World Human Development 1870-2007[1]

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How has world wellbeing evolved over the long run? How does the *West* compare to the *Rest*? Have their differences widened? How do regions in the *Rest* compare to each other? Economists usually address these questions in terms of per capita income (See Oulton, 2012). Human wellbeing is widely viewed, however, as a multidimensional phenomenon, in which income is only one facet. As a matter of fact, attempts at providing more comprehensive measures of living standards go back to the origins of modern national accounts (Engerman, 1997). Non-income dimensions of wellbeing (infant mortality, life expectancy at birth, height, literacy, etc.) have been used individually or combined into a composite index (physical quality of life, basic needs, and, more recently, human development) to provide welfare measures that go beyond GDP.

Human development was originally defined as "a process of enlarging people's choices"(UNDP, 1990, p. 10), namely, enjoying a healthy life, acquiring knowledge and achieving a decent standard of living. These achievements provide individuals with freedom to choose (Fleurbaey, 2009) and the opportunity "to lead lives they have reasons to value" (Sen, 1997, p. 1959). Human development can, thus, be depicted as positive freedom (Desai, 1991, p. 356) by which individuals are granted access to goods and services, including property, that allow them to develop their personal potential.

In this paper, these recurring questions will be addressed. As a comprehensive long run perspective of human development at world scale is lacking, an attempt is made here to provide a first worldwide view on the basis of a new historical index of human development that stresses the health and knowledge dimensions of wellbeing.[2]

The main hypothesis of this paper is that world human development has improved over time and across the board even if its variance may have been large and absolute differences between the *West* and the *Rest* probably widened over time. This hypothesis is built on the scattered *historical* evidence on life expectancy, education measures, and per capita income. This hypothesis, to be confirmed, would contradict the often pessimistic rhetoric of the Human Development Reports [HDR].

[2] The only exception is Crafts' (1997, 2002) pioneering but spatially limited contribution and, for OECD countries over 1870-1930, Boyer (2007).

When a synthetic measure of Human development is attempted, its different dimensions, expressed in reduced form, are combined into an index: life expectancy at birth as a proxy for a healthy life, education measures (literacy, schooling) for access to knowledge, and discounted *per capita* income (its log) as a surrogate for wellbeing dimensions other than education and health (Anand and Sen, 2000; UNDP, 2001). Since all dimensions are considered indispensable they are assigned equal weights.

In Sen's (1985, 1987) capabilities approach, that inspires the concept of human development, functionings are directly related to what life people actually lead, that is, achievements, while capabilities, or ability to achieve, are connected with the freedom people have in the choice of life or functionings. This means that while achievements are taken into account in the human development index, the freedom to choose functionings is not. However, without agency and freedom the HDI becomes just a "basic needs" index and does not even correspond to a reduced form of the concept of human development (Ivanov and Peleah, 2010). This HDI's shortcoming is usually neglected but raises a major objection to the way it is computed and deserves further discussion (see below).

I will start by discussing the HDI, as defined by the United Nations Development Programme (UNDP), and proposing an alternative historical index (*HIHD*) in which non-income variables are transformed non-linearly in order to allow for two main facts: that increases of the same absolute size represent greater achievements the higher the level at which they take place, and that quality improvements are associated to increases in quantity.[3] Next, I will present the main results for the world and its main regions and their differences over time. Lastly, I will address the contribution over time of each dimension of human development to the index's aggregate performance and the extent to which they explain the observed human development differences between the *West*, defined as the countries that composed the OECD prior to 1994, -*OECD*, hereafter-, and the *Rest*, namely, the developing regions.[4]

[3] I will not discuss here the human development index as a measure of wellbeing as it has recently been done (Klugman et al., 201; Prados de la Escosura, 2010).

[4] Pre-1994 OECD members were: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxemburg, Netherlands, New Zealand, Norway,

As regards the time span considered, the initial date, 1870, seems an appropriate starting point because it is when large scale improvements in health, helped by the diffusion of the germ theory of disease since the 1880s (Preston, 1975; Easterlin, 1999), and mass education (Benavot and Riddle, 1988; Lindert, 2004) began in Western Europe and the European Offshoots. It is also in the late nineteenth century when, along the advance in medical knowledge, social spending started expanding in Western Europe and its offshoots (Riley, 2001; Lindert, 2004). The final year, 2007, signals the end of an era of sustained progress in wellbeing across the board.

What is the paper's main contribution to the literature? Some findings from a long-run perspective on human development, which would be missed in short-run studies, can be highlighted. Substantial gains in world human development are observed since 1870 –and especially over the period 1913-1970. Such progress is significantly more intense, although its levels are lower, than when the conventional UNDP HDI is considered. A major advance across the board took place between 1920 and 1950 just at the time of an economic globalization backlash, which resulted from substantial gains in longevity and education.

Although the gap between *OECD* and the *Rest* widened in absolute terms, an incomplete catching up took place across the board between 1913 and 1970. This represents another major difference with the outcome of the conventional HDI that would offer, instead, a more benign performance of the *Rest*, with a sustained catching-up from 1913 onwards. Thereafter, the variance in the *Rest*'s performance has been large. Asia, driven by China and India, and, to less extent, Latin America and North Africa managed to catch up, while Central and Eastern Europe (including Russia) and Sub-Saharan Africa fell behind. Education and, to less extent, life expectancy at birth appears to lie behind the Periphery's limited human development catching-up. Since 1970, all world regions have fallen behind in terms of the longevity index, as a

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Portugal, Spain, Sweden, Switzerland, Turkey, the UK, and the US. Since I have not derived human development estimates for Iceland and Luxemburg, they are excluded from my own version of *OECD*. Turkey, an OECD member, has been added to Asia in order to make the *OECD* group more homogeneous in terms of development. New members since 1994 are: the Czech Republic, Estonia, Hungary, Israel, Poland, Slovakia, Slovenia, South Korea, and Mexico.

result of a *second* health transition in the *OECD*. The epidemiological or health transition –that is, the phase in which persistent gains in lower mortality and higher survival are achieved as infectious disease gives way to chronic disease (Riley, 2005a)- is the only period in which substantial gains in longevity were achieved in the *Rest*. This largely explains its failure to catch-up with the *West* despite the educational expansion and the recovery, at the turn of the twentieth century, of per capita income growth. It is worth noting the role public policies played in the improvement of health and education throughout the 20th century that translated into long-run gains in human development in both developed and developing countries. Medical technological change, in turn, has been a main force behind the major advancement in longevity and quality of life.

1. MEASURING HUMAN DEVELOPMENT

How progress in human development dimensions is measured matters. Usually, the original values of social variables (life expectancy, infant mortality, heights, literacy, etc.) are used untransformed in studies on the progress of human welfare (see, for example, Acemoglu and Johnson, 2007; Hatton and Bray, 2010; Lindert, 2004). However, its bounded nature has raised concern about the use of original values to comparing their levels and rates of variation over space and time (Sen, 1981; Kakwani, 1993; Canning, 2010).

In fact, when the original values of a social variable, which has asymptotic limits, say, life expectancy, are employed, identical changes in absolute terms result in lower increases, as the starting level is higher. More specifically, the objection is based upon the fact that the mortality decline takes place at different age groups, depending on a country's level of development, rendering comparisons difficult. 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 disease and of better nutrition in their early years (Deaton, 2006). Thus, if original values of life expectancy are employed, absolute changes of the same magnitude receive larger weight when the starting level is lower, and, hence, give more weight to saving the life of younger over

older people. This finding led Deaton (2006) to conclude "the use of life expectancy at birth as an overall measure of [health] benefit is not easily justifiable because its relatively heavy weighting for mortality reductions early in life is arbitrary".

In an attempt to correct this bias, a linear transformation was introduced for non-income dimensions in the human development index (UNDP, 1990), which, by reducing the denominator, widens the index's range. Thus, in the UNDP HDI, the original values of each dimension (*I*) are transformed into index form,

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

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

From 1995 to 2009 *Human Development Reports* kept the same goalposts for its different dimensions. For life expectancy at birth, the maximum and the minimum values were established at 85 and 25 years, respectively. For education, adult literacy and gross enrolment (primary, secondary, and tertiary) rates, with maximum and minimum values of 100 and 0, were combined using two-thirds and one-third weights, respectively. In the case of per capita GDP, the maximum and minimum values were 40,000 and 100 purchasing-power-adjusted dollars, respectively, and, in 1999, a logarithmic transformation was introduced to allow for diminishing returns of income in terms of human development since this indicator is a crude proxy for those dimensions of wellbeing other than education and health (Anand and Sen, 2000).

In 2010 the *Human Development Report* [HDR](UNDP, 2010) 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 above were combined using an unweighted geometric average. In the case of income, per capita Gross National Income (GNI) replaced GDP per capita, capturing, thus, the income accrued to residents of a country, rather than the income produced in the country. The new human development index also altered its goalposts for each dimension with upper and lower bounds

corresponding to the maximum values observed during the period 1980-2010 and to discretionally fix minimum values, respectively.[5]

A major difference was the change in the way the human development dimensions were combined into an aggregate index. Until 2010, the index of human development (HDI) was derived as the unweighted arithmetic average of the three dimensions' indices. Since 2010, in an attempt to mitigate the substitutability between its different dimensions, -that is, to avoid that a high achievement in one dimension linearly compensates for a low achievement in another-, the indices for each dimension are combined using a geometric average.[6]

The new index is very data demanding, and when long-run trends are needed, most of the information required (for example, GNI or expected years of schooling) is not available across countries and over time. "Old" indicators (namely, literacy and school enrolment for education, and real GDP per capita) have been, then, recovered in the so-called "hybrid" human development index due to its wider availability (UNDP, 2010). However, in the "hybrid" HDI, indices for each dimension are derived with the new goalposts and combined with a geometric average (Gidwitz et al., 2010).

