.138	0.173	0.068	0.100	0.116
1929	0.142	0.244	0.128	0.146	0.185	0.074	0.108	0.120
1933	0.144	0.247	0.127	0.143	0.185	0.074	0.108	0.117
1938	0.152	0.258	0.136	0.152	0.197	0.080	0.116	0.125
1950	0.193	0.320	0.173	0.187	0.246	0.105	0.149	0.153
1955	0.218	0.356	0.199	0.212	0.278	0.122	0.170	0.173
1960	0.225	0.367	0.209	0.223	0.289	0.128	0.177	0.183
1965	0.248	0.396	0.233	0.245	0.316	0.146	0.198	0.199
1970	0.262	0.412	0.248	0.259	0.332	0.158	0.211	0.210
1975	0.266	0.414	0.254	0.263	0.335	0.163	0.216	0.209
1980	0.291	0.447	0.279	0.289	0.365	0.182	0.238	0.235
1985	0.305	0.463	0.291	0.301	0.380	0.192	0.250	0.246
1990	0.328	0.495	0.316	0.325	0.408	0.209	0.271	0.265
1995	0.348	0.520	0.334	0.344	0.430	0.224	0.288	0.277
2000	0.369	0.543	0.357	0.366	0.454	0.242	0.308	0.290
2005	0.381	0.556	0.375	0.383	0.469	0.257	0.322	0.307
2010	0.396	0.571	0.394	0.402	0.487	0.273	0.338	0.331
2015	0.409	0.579	0.406	0.413	0.497	0.287	0.352	0.342

Panel B. Growth Rates (%)

	AHHDI	*AHDI-un*	*AHDI-b-v*	*AHDI-h*	*AHDI-z*	*AHDI-bk*	*AHDI-zk*	*AHDI-hi*
1870-1880	0.9	0.9	1.1	0.9	1.0	1.1	1.0	1.0
1880-1890	0.8	0.7	0.9	0.7	0.8	1.0	0.8	0.8
1890-1900	1.0	1.0	1.2	1.0	1.1	1.3	1.1	0.8
1900-1913	1.0	1.0	1.2	1.0	1.1	1.3	1.1	0.9
1913-1929	1.3	1.2	1.4	1.1	1.3	1.5	1.4	0.8
1929-1938	0.8	0.6	0.7	0.5	0.7	0.8	0.8	0.4
1938-1950	2.0	1.8	2.0	1.7	1.9	2.2	2.1	1.7
1950-1960	1.5	1.4	1.9	1.8	1.6	2.0	1.7	1.8
1960-1970	1.5	1.1	1.7	1.5	1.4	2.1	1.8	1.4
1970-1980	1.1	0.8	1.2	1.1	1.0	1.4	1.2	1.1
1980-1990	1.2	1.0	1.2	1.2	1.1	1.4	1.3	1.2
1990-2000	1.2	0.9	1.2	1.2	1.1	1.5	1.3	0.9
2000-2010	0.7	0.5	1.0	0.9	0.7	1.2	0.9	1.3
2010-2015	0.7	0.3	0.6	0.6	0.4	1.0	0.8	0.7
1870-2015	1.2	1.0	1.3	1.1	1.1	1.4	1.3	1.1
1870-1913	0.9	0.9	1.1	0.9	1.0	1.2	1.0	0.9
1913-1950	1.4	1.3	1.4	1.1	1.3	1.6	1.5	1.0
1950-1970	1.5	1.3	1.8	1.6	1.5	2.1	1.7	1.6
1970-1990	1.1	0.9	1.2	1.1	1.0	1.4	1.3	1.2
1990-2015	0.9	0.6	1.0	1.0	0.8	1.3	1.0	1.0

Table 7. Augmented Human Development Index and its Components: The World

Panel A. Levels

	AHHDI	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870	0.077	0.032	0.033	0.350	0.093
1880	0.084	0.037	0.036	0.368	0.102
1890	0.091	0.042	0.039	0.386	0.105
1900	0.100	0.048	0.045	0.408	0.115
1913	0.115	0.055	0.053	0.438	*0.137*
1925	0.132	0.063	0.067	0.450	*0.161*
1929	0.142	0.070	0.081	0.465	*0.154*
1933	0.144	0.076	0.090	0.444	*0.144*
1938	0.152	0.081	0.098	0.471	*0.143*
1950	0.193	0.094	0.143	0.496	*0.208*
1955	0.218	0.104	0.161	0.522	*0.257*
1960	0.225	0.115	0.157	0.540	*0.262*
1965	0.248	0.127	0.200	0.566	*0.265*
1970	0.262	0.141	0.222	0.589	*0.254*
1975	0.266	0.153	0.240	0.604	*0.225*
1980	0.291	0.169	0.257	0.619	*0.267*
1985	0.305	0.184	0.271	0.626	*0.277*
1990	0.328	0.194	0.283	0.638	0.331
1995	0.348	0.212	0.294	0.645	0.366
2000	0.369	0.229	0.310	0.663	0.392
2005	0.381	0.244	0.325	0.683	0.390
2010	0.396	0.257	0.342	0.702	0.398
2015	0.409	0.274	0.380	0.718	0.374

Panel B. Growth Rates (%)

	AHHDI	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	0.9	1.4	0.8	0.5	0.9
1880-1890	0.8	1.3	1.0	0.5	0.3
1890-1900	1.0	1.3	1.3	0.6	0.9
1900-1913	1.0	1.0	1.3	0.5	1.3
1913-1929	1.3	1.5	2.7	0.4	0.7
1929-1938	0.8	1.6	2.1	0.2	-0.9
1938-1950	2.0	1.2	3.2	0.4	3.2
1950-1960	1.5	2.0	1.0	0.9	2.3
1960-1970	1.5	2.0	3.4	0.9	-0.3
1970-1980	1.1	1.8	1.5	0.5	0.5
1980-1990	1.2	1.4	1.0	0.3	2.2
1990-2000	1.2	1.6	0.9	0.4	1.7
2000-2010	0.7	1.2	1.0	0.6	0.1
2010-2015	0.7	1.3	2.1	0.4	-1.2
1870-2015	1.2	1.5	1.7	0.5	1.0
1870-1913	0.9	1.2	1.1	0.5	0.9
1913-1950	1.4	1.5	2.7	0.3	1.1
1950-1970	1.5	2.0	2.2	0.9	1.0
1970-1990	1.1	1.6	1.2	0.4	1.3
1990-2015	0.9	1.4	1.2	0.5	0.5

Panel C. Breakdown of Dimensions' Contribution to *AHHDI* Growth (%)

	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	0.3	0.2	0.1	0.2
1880-1890	0.3	0.2	0.1	0.1
1890-1900	0.3	0.3	0.1	0.2
1900-1913	0.2	0.3	0.1	0.3
1913-1929	0.4	0.7	0.1	0.2
1929-1938	0.4	0.5	0.0	-0.2
1938-1950	0.3	0.8	0.1	0.8
1950-1960	0.5	0.2	0.2	0.6
1960-1970	0.5	0.9	0.2	-0.1
1970-1980	0.5	0.4	0.1	0.1
1980-1990	0.3	0.2	0.1	0.5
1990-2000	0.4	0.2	0.1	0.4
2000-2010	0.3	0.2	0.1	0.0
2010-2015	0.3	0.5	0.1	-0.3
1870-2015	0.4	0.4	0.1	0.2
1870-1913	0.3	0.3	0.1	0.2
1913-1950	0.4	0.7	0.1	0.3
1950-1970	0.5	0.5	0.2	0.2
1970-1990	0.4	0.3	0.1	0.3
1990-2015	0.3	0.3	0.1	0.1

Table 8. Augmented Human Development across World Regions, 1870-2015.

Panel A. Levels

	Latin America	East Europe	Russia	SS Africa	North Africa	Middle East	China	East Asia	South Asia	Japan	West Offshoots	West Europe
1870	0.063	0.103	0.069	0.027	0.038	0.038	0.040	0.035	0.030	0.087	0.239	0.168
1880	0.067	0.108	0.066	0.028	0.038	0.037	0.041	0.036	0.032	0.095	0.238	0.194
1890	0.075	0.115	0.066	0.029	0.045	0.038	0.041	0.036	0.035	0.116	0.265	0.213
1900	0.081	0.130	0.070	0.035	0.052	0.041	0.041	0.041	0.042	0.139	0.301	0.232
1913	0.100	0.151	0.097	0.041	0.056	0.051	0.056	0.048	0.045	0.172	0.331	0.260
1925	0.122	0.219	0.084	0.047	0.067	0.060	0.049	0.064	0.060	0.191	0.382	0.301
1929	0.127	0.212	0.089	0.051	0.071	0.068	0.067	0.070	0.066	0.209	0.387	0.308
1933	0.125	0.213	0.094	0.054	0.074	0.074	0.074	0.079	0.071	0.216	0.398	0.301
1938	0.133	0.223	0.102	0.061	0.079	0.084	0.076	0.091	0.082	0.223	0.415	0.300
1950	0.192	0.192	0.127	0.077	0.109	0.124	0.068	0.127	0.118	0.304	0.469	0.399
1955	0.202	0.212	0.161	0.089	0.103	0.140	0.084	0.149	0.143	0.419	0.490	0.422
1960	0.230	0.237	0.181	0.104	0.116	0.132	0.077	0.154	0.153	0.465	0.507	0.448
1965	0.224	0.256	0.189	0.116	0.131	0.166	0.108	0.158	0.169	0.498	0.530	0.472
1970	0.222	0.265	0.195	0.117	0.138	0.198	0.117	0.176	0.183	0.546	0.556	0.497
1975	0.240	0.281	0.200	0.121	0.154	0.221	0.125	0.185	0.176	0.575	0.598	0.526
1980	0.263	0.292	0.216	0.143	0.178	0.200	0.165	0.193	0.211	0.610	0.634	0.569
1985	0.316	0.302	0.228	0.139	0.212	0.238	0.179	0.211	0.227	0.656	0.660	0.596
1990	0.382	0.410	0.316	0.153	0.234	0.263	0.185	0.270	0.249	0.675	0.692	0.622
1995	0.405	0.461	0.377	0.186	0.250	0.289	0.212	0.295	0.270	0.719	0.712	0.647
2000	0.433	0.481	0.358	0.202	0.273	0.319	0.229	0.370	0.292	0.749	0.731	0.673
2005	0.458	0.513	0.352	0.214	0.289	0.342	0.245	0.392	0.305	0.779	0.748	0.696
2010	0.471	0.539	0.385	0.230	0.305	0.337	0.268	0.389	0.313	0.815	0.793	0.727
2015	0.480	0.545	0.373	0.266	0.313	0.354	0.250	0.415	0.323	0.803	0.776	0.729

Panel B. Growth Rate (%)

	Latin America	East Europe	Russia	SS Africa	North Africa	Middle East	China	East Asia	South Asia	Japan	West Offshoots	West Europe
1870-1880	0.7	0.5	-0.4	0.3	0.0	-0.1	0.2	0.3	0.6	0.9	0.0	1.5
1880-1890	1.1	0.6	0.1	0.3	1.8	0.1	0.0	0.0	0.7	2.0	1.0	0.9
1890-1900	0.8	1.3	0.5	2.0	1.4	0.7	0.2	1.2	1.8	1.8	1.3	0.9
1900-1913	1.6	1.1	2.5	1.2	0.7	1.7	2.4	1.2	0.6	1.6	0.7	0.9
1913-1929	1.5	2.1	-0.6	1.4	1.5	1.8	1.1	2.4	2.4	1.2	1.0	1.1
1929-1938	0.5	0.5	1.5	2.0	1.2	2.3	1.3	2.9	2.5	0.7	0.8	-0.3
1938-1950	3.1	-1.2	1.9	1.9	2.6	3.3	-0.9	2.8	3.0	2.6	1.0	2.4
1950-1960	1.8	2.1	3.5	3.0	0.6	0.6	1.2	1.9	2.6	4.3	0.8	1.2
1960-1970	-0.4	1.1	0.8	1.2	1.8	4.1	4.2	1.3	1.8	1.6	0.9	1.1
1970-1980	1.7	1.0	1.0	2.0	2.6	0.1	3.4	0.9	1.5	1.1	1.3	1.4
1980-1990	3.7	3.4	3.8	0.7	2.7	2.7	1.2	3.4	1.6	1.0	0.9	0.9
1990-2000	1.3	1.6	1.3	2.8	1.5	1.9	2.1	3.2	1.6	1.0	0.5	0.8
2000-2010	0.8	1.1	0.7	1.3	1.1	0.5	1.6	0.5	0.7	0.8	0.8	0.8
2010-2015	0.4	0.2	-0.6	2.9	0.5	1.0	-1.4	1.3	0.6	-0.3	-0.4	0.0
1870-2015	1.4	1.2	1.2	1.6	1.5	1.5	1.3	1.7	1.6	1.5	0.8	1.0
1870-1913	1.1	0.9	0.8	1.0	0.9	0.7	0.8	0.7	0.9	1.6	0.8	1.0
1913-1950	1.8	0.7	0.7	1.7	1.8	2.4	0.5	2.7	2.6	1.5	0.9	1.2
1950-1970	0.7	1.6	2.1	2.1	1.2	2.3	2.7	1.6	2.2	2.9	0.9	1.1
1970-1990	2.7	2.2	2.4	1.4	2.6	1.4	2.3	2.1	1.5	1.1	1.1	1.1
1990-2015	0.9	1.1	0.7	2.2	1.2	1.2	1.2	1.7	1.0	0.7	0.5	0.6

Table 9. Augmented Human Development Index and its Components: *OECD*

Panel A. Levels

	AHHDI	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870	0.171	0.097	0.079	0.478	0.233
1880	0.192	0.115	0.085	0.502	0.278
1890	0.213	0.135	0.101	0.523	0.289
1900	0.237	0.154	0.118	0.549	0.317
1913	0.266	0.176	0.147	0.584	0.334
1925	0.310	0.206	0.181	0.603	0.408
1929	0.318	0.218	0.188	0.619	0.404
1933	0.318	0.229	0.208	0.590	0.364
1938	0.324	0.240	0.218	0.622	0.337
1950	0.409	0.268	0.295	0.655	0.540
1955	0.447	0.292	0.329	0.686	0.602
1960	0.472	0.322	0.345	0.708	0.630
1965	0.496	0.353	0.362	0.742	0.640
1970	0.525	0.395	0.376	0.773	0.663
1975	0.558	0.435	0.403	0.791	0.701
1980	0.598	0.477	0.432	0.814	0.762
1985	0.627	0.518	0.460	0.829	0.785
1990	0.655	0.561	0.486	0.851	0.790
1995	0.680	0.606	0.509	0.861	0.805
2000	0.704	0.629	0.549	0.882	0.807
2005	0.726	0.663	0.589	0.894	0.794
2010	0.761	0.699	0.643	0.895	0.834
2015	0.753	0.661	0.675	0.903	0.796

Panel B. Growth Rates (%)

	AHHDI	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	1.2	1.7	0.8	0.5	1.7
1880-1890	1.0	1.6	1.7	0.4	0.4
1890-1900	1.1	1.3	1.6	0.5	0.9
1900-1913	0.9	1.0	1.7	0.5	0.4
1913-1929	1.1	1.3	1.5	0.4	1.2
1929-1938	0.2	1.1	1.6	0.0	-2.0
1938-1950	2.0	0.9	2.5	0.4	3.9
1950-1960	1.4	1.8	1.6	0.8	1.6
1960-1970	1.1	2.0	0.8	0.9	0.5
1970-1980	1.3	1.9	1.4	0.5	1.4
1980-1990	0.9	1.6	1.2	0.4	0.4
1990-2000	0.7	1.1	1.2	0.4	0.2
2000-2010	0.8	1.1	1.6	0.1	0.3
2010-2015	-0.2	-1.1	1.0	0.2	-0.9
1870-2015	1.0	1.3	1.5	0.4	0.8
1870-1913	1.0	1.4	1.5	0.5	0.8
1913-1950	1.2	1.1	1.9	0.3	1.3
1950-1970	1.3	1.9	1.2	0.8	1.0
1970-1990	1.1	1.8	1.3	0.5	0.9
1990-2015	0.6	0.7	1.3	0.2	0.0

Panel C. Breakdown of Dimensions' Contribution to *AHHDI* Growth (%)

	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	0.4	0.2	0.1	0.4
1880-1890	0.4	0.4	0.1	0.1
1890-1900	0.3	0.4	0.1	0.2
1900-1913	0.2	0.4	0.1	0.1
1913-1929	0.3	0.4	0.1	0.3
1929-1938	0.3	0.4	0.0	-0.5
1938-1950	0.2	0.6	0.1	1.0
1950-1960	0.5	0.4	0.2	0.4
1960-1970	0.5	0.2	0.2	0.1
1970-1980	0.5	0.4	0.1	0.3
1980-1990	0.4	0.3	0.1	0.1
1990-2000	0.3	0.3	0.1	0.1
2000-2010	0.3	0.4	0.0	0.1
2010-2015	-0.3	0.2	0.0	-0.2
1870-2015	0.3	0.4	0.1	0.2
1870-1913	0.3	0.4	0.1	0.2
1913-1950	0.3	0.5	0.1	0.3
1950-1970	0.5	0.3	0.2	0.3
1970-1990	0.4	0.3	0.1	0.2
1990-2015	0.2	0.3	0.1	0.0

Table 10. Augmented Human Development Index and its Components: The *Rest*

Panel A. Levels

	AHHDI	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870	**0.049**	0.016	0.022	0.293	0.056
1880	**0.051**	0.018	0.023	0.301	0.053
1890	**0.053**	0.019	0.024	0.314	0.053
1900	**0.057**	0.022	0.027	0.328	0.056
1913	**0.067**	0.024	0.030	0.349	*0.080*
1925	**0.078**	0.029	0.041	0.350	*0.089*
1929	**0.087**	0.035	0.056	0.364	*0.081*
1933	**0.093**	0.040	0.063	0.359	*0.081*
1938	**0.103**	0.046	0.072	0.381	*0.089*
1950	**0.130**	0.056	0.113	0.392	*0.115*
1955	**0.155**	0.065	0.130	0.417	*0.165*
1960	**0.162**	0.075	0.126	0.437	*0.167*
1965	**0.186**	0.087	0.172	0.461	*0.174*
1970	**0.199**	0.101	0.197	0.484	*0.161*
1975	**0.198**	0.113	0.216	0.504	*0.124*
1980	**0.227**	0.130	0.233	0.521	*0.169*
1985	**0.243**	0.146	0.248	0.527	*0.184*
1990	**0.269**	0.155	0.260	0.529	0.248
1995	**0.293**	0.172	0.271	0.540	0.292
2000	**0.316**	0.191	0.287	0.560	0.324
2005	**0.331**	0.206	0.301	0.595	0.326
2010	**0.348**	0.220	0.317	0.633	0.331
2015	**0.364**	0.241	0.357	0.657	0.313

Panel B. Growth Rates (%)

	AHHDI	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	0.3	0.8	0.6	0.3	-0.5
1880-1890	0.4	0.8	0.3	0.4	0.0
1890-1900	0.8	1.3	1.0	0.4	0.6
1900-1913	1.2	0.9	0.9	0.5	2.6
1913-1929	1.6	2.3	3.9	0.3	0.2
1929-1938	1.8	2.9	2.8	0.5	1.0
1938-1950	1.9	1.6	3.8	0.2	2.1
1950-1960	2.2	3.0	1.1	1.1	3.8
1960-1970	2.0	2.9	4.5	1.0	-0.4
1970-1980	1.4	2.5	1.7	0.7	0.5
1980-1990	1.7	1.7	1.1	0.2	3.8
1990-2000	1.6	2.1	1.0	0.6	2.7
2000-2010	1.0	1.4	1.0	1.2	0.2
2010-2015	0.9	1.8	2.3	0.8	-1.1
1870-2015	1.4	1.9	1.9	0.6	1.2
1870-1913	0.7	0.9	0.7	0.4	0.8
1913-1950	1.8	2.2	3.6	0.3	1.0
1950-1970	2.1	3.0	2.8	1.1	1.7
1970-1990	1.5	2.1	1.4	0.4	2.2
1990-2015	1.2	1.8	1.3	0.9	0.9

Panel C. Breakdown of Dimensions' Contribution to *AHHDI* Growth (%)