Although the multiplicative formula may be considered a substantial improvement over the previous additive one, the linear transformation of the social, non-income dimensions remains a serious obstacle for the comparison of human development levels across space and time. In the linear transformation, for a given absolute change in a social dimension, its corresponding increase would be larger the lower the initial level, favouring the country with the lower initial level of human development. Such a bias is only justifiable if, from a normative point of view,

[5] Upper and lower bounds for life expectancy were, then, fixed at 83.2 and 20 years, respectively. The expected years of schooling and the mean years of schooling were assigned maxima of 20.6 and 13.2 years, respectively, and minima of zero. In the case of per capita income, an upper bound was set at 108,211 dollars of 2008, expressed in purchasing power terms, while the lower bound was fixed in 163 dollars.

[6] The geometric average had been previously proposed by Desai (1991) and Sagar and Najam (1998) and used in historical estimates by Prados de la Escosura (2010). The choice of a geometric over an arithmetic average to combine the HDI dimensions has received a harsh critique by Ravallion's (2012) and a defence by Zambrano (2011).

achieving a "basic" or minimum level of human development becomes the main goal. However, the linear transformation narrows down the differences across countries introducing a spurious tendency towards human development convergence.

In an attempt to facilitating comparability of HDI levels across countries the Human Development Report 2010 introduced the alternative concept of 'deviation from fit', which provides a country's deviation from its expected performance, given its initial HDI (UNDP, 2010). This measure represents an attempt to eliminate any bias in favour or against developing countries. However, it has limited value since, by construction, it only allows comparisons between countries starting from the same level.

Another option is provided by the 'shortfall' approach (Sen, 1981), which measures, for a given dimension, the relative fall in the distance between the country's initial level and some chosen upper bound. It has been pointed out that, contrary to the linear transformation, this method tends to favour the country with the higher initial level (Gidwitz et al., 2010).

The UNDP's linear transformation of the original values of each dimension does not provide, therefore, a solution to the comparability problem across countries and over time. In fact, it poses a further challenge. In Sen's words (1981, p. 292), "as, say, longevity becomes high, it becomes more of an achievement to raise it further". Kakwani (1993, p. 312) concurs: "as the standard of living reaches progressively higher limits, incremental improvement should require much greater resources than similar incremental improvements from a lower base".[7]

Perhaps, the problem derives from the fact that ethical and measurement aspects of wellbeing are at odds in the human development index. As Dasgupta (1990, p. 23) pointed out:

[7] Molina and Purser (2010: 11) also stress the additional effort to increase human development's social dimensions at high levels. This reasoning does not imply that for many of the countries at the bottom of the distribution it has been far from easy to move up in their development pathway (I owe this remark to a Referee).

> "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. The idea here is that it becomes more and more difficult to increase life expectancy as life expectancy rises."

The shortcomings of the linear transformation become clearer when quality is taken into account. Life expectancy at birth and literacy and schooling rates (or, for the same token, years of education) are just crude proxies for a "long and healthy life" (Engineer et al., 2009) and for access to knowledge, respectively, the actual goals of human development.

Unfortunately, health-adjusted life expectancy and quality-adjusted education measures are only available for recent years. Research on the last two decades concludes that healthy life expectancy increases as total life expectancy at birth expands and that age-specific disability is lower when life expectancy is higher (Salomon et al., 2012). In other words, the quality of life rises for each age cohort as life expectancy at birth increases.[8]

A similar association can be proposed between the increase in the number of years of schooling and the quality improvement of the education received. The comparison between cognitive skills (Hanushek and Kimko, 2000; Hanushek and Woessmann, 2012) and gross rates of schooling suggests that quality improvements are correlated with increases in the quantity of education.[9]

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[8] The decline in age-specific disability as life expectancy at birth increases is compatible, however, with the recent finding that years lost to disability (YLD) rise with life expectancy because YLD tend to concentrate at the end of life (Salomon et al., 2012). Nonetheless, whether an association between death and ill health existed since 1870 remains under discussion and deserves further research (Riley, 1990; Howse, 2006; Bleakley, 2007, 2010; Cutler at al., 2010).

[9] The correlation between quality and quantity of education over 1965-2010 appears high at world scale but it declines when the sample is reduced to developed countries, which may be interpreted as the quantity of education gets higher quality increases tend to be more than proportional (Altinok et al., 2013).

The bottom line is that more years of life and education imply better health and education for a country's population.

Since social indicators (life expectancy, literacy, infant mortality, etc.) have, unlike GDP per capita, asymptotic limits -which reflect physical and biological maxima-, Kakwani (1993) explored the non-linearity of the relationship between the value of each social indicator and its achievement. Using an axiomatic approach, Kakwani (1993) constructed a normalised index from an achievement function in which an increase in the standard of living of a country at a higher level implies a greater achievement than would have been the case had it occurred at a lower level,

$$f(x, Mo, M) = ((M - Mo)^{1-\varepsilon} - (M - x)^{1-\varepsilon}) / ((M - Mo)^{1-\varepsilon}), \quad \text{for } 0 < \varepsilon < 1 \quad [2]$$

$$= f(x, Mo, M) = (\log(M - Mo) - \log(M - x)) / \log(M - Mo), \quad \text{for } \varepsilon = 1 \quad [3]$$

where 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 (1993) 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. In this context, the UNDP HDI represents a particular case, for $\varepsilon = 0$, which yields expression [1] for each dimension of the index.

In the alternative historical index of human development, *HIHD*, the original values of the social, non-income dimensions of the index have been transformed following Kakwani's proposal, using a convex achievement function (expression 3). Thus, as a social indicator reaches higher levels, its increases represent higher achievements than had the same increase taken place at a lower level.[10]

The log transformation of GDP per capita -which implies returns of *per capita* income in terms of human development decline as it reaches higher levels- chosen by the UNDP to proxy any other dimension of wellbeing aside health and education, has been kept in the new index. I have, then, used the log of GDP per capita in expression [1] to get the income index. Although this is far from a fully satisfactory solution, were

[10] It is worth noting that the risk of giving more weight to growth from initial levels when growth rates are used –the main argument to use the 'deviation from fit' (Gidwitz et al., 2010)- is largely avoided when the logarithmic growth rates computed from the values obtained convex transformation are used.

the assumption of diminishing returns to income relaxed, per capita GDP –not having an asymptotic upper bound- would drive the human development index, rendering it redundant.[11]

The new historical index has been derived, then, as a multiplicative combination of the transformed values of each dimension. If we denote the non-linearly transformed values of life expectancy and education as *LEB* and *EDU*, and the adjusted *per capita* income as *UNY*, the historical index of human development can be expressed as,

$$HIHD = LEB^{1/3}\ EDU^{1/3}\ UNY^{1/3} \qquad [4].$$

2. SOURCES AND PROCEDURES

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). Data for most countries during the period 1980-2007 come from the 2010 Human Development Report (UNDP, 2010) while the United Nations" Demographic Yearbook Historical Supplement (United Nations, 2000) provides the rest of the data from 1950 onwards. Pre-1950 estimates come mostly from Riley (2005b), Flora (1983), the OxLAD database for Latin America (Astorga et al., 2003), which were completed with national sources (A detailed account of the sources and procedures is offered in the electronic appendix). Dearth of data forced me occasionally 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). Furthermore, given a minimum goalpost (M_o) of 20 years – that appears to be the *Homo sapiens* lowest life expectancy prior to the late 19th century (Fogel, 2009; Steckel, 2009)-, a "floor" of 25 years has been accepted as the minimum historical

[11] See Zambrano's (2011a, 2011b) theoretical justification for the introduction of diminishing returns to income. For an alternative proposal excluding the log transformation of income, see Ravallion (2012).

value for life expectancy at birth. Such a "floor" precludes a zero value for the transformed life expectancy index and, consequently, for the *HIHD*.

The rate of adult literacy is defined as the percentage of the population aged 15 years or over who is able to read and write. Unfortunately, in empirical terms, adult literacy is a far from uniform concept (Markussen, 1990; Nilsson, 1999). The 2009 Human Development Report (UNDP, 2009) provides most of the data on literacy for 1980-2007. From 1950 onwards data come from UNESCO (1970, 2002) and the World Bank (2010), completed with data from Banks (2010), Hayami and Ruttan (1985), and Easterly (1999). UNESCO (1953, 1957), Flora (1973), OxLAD database for Latin America, plus national sources, provide data for the pre-1950 era.

Enrolment rates basically capture the expansion of formal education and do not inform about the length of the academic year, the quality of education, or student completion (Benavot and Riddle, 1988). Historical evidence only allows one to estimate the unadjusted rate of total enrolment, that is to say, the percentage of population aged 5-24 enrolled in primary, secondary, and tertiary education. Only for the recent past, international organisations (UNESCO, OECD, World Bank) provide gross enrolment rates, in which the denominator is adjusted to the age bracket for each type of schooling (primary, secondary, etc.). Unadjusted rates will usually under-estimate gross enrolment rates, as, in the past, hardly any country's education extended to those aged 24 years. Thus, for the historical (pre-1980) estimates I corrected the downward bias in previous benchmark years ($_j$) using the ratio between gross enrolment rates (GER) and unadjusted rates (UER) for each country ($_i$) in 1980, and assuming the relationship between GER and UER was stable over time. That is,

$$GER_{ij} = (GER_{i1980} / UER_{i1980}) * UER_{ij} \qquad [5].$$

The 2009 Human Development Report (UNDP 2009) provides most of the data enrolment for 1980-2007, completed with UNESCO (2010). For the pre-1970 period, enrolment figures come mostly from UNESCO (2010), Banks (2010), Mitchell (2003a, 2003b, 2003c), Flora (1983), and OxLAD database for Latin America, supplemented with national sources.

In the case of education indicators (literacy and enrolment rates), UNDP goalposts [M=100, Mo=0] have been kept, but the highest and lowest historical values were set at 99 and 1 per cent, respectively.[12] Since perhaps the major difference between the new 2010 HDI and the 'hybrid' index is the latter's use of literacy and enrolment rates instead of years of education, I have carried out sensitivity test comparing the resulting Kakwani-type indices derived from years of education (estimated by Morrisson and Murtin, 2010) and the 'hybrid' education index (built as a geometric average of Kakwani indices of literacy and total enrolment) for a sample of 74 countries over 1870-2007 and the correlation between them is very close (0.94).