	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	0.2	0.1	0.1	-0.1
1880-1890	0.2	0.1	0.1	0.0
1890-1900	0.3	0.2	0.1	0.1
1900-1913	0.2	0.2	0.1	0.7
1913-1929	0.6	1.0	0.1	0.0
1929-1938	0.7	0.7	0.1	0.2
1938-1950	0.4	0.9	0.1	0.5
1950-1960	0.8	0.3	0.3	0.9
1960-1970	0.7	1.1	0.3	-0.1
1970-1980	0.6	0.4	0.2	0.1
1980-1990	0.4	0.3	0.0	1.0
1990-2000	0.5	0.2	0.1	0.7
2000-2010	0.4	0.3	0.3	0.1
2010-2015	0.4	0.6	0.2	-0.3
1870-2015	0.5	0.5	0.1	0.3
1870-1913	0.2	0.2	0.1	0.2
1913-1950	0.6	0.9	0.1	0.2
1950-1970	0.7	0.7	0.3	0.4
1970-1990	0.5	0.3	0.1	0.5
1990-2015	0.4	0.3	0.2	0.2

Table 11. *AHHDI* Catching Up in The *Rest*: Dimensions' Contribution

	Kakwani index of Schooling	Kakwani index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	-0.2	-0.1	-0.1	-0.6
1880-1890	-0.2	-0.3	0.0	-0.1
1890-1900	0.0	-0.1	0.0	-0.1
1900-1913	0.0	-0.2	0.0	0.6
1913-1929	0.2	0.6	0.0	-0.3
1929-1938	0.5	0.3	0.1	0.7
1938-1950	0.2	0.3	-0.1	-0.4
1950-1960	0.3	-0.1	0.1	0.6
1960-1970	0.2	0.9	0.0	-0.2
1970-1980	0.2	0.1	0.1	-0.2
1980-1990	0.0	0.0	-0.1	0.9
1990-2000	0.2	-0.1	0.1	0.6
2000-2010	0.1	-0.1	0.3	0.0
2010-2015	0.7	0.3	0.1	0.0
1870-2015	0.1	0.1	0.0	0.1
1870-1913	-0.1	-0.2	0.0	0.0
1913-1950	0.3	0.4	0.0	-0.1
1950-1970	0.3	0.4	0.1	0.2
1970-1990	0.1	0.0	0.0	0.3
1990-2015	0.3	0.0	0.2	0.2

Appendix A.

Table A1. Augmented Human Development Index and its Components: *AHDI-un*

Panel A. Levels

	AHDI-un	UNDP index of Schooling	UNDP index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870	0.137	0.084	0.128	0.350	0.093
1880	0.149	0.096	0.138	0.368	0.102
1890	0.160	0.108	0.151	0.386	0.105
1900	0.177	0.123	0.170	0.408	0.115
1913	0.201	0.138	0.198	0.438	*0.137*
1925	0.230	0.158	0.244	0.450	*0.161*
1929	0.244	0.173	0.286	0.465	*0.154*
1933	0.247	0.186	0.312	0.444	*0.144*
1938	0.258	0.198	0.335	0.471	*0.143*
1950	0.320	0.225	0.450	0.496	*0.208*
1955	0.356	0.245	0.490	0.522	*0.257*
1960	0.367	0.267	0.482	0.540	*0.262*
1965	0.396	0.291	0.565	0.566	*0.265*
1970	0.412	0.317	0.604	0.589	*0.254*
1975	0.414	0.340	0.633	0.604	*0.225*
1980	0.447	0.368	0.658	0.619	*0.267*
1985	0.463	0.392	0.677	0.626	*0.277*
1990	0.495	0.409	0.693	0.638	0.331
1995	0.520	0.436	0.707	0.645	0.366
2000	0.543	0.462	0.726	0.663	0.392
2005	0.556	0.483	0.742	0.683	0.390
2010	0.571	0.502	0.760	0.702	0.398
2015	0.579	0.524	0.796	0.718	0.374

Panel B. Growth Rates (%)

	AHDI-un	UNDP index of Schooling	UNDP index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	0.9	1.3	0.7	0.5	0.9
1880-1890	0.7	1.2	0.9	0.5	0.3
1890-1900	1.0	1.3	1.2	0.6	0.9
1900-1913	1.0	0.9	1.2	0.5	1.3
1913-1929	1.2	1.4	2.3	0.4	0.7
1929-1938	0.6	1.5	1.8	0.2	-0.9
1938-1950	1.8	1.1	2.5	0.4	3.2
1950-1960	1.4	1.7	0.7	0.9	2.3
1960-1970	1.1	1.7	2.3	0.9	-0.3
1970-1980	0.8	1.5	0.8	0.5	0.5
1980-1990	1.0	1.1	0.5	0.3	2.2
1990-2000	0.9	1.2	0.5	0.4	1.7
2000-2010	0.5	0.8	0.5	0.6	0.1
2010-2015	0.3	0.9	0.9	0.4	-1.2
1870-2015	1.0	1.3	1.3	0.5	1.0
1870-1913	0.9	1.2	1.0	0.5	0.9
1913-1950	1.3	1.3	2.2	0.3	1.1
1950-1970	1.3	1.7	1.5	0.9	1.0
1970-1990	0.9	1.3	0.7	0.4	1.3
1990-2015	0.6	1.0	0.6	0.5	0.5

Panel C. Breakdown of Dimensions' Contribution to *AHDI-un* Growth (%)

	UNDP index of Schooling	UNDP index of Life Expectancy	UNDP index of Income	Liberal Democracy Index
1870-1880	0.3	0.2	0.1	0.2
1880-1890	0.3	0.2	0.1	0.1
1890-1900	0.3	0.3	0.1	0.2
1900-1913	0.2	0.3	0.1	0.3
1913-1929	0.4	0.6	0.1	0.2
1929-1938	0.4	0.4	0.0	-0.2
1938-1950	0.3	0.6	0.1	0.8
1950-1960	0.4	0.2	0.2	0.6
1960-1970	0.4	0.6	0.2	-0.1
1970-1980	0.4	0.2	0.1	0.1
1980-1990	0.3	0.1	0.1	0.5
1990-2000	0.3	0.1	0.1	0.4
2000-2010	0.2	0.1	0.1	0.0
2010-2015	0.2	0.2	0.1	-0.3
1870-2015	0.3	0.3	0.1	0.2
1870-1913	0.3	0.3	0.1	0.2
1913-1950	0.3	0.6	0.1	0.3
1950-1970	0.4	0.4	0.2	0.2
1970-1990	0.3	0.2	0.1	0.3
1990-2015	0.2	0.1	0.1	0.1

Table A2. Augmented Human Development Index and its Components: *AHDI-z*

Panel A. Levels

	AHDI-z	UNDP index of Schooling	UNDP index of Life Expectancy	Zambrano index of Income	Liberal Democracy Index
1870	0.098	0.084	0.128	0.094	0.093
1880	0.108	0.096	0.138	0.102	0.102
1890	0.117	0.108	0.151	0.110	0.105
1900	0.131	0.123	0.170	0.121	0.115
1913	0.151	0.138	0.198	0.138	*0.137*
1925	0.173	0.158	0.244	0.145	*0.161*
1929	0.185	0.173	0.286	0.154	*0.154*
1933	0.185	0.186	0.312	0.141	*0.144*
1938	0.197	0.198	0.335	0.158	*0.143*
1950	0.246	0.225	0.450	0.174	*0.208*
1955	0.278	0.245	0.490	0.192	*0.257*
1960	0.289	0.267	0.482	0.206	*0.262*
1965	0.316	0.291	0.565	0.228	*0.265*
1970	0.332	0.317	0.604	0.248	*0.254*
1975	0.335	0.340	0.633	0.262	*0.225*
1980	0.365	0.368	0.658	0.277	*0.267*
1985	0.380	0.392	0.677	0.283	*0.277*
1990	0.408	0.409	0.693	0.296	0.331
1995	0.430	0.436	0.707	0.303	0.366
2000	0.454	0.462	0.726	0.323	0.392
2005	0.469	0.483	0.742	0.347	0.390
2010	0.487	0.502	0.760	0.371	0.398
2015	0.497	0.524	0.796	0.392	0.374

Panel B. Growth Rates (%)

	AHDI-z	UNDP index of Schooling	UNDP index of Life Expectancy	Zambrano index of Income	Liberal Democracy Index
1870-1880	1.0	1.3	0.7	0.8	0.9
1880-1890	0.8	1.2	0.9	0.8	0.3
1890-1900	1.1	1.3	1.2	1.0	0.9
1900-1913	1.1	0.9	1.2	1.0	1.3
1913-1929	1.3	1.4	2.3	0.7	0.7
1929-1938	0.7	1.5	1.8	0.3	-0.9
1938-1950	1.9	1.1	2.5	0.8	3.2
1950-1960	1.6	1.7	0.7	1.7	2.3
1960-1970	1.4	1.7	2.3	1.9	-0.3
1970-1980	1.0	1.5	0.8	1.1	0.5
1980-1990	1.1	1.1	0.5	0.7	2.2
1990-2000	1.1	1.2	0.5	0.9	1.7
2000-2010	0.7	0.8	0.5	1.4	0.1
2010-2015	0.4	0.9	0.9	1.1	-1.2
1870-2015	1.1	1.3	1.3	1.0	1.0
1870-1913	1.0	1.2	1.0	0.9	0.9
1913-1950	1.3	1.3	2.2	0.6	1.1
1950-1970	1.5	1.7	1.5	1.8	1.0
1970-1990	1.0	1.3	0.7	0.9	1.3
1990-2015	0.8	1.0	0.6	1.1	0.5

Panel C. Breakdown of Dimensions' Contribution to *AHDI-z* Growth (%)

	UNDP index of Schooling	UNDP index of Life Expectancy	Zambrano index of Income	Liberal Democracy Index
1870-1880	0.3	0.2	0.2	0.2
1880-1890	0.3	0.2	0.2	0.1
1890-1900	0.3	0.3	0.2	0.2
1900-1913	0.2	0.3	0.2	0.3
1913-1929	0.4	0.6	0.2	0.2
1929-1938	0.4	0.4	0.1	-0.2
1938-1950	0.3	0.6	0.2	0.8
1950-1960	0.4	0.2	0.4	0.6
1960-1970	0.4	0.6	0.5	-0.1
1970-1980	0.4	0.2	0.3	0.1
1980-1990	0.3	0.1	0.2	0.5
1990-2000	0.3	0.1	0.2	0.4
2000-2010	0.2	0.1	0.3	0.0
2010-2015	0.2	0.2	0.3	-0.3
1870-2015	0.3	0.3	0.2	0.2
1870-1913	0.3	0.3	0.2	0.2
1913-1950	0.3	0.6	0.2	0.3
1950-1970	0.4	0.4	0.4	0.2
1970-1990	0.3	0.2	0.2	0.3
1990-2015	0.2	0.1	0.3	0.1