In historical terms, there is practically no discrepancy in the available per capita GDP figures (expressed in Geary-Khamis [G-K] 1990 $) between the old UNDP "cap" (G-K 1990 $ 40,000) and the new "observed maximum" (G-K 1990 $ 42,916 for Qatar in 1973), although a significant difference appears between the previous lower bound of $100 and the observed minimum ($ 206 corresponding to D.R. Congo in 2001) (Maddison, 2010).[13]

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. GDP per capita (G-K 1990 $) data come from Maddison (2006, 2010) supplemented with historical national accounts.

Later, in order to derive the historical index (*HIHD*), the indices for each dimension of human development were combined with a geometric average (see expression [4]) on the basis of four different country samples for which time and

[12] An historical maximum of 99 per cent is also accepted for adult literacy in the "old" *HDI*, but not in the "hybrid" HDI, for which the maximum is 115.8 per cent (Gidwitz et al., 2010). A consequence of assuming a historical lower bound of 1 per cent is preventing zero values for the transformed variables.

[13] In the 2010 Human Development Report (UNDP, 2010), the lowest level observed since 1980 has been established in PPP 2008$ 163, equivalent to G-K 1990$ 108. The highest level reached over the same time span 2008$ 108,211, corresponds to 1990$ 72,020. Since such a figure has never been reached in Maddison (2010) estimates, I chose the observed maximum and minimum values over 1870-2007 in Maddison (2010).

spatial coverage are inversely related. Thus, over the entire time span, 1870-2007, 96 countries are considered, and its number rises up to 104, 137, and 157 countries for the samples starting in 1913, 1950, and 1990, respectively. These samples represent above 90 per cent of the world population (and practically 100 per cent after 1950). Since the regional aggregates resulting from these samples are highly coincidental, I decided no splicing was need.

3. TRENDS IN HUMAN DEVELOPMENT

A long-run upward trend in world human development is observed for both the UNDP indices ("hybrid" and "old" HDI) –whose level in 2007 was a fourfold of that in 1870- and for the new historical index, *HIHD* –which rose six fold within the same period-. The *HIHD* exhibits a systematically lower level than both the "hybrid" and "old" UNDP indices. A widening absolute gap between them emerges over time, but not in relative terms, as the *HIHD* grows at a faster pace: 1.3 per cent annually against 0.9 and 1.0 per cent for "old" and the "hybrid" HDI, respectively (Table 1).

There is significant room for improvement in world human development according to the *HIHD*. Using the HDR conventional distinction between "low" (< 0.5), "medium" (0.5-0.8), and "high" (> 0.8) levels, the world, would be still below the "medium" level in 2007. In contrast, the *UNDP* indices place the world in the "medium" level since the 1960s and approaching the "high" level nowadays.

Three main phases can be distinguished: a first one, up to 1913, of steady and moderate progress; a second one of acceleration, (but for World War II), during the period 1913-1970, and a third one, since 1970, in which a sustained deceleration gave way to an expansion from 1990 onwards.

Place Table 1 here

Since the income index is the same for all indices (the *HIHD* and UNDP "old" and "hybrid" indices), their differences derive from the way in which the original values of the social variables (life expectancy at birth and education) are transformed and from the aggregation function (additive or multiplicative) used. The alternative indices for life expectancy and education confirm the lower level but faster growth of

the alternative Kakwani indices, and consequently, the widening gap between them and the UNDP linearly transformed indices.

When the alternative UNDP indices are contrasted, it appears that the "hybrid" index remains systematically below the "old" HDI. Furthermore, if the UNDP indices for each social variable are compared, it appears that, in the case of life expectancy, the "hybrid" index remains above the "old" one, while the opposite happens in the case of education. Thus, if an index of human development excluding the income dimension (HDI*) is built, the "old" and the "hybrid" indices become practically identical (Figure 1). Since the income index is the same in both cases, this result implies that the difference between the "old" and the "hybrid" HDI stems mostly from the arithmetic and geometric average used to aggregate the HDI dimensions. Another differential element, but of much less weight, derives from their different goalposts. This coincidence between the "old" and the "hybrid" indices should attenuate reservations about the impact of the new aggregating of human development dimensions (see Ravallion, 2012). Moreover, by excluding income from the human development index, the absolute gap between the *HIHD** and the UNDP "old" and "hybrid" HDI* broadens.

Place Figure 1 here

Trends in human development do not match closely those observed in real GDP per capita (Maddison, 2010). More specifically, phases of economic globalization have a dramatic impact on per capita income growth (Lindert and Williamson, 2003) but not on the progress of human development. A counterintuitive lack of association is observed between human development and per capita income prior to World War I. Although the initial large-scale progress in health can be traced back to the late nineteenth century, with the diffusion of the germ theory of disease (Riley, 2001), and the significant advance of primary education (Benavot and Riddle, 1988), in the era of laissez faire capitalism the progress in human development dimensions fell short of the economic advancement resulting from globalization and industrialization. The negative impact of urbanization on life expectancy and the lack of public policies on education and health may account for human development's slower progress in the late nineteenth century (Easterlin, 1999; Lindert, 2004). It is during the globalization backlash of the period 1914-1950, however, when clear discrepancies emerged. More significantly, while real GDP per capita stagnated or declined as world commodity and

factor markets disintegrated, health and education practices became increasingly globalized and human development progressed steadily. Since 1950, advancement in human development has been hand-in-hand with economic growth, although at a slower pace in the Golden Age (1950-73) and, again, since 2000.

Did the gap between *OECD* and the *Rest* deepen over time? Relative to the *OECD*, the *Rest* showed stability up to 1913 and catching up thereafter, stronger up to 1970 –with the exception of the World War II years-, and weaker afterwards (Figure 2). Human development in the *Rest* presents comparatively lower levels measured by the *HIHD* than in terms of the UNDP indices, with catching-up to *OECD* slowing down dramatically after 1970. Thus, while the *Rest* represented only 50 per cent of the *OECD* level in 2007, according to the *HIHD*, it reached 71 and 75 per cent in the "hybrid" and "old" HDI. Consequently, the *UNDP* indices offer a more benign view of the Periphery than the historical index of human development.

Place Figure 2 here

A deeper perception of world human development derives from comparing the performance of different regions in both absolute terms and relative to *OECD* (Table 2). The comparison of levels and yearly rates of variation across regions shows a wide variance.

Place Table 2 here

Latin America caught up to the *OECD* until 1980, although more intensively during the first half of the twentieth century. In Africa a sustained improvement and catching-up took place between the 1920s and the 1970s, which, since 1980, slowed down in North Africa and ceased altogether in Sub-Saharan Africa. In Asia, starting from low levels -similar to those of Africa up to the early 1920s-, human development improved significantly until 1970 and, again, at the turn of the century, driven by China's and India's progress. Since the 1970s, due to Central and Eastern Europe's falling behind *OECD* and Asia's (especially China's) and North Africa's catching up, a process of convergence between these regions and Latin America has taken place, while Sub-Saharan Africa fell behind.

By 2007, levels of human development in Central and Eastern Europe (including Russia), and Latin America matched those of the *OECD* in the late 1960s; while China

and India had achieved the *OECD* level of 1960 and 1929, respectively, and, in the rest of Asia (excluding Japan), that of 1950. In Africa, the Arab north had reached the *OECD* level of 1938 but in the Sub-Saharan region only represented that of 1890. On average, human development in in the *Rest* had reached by 2007 the level of *OECD* in 1950.

Relative to *the Core*, the *Periphery* performed better in human development than in income per capita terms, although not to the extent suggested by the conventional "old" *UNDP HDI* (Crafts, 2002). Thus, in 2007, real per capita GDP for the *Rest* was similar to that of *OECD* by 1938.

What does explain the *OECD* superior performance in terms of human development? It has been pointed out that it was largely due to public intervention, as markets would not have contributed to control disease transmission, encourage immunization, nor stimulate medical research (Easterlin, 1999).

The relative size of social spending is associated to globalization, economic growth, democratization, and longevity (Lindert, 2004; Huberman, 2012). Has Government intervention and, in particular, the expansion of social spending, played a distinctive role in *OECD* wellbeing achievements? Figure 3 plots levels of human development against social transfers (that is, all social spending but that in education) expressed in proportion of GDP for a group of *OECD* countries.[14] A positive non-linear association seems to exist between the expansion of social protection and the improvement in human development. At low levels, increases in social transfers correspond to large gains in human development (left of the figure). Then, as one moves to the right, it can be observed that increases in social transfers are associated with smaller, but still positive, increases in human development. As social transfer reach 25 percent of GDP the curve tends to flatten, suggesting a reversal for levels above 30 percent. It seems, therefore, that increasing social spending accounts only up

[14] The data on social transfers as a share of GDP for *OECD* countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, UK, and USA) at decadal intervals from 1880 to 2000 (except from 1960 when data are for 5-year intervals) comes from Lindert (1994) and the Allard-Lindert OECD 1950-2001 Dataset in Peter Lindert's website, http://lindert.econ.ucdavis.edu (accessed on August 18, 2012).

to a point for the advancement in *OECD*"s human development but further research would be needed before a conclusion can be established.

Place Figure 3 here

At the time the welfare state expanded in advanced capitalist countries socialism emerged as alternative economic and social system. It has been suggested that it is at low levels of economic development when socialist societies have an advantage over capitalist ones in lifting human wellbeing. Does the evidence on human development support this view?

Substantial gains in human development were obtained in the Soviet Union between the 1920s and the 1960s, which resulted in an impressive catching-up to the *OECD* (Table 2). The significant achievements in health and education that lie behind human development advance and catching-up in the Soviet Union up to the mid-1960s can be also observed in socialist Central and Eastern Europe since 1950. However, from the late 1960s onwards, human development progress gave way to stagnation and, relative to *OECD*, to a dramatic decline that lasted up to 2000.

The success of the Soviet Union in raising longevity and education during the central decades of the twentieth century provided an appealing model for newly independent nations in Asia and Africa after World War II as they were facing the challenge of meeting basic needs (Collier and O'Connell, 2008; Ivanov and Peleah, 2010). In China, human development improved significantly during the first half of the twentieth century, accelerated under socialism up to the 1960s, and only experienced significant advance again since 1990, once pro-market economic reforms were introduced. Notwithstanding, social engineering experiences during China's Cultural Revolution and Cambodia's Khmer Rouge rule proved disastrous in terms of human development. In Indochina, human development improvements had to wait until the late twentieth century, once economic liberalization was introduced, and Vietnam, Lao, and Cambodia caught up to the East Asian average only after 1990. Socialist experiences in Sub-Saharan Africa did not succeed in terms of human development as the cases of Benin, Ethiopia, Congo, Angola, and Mozambique evidence. Political-economic distortions, particularly those associated to moving away from market resource allocation, appear inversely related to human development progress in Sub-

Saharan Africa (Prados de la Escosura, 2013). Cuba, the only socialist experience in the Americas, achieved remarkable success since the 1959 Revolution, driven exclusively by its non-income dimensions, and represents the long-term exception. A preliminary evaluation suggests, therefore, that, but for Russia during the central decades of the twentieth century and Cuba, socialism has not delivered higher human development for developing countries than capitalism.

The short-cut approach to "measure" human development used here so far leaves aside agency and freedom. Without agency –that is, the ability to pursue and realize goals a person has reasons to value- and freedom, the human development index becomes simply a "basic needs" index (Ivanov and Peleah, 2010). Thus, the opportunities individuals have of exercising their political capabilities and influencing public decisions need to be taken into account fin a comprehensive depiction of human development (Dasgupta and Weale, 1992; Cheibub, 2010). In socialist countries, restrictions of individual choice -as collectivization, forced industrialization, and political repression exemplify-, affected negatively agency and freedom. Hence, strictly speaking, their progress in health and education should be depicted as "basic needs" rather than human development achievements (Ivanov and Peleah, 2010). This caveat also applies to fascism and other totalitarian regimes under capitalism. Nonetheless, human development and Vanhanen's (2011) democratization index are correlated since 1950.

4. DECOMPOSING HUMAN DEVELOPMENT GROWTH

Long run gains in world human development are driven by the progress of its social dimensions, longevity and education (Table 3). A sustained progress in Kakwani indices of life expectancy at birth and education is observed in different world regions. Exceptions are the practical stagnation of life expectancy indices in Central and Eastern Europe from the 1960s onwards and in Sub-Saharan Africa since the 1980s. Nonetheless, the improvement falls short from that of *OECD* and catching up in the *Rest* either stops, as in it did the case of life expectancy after 1970, or falls short to be complete, as it happened in the case of education.

Place Table 3 here

The growth of human development (*HIHD*) can be decomposed into the contribution of its different dimensions -life expectancy at birth (*LEB*), education (*EDU*) and truncated income (*UNY*)- on the basis of expression [4]. Using low case to denote rates of variation,

$$hihd = 1/3\ leb + 1/3\ edu + 1/3\ uny \qquad [6].$$

It appears that social dimensions drove world human development gains over time, with life expectancy as the driving force during the 1920s and 1940s and education taking the lead during the 1930s, 1950s, and 1990s (Table 3).

Health improvements can be depicted as movements along a health function and outward shifts of the health function (Preston, 1975). Movements along the curve would represent gains derived from economic growth, which result in nutrition improvements -that strengthen the immune system and reduce morbidity (Stolnitz, 1955; McKeown et al., 1962, 1975; Fogel, 2004)- and in the public provision of health (Loudon, 2000; Cutler and Miller, 2005). Outward shifts in the health function capture, in turn, technological change and would have been responsible for a sustained increase in longevity since the late nineteenth century (McKinley and McKinley, 1977; Riley, 2005a; Cutler et al., 2006). Furthermore, health improvements derived from the diffusion of new technologies resulted not only in a longer life but also in longer healthy life years (Mathers et al., 2001; Murray and Lopez, 1997; Salomon et al., 2012). Technological advance had an impact on health through the diffusion of the germ theory of disease since the 1880s (Preston, 1975), the introduction of new vaccines (since the 1890s) and drugs to cure infectious diseases (sulpha drugs since the late 1930s and antibiotics since the 1950s) (Easterlin, 1999; Jayachandran et al., 2010), and the new medical knowledge to treat respiratory and cardiovascular illnesses in the late 20th century (Cutler et al., 2006).

Place Table 4 here

Why did the longevity's drive in human development fade away by mid-twentieth century? The contrast between the experiences of the *West* and the *Rest* is illuminating. In the case of *OECD* countries, improvements in life expectancy have driven human development advance since 1880 (Table 4). A "second" health transition, with mortality falling among the elderly as a result of a better treatment of respiratory and cardiovascular disease and of better health and nutrition in their early

years (Eggleston and Fuchs, 2012), accounts for the sustained gains in life expectancy at birth and healthy life years during the late twentieth and early twenty-first century. In the *Rest*, the role of life expectancy in human development advance is, despite its very impressive gains during 1913-1970, less decisive since the late twentieth century as longevity gains appeared to slow down once the health transition takes place (Table 5).

Place Table 5 here

Catching up to *OECD* in the *Rest* -measured as the difference in the human development growth rate between the *Rest* and *OECD*-, concentrates between 1913 and 1970, and more intensely in the Interwar and in the 1950s, when a large proportion of the *Rest* was still under colonial rule (Figure 4). Education appears as the main dimension behind human development progress and catching up. In the sluggish catching-up of the *Rest* since 1970, life expectancy plays a negative role, providing support to the view that health inequalities across countries increase as new health technology and knowledge occurs, since it is introduced earlier and at a faster pace in developed countries (Cutler et al., 2006). Only after 2000, income per capita constitutes the main element behind the *Rest*'s catching up.

Place Figure 4 here

The contrast between the *West* and the *Rest* is better understood when the role of human development dimensions is considered at regional level. In Eastern and Central Europe (Russia included) most improvement in human development took place up to 1970, -and more intensely in the 1890s and between the 1920s and 1950s, when catching up to the *OECD* took place-. Education was the driving force (with remarkable intensity during the 1930s), but for the 1920s and the 1940s, when life expectancy took the lead. Since 2000 income has become the main dimension of human development advancement. Russia's performance –the dominating country in the region- confirms and accentuates this depiction, although its catching-up was mostly restricted to the 1890s and to the period 1913-1950.

In the Soviet Union, the expansion of health care to the whole population was particularly successful in fighting infectious disease and child mortality that fell rapidly between 1940 and 1965 (Brainerd and Cutler, 2005; Brainerd, 2010b). By the mid-

1960s life expectancy at birth had practically converged to Western Europe, after a dramatic improvement over the previous four decades, in particular the 1950s, (Mazur, 1969). However, life expectancy fell since 1965 as a result of the decline in adult (male) longevity, largely attributed to diseases of the circulatory system, increasing death rates by accident, suicide, and poisoning, and alcoholism (Dutton, 1979). Increasing infant mortality since 1970 reinforced this declining trend. Stature, a measure of health infrastructure and nutrition improvements, also experienced an increase in the 1930s accelerating from the late 1940s to 1970, when it stagnated (Brainerd, 2010b). In the rest of socialist Europe life expectancy also stagnated since the mid-1960s.

The demise of socialism in Central and Eastern Europe and the disintegration of the Soviet Union brought with it a decline in life expectancy (Brainerd and Cutler, 2005; Brainerd, 2010a). However, life expectancy recovered quickly and expanded after the mid-1990s in Central Europe, especially in Czechoslovakia, Poland and Hungary (Stillman, 2006; Brainerd, 2010a). Alcohol consumption and stress from the transition to market (unemployment uncertainty for mid-age workers, rising inequality), along with worsening of diets and health and material deprivation, appear to be largely responsible for the increase in mortality and help to explain the severity and persistence of the life expectancy decline in the former Soviet Union (Shkolnikov et al., 2001; Cutler and Brainerd, 2005; Brainerd, 2010a).

In Latin America, human development experienced moderate and steady progress and catching-up between 1880 and 1980. In this region too education has been the leading dimension, especially, during the second half of the twentieth century. Life expectancy had a distinguished role during the early twentieth century, in particular during the 1940s, when the strongest catching-up took place. Interestingly, such an advance often did not result of a widespread treatment of infectious diseases with sulpha drugs and antibiotics and vaccination against tuberculosis, since they were largely inaccessible to its low-income population, but of low-cost public health measures and the diffusion of hygienic practices (Riley, 2001). In Jamaica, for example, mortality declined sharply during 1920-1965, but more intensively during the late 1920s and 1930s while real per capita GDP was relatively stagnant. Low-cost public

health measures and diffusion of health knowledge played a major role in eradicating communicable diseases (diarrheal diseases, malaria, and tuberculosis), prior to the introduction of antibiotics (Riley, 2005a). A similar experience is found in British Guiana (Mandle, 1970). Latin America's weak convergence to developed countries during the second half of the twentieth century deserves investigation. In particular, restricted access to health and education as result of income inequality may have been a serious obstacle for human development catching up.

Cuba provides an interesting counterpoint to the rest of Latin America and to other socialist experiences. A sustained improvement in life expectancy took place during the first half of the twentieth century so, by eve of the 1959 Revolution, Cuba was above the average Latin American and Southern European countries (McGuire and Frankel, 2005; Devereux, 2010; Ward and Devereux, 2010, 2012). After the 1959 Revolution, a further and impressive improvement in life expectancy has taken place as a result of the success in eradicating infant mortality. The mortality decline, initiated after the U.S. occupation, was associated to public health innovation and largely independent from Cuba's level of economic development (Díaz-Briquets, 1981). There is some continuity in this pattern since 1959, as its achievements in human development have been in striking contrast with its poor economic performance. The case of Cuba provides a case of extreme contrast between the success in achieving "basic needs" and the failure to enlarging people's choices –the core of human development- as agency and freedom are curtailed by the political regime.

Significant progress of human development has taken place in Asia during the last century although the regional variance was large. China experienced an impressive advancement and catching up in human development during the last hundred years, with special intensity in the Interwar and the Golden Age, led by education -between 1929 and 1960-, and by life expectancy -from 1913 to 1929 and in the 1960s. Since the 1970s the income dimension has dominated human development progress –largely a consequence of the pro-market reforms while its social components –life expectancy, in particular, played a minor role. The slowdown in health improvements has been regarded as a direct consequence of the new economic policies (Dréze and Sen, 2002; Cutler et al., 2006).