Table A3. Augmented Human Development Index and its Components: *AHDI-b-v*

Panel A. Levels

	AHDI-b	UNDP index of Schooling	UNDP index of Life Expectancy	Bértola et al. index of Income	Liberal Democracy Index
1870	0.063	0.084	0.128	0.016	0.093
1880	0.071	0.096	0.138	0.018	0.102
1890	0.077	0.108	0.151	0.021	0.105
1900	0.087	0.123	0.170	0.024	0.115
1913	0.102	0.138	0.198	0.029	*0.137*
1925	0.119	0.158	0.244	0.032	*0.161*
1929	0.128	0.173	0.286	0.035	*0.154*
1933	0.127	0.186	0.312	0.031	*0.144*
1938	0.136	0.198	0.335	0.037	*0.143*
1950	0.173	0.225	0.450	0.043	*0.208*
1955	0.199	0.245	0.490	0.051	*0.257*
1960	0.209	0.267	0.482	0.057	*0.262*
1965	0.233	0.291	0.565	0.067	*0.265*
1970	0.248	0.317	0.604	0.078	*0.254*
1975	0.254	0.340	0.633	0.085	*0.225*
1980	0.279	0.368	0.658	0.094	*0.267*
1985	0.291	0.392	0.677	0.098	*0.277*
1990	0.316	0.409	0.693	0.106	0.331
1995	0.334	0.436	0.707	0.111	0.366
2000	0.357	0.462	0.726	0.124	0.392
2005	0.375	0.483	0.742	0.141	0.390
2010	0.394	0.502	0.760	0.158	0.398
2015	0.406	0.524	0.796	0.175	0.374

Panel B. Growth Rates (%)

	AHDI-b	UNDP index of Schooling	UNDP index of Life Expectancy	Bértola et al. index of Income	Liberal Democracy Index
1870-1880	1.1	1.3	0.7	1.2	0.9
1880-1890	0.9	1.2	0.9	1.2	0.3
1890-1900	1.2	1.3	1.2	1.5	0.9
1900-1913	1.2	0.9	1.2	1.5	1.3
1913-1929	1.4	1.4	2.3	1.1	0.7
1929-1938	0.7	1.5	1.8	0.5	-0.9
1938-1950	2.0	1.1	2.5	1.3	3.2
1950-1960	1.9	1.7	0.7	2.8	2.3
1960-1970	1.7	1.7	2.3	3.1	-0.3
1970-1980	1.2	1.5	0.8	1.9	0.5
1980-1990	1.2	1.1	0.5	1.2	2.2
1990-2000	1.2	1.2	0.5	1.6	1.7
2000-2010	1.0	0.8	0.5	2.5	0.1
2010-2015	0.6	0.9	0.9	1.9	-1.2
1870-2015	1.3	1.3	1.3	1.6	1.0
1870-1913	1.1	1.2	1.0	1.4	0.9
1913-1950	1.4	1.3	2.2	1.0	1.1
1950-1970	1.8	1.7	1.5	3.0	1.0
1970-1990	1.2	1.3	0.7	1.5	1.3
1990-2015	1.0	1.0	0.6	2.0	0.5

Panel C. Breakdown of Dimensions' Contribution to *AHDI-b-v* Growth (%)

	UNDP index of Schooling	UNDP index of Life Expectancy	Bértola et al. index of Income	Liberal Democracy Index
1870-1880	0.3	0.2	0.3	0.2
1880-1890	0.3	0.2	0.3	0.1
1890-1900	0.3	0.3	0.4	0.2
1900-1913	0.2	0.3	0.4	0.3
1913-1929	0.4	0.6	0.3	0.2
1929-1938	0.4	0.4	0.1	-0.2
1938-1950	0.3	0.6	0.3	0.8
1950-1960	0.4	0.2	0.7	0.6
1960-1970	0.4	0.6	0.8	-0.1
1970-1980	0.4	0.2	0.5	0.1
1980-1990	0.3	0.1	0.3	0.5
1990-2000	0.3	0.1	0.4	0.4
2000-2010	0.2	0.1	0.6	0.0
2010-2015	0.2	0.2	0.5	-0.3
1870-2015	0.3	0.3	0.4	0.2
1870-1913	0.3	0.3	0.3	0.2
1913-1950	0.3	0.6	0.3	0.3
1950-1970	0.4	0.4	0.7	0.2
1970-1990	0.3	0.2	0.4	0.3
1990-2015	0.2	0.1	0.5	0.1

Table A4. Augmented Human Development Index and its Components: *AHDI-h*

Panel A. Levels

	AHDI-h	UNDP index of Schooling	Herrero et al. index of Life Expectancy	Herrero et al. index of Income	Liberal Democracy Index
1870	0.083	0.084	0.334	0.018	0.093
1880	0.091	0.096	0.341	0.020	0.102
1890	0.098	0.108	0.351	0.023	0.105
1900	0.108	0.123	0.365	0.026	0.115
1913	0.123	0.138	0.387	0.031	*0.137*
1925	0.138	0.158	0.422	0.034	*0.161*
1929	0.146	0.173	0.454	0.037	*0.154*
1933	0.143	0.186	0.474	0.033	*0.144*
1938	0.152	0.198	0.492	0.039	*0.143*
1950	0.187	0.225	0.579	0.045	*0.208*
1955	0.212	0.245	0.610	0.053	*0.257*
1960	0.223	0.267	0.604	0.059	*0.262*
1965	0.245	0.291	0.668	0.069	*0.265*
1970	0.259	0.317	0.697	0.080	*0.254*
1975	0.263	0.340	0.719	0.087	*0.225*
1980	0.289	0.368	0.738	0.096	*0.267*
1985	0.301	0.392	0.753	0.100	*0.277*
1990	0.325	0.409	0.765	0.108	0.331
1995	0.344	0.436	0.776	0.112	0.366
2000	0.366	0.462	0.791	0.126	0.392
2005	0.383	0.483	0.803	0.143	0.390
2010	0.402	0.502	0.817	0.160	0.398
2015	0.413	0.524	0.844	0.176	0.374

Panel B. Growth Rates (%)

	AHDI-h	UNDP index of Schooling	Herrero et al. index of Life Expectancy	Herrero et al. index of Income	Liberal Democracy Index
1870-1880	0.9	1.3	0.2	1.1	0.9
1880-1890	0.7	1.2	0.3	1.1	0.3
1890-1900	1.0	1.3	0.4	1.4	0.9
1900-1913	1.0	0.9	0.4	1.4	1.3
1913-1929	1.1	1.4	1.0	1.0	0.7
1929-1938	0.5	1.5	0.9	0.4	-0.9
1938-1950	1.7	1.1	1.4	1.3	3.2
1950-1960	1.8	1.7	0.4	2.7	2.3
1960-1970	1.5	1.7	1.4	3.0	-0.3
1970-1980	1.1	1.5	0.6	1.8	0.5
1980-1990	1.2	1.1	0.4	1.1	2.2
1990-2000	1.2	1.2	0.3	1.5	1.7
2000-2010	0.9	0.8	0.3	2.4	0.1
2010-2015	0.6	0.9	0.7	1.9	-1.2
1870-2015	1.1	1.3	0.6	1.6	1.0
1870-1913	0.9	1.2	0.3	1.3	0.9
1913-1950	1.1	1.3	1.1	1.0	1.1
1950-1970	1.6	1.7	0.9	2.9	1.0
1970-1990	1.1	1.3	0.5	1.5	1.3
1990-2015	1.0	1.0	0.4	2.0	0.5

Panel C. Breakdown of Dimensions' Contribution to *AHDI-h* Growth (%)

	UNDP index of Schooling	Herrero et al. index of Life Expectancy	Herrero et al. index of Income	Liberal Democracy Index
1870-1880	0.3	0.1	0.3	0.2
1880-1890	0.3	0.1	0.3	0.1
1890-1900	0.3	0.1	0.3	0.2
1900-1913	0.2	0.1	0.4	0.3
1913-1929	0.4	0.3	0.3	0.2
1929-1938	0.4	0.2	0.1	-0.2
1938-1950	0.3	0.3	0.3	0.8
1950-1960	0.4	0.1	0.7	0.6
1960-1970	0.4	0.4	0.8	-0.1
1970-1980	0.4	0.1	0.5	0.1
1980-1990	0.3	0.1	0.3	0.5
1990-2000	0.3	0.1	0.4	0.4
2000-2010	0.2	0.1	0.6	0.0
2010-2015	0.2	0.2	0.5	-0.3
1870-2015	0.3	0.2	0.4	0.2
1870-1913	0.3	0.1	0.3	0.2
1913-1950	0.3	0.3	0.2	0.3
1950-1970	0.4	0.2	0.7	0.2
1970-1990	0.3	0.1	0.4	0.3
1990-2015	0.2	0.1	0.5	0.1

Table A5. Augmented Human Development Index and its Components: *AHDI-bk*

Panel A. Levels

	AHDI-bk	Kakwani index of Schooling	Kakwani index of Life Expectancy	Bértola et al. index of Income	Liberal Democracy Index
1870	0.036	0.032	0.033	0.016	0.093
1880	0.040	0.037	0.036	0.018	0.102
1890	0.044	0.042	0.039	0.021	0.105
1900	0.049	0.048	0.045	0.024	0.115
1913	0.058	0.055	0.053	0.029	*0.137*
1925	0.068	0.063	0.067	0.032	*0.161*
1929	0.074	0.070	0.081	0.035	*0.154*
1933	0.074	0.076	0.090	0.031	*0.144*
1938	0.080	0.081	0.098	0.037	*0.143*
1950	0.105	0.094	0.143	0.043	*0.208*
1955	0.122	0.104	0.161	0.051	*0.257*
1960	0.128	0.115	0.157	0.057	*0.262*
1965	0.146	0.127	0.200	0.067	*0.265*
1970	0.158	0.141	0.222	0.078	*0.254*
1975	0.163	0.153	0.240	0.085	*0.225*
1980	0.182	0.169	0.257	0.094	*0.267*
1985	0.192	0.184	0.271	0.098	*0.277*
1990	0.209	0.194	0.283	0.106	0.331
1995	0.224	0.212	0.294	0.111	0.366
2000	0.242	0.229	0.310	0.124	0.392
2005	0.257	0.244	0.325	0.141	0.390
2010	0.273	0.257	0.342	0.158	0.398
2015	0.287	0.274	0.380	0.175	0.374

Panel B. Growth Rates (%)

	AHDI-bk	Kakwani index of Schooling	Kakwani index of Life Expectancy	Bértola et al. index of Income	Liberal Democracy Index
1870-1880	1.1	1.4	0.8	1.2	0.9
1880-1890	1.0	1.3	1.0	1.2	0.3
1890-1900	1.3	1.3	1.3	1.5	0.9
1900-1913	1.3	1.0	1.3	1.5	1.3
1913-1929	1.5	1.5	2.7	1.1	0.7
1929-1938	0.8	1.6	2.1	0.5	-0.9
1938-1950	2.2	1.2	3.2	1.3	3.2
1950-1960	2.0	2.0	1.0	2.8	2.3
1960-1970	2.1	2.0	3.4	3.1	-0.3
1970-1980	1.4	1.8	1.5	1.9	0.5
1980-1990	1.4	1.4	1.0	1.2	2.2
1990-2000	1.5	1.6	0.9	1.6	1.7
2000-2010	1.2	1.2	1.0	2.5	0.1
2010-2015	1.0	1.3	2.1	1.9	-1.2
1870-2015	1.4	1.5	1.7	1.6	1.0
1870-1913	1.2	1.2	1.1	1.4	0.9
1913-1950	1.6	1.5	2.7	1.0	1.1
1950-1970	2.1	2.0	2.2	3.0	1.0
1970-1990	1.4	1.6	1.2	1.5	1.3
1990-2015	1.3	1.4	1.2	2.0	0.5

Panel C. Breakdown of Dimensions' Contribution to *AHDI-bk* Growth (%)

	Kakwani index of Schooling	Kakwani index of Life Expectancy	Bértola et al. index of Income	Liberal Democracy Index
1870-1880	0.3	0.2	0.3	0.2
1880-1890	0.3	0.2	0.3	0.1
1890-1900	0.3	0.3	0.4	0.2
1900-1913	0.2	0.3	0.4	0.3
1913-1929	0.4	0.7	0.3	0.2
1929-1938	0.4	0.5	0.1	-0.2
1938-1950	0.3	0.8	0.3	0.8
1950-1960	0.5	0.2	0.7	0.6
1960-1970	0.5	0.9	0.8	-0.1
1970-1980	0.5	0.4	0.5	0.1
1980-1990	0.3	0.2	0.3	0.5
1990-2000	0.4	0.2	0.4	0.4
2000-2010	0.3	0.2	0.6	0.0
2010-2015	0.3	0.5	0.5	-0.3
1870-2015	0.4	0.4	0.4	0.2
1870-1913	0.3	0.3	0.3	0.2
1913-1950	0.4	0.7	0.3	0.3
1950-1970	0.5	0.5	0.7	0.2
1970-1990	0.4	0.3	0.4	0.3
1990-2015	0.3	0.3	0.5	0.1

Table A6. Augmented Human Development Index and its Components: *AHDI-zk*

Panel A. Levels

	AHDI-zk	Kakwani index of Schooling	Kakwani index of Life Expectancy	Zambrano index of Income	Liberal Democracy Index
1870	0.055	0.032	0.033	0.094	0.093
1880	0.061	0.037	0.036	0.102	0.102
1890	0.066	0.042	0.039	0.110	0.105
1900	0.074	0.048	0.045	0.121	0.115
1913	0.086	0.055	0.053	0.138	*0.137*
1925	0.100	0.063	0.067	0.145	*0.161*
1929	0.108	0.070	0.081	0.154	*0.154*
1933	0.108	0.076	0.090	0.141	*0.144*
1938	0.116	0.081	0.098	0.158	*0.143*
1950	0.149	0.094	0.143	0.174	*0.208*
1955	0.170	0.104	0.161	0.192	*0.257*
1960	0.177	0.115	0.157	0.206	*0.262*
1965	0.198	0.127	0.200	0.228	*0.265*
1970	0.211	0.141	0.222	0.248	*0.254*
1975	0.216	0.153	0.240	0.262	*0.225*
1980	0.238	0.169	0.257	0.277	*0.267*
1985	0.250	0.184	0.271	0.283	*0.277*
1990	0.271	0.194	0.283	0.296	0.331
1995	0.288	0.212	0.294	0.303	0.366
2000	0.308	0.229	0.310	0.323	0.392
2005	0.322	0.244	0.325	0.347	0.390
2010	0.338	0.257	0.342	0.371	0.398
2015	0.352	0.274	0.380	0.392	0.374

Panel B. Growth Rates (%)

	AHDI-zk	Kakwani index of Schooling	Kakwani index of Life Expectancy	Zambrano index of Income	Liberal Democracy Index
1870-1880	1.0	1.4	0.8	0.8	0.9
1880-1890	0.8	1.3	1.0	0.8	0.3
1890-1900	1.1	1.3	1.3	1.0	0.9
1900-1913	1.1	1.0	1.3	1.0	1.3
1913-1929	1.4	1.5	2.7	0.7	0.7
1929-1938	0.8	1.6	2.1	0.3	-0.9
1938-1950	2.1	1.2	3.2	0.8	3.2
1950-1960	1.7	2.0	1.0	1.7	2.3
1960-1970	1.8	2.0	3.4	1.9	-0.3
1970-1980	1.2	1.8	1.5	1.1	0.5
1980-1990	1.3	1.4	1.0	0.7	2.2
1990-2000	1.3	1.6	0.9	0.9	1.7
2000-2010	0.9	1.2	1.0	1.4	0.1
2010-2015	0.8	1.3	2.1	1.1	-1.2
1870-2015	1.3	1.5	1.7	1.0	1.0
1870-1913	1.0	1.2	1.1	0.9	0.9
1913-1950	1.5	1.5	2.7	0.6	1.1
1950-1970	1.7	2.0	2.2	1.8	1.0
1970-1990	1.3	1.6	1.2	0.9	1.3
1990-2015	1.0	1.4	1.2	1.1	0.5

Panel C. Breakdown of Dimensions' Contribution to *AHDI-zk* Growth (%)

	Kakwani index of Schooling	Kakwani index of Life Expectancy	Zambrano index of Income	Liberal Democracy Index
1870-1880	0.3	0.2	0.2	0.2
1880-1890	0.3	0.2	0.2	0.1
1890-1900	0.3	0.3	0.2	0.2
1900-1913	0.2	0.3	0.2	0.3
1913-1929	0.4	0.7	0.2	0.2
1929-1938	0.4	0.5	0.1	-0.2
1938-1950	0.3	0.8	0.2	0.8
1950-1960	0.5	0.2	0.4	0.6
1960-1970	0.5	0.9	0.5	-0.1
1970-1980	0.5	0.4	0.3	0.1
1980-1990	0.3	0.2	0.2	0.5
1990-2000	0.4	0.2	0.2	0.4
2000-2010	0.3	0.2	0.3	0.0
2010-2015	0.3	0.5	0.3	-0.3
2000-2015	0.3	0.3	0.3	-0.1
1870-2015	0.4	0.4	0.2	0.2
1870-1913	0.3	0.3	0.2	0.2
1913-1950	0.4	0.7	0.2	0.3
1950-1970	0.5	0.5	0.4	0.2
1970-1990	0.4	0.3	0.2	0.3
1990-2015	0.3	0.3	0.3	0.1

Table A7. Augmented Human Development Index and its Components: *AHDI-hi*

Panel A. Levels

	AHDI-hi	UNDP index of Schooling	Herrero et al. index of Life Expectancy	Herrero et al. Index of Inequality-adjusted Income	Liberal Democracy Index
1870	0.072	0.084	0.334	0.010	0.093
1880	0.079	0.096	0.341	0.012	0.102
1890	0.086	0.108	0.351	0.014	0.105
1900	0.093	0.123	0.365	0.015	0.115
1913	0.105	0.138	0.387	0.017	*0.137*
1925	0.116	0.158	0.422	0.017	*0.161*
1929	0.120	0.173	0.454	0.017	*0.154*
1933	0.117	0.186	0.474	0.015	*0.144*
1938	0.125	0.198	0.492	0.018	*0.143*
1950	0.153	0.225	0.579	0.020	*0.208*
1955	0.173	0.245	0.610	0.024	*0.257*
1960	0.183	0.267	0.604	0.026	*0.262*
1965	0.199	0.291	0.668	0.031	*0.265*
1970	0.210	0.317	0.697	0.035	*0.254*
1975	0.209	0.340	0.719	0.035	*0.225*
1980	0.235	0.368	0.738	0.042	*0.267*
1985	0.246	0.392	0.753	0.045	*0.277*
1990	0.265	0.409	0.765	0.048	0.331
1995	0.277	0.436	0.776	0.048	0.366
2000	0.290	0.462	0.791	0.049	0.392
2005	0.307	0.483	0.803	0.059	0.390
2010	0.331	0.502	0.817	0.073	0.398
2015	0.342	0.524	0.844	0.083	0.374

Panel B. Growth Rates (%)

	AHDI-hi	UNDP index of Schooling	Herrero et al. index of Life Expectancy	Herrero et al. Index of Inequality-adjusted Income	Liberal Democracy Index
1870-1880	1.0	1.3	0.2	1.5	0.9
1880-1890	0.8	1.2	0.3	1.4	0.3
1890-1900	0.8	1.3	0.4	0.7	0.9
1900-1913	0.9	0.9	0.4	0.9	1.3
1913-1929	0.8	1.4	1.0	0.2	0.7
1929-1938	0.4	1.5	0.9	0.2	-0.9
1938-1950	1.7	1.1	1.4	1.1	3.2
1950-1960	1.8	1.7	0.4	2.8	2.3
1960-1970	1.4	1.7	1.4	2.7	-0.3
1970-1980	1.1	1.5	0.6	1.8	0.5
1980-1990	1.2	1.1	0.4	1.4	2.2
1990-2000	0.9	1.2	0.3	0.3	1.7
2000-2010	1.3	0.8	0.3	4.0	0.1
2010-2015	0.7	0.9	0.7	2.5	-1.2
1870-2015	1.1	1.3	0.6	1.4	1.0
1870-1913	0.9	1.2	0.3	1.1	0.9
1913-1950	1.0	1.3	1.1	0.5	1.1
1950-1970	1.6	1.7	0.9	2.8	1.0
1970-1990	1.2	1.3	0.5	1.6	1.3
1990-2015	1.0	1.0	0.4	2.2	0.5