India experienced a steady advance in human development since the late nineteenth century, catching up to *OECD* over the last century, especially in the 1920s and, again, during the 1940s and 1950s. Education appears as the main contributor to human development advancement in the long run, although life expectancy at birth drove it in the first half of the twentieth century. Improvements in sanitation, medical care, and famine prevention successfully contributed to reducing the impact of infectious disease (malaria, smallpox, cholera) (McAlpin, 1983; Roy, 2006). These achievements are especially remarkable because they took place during a period of stagnation in real incomes per capita (Roy, 2006; Maddison, 2010) and under colonial rule, despite claims of colonial under-investment and poor health infrastructure (Amrith, 2009). In the last three decades, the income dimension has played a major role, along education, in human development advance. This feature has been associated, as in China, to the impact of pro-market reforms, which contributed to reduce the poverty rate by half since the early 1970s (Kotwal et al., 2011). A simultaneous slowdown in infant mortality reduction occurred as the new economic policies were implemented (Dréze and Sen, 2002) helping to explain why longevity's contribution to human development progress has been so weak in recent times.

In the rest of Asia (excluding Japan), sustained progress in human development has taken place since 1870 and catching up to *OECD* can be observed since 1913, especially up to 1938 and during the Golden Age. Education and health improvements jointly contributed in the advancement of human development. As in the case of India, substantial health improvements were achieved before independence. Thus, mortality from smallpox, cholera and plague was reduced through specific public health measures in Indonesia, the Philippines, and Taiwan during the 1920s (Preston, 1975).

In Africa, a very distinctive performance is observed between its north and sub-Saharan regions. In North Africa, a steady long-run improvement has taken place in human development on the basis of both longevity, which experienced a major improvement in the 1940s, and education gains that allowed the region's catching-up to *OECD* during the twentieth century, especially in its central decades and in the 1970s. South of the Sahara the period 1913-1980 is also the one of human development advance and catching-up. However, the leading role played by life

expectancy is restricted to the 1930s and 1940s, and education provided the main source of progress, in particular, after the collapse in per capita GDP growth during the last quarter of the twentieth century. The stagnation of life expectancy, due to the spread of HIV/AIDS and the resilience of malaria, together with arrested growth and the deceleration in the education expansion, largely resulting from political turmoil, civil wars and unsound economic policies (Collier, 2000; Collier and O'Connell, 2008), explain the weak advance in human development and the region's falling behind. The surge in human development during the 2000s has been helped by the recovery in economic activity and, to less extent, in life expectancy, but education has remained the main force behind its advance.

5. CONCLUDING REMARKS

On the basis of an alternative, historical index of human development in which non-income variables are transformed non-linearly in order to allow for the fact that increases of the same absolute size represent greater achievements the higher the level at which they take place, as well as for the quality improvements associated to increases in quantity, some findings the long-term evolution of human welfare can be highlighted.

Substantial but incomplete gains in world human development have taken place during the last one and a half centuries, although it was between World War I and the oil shocks of the 1970s when wellbeing improved intensively and across the board.

Significant progress in longevity and education and, hence, in human development took place across world regions between 1920 and 1950, just at the time of economic globalization backlash. This counterintuitive result calls for further research. Why are trends in GDP per capita and human development uncorrelated over time when increases in per capita income would surely contribute to better nutrition, health and education? Is it due to public policy (e.g. public schooling, public health, the rise of the welfare state), or to the fact that medical technology is a public good? On the basis of the available evidence it seems that public policies have played an important role in the improvement of health and education. Also technological medical change appears to have made a major contribution to long-term longevity

gains and the increase in healthy life years. Both of them translated into human development gains throughout the 20th century. However, further investigation on their causal connections is required.

The choice of economic and social system had a far from negligible influence in human development across countries. Socialist and capitalist models implied different health and education policies, as well as different economic policies. The results presented here suggest that, despite its initial success as providers of "basic needs", socialist experiences failed to sustain the momentum and, but for Cuba, stagnated and fell behind before the demise of socialism. Moreover, as in other totalitarian experiences, its suppression of agency and freedom prevented real achievements in human development.

The last four decades have witnessed a deceleration in human development advance and a widening in the absolute gap between the *OECD* and the *Rest* that has exhibited, nonetheless, a large variance in regional behaviour. Progress and catching up in large areas of Asia, North Africa and, to less extent, in Latin America, coexisted with the collapse and falling behind of former socialist Europe and Sub-Saharan Africa.

Differences in the behaviour of human development dimensions help to explain the gap between *OECD* and the *Rest* (and the variance within the *Rest*). Longevity is the key element in *OECD* forging ahead, not only because of the longer life span enjoyed by its population, but because of the higher quality of life associated to it. Conversely, in the *Rest*, life expectancy only played a major role in human development gains and catching up until the central decades of the twentieth century and, as the demographic and epidemiological transition took place, its dynamic role faded away. A second wave of longevity expansion comparable to that of the *OECD* has not taken place in the *Rest* yet. Thus, education carried most of the weight in human development progress during the last four decades, with the income dimension playing a decisive role in catching up to *OECD*: positive in China and India, and negative in Sub-Saharan Africa and Russia and former socialist countries in Europe.

Why did life expectancy stop being the driving force of world human development as the health transition was completed? Why a "second" transition, like the one underway in the *OECD*, has not been triggered off in the *Rest*? Is it due to a

lack of public policies, or to the inequalising impact of the new medical technologies? Is it because health and education are high income-elastic goods? Or are political and institutional factors its main determinants? All these questions deserve further investigation.

REFERENCES

Acemoglu, D. and S. Johnson, "Disease and Development: The Effects of Life Expectancy on Economic Growth," *Journal of Political Economy*, 115, 925-985, 2007.

Altinok, N., C. Diebolt, and J.L- Demeulemeester, "A New International Dataset on Education Quality, 1965-2010," AFC Working Papers 3, 2013.

Amrith, S.S., "Health in India since Independence," University of Manchester Brooks World Poverty Institute Working Paper 79, 2009.

Anand, S. and A.Sen, "The Income Component of the Human Development Index," *Journal of Human Development*, 1, 83-106, 2000.

Astorga, P., Bergés, A. R., and FitzGerald, E. V. K., "The Oxford Latin American Economic History Database [OxLAD]," Oxford: Latin American Centre, Oxford University, 2003. Available online at: http://oxlad.qeh.ox.ac.uk/

Banks, A. S., "Cross-National Time-Series Data Archive," 2010. http://www.databanksinternational.com/

Benavot, A. and P. Riddle, "The Expansion of Primary Education, 1870-1940: Trends and Issues," *Sociology of Education*, 61, 191-210, 1988.

Bleakley, H., "Disease and Development: Evidence from Hookworm Eradication in the American South," *Quarterly Journal of Economics*, 122, 73-117, 2007.

_____, "Malaria Eradication in the Americas: A Retrospective Analysis of Childhood Exposure," *American Economic Journal*: *Applied Economics*, 2, 1-45, 2010.

Brainerd, E, "Human Development in Eastern Europe and the CIS since 1990," UNDP Human Development Reports Research Paper 16, 2010a.

_____, "Reassessing the Standard of Living in the Soviet Union: An Analysis Using Archival and Anthropometric Data," *Journal of Economic History*, 70, 83-117, 2010b.

Brainerd, E. and D.M. Cutler, "Autopsy on an Empire: Understanding Mortality in Russia and the Former Soviet Union," *Journal of Economic Perspectives*, 19, 107-130, 2005.

Boyer, G.R., "The Convergence of Living Standards in the Atlantic Economy, 1870-1930," in T.J. Hatton, K.H. O'Rourke, and A.M. Taylor, eds., *The New Comparative Economic History*, 317-342, MIT Press, Cambridge M.A., 2007.

Canning, D., "Progress in Health around the World," UNDP Human Development Reports Research Paper 43, 2010.

Cheibub, J.A., "How to Include Political Capabilities in the HDI? An Evaluation of Alternatives," UNDP Human Development Reports Research Paper 41, 2010

Collier, P., "Ethnicity, Politics, and Economic Performance," *Economics and Politics*, 12, 225-245, 2000.

Collier, P. and S.A. O'Connell, "Opportunities and Choices," in B.J. Ndulu, S.A. O'Connell, J.P. Azam, R.H. Bates, A.K. Fosu, J.W. Gunning, and D. Njinkeu, eds., *The Political Economy of Economic Growth in Africa, 1960-2000*, I, 76-136, Cambridge University Press, Cambridge, 2008

Crafts, N.F.R., "The Human Development Index and Changes in the Standard of Living: Some Historical Comparisons," *European Review of Economic History*, 1, 299-322, 1997

_____, "The Human Development Index, 1870-1999: Some Revised Estimates," *European Review of Economic History*, 6, 395-405, 2002.

Cutler, D. and G. Miller, "The Role of Public Health Improvements in Health Advance: The Twentieth Century United States," *Demography*, 42, 1-22, 2005.

Cutler, D., A. Deaton and A. Lleras-Muney, "The Determinants of Mortality," *Journal of Economic Perspectives*, 20, 97-120, 2006

Cutler, D., Cutler, W. Fung, M. Kremer, M. Singhal and T Vogl, "Early-life Malaria Exposure and Adult Outcomes: Evidence from Malaria Eradication in India," *American Economic Journal*: *Applied Economics*, 2, 72-94, 2010.

Dasgupta, P., "Well-Being and the Extent of its Realization in Poor Countries," *Economic Journal*, 100, 1-32, 1990.

Dasgupta, P. and M. Weale, "On Measuring the Quality of Life," *World Development*, 20, 119-131, 1992.

Deaton, A., "Global Patterns of Income and Health: Facts, Interpretations, and Policies," NBER Working Papers 12735, 2006.

Desai, M., "Human Development: Concept and Measurement," *European Economic Review*, 35, 350-357, 1991.

Devereux, J., "The Health of the Revolution: Explaining the Cuban Health Care Paradox," Unpublished manuscript, 2010.

Díaz-Briquets, S., "Determinants of Mortality Transition in Developing Countries Before and After the Second World War: some Evidence from Cuba," *Population Studies*, 35, 399-411, 1981.

Dréze, J. and A.K. Sen, *India: Development and Participation*, Oxford University Press, Delhi, 2002.

Dutton, J. Jr., "Changes in Soviet Mortality Patterns, 1959-77," *Population and Development Review*, 5, 267-291, 1979.

Easterlin, R.A., "How Beneficient is the Market? A Look at the Modern History of Mortality," *European Review of Economic History*, 3, 257-294, 1999.

Easterly, W., "Life after Growth," *Journal of Economic Growth*, 4, 239-276, 1999, underlying data available online at:
http://www.worldbank.org/html/prdmg/grthweb/growth t.htm

Engerman, S.L., "The Standard of Living Debate in International Perspective: Measure and Indicators," in R.H. Steckel and R. Floud, eds., *Health and Welfare during Industrialization*, 17-45, University of Chicago Press/NBER, Chicago, 1997.

Eggleston, K.N. and V. Fuchs, "The New Demographic Transition: Most Gains in Life Expectancy Now Realized Late in Life," *Journal of Economic Perspectives*, 26, 137-156, 2012.

Engineer, M.H., N. Roy and S. Fink, " 'Healthy' Human Development Indices," *Social Indicators Research*, 99, 61-80, 2010.

Fleurbaey, M., "Beyond GDP: The Quest for a Measure of Social Welfare," *Journal of Economic Literature*, 47, 1029–1075, 2009.

Flora, P., "Historical Processes of Social Mobilization: Urbanization and Literacy, 1850–1965," in S. N. Eisenstadt and S. Rokkan, eds., *Building States and Nations: Models and Data Resources*, 213-258, Sage, London, 1973.

_____, *State, Economy, and Society in Western Europe 1815-1975. A Data Handbook in Two Volumes*, Campus Verlag, Frankfurt, 1983.

Fogel, R.W., *The Escape from Hunger and Premature Death, 1700-2010. Europe, American and the Third World*, Cambridge University Press, New York, 2004.

_____, "Biotechnology and the Burden of Age-Related Diseases," in D. Eltis, F.D. Lewis and K.L. Sokoloff, eds., *Human Capital and Institutions. A Long-run View*, 11-26, Cambridge University Press, New York, 2009

Gidwitz, Z.,Heger, M.P., Pineda, J., Rodríguez, F., "Understanding Performance in Human Development: a Cross-national Study," UNDP Human Development Reports Research Paper 42, 2010.

Hanushek, E.A. and D.D. Kimko, "Schooling, Labor-Force Quality, and the Growth of Nations," *American Economic Review*, 90, 1184-1208, 2000.

Hanushek, E.A. and L. Woessmann, "Do Better Schools Lead to More Growth? Cognitive Skills, Economic Outcomes, and Causation," *Journal of Economic Growth*, 17: 267-321, 2012.

Hayami, Y. and V.W. Ruttan, *Agricultural Development An International Perspective*, Johns Hopkins University Press, Baltomore, 1985.

Hatton, T.J. and B.E. Brey, "Long Run Trends in the Heights of European Men, 19th–20th Centuries," *Economics and Human Biology*, 8, 405-413, 2010.

Howse, K., "Increasing Life Expectancy and the Compression of Morbidity: a Critical Review of the Debate," Oxford Institute of Ageing Working Paper 226, 2006.

Huberman, M., *Odd Couple. International Trade and Labor Standards in History*, Yale University Press, New Haven, 2012.

Ivanov, A. and M. Peleah, "From Centrally Planned Development to Human Development," UNDP Human Development Reports Research Paper 38, 2010

Jayachandran, S., A. Lleras-Muney, and K.V. Smith, "Modern Medicine and the Twentieth Century Decline in Mortality: Evidence on the Impact of Sulfa Drugs," *American Economic Journal*: *Applied Economics*, 2, 118-146, 2010.

Kakwani, N., "Performance in Living Standards. An International Comparison", *Journal of Development Economics*, 41, 307-336, 1993.

Klugman, J., F. Rodríguez, and H. J. Choi, "The HDI 2010: New Controversies, Old Critiques," UNDP Human Development Reports Research Paper 01, 2011.

Kotwal, A., B. Ramaswami, and W. Wadhwa, "Economic Liberalization and India Economic Growth: What"s the Evidence?," *Journal of Economic Literature*, 49, 1152-1199, 2011.

Lindert, P.H. (2004), *Growing Public. Social Spending and Economic Growth since the Eighteenth Century*, Cambridge University Press, Cambridge, 2004.

Lindert, P.H. and J.G. Williamson, "Does Globalization Make the World More Unequal?", in M. Bordo, A.M. Taylor and J.G. Williamson, eds., *Globalization in Historical Perspective*, 227-275, University of Chicago Press/NBER, Chicago, 2003.

Loudon, I., "Maternal Mortality in the Past and its Relevance to Developing Countries Today," *American Journal of Clinical Nutrition*, 72, 1 (supplement), 241S-6S, 2000.

Maddison, A., *The World Economy*, OECD Development Centre, Paris, 2006.

_____, Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD, 2010, available online at http://www.ggdc.net/maddison/

Mandle, J.R., "The Decline of Mortality in British Guiana, 1911-1960," *Demography*, 7, 301-315, 1970.

Markussen, I., "The Development of Writing Ability in Nordic Countries in the Eighteenth and Nineteenth Centuries," *Scandinavian Journal of History*, 15, 37-63, 1990.

Mathers, C. D., R. Sadana, J.A. Salomon, C.J.L. Murray, and A.D. Lopez, "Healthy Life Expectancy in 191 Countries," *Lancet*, 357, 1685–1691, 2001.

Mazur, D.P., "Expectancy of Life at Birth in 36 Nationalities of the Soviet Union: 1958-60," *Population Studies*, 23, 225-246, 1969.

McAlpin, M.B., "Famines, Epidemics, and Population Growth: The Case of India," *Journal of Interdisciplinary History*, 14, 351-366, 1983.

McGuire and L.B. Frankel, "Mortality Decline in Cuba, 1900-1959: Patterns, Comparisons, and Causes," *Latin American Research Review*, 40, 83-116, 2005.

McKeown, T. and R.G. Record, "Reasons for the Decline of Mortality in England and Wales during the Nineteenth Century," *Population Studies*, 16: 94-122, 1962.

McKeown, T., R.G. Record, and R.D. Turner, "An Interpretation of the Decline of Mortality in England and Wales during the Twentieth Century," *Population Studies*, 29, 391-422, 1975

McKinlay, J.B. and S.M. McKinlay, "The Questionable Contribution of Medical Measure to the Decline of Mortality in the United States in the Twentieth Century," *Milbank Memorial Fund Quarterly. Health and Society*, 55, 405-428, 1977

Milanovic, B., P.H. Lindert, and J.G. Williamson, "Measuring Ancient Inequality," *Economic Journal*, 121, 255-272, 2011.

Mitchell, B. R., *International Historical Statistics: Africa, Asia, and Oceania 1750-2000*, Palgrave Macmillan, New York, 2003a.

_____, *International Historical Statistics: The Americas, 1750–2000*, Palgrave Macmillan, New York, 2003b.

_____, *International Historical Statistics: Europe 1750-2000*, Palgrave Macmillan, New York, 2003c.

Murray, C.J.L. and A.D. Lopez, "Regional Patterns of Disability-free Life Expectancy and Disability-adjusted Life Expectancy: Global Burden of Disease Study," *Lancet*, 349, 1347-1352, 1997.

Nilsson, A., "What Do Literacy Rates in the 19th Century Really Signify? New Light on an Old Problem from Unique Swedish Data," *Paedagogica Historica*, 35, 275-296, 1999

Noorbakhsh, F., "A Modified Human Development Index," *World Development*, 2, 517-528, 1998.

Omran, A.R., "The Epidemiological Transition: A Theory of Epidemiology of Population Change," *Milbank Memorial Fund Quarterly*, 49, 509-538, 1971.

Oulton, P., "Hooray for GDP!," LSE Centre for Economic Performance Occasional Paper 30, 2012.

Prados de la Escosura, L., "Improving Human Development: A Long-run View," *Journal of Economic Surveys*, 24, 841-894, 2010.

_____, "Output per Head in Pre-Independence Africa: Quantitative Conjectures," *Economic History of Developing Regions*, 27 (2), 1-35, 2012.

_____, L., "Human Development in Africa: A Long-run Perspective," *Explorations in Economic History*, 50, 2013.

Ravallion, M., "Troubling Tradeoffs in the Human Development Index," *Journal of Development Economics*, 99, 201–209, 2012.

Riley, J.C., "The Risk of Being Sick: Morbidity Trends in Four Countries," *Population and Development Review*, 16, 403-432, 1990.

_____, *Rising Life Expectancy. A Global History*, Cambridge University Press, New York, 2001.

_____, *Poverty and Life Expectancy. The Jamaica Paradox*, Cambridge University Press, New York, 2005a.

_____, "The Timing and Pace of Health Transitions Around the World," *Population and Development Review*, 31, 741-764, 2005b.

_____, "Bibliography of Works Providing Estimates of Life Expectancy at Birth and Estimates of the Beginning Period of Health Transitions in Countries with a Population in 2000 of at Least 400,000," 2005c, available online at: www.lifetable.de/RileyBib.htm

Roy, T., *The Economic History of India 1857-1947*, Oxford University Press, New Delhi, 2006.

Salomon, J.A., H. Wang, M.K. Freeman, T. Vos, A.D. Flaxman, A.D. Lopez, and C.J.L. Murray, "Healthy Life Expectancy for 187 Countries, 1990–2010: A Systematic Analysis for the Global Burden Disease Study 2010," *Lancet*, 380: 2144-2162, 2012.

Sagar, A .D. and A. Najam, "The Human Development Index: A Critical Review," *Ecological Economics*, 25, 249-264, 1998.

Sen, A.K., "Public Action and the Quality of Life in Developing Countries," *Oxford Bulletin of Economics and Statistics*, 43, 287-319, 1981.