Panel C. Breakdown of Dimensions' Contribution to *AHDI-hi* Growth (%)

	UNDP index of Schooling	Herrero et al. index of Life Expectancy	Herrero et al. Index of Inequality-adjusted Income	Liberal Democracy Index
1870-1880	0.3	0.1	0.4	0.2
1880-1890	0.3	0.1	0.4	0.1
1890-1900	0.3	0.1	0.2	0.2
1900-1913	0.2	0.1	0.2	0.3
1913-1929	0.4	0.3	0.1	0.2
1929-1938	0.4	0.2	0.1	-0.2
1938-1950	0.3	0.3	0.3	0.8
1950-1960	0.4	0.1	0.7	0.6
1960-1970	0.4	0.4	0.7	-0.1
1970-1980	0.4	0.1	0.5	0.1
1980-1990	0.3	0.1	0.3	0.5
1990-2000	0.3	0.1	0.1	0.4
2000-2010	0.2	0.1	1.0	0.0
2010-2015	0.2	0.2	0.6	-0.3
1870-2015	0.3	0.2	0.4	0.2
1870-1913	0.3	0.1	0.3	0.2
1913-1950	0.3	0.3	0.1	0.3
1950-1970	0.4	0.2	0.7	0.2
1970-1990	0.3	0.1	0.4	0.3
1990-2015	0.2	0.1	0.6	0.1

Appendix B. Sources and Procedures

Life Expectancy at birth

Life expectancy is defined as "the average number of years of life which would remain for males and females reaching the ages specified if they continued to be subjected to the same mortality experienced in the year(s) to which these life expectancies refer" (United Nations, 2000). Most data for the period 1980-2015 come from the Human Development Reports (UNDP, 2010 and 2016) while the World Bank (World Development Indicators) provides data for 1960-1975 (exceptionally completed with data from UNESCO) and the United Nations" Demographic Yearbook Historical Supplement (United Nations, 2000) for the 1950s. Pre-1950 estimates come mostly from Riley (2005b), Flora (1983), and the OxLAD database for Latin America (Astorga et al., 2003), completed with the national sources listed below. Nonetheless, for Most OECD countries (namely, Europe, the European Offshoots –Australia, Canada, New Zealand-, plus Israel, Japan, Korea, and Taiwan), the Human Mortality Dataset https://www.mortality.org/ (HMD hereafter) has been preferred, completed with the Clio-Infra Dataset https://www.clio-infra.eu/.

Occasionally, dearth of data has forced me to introduce some assumptions for the period before the epidemiological or health transition that, in developing regions, particularly those of South Asia and Sub-Saharan Africa, often started during the Interwar years (Omran, 1971; Riley 2005b, 2005c). In particular, I have accepted Riley's (2005a, p. 539) assumption that "the average of all life expectancy estimates of acceptable quality for countries in a region provides the best available gauge of the pretransition average for the entire region".

Maximum and the minimum values for the life expectancy index were established at 85 and 20 years, respectively. A "floor" of 25 years has been accepted as the minimum historical value for life expectancy at birth. Such a "floor" precludes a zero value for the transformed life expectancy index and, consequently, for the *HIHD*.

North Africa.
Algeria, 1913-1925, and 1938, Clio-Infra. 1900-1929, inferred from the infant survival rate (*ISR*, that is, 400 –as the maximum infant mortality rate per thousand- less the country's infant mortality rate). Egypt, 1929-1938, from Fargues (1986); 1913, assumed to be as Tunisia's; and 1900, as Algeria's. Libya, 1900-1938, assumed to be identical to Egypt's. Morocco, 1900-1938, assumed to be as Algeria's, except 1913, as Tunisia's. Tunisia, 1900, 1929, assumed to be the same as Algeria. 1913, 1925, Conté (1973), cited in Riley (2005); 1930s, Clio-Infra.
Central Africa. Estimates for CAR, Chad, Congo, Congo D.R., and Gabon over 1870-1929, and for Cameroon (1870-1913) inferred from heights.
West Africa. Figures for 1938 are backwards projected with estimates inferred from heights and infant survival rates (*ISR*), for Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana (but for 1913), Guinea, Guinea-Bissau, Liberia, Mali, Nigeria (but for 1929, from Ayeni 1976), Senegal (but for 1929), and Sierra Leone (but for 1929). Mauritania's and Niger's assumed to identical to Mali's. Togo's assumed to be as Benin's, but Benin in 1913, as Ghana's.

East Africa. Data for 1938 backwards projected with estimates inferred from heights and *ISR*, for Burundi, Ethiopia, Rwanda, Somalia, and Tanzania. Djibouti's assumed to be as Ethiopia's. Riley (2005b) provides estimates of 23.9 years for Kenya and Uganda in the 1930s, so I assigned the minimum historical value of 25 years to these countries over 1870-1929. Sudan's was assumed to be as Kenya's.
Southern Africa. Data for 1938 backwards projected with estimates inferred from heights and *ISR*, for Angola, Botswana (1913), Malawi, Mauritius (1870-1913), Namibia (1870-1880), South Africa (1870), Swaziland (1929), and Zambia. Namibia, 1890-1900, assumed to be the same as for blacks in Cape Colony, from Simkins et al. (1989); 1929-1938, from Notkola et al. (2000), estimated from Northern Namibia's figures adjusted with the ratio all Namibia to Northern Namibia c. 1960. South Africa, 1880-1913, estimates from Simkins et al. (1989). For Zimbabwe, Riley (2005b), following Condé (1973), assigned 26.4 to the 1930s, so I have assigned the minimum goalpost over 1870-1929. Botswana's (but for 1913), Lesotho's, and Swaziland's (but for 1929), were assumed to be identical to Namibia's. Madagascar's, assumed to as Mauritius's and Mozambique's as Malawi's. Mauritius, 1930s, Clio-Infra.

Americas.
For Latin America, most data come from Arriaga (1968) and the MOxLAD database (Astorga *et al*. 2003) (supplemented with the working sheets prepared by Shane and Barbara Hunt which have been kindly provided by Pablo Astorga). In addition, national sources used are:
Argentina, 1870-1890, Recchini de Lattes and Lattes (1975).
Chile, 1890-1900, assumed to have evolved along Argentina; 1913, 1930s, Clio-Infra; 1950-2005, Díaz, Lüders, and Wagner (2016).
Uruguay, 1870-1900, assumed to have evolved along Argentina;1900-1938, Ministerio de Salud Pública (2001),
Life expectancy for Colombia, 1870-1900, Cuba, 1870-1900, Panama, 1880-1900, Honduras, 1890-1900, Puerto Rico, 1870-1890, and Venezuela, 1880-1900, has been assumed to evolve along Costa Rica.
Ecuador, 1925-1938, assumed to evolve along Paraguay.
Peru, 1913-1933, assumed to evolve along Bolivia.
Puerto Rico, 1870-1890, assumed it evolves along Costa Rica; 1890, Riley (2005b); 1900-1938, UN (1993).
Jamaica, 1870-1880, assumed it evolves along Costa Rica; 1880-1955, Riley (2005a: 198).
Trinidad-Tobago, 1870-1900, assumed to evolve along Jamaica.
Bahamas and Belize, 1870-1938, assumed to evolve along Jamaica.
Barbados, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Surinam, 1870-1938, assumed to evolve along Trinidad and Tobago.
St. Kitts and Nevis, 1950-1975, assumed to evolve as Surinam.
Canada, 1870-1890, Clio-Infra; 1925-2010, HMD.
U.S.A., 1870-1890, Haines (1994); 1913-1929, Clio-Infra; 1933-2015, HMD.
In the absence of life expectancy estimates for early years projecting the available figures with infant survival rates (*ISR*) has derived them for Panama, 1900-1929 and Guyana, 1950-1960. Such a procedure was also used to distribute the average life expectancy estimate for Argentina, 1869-1894.

Asia

Most pre-1950 estimates come from Riley (2005b) who claims that the earliest health transition started in the 1870/1890s when mean and median values were 27.5 and 25.1 years, respectively. Lower bound estimates for 1950 or 1940s levels were used for 1938. In the absence data, pre-1929 life expectancy at birth was assumed to be 25 years.

Bahrain, Oman, Qatar, UAR, and Yemen, 1913-1938, assumed to evolve along Kuwait.

Brunei Darussalam, 1929-1938, assumed to evolve as Malaysia.

Cambodia, 1925-1929, assumed it evolved along China as they had similar levels in 1938; 1938, Siampos (1970), cited in Riley (2005b).

China, 1929, Caldwell et al. (1986), cited in Lavely and Wong (1998); 1930s, Clio-Infra.

Hong Kong SAR, 1900-1938, assumed to evolve along Taiwan.

India, 1880-1938, Clio-Infra; extrapolated to 1870 with Visaria and Visaria (1982); 1900 and 1925, McAlpin (1983).

Indonesia, 1929, Riley (2005b); 1930s, Clio-Infra.

Israel, 1950-1980, Clio-Infra; 1985-2010, HMD.

Japan, 1870, Riley (2005b); 1880, Janetta and Preston (1991); 1890-1900, Johansson and Mosk (1987); 1950-2015, HMD.

Jordan, 1929-1938, assumed to evolve as Syria's.

Korea, 1913-2000, Clio-Infra; 2005-2015, HMD.

Laos, 1929, assumed to evolve as Vietnam.

Lebanon, 1870-1938, assumed to evolve along Cyprus.

Malaysia, 1929-1938, obtained by projecting 1950 level backwards with the infant survival rate.

Nepal, 1925-1933, assumed to evolve as India.

Singapore, 1929-1938, obtained by projecting 1950 level backwards with the infant survival rate.

Sri Lanka, 1890-1913, 1938, Langford and Storey (1993); 1929, Sarkar (1951)

Taiwan, 1890-1938, Cha and Wu (2002). The level assumed for 1890 by Cha and Wu, 25 years, accepted for 1870-1880. 1950, Glass and Grebenik (1967); 1955, Taiwan Official statistics; 1970-2010, HMD.

Thailand, 1938, Vallin (1976).

Turkey, 1870-1900 and 1925-1933 assumed to evolve as Greece's; 1913, Pamuk (2007); 1938, Shorter and Macura (1982).