_____, *Commodities and Capabilities*, North Holland, Amsterdam, 1985.

_____, *Standard of Living*, Cambridge University Press, New York, 1987.

_____, "Human Capital and Human Capability," *World Development*, 25, 1959-1961, 1997.

Shkolnikov, V., M. McKee, and D.A. Leon, "Changes in Life Expectancy in Russia in the mi-1990s," *Lancet*, 357, 917-921, 2001.

Steckel, R.H., "Extending the Reach of Anthropometric History to the Distant Past", in D. Eltis, F.D. Lewis and K.L. Sokoloff, eds., *Human Capital and Institutions. A Long-run View*, 27-45, Cambridge University Press, New York, 2009.

Stillman, S., "Health and Nutrition in Eastern Europe and the Former Soviet Union during the Decade of Transition: A Review of the Literature," *Economics and Human Biology*, 4, 104-146, 2006.

Stolnitz, G.J., "A Century of International Mortality Trends," *Population Studies*, 9, 24-55, 1955.

UNESCO, *Progress of Literacy in Various Countries. A Preliminary Statistical Study of Available Census Data since 1900*, UNESCO, Paris, 1953.

_____, *World Illiteracy at Mid-Century. A Statistical Study*, UNESCO, Paris, 1957.

_____, *Literacy 1967-1969 Progress Achieved in Literacy throughout the World*, UNESCO, Paris, 1970.

_____, *Estimated Illiteracy Rate and Illiterate Population Aged 15 Years and Older by Country, 1970-2015*, UNESCO, Paris, 2002.

_____, *Total Enrolment, School Life Expectancy, and Expenditure on Education 1970-2005*, UNESCO, Paris, 2010.

United Nations Development Program [UNDP], *Human Development Report*, Oxford University Press, New York, 1990-2011.

Vanhanen, T., "Measures of Democracy 1810-2010," FSD1289, version 5.0 (2011-07-07), Finnish Social Science Data Archive, Tampere, 2011,
available online at www.fsd.uta.fi/en/data/catalogue/FSD1289/meF1289e.html (accessed 23 July 2012)

Ward, M. and J. Devereux, "The Absolution of History: Cuban Living Standards after Fifty Years of Revolutionary Rule," mimeo, 2010.

_____, "The Road Not Taken: Pre-Revolutionary Cuban Living Standards in Comparative Perspective," *Journal of Economic History*, 72, 104-132, 2012.

World Bank, "World Development Indicators Database," World Bank, Washington D.C., 2010, available online at http://data.worldbank.org/data-catalog

Zambrano, E., "An Axiomatization of the Human Development Index," UNDP Human Development Reports Research Paper 10, 2011a.

Zambrano, E., Functionings, "Capabilities and the 2010 Human Development Index," UNDP Human Development Reports Research Paper 11, 2011b.

Table 1 ***Human Development in the World, 1870-2007: Alternative Indices***

Panel A:
Levels

	HIHD	"Hybrid" HDI	"Old" HDI
1870	0.076	0.173	0.212
1880	0.083	0.187	0.229
1890	0.095	0.210	0.252
1900	0.107	0.231	0.277
1913	0.122	0.257	0.306
1929	0.157	0.316	0.365
1938	0.185	0.359	0.407
1950	0.210	0.397	0.466
1960	0.263	0.476	0.540
1970	0.307	0.535	0.603
1980	0.334	0.573	0.639
1990	0.367	0.613	0.676
2000	0.416	0.659	0.719
2007	0.460	0.702	0.751

Panel B: Average Growth Rates (%)

1870-1880	1.0	0.8	0.8
1880-1890	1.4	1.1	0.9
1890-1900	1.2	1.0	0.9
1900-1913	1.0	0.8	0.8
1913-1929	1.6	1.3	1.1
1929-1938	1.8	1.4	1.2
1938-1950	1.1	0.8	1.1
1950-1960	2.2	1.8	1.5
1960-1970	1.5	1.2	1.1
1970-1980	0.9	0.7	0.6
1980-1990	0.9	0.7	0.6
1990-2000	1.3	0.7	0.6
2000-2007	1.4	0.9	0.6
1870-1913	1.1	0.9	0.9
1913-1950	1.5	1.2	1.1
1950-1970	1.9	1.5	1.3
1970-1990	0.9	0.7	0.6
1990-2007	1.3	0.8	0.6
1870-1913	1.1	0.9	0.9
1913-1970	1.6	1.3	1.2
1970-2007	1.1	0.7	0.6
1870-2007	1.3	1.0	0.9

Table 2 *Human Development across World Regions, 1870-2007*

Panel A: HIHD Levels

	OECD	Central & Eastern Europe (Incl. Russia)	Latin America	China	India	Rest of Asia (Excl. Japan)	North Africa	Sub-Saharan Africa
1870	0.175	0.073	0.055	0.032	0.025	0.028	0.036	0.027
1880	0.192	0.082	0.060	0.033	0.029	0.031	0.037	0.029
1890	0.220	0.097	0.071	0.042	0.034	0.037	0.040	0.031
1900	0.246	0.119	0.083	0.040	0.035	0.042	0.046	0.034
1913	0.277	0.133	0.106	0.040	0.041	0.053	0.056	0.037
1929	0.334	0.187	0.137	0.064	0.060	0.088	0.072	0.050
1938	0.366	0.266	0.156	0.081	0.070	0.113	0.080	0.062
1950	0.417	0.335	0.215	0.093	0.097	0.123	0.112	0.081
1960	0.482	0.413	0.263	0.166	0.130	0.168	0.152	0.108
1970	0.541	0.482	0.313	0.222	0.160	0.220	0.182	0.139
1980	0.593	0.490	0.374	0.257	0.185	0.261	0.233	0.173
1990	0.658	0.509	0.403	0.308	0.225	0.314	0.286	0.185
2000	0.745	0.497	0.481	0.408	0.267	0.364	0.350	0.194
2007	0.809	0.537	0.520	0.470	0.311	0.417	0.389	0.220

Panel B: Average Growth Rates (%)

	OECD	Central & Eastern Europe (Incl. Russia)	Latin America	China	India	Rest of Asia (Excl. Japan)	North Africa	Sub-Saharan Africa
1870-1880	0.9	1.3	0.8	0.1	1.5	1.2	0.4	0.6
1880-1890	1.4	1.7	1.7	2.5	1.7	1.5	0.9	0.8
1890-1900	1.1	2.0	1.6	-0.4	0.1	1.3	1.3	0.9
1900-1913	0.9	0.9	1.9	0.0	1.2	1.9	1.5	0.8
1913-1929	1.2	2.1	1.6	3.0	2.4	3.2	1.6	1.8
1929-1938	1.0	3.9	1.4	2.5	1.8	2.8	1.2	2.4
1938-1950	1.1	1.9	2.7	1.2	2.7	0.7	2.8	2.2
1950-1960	1.4	2.1	2.0	5.8	2.9	3.1	3.0	2.9
1960-1970	1.2	1.5	1.7	2.9	2.1	2.7	1.8	2.5
1970-1980	0.9	0.2	1.8	1.5	1.5	1.7	2.5	2.2
1980-1990	1.0	0.4	0.7	1.8	1.9	1.8	2.1	0.7
1990-2000	1.2	-0.2	1.8	2.8	1.7	1.5	2.0	0.5
2000-2007	1.2	1.1	1.1	2.0	2.2	2.0	1.5	1.8
1870-1913	1.1	1.4	1.5	0.5	1.1	1.5	1.0	0.8
1913-1950	1.1	2.5	1.9	2.3	2.4	2.3	1.9	2.1
1950-1970	1.3	1.8	1.9	4.4	2.5	2.9	2.4	2.7
1970-1990	1.0	0.3	1.3	1.6	1.7	1.8	2.3	1.4
1990-2007	1.2	0.3	1.5	2.5	1.9	1.7	1.8	1.0
1870-1913	1.1	1.4	1.5	0.5	1.1	1.5	1.0	0.8
1913-1970	1.2	2.3	1.9	3.0	2.4	2.5	2.1	2.3
1970-2007	1.1	0.3	1.4	2.0	1.8	1.7	2.1	1.3
1870-2007	1.1	1.5	1.6	2.0	1.8	2.0	1.7	1.5

Table 3 *Human Development and its Dimensions: the World, 1870-2007*

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.076	0.038	0.047	0.242
1880	0.083	0.040	0.056	0.255
1890	0.095	0.046	0.069	0.272
1900	0.107	0.054	0.079	0.291
1913	0.122	0.063	0.092	0.318
1929	0.157	0.099	0.117	0.336
1938	0.185	0.119	0.155	0.344
1950	0.210	0.174	0.166	0.323
1960	0.263	0.215	0.224	0.375
1970	0.307	0.263	0.264	0.416
1980	0.334	0.294	0.282	0.450
1990	0.367	0.328	0.308	0.489
2000	0.416	0.372	0.369	0.526
2007	0.460	0.411	0.403	0.589

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	1.0	0.2	0.6	0.2
1880-1890	1.4	0.5	0.7	0.2
1890-1900	1.2	0.5	0.5	0.2
1900-1913	1.0	0.4	0.4	0.2
1913-1929	1.6	1.0	0.5	0.1
1929-1938	1.8	0.7	1.1	0.1
1938-1950	1.1	1.1	0.2	-0.2
1950-1960	2.2	0.7	1.0	0.5
1960-1970	1.5	0.7	0.5	0.3
1970-1980	0.9	0.4	0.2	0.3
1980-1990	0.9	0.4	0.3	0.3
1990-2000	1.3	0.4	0.6	0.2
2000-2007	1.4	0.5	0.4	0.5
1870-1913	1.1	0.4	0.5	0.2
1913-1950	1.5	0.9	0.5	0.0
1950-1970	1.9	0.7	0.8	0.4
1970-1990	0.9	0.4	0.3	0.3
1990-2007	1.3	0.4	0.5	0.4
1870-1913	1.1	0.4	0.5	0.2
1913-1970	1.6	0.8	0.6	0.2
1970-2007	1.1	0.4	0.4	0.3
1870-2007	1.3	0.6	0.5	0.2