Oceania

Australia, 1870-1900, Whitwell et al. (1997); 1925-2015, HMD.

New Zealand (adjusted for Maori population up to 1950), 1870, Riley (2005b); 1880-1890, Glass and Grebenik (1967); 1950-2010, HMD.

Europe

Albania, 1870-1890, assumed to evolve along Greece; 1900-1933, assumed to evolve along Bulgaria.
Austria, 1870-1929, Clio-Infra; 1950-2010, HMD.
Belgium, 1870-2015, HMD.
Belarus, 1950s, Clio-Infra; 1960-2015, HMD.
Bulgaria, 1870-1890, assumed to move along Greece; 1913-1938, Clio-Infra; 1950-2010, HMD.
Croatia, 2005-2015, HMD.
Cyprus, 1870-1880, assumed to be identical to Greece; 1890, Riley (2005b); 1900-1938, Clio-Infra.
Czechoslovakia/Czechia, 1870-1938, Sbr (1962); 1890, Riley (2005b); 1950-2015, HMD.
Denmark, 1870-2015, HMD.
Estonia, 1938-1955, Clio-Infra; 1960-2015, HMD.
Finland, 1870, Kannisto et al. (1999); 1880-2015, HMD.
France, 1870-2015, HMD.
Germany, 1870-1890, Flora (1983); 1950s, Clio-Infra; 1960-2015, HMD.
Greece, 1870-1913, Valaoras (1960), 1933-1980, Clio-Infra; 1985-2015, HMD.
Hungary, 1870-1890, assumed to evolve along Austria; 1950-2015, HMD.
Iceland, 1870-2015, HMD.
Ireland, 1850-1890, assumed to evolve along the U.K.; 1950-2015, HMD
Italy, 1870, Felice et al. (2016); 1880-2010, HMD.
Latvia and Lithuania, 1925-1955, Clio-Infra; 1960-2010, HMD.
Luxembourg, 1913-1955, Clio-Infra; 1960-2010, HMD.
Netherlands, 1870-2015, HMD.
Norway, 1870-2015, HMD.
Poland, 1870-1913, assuming it evolved as Czechoslovakia; 1950-2010, HMD.
Portugal, 1850-1913, Leite (2005); 1925 (interpolated) and 1933, Valério (2001; I); 1929, Veiga (2005); 1938, United Nations (1993); 1950-2015, HMD.
Romania, 1870-1880, assumed to evolve along Greece, 1890-1890, and along Bulgaria, 1890-1929.
Russia, Pressat (1985) for European Russia, 1870-1913, and European Soviet Union, 1929-1938; 1950s, Clio-Infra; 1960-2015, HMD.
Slovakia, 1925, Clio-Infra; 1929-1938, Sbr (1962); 1950-2015, HMD.
Slovenia, 1950-1980, Clio-Infra; 1985-2015, HMD.
Spain, 1870-1890, Felice et al. (2016); 1900, Dopico and Reher (1998); 1913-2015, HMD.
Sweden, 1870-2010, HMD.
Switzerland, 1870, Flora (1983); 1880-2010, HMD.
Ukraine, 1900, Mazur (1969); 1925-1955, Clio-Infra; 1960-2010, HMD.
United Kingdom, 1850-1900, Floud and Harris (1997); 1925-2015, HMD.
Yugoslavia, assumed to evolve along Greece, 1870-1880, and along Bulgaria, 1890-1929. For 1929 and 1938 life expectancy was estimated by projecting the available figures with infant survival rates for 1950.

Average Years of Education

Education attainment is measured by the average years of total schooling (primary, secondary, and tertiary) for population aged 15 and over. Most figures for 2015 and 2010 derive from the Human Development Reports 2016 and 2013 (UNDP, 2016, 2013). For 1870-2010, the most comprehensive database is the Clio-Infra dataset (https://www.clio-infra.eu/Indicators/AverageYearsofEducation.html) put together by Bas van Leeuwen, Jieli van Leeuwen-Li, and Péter Földvári in 2013, which provides decadal figures (years ending in 0). These figures come from historical reconstructions derived from national statistical offices for the post-1960 and the authors' own estimates through the perpetual inventory method up to 1950. Clio-Infra database relies on Morrisson and Murtin (2009) dataset for 78 countries at 10- year intervals.

I completed the dataset with estimates for years ending in 5 between 1915 and 2005 from Földvári and van Leeuwen (2014) for Europe, while for the rest of the world have interpolated them on the basis of Barro and Lee (2013, version 2.2, updated on June 2018) average years of schooling for population aged 15 and over for 1950-2010, and Lee and Lee (2016) dataset for years of schooling for population aged 15-64, for 1915-1935. Specifically, for, say, 2005, the formula used is

$$Y_{2005} = ((2*X_{2005}) / (X_{2000} + X_{2010})) * (Y_{2000} + Y_{2010}),$$

where Y represents the Clio-Infra values and X those of Barro and Lee (2013, v. 2.2).

I have assigned the values for 1915, 1930, 1935, and 1940 to my 1913, 1929, 1933, and 1938 benchmarks, respectively.

I have filled missing values for earlier years in Clio-Infra by projecting its levels with Lee and Lee (2016) estimates. This was the case for Barbados, Colombia, and Ecuador (1870); Cyprus and Serbia (1870-1880); Czechia and Romania (1870-1890); Iceland, Poland, Gambia, and Zambia (1870-1913); Haiti and Togo (1870-1925); D.R. Congo, Lesotho, Liberia, Libya, Swaziland, Afghanistan, Cambodia, and Jordan (1870-1938).

I have also filled Clio-Infra missing values by projecting its levels with Barro and Lee (2013, 2018) for Estonia, Latvia, Lithuania, Ukraine, Burundi, Central African Republic (C.A.R.), Gabon, Armenia, and Nepal (1950-1955); and Moldova, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan (1950-1965).

Lack of Clio-Infra 1950-2010 estimates for Belize, Albania, Croatia, Malta, Slovenia, Sudan, Bahrain, Brunei Darussalam, Hong Kong, Indonesia, Kuwait, Mongolia, Qatar, Taiwan, United Arab Emirates (U.A.E.), and Yemen led me to use Barro and Lee's (2013, v. 2.2) figures for these countries. For Belize, Albania, Malta, Sudan, Hong Kong, Kuwait, Taiwan, and Yemen, Barro and Lee's figures for 1950 were projected backwards to 1870 with Lee and Lee's (2016) years of schooling.

Lastly, missing values for some countries before 1950 have been estimated by assuming they evolved along their neighbours:

<u>Africa</u>

Botswana, 1870-1913, and Namibia, 1870-1938, assumed to evolve as Lesotho; pre-1960 Burkina Faso, Chad, and Guinea, as Mali, Niger, and Sierra Leone, respectively; pre-1950 Burundi and Rwanda, as Uganda; pre-1950 CAR, Congo, and Gabon, as Cameroon; pre-1950 Mauritania as Senegal; pre-1950 Tanzania as Kenya; Seychelles, 1870-1913, as Mauritius. Guinea-Bissau, 1870-2010, was assumed to evolve as Guinea.

Americas

Bahamas, 1870-1990, assumed to evolve along Barbados and St. Kitts and Nevis and St. Vincent and the Grenadines, 1870-2005, as Trinidad-Tobago.

Asia

It has been assumed that pre-1929 Lebanon evolved as Cyprus; pre-1950 Laos as Cambodia; and pre-1950 Bahrain, Brunei-Darussalam, Qatar, Saudi Arabia, and United Arab Emirates (U.A.E.) as Kuwait.

Maximum and the minimum values are established at 15 and 0 years, respectively. However, the lowest historical value was set at 0.1 years of education. Such a 'floor' precludes a zero value for the transformed education index and, consequently, for the *HIHD*.

Per Capita GDP

GDP per head is expressed in 1990 Geary-Khamis dollars. Unless stated below, GDP per head data come from the Maddison Project Database (2018) [MPD2018], completed with Maddison (2006, 2010) and the Maddison Project Database 2013 [MPD2013] and, for Latin America since 1950, CEPAL (2009) and (2017) http://interwp.cepal.org/. Conference Board (2016) estimates have been accepted for China since 1950, specifically, the so-called "alternative" series. Otherwise, for specific countries shown below, per capita GDP levels for (usually) 1950 have been projected backwards with volume indices of real per capita GDP taken from historical national accounts.

Similarly to the cases of social indicators, I have assumed a lower bound for *per capita* GDP that has been set at G-K 1990 $ 300, which represents a basic level of physiological subsistence (Sagar and Najam, 1998; Milanovic et al., 2011), below both the World Bank's extreme poverty threshold of G-K 1990 $ 1 a day per person and Maddison's (2006) G-K 1990 $ 400 per capita.

Africa

Most pre-1950 estimates come from projecting the 1950 benchmark in the MDP2018 with Prados de la Escosura (2012) estimates. The GDP data set for Africa includes available estimates for the northern region and South Africa. In North Africa, 1870-1950, estimates come from Maddison (2006: 577-580) completed with some interpolations on the basis of my own indirect estimates. For Algeria, I interpolated the levels for 1890 and 1900. For Tunisia, I accepted Maddison estimates for 1913 and interpolated the rest of the benchmarks. In the case of Morocco, I found Maddison's level for 1913 too low relative to Tunisia, and used my own estimates. For Egypt, Maddison figures were also used but re-scaled by accepting Pamuk (2006) level for 1950. In the case of South Africa, I deflated Stadler (1963) nominal GDP estimates for 1913-1950 with Alvaredo and Atkinson (2010) price index, and used population figures from Feinstein (2005: 257-8) to derive per capita GDP. Then, the estimates for 1913 were projected backwards to 1870 with my own indirect estimates.

Further assumptions were needed to fill missing values of GDP per head for some Sub-Saharan countries. Following Maddison's approach, I assumed that growth trends for missing countries were similar to those of their neighbours. Thus, in the case of French Equatorial Africa (CAR, Congo, Gabon, and Chad), over 1870-1929, I assumed they grew as similar countries (coastal or landlocked, resource abundant or scarce) in French West Africa. Similarly, during the same period, Cameroon, Guinea-Bissau, and Togo were assumed to grow at the same rate of similar countries in West French Africa. Liberia was assumed to evolve as Sierra Leone over 1900-1913. I assumed The Gambia (1870-1913) and Sierra Leone (1870-1900) evolved alongside Ghana. In East Africa, I accepted Uganda's pace of growth for Rwanda and Burundi (1913-1929) while Kenya's pace of growth during 1870-1913 was assumed to be similar to Tanzania's. Also, Ethiopia and Sudan were assumed to evolve as Egypt over 1870-1913. In southern Africa, Mozambique was accepted to evolve as Angola (1870-1900), and Zambia and Malawi (1913-1929) as Zimbabwe. Lastly, in the cases of Botswana and Lesotho (1913-1938), Namibia (1870-1929), and Swaziland (1870-1938), I accepted the growth rate for South Africa.

Americas

MPD2018 benchmark for 1990 has been projected back and forth with CEPAL (2009) and (2017) http://interwp.cepal.org/ for Latin America and the Caribbean over 1950-2015, except in the case of Cuba for 1950-1990. Pre-1950 period, per capita GDP volumes derive from MPD2018, MPD2103, Astorga and Fitzgerald (1998) and MOxLAD database (Astorga *et al*. 2003). Otherwise national sources have been used.
Argentina, Della Paolera et al. (2003), 1884-1950. I projected the resulting level for 1884 backwards 1875 with Cortés Conde (1997) growth rate and assumed the level of 1870 to be equal to that of 1875.
Brazil, 1870-1950, Goldsmith (1986).
Bolivia, 1870-1950, Herranz-Loncán and Peres Cajías (2016). Figures for 1870 and 1880 interpolated from those for 1850 and 1883.
Chile, 1870-1950, Díaz, Lüders and Wagner (2016).
Colombia, 1870-1905, Kalmanovitz Krauter and López Rivera (2009) and data kindly provided by Salomon Kalmanovitz in private communication; 1905-1950, GRECO (2002).
Cuba, up to 1902, Santamaría (2005); 1902-1958, Ward and Devereux (2012); 1958-1990, MDP2018; 1990-2015, CEPAL (2017). An important caveat is that neither the MPD2018 benchmark level for 1990 (nor the MPD2013 or Maddison's 2006, 2010) has been accepted. The reason is that, given the lack of PPPs for Cuba in 1990, Maddison (2006: 192) assumed Cuban per capita GDP was 15 per cent below the Latin American average. Since this is an arbitrary assumption, I started from Brundenius and Zimbalist's (1989) estimate of Cuba's GDP per head relative to six major Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela, LA6) in 1980 (provided in Astorga and Fitzgerald, 1998) and applied this ratio to the average per capita income of LA6 in 1980 Geary-Khamis dollars to derive Cuba's level in 1980. Then, following Maddison (1995: 166), I derived the level for 1990 with the growth rate of real per capita GDP at national prices over 1980-1990 and reflated the result with the US implicit GDP deflator in order to arrive to an estimate of per capita GDP in 1990 at 1990 Geary-Khamis dollars. Interestingly, Cuba's position relative to the US in 1929 and 1955 is very close to the one Ward and Devereux (2012) estimated using a different approach.
Jamaica, 1870-1929, Eisner (1961).
Mexico, 1870-1900, Coatsworth (1989: 41); 1896-1950, INEGI (1995)
Puerto Rico, 1900-1940, Devereux (2017); 1940-1950, Anuario Estadístico de Puerto Rico (1955).
Peru, 1870-1950, Seminario (2012).
Uruguay, 1870-1950, Bértola (2016).
Venezuela, 1870-1950, Batista (1997). I have preferred Batista's well-known estimates to de Corso's (2013, 2018).
Central America (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua), I derived the level for 1913 by assuming the growth over 1913-20 was identical to that of 1920-25, the latter derived from OxLAD database (Astorga *et al*. 2003).
Caribbean. Bahamas, Barbados, Belize, Guyana, since 1950, Trinidad-Tobago, 1950-1970, and St. Kitts and Nevis, St. Vincent and the Grenadines, from 1990, Maddison (2006, 2010), Conference Board (2016), and Bulmer-Thomas (kindly provided in private communication)

Asia

Middle East (Iran, Iraq, Jordan, Lebanon, Palestine (Israel), Saudi Arabia, Syria, Yemen, and the Gulf (Bahrain, Kuwait, Oman, Qatar, UAE), 1870-1913, Pamuk (2006)
Cambodia and Laos were assumed to evolve alongside Vietnam, 1870-1938.
Korea, 1870-1913, MPD2013; 1913-1938, Cha and Kim (2006). I obtained the figures for 1880-1900 through log-linear interpolation.
Myanmar, 1880-1890, assumed to evolve along India.
Malaysia, 1870-1913, assumed to evolve along Indonesia.
Philippines, 1890, Bourguignon and Morrisson (2002).
Turkey, MPD2013. 1880, Altug et al. (2009) with 1890-1900 figures log-linearly interpolated.
Taiwan, 1890-1900, assumed to evolve as China's; 1900, Cha and Wu (2002).
For the Middle East, Indochina (Cambodia, Laos, and Vietnam), and Hong Kong, I interpolated log-linearly the values for 1880-1900 and 1935-1938.

Oceania

New Zealand, 1870-1990, kindly provided by Les Oxley in private communication.

Europe

Austria, 1870-1913, Maddison (2010) level for 1913 projected backwards with Schulze (2000) estimates for Imperial Austria under the assumption that real output per head in Modern Austria moved along Imperial Austria's.
Belgium, 1870-1913, Horlings (1997); 1929-1938, average of GDP estimates of income and expenditure approaches in Buyst (1997), and output in Horlings (1997).
Bulgaria, 1890-1913, Maddison (2010). 1880, interpolated.
Czechoslovakia, 1880, computed with Good (1994) ratio of 1880 GDP per head to the average GDP per head of 1870 and 1890 applied to MPD2018 average levels for 1870 and 1890.
Cyprus, 1913-1950, Apostolides (2011). I assumed the level for 1913 was identical to that for 1921.
France, 1870-1950, Toutain (1997).
Greece, 1870-1938, Kostelenos *et al*. (2007) moving base series.
Hungary, 1870-1913, Schulze (2000) estimates for Imperial Hungary.
Ireland, 1880-1900, applying the ratio Ireland/UK in 1913 to UK real per capita GDP.
Malta, 1913-1950, Apostolides (2011). I assumed the level for 1913 was identical to that for 1921.
Portugal, 1850-1913, Lains (2006).
Romania, MPD2013. 1880, computed with Good (1994) ratio of 1880 GDP per head to the average GDP per head of 1870 and 1890 applied to MPD2013 average levels for 1870 and 1890.
Russia, 1870-1885, Imperial Russia, Goldsmith (1961), agricultural and industrial output weighted with Gregory (1982) weights for 1883-87; 1885-1913, Gregory (1982, Table 3.1); 1913-1928, Markevich and Harrison (2011).
Spain, 1870-2015, Prados de la Escosura (2017).
United Kingdom, 1850-1913, MPD2013.
Yugoslavia, 1880, computed with Good (1994) ratio of 1880 GDP per head to the average GDP per head of 1870 and 1890 applied to MPD2018 average levels for 1870 and 1890.

Index of Liberal Democracy

Varieties of Democracy [V-Dem] (Coppedge *et al*., 2018) provides the *Liberal Democracy Index*. It combines the electoral democracy index and the liberal component index. The former incorporates indices of freedom of association, expression, suffrage, and clean elections. The latter includes indices of equality before the law and individual liberty, judicial constraints on the executive, and legislative constraints on the executive.

The index ranges between 0, low, and 1, high. As for other dimensions of human development I have adopted a 'floor' level that in this case is 0.01.

Missing values for some countries, mostly before 1900, have been estimated by assuming they evolved along their neighbours and, exceptionally, were assigned the same values.

Africa

For most countries in Sub Saharan Africa, except Ethiopia, Liberia, Madagascar, and Tanzania, lacking estimates for 1870-1890, I have assigned the 'floor' value of 0.01. This assumption is consistent with their low values for 1913. In the case of South Africa, I assumed it evolved along the Orange Free State in Polity 2 (Polity 4 database) (Marshall *et al*., 2018).

Algeria, 1870-1890 assumed to evolve as Tunisia.

Cameroon, 1920-1960, assumed to evolve along Central African Republic.

Americas

Jamaica, 1870-1890, assumed to evolve along Cuba.

The Bahamas and Belize, 1950-2015, assumed to have the same values as Jamaica.

St. Kitts, St. Lucia, and St. Vincent and the Grenadines, 1950-2015, same values as Barbados.

Asia

Brunei Darussalam, same values as Malaysia.

Cambodia and Laos, 1870-1890, assumed to evolve along Vietnam.

Iraq, Jordan, Lebanon, and Syria, 1870-1913, assumed to evolve as Turkey.

Hong-Kong and Taiwan, assumed to evolve along China.

Qatar, 1870-1890, assume to evolve as Oman.

Sri Lanka, 1870-1890, assumed to evolve as India.

United Arab Emirates, 1870-1970, assumed to evolve as Qatar.

Yemen, 1870-1890, the 'floor' was accepted as the value for 1913 was 0.011.

Europe

Albania, 1870-1900, as an Ottoman colony, same values as Turkey.

Belgium, 1870-1890, I assumed it evolved as the average of Vanhanen Index of Democratization (Vanhanen, 2016) and Polity 2 (Marshall et al., 2018).

Czechoslovakia, 1870-1913, as part of Austria-Hungary, I used the average value of Austria and Hungary.

Ireland, 1870-1913, same values as the United Kingdom.

Poland, 1870-1913, same values as Russia.

Population

All figures are adjusted to refer to mid-year and to take into account the territorial changes and are derived from UNESCO, http://data.uis.unesco.org/, for 1970-2015, Maddison (2010), and Mitchell (2003a, 2003b, 2003c), completed for Latin America and the Caribbean with CEPAL (2009 and 2016), 1950-2015, and OxLAD database (Astorga et al., 2003), 1900-1938. Otherwise, national sources were used.
Cyprus, 1929-1938, Apostolides (2011).
Spain, 1870-2015, Prados de la Escosura (2017).
Turkey, 1870-1913, Pamuk (2006, 2007).
Algeria and Tunisia, 1870-1950, Fargues (1986).
South Africa, 1870-2000, Feinstein (2005).
Sub-Saharan Africa, 1910-1950 data come from Smits (private communication), completed with Banks (2010), for Ethiopia, Liberia, Malawi, and Sierra Leone. Missing observations for Sub-Saharan African countries in the late 19th century were filled by assuming the average growth rate for countries in the region.

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