Table 4 ***Human Development and its Dimensions: the OECD, 1870-2007***

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1880	0.192	0.091	0.182	0.429
1890	0.220	0.112	0.211	0.454
1900	0.246	0.131	0.237	0.485
1913	0.277	0.152	0.268	0.522
1929	0.334	0.210	0.314	0.563
1938	0.366	0.243	0.354	0.569
1950	0.417	0.319	0.387	0.586
1960	0.482	0.374	0.451	0.663
1970	0.541	0.412	0.513	0.748
1980	0.593	0.474	0.551	0.797
1990	0.658	0.544	0.622	0.841
2000	0.745	0.657	0.717	0.878
2007	0.809	0.776	0.760	0.898

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	0.9	0.2	0.5	0.2
1880-1890	1.4	0.7	0.5	0.2
1890-1900	1.1	0.5	0.4	0.2
1900-1913	0.9	0.4	0.3	0.2
1913-1929	1.2	0.7	0.3	0.2
1929-1938	1.0	0.5	0.4	0.0
1938-1950	1.1	0.8	0.2	0.1
1950-1960	1.4	0.5	0.5	0.4
1960-1970	1.2	0.3	0.4	0.4
1970-1980	0.9	0.5	0.2	0.2
1980-1990	1.0	0.5	0.4	0.2
1990-2000	1.2	0.6	0.5	0.1
2000-2007	1.2	0.8	0.3	0.1
1870-1913	1.1	0.4	0.4	0.2
1913-1950	1.1	0.7	0.3	0.1
1950-1970	1.3	0.4	0.5	0.4
1970-1990	1.0	0.5	0.3	0.2
1990-2007	1.2	0.7	0.4	0.1
1870-1913	1.1	0.4	0.4	0.2
1913-1970	1.2	0.6	0.4	0.2
1970-2007	1.1	0.6	0.4	0.2
1870-2007	1.1	0.5	0.4	0.2

Table 5 ***Human Development and its Dimensions: the Rest, 1870-2007***

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.040	0.024	0.014	0.196
1880	0.044	0.025	0.017	0.201
1890	0.051	0.026	0.024	0.214
1900	0.057	0.029	0.027	0.228
1913	0.065	0.033	0.034	0.249
1929	0.094	0.063	0.051	0.263
1938	0.124	0.080	0.088	0.273
1950	0.148	0.131	0.100	0.247
1960	0.203	0.173	0.162	0.299
1970	0.249	0.227	0.201	0.338
1980	0.278	0.257	0.222	0.378
1990	0.315	0.290	0.252	0.427
2000	0.363	0.326	0.313	0.468
2007	0.405	0.354	0.347	0.541

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	0.8	0.1	0.6	0.1
1880-1890	1.5	0.2	1.2	0.2
1890-1900	1.0	0.4	0.5	0.2
1900-1913	1.1	0.3	0.6	0.2
1913-1929	2.3	1.3	0.8	0.1
1929-1938	3.1	0.9	2.0	0.1
1938-1950	1.5	1.4	0.3	-0.3
1950-1960	3.2	0.9	1.6	0.6
1960-1970	2.0	0.9	0.7	0.4
1970-1980	1.1	0.4	0.3	0.4
1980-1990	1.2	0.4	0.4	0.4
1990-2000	1.4	0.4	0.7	0.3
2000-2007	1.6	0.4	0.5	0.7
1870-1913	1.1	0.3	0.7	0.2
1913-1950	2.2	1.2	1.0	0.0
1950-1970	2.6	0.9	1.2	0.5
1970-1990	1.2	0.4	0.4	0.4
1990-2007	1.5	0.4	0.6	0.5
1870-1913	1.1	0.3	0.7	0.2
1913-1970	2.3	1.1	1.0	0.2
1970-2007	1.3	0.4	0.5	0.4
1870-2007	1.7	0.7	0.8	0.2

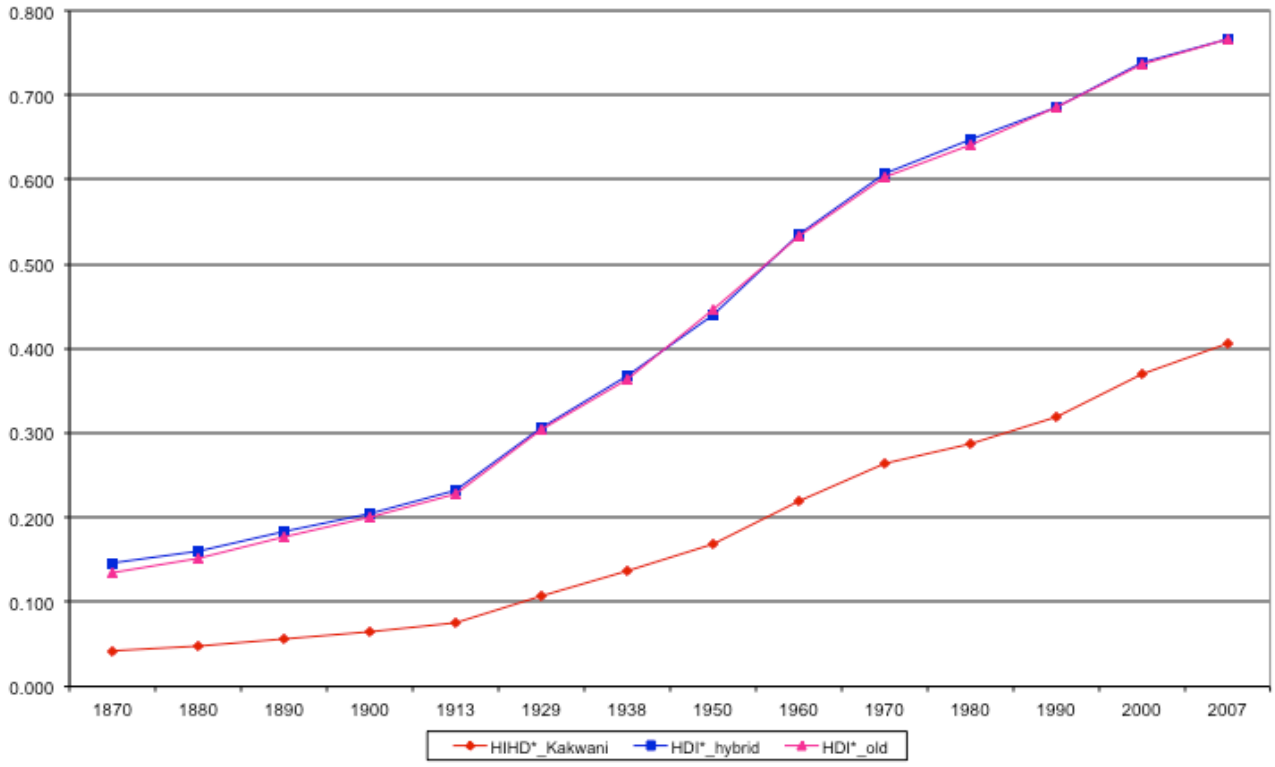

Figure 1 World Human Development* (excluding Per Capita Income): HIHD*, "hybrid" and "old" HDI*, 1870-2007

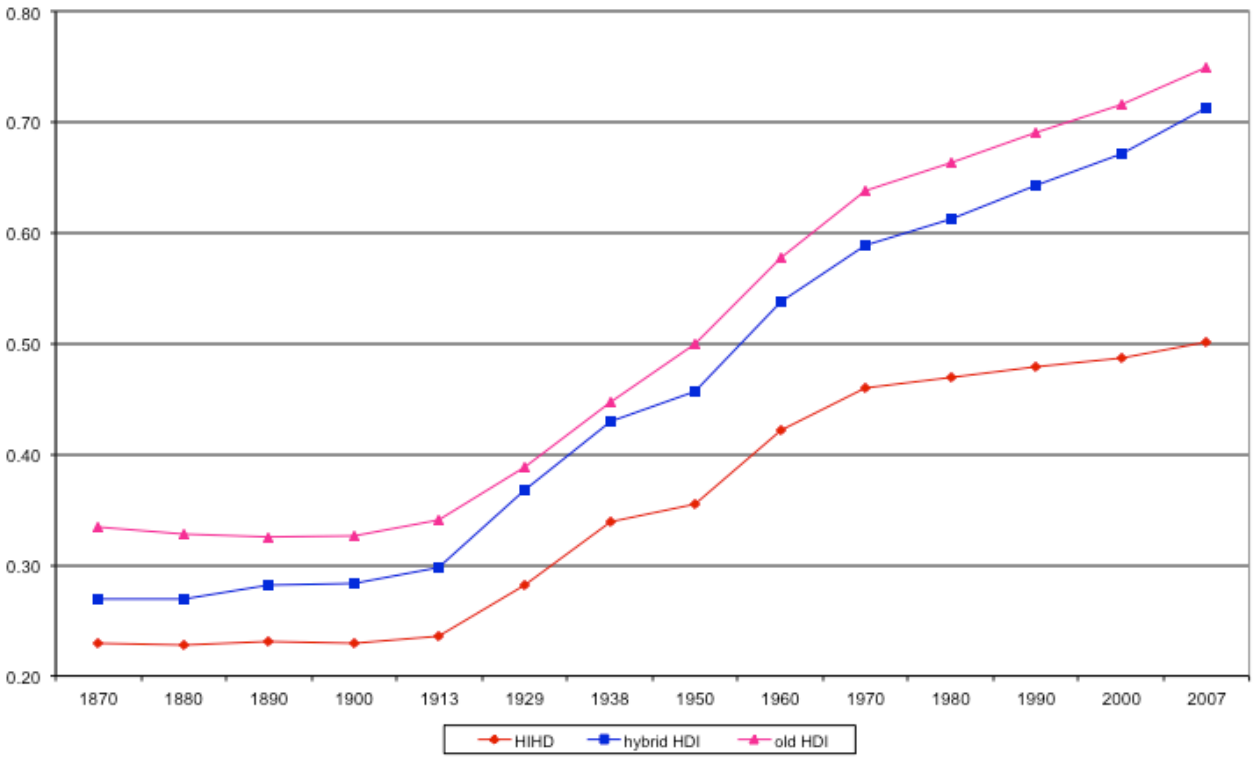

Figure 2 Human Development in the *Rest* as a share of *OECD*: HIHD, "hybrid" and "old" HDI, 1870-2007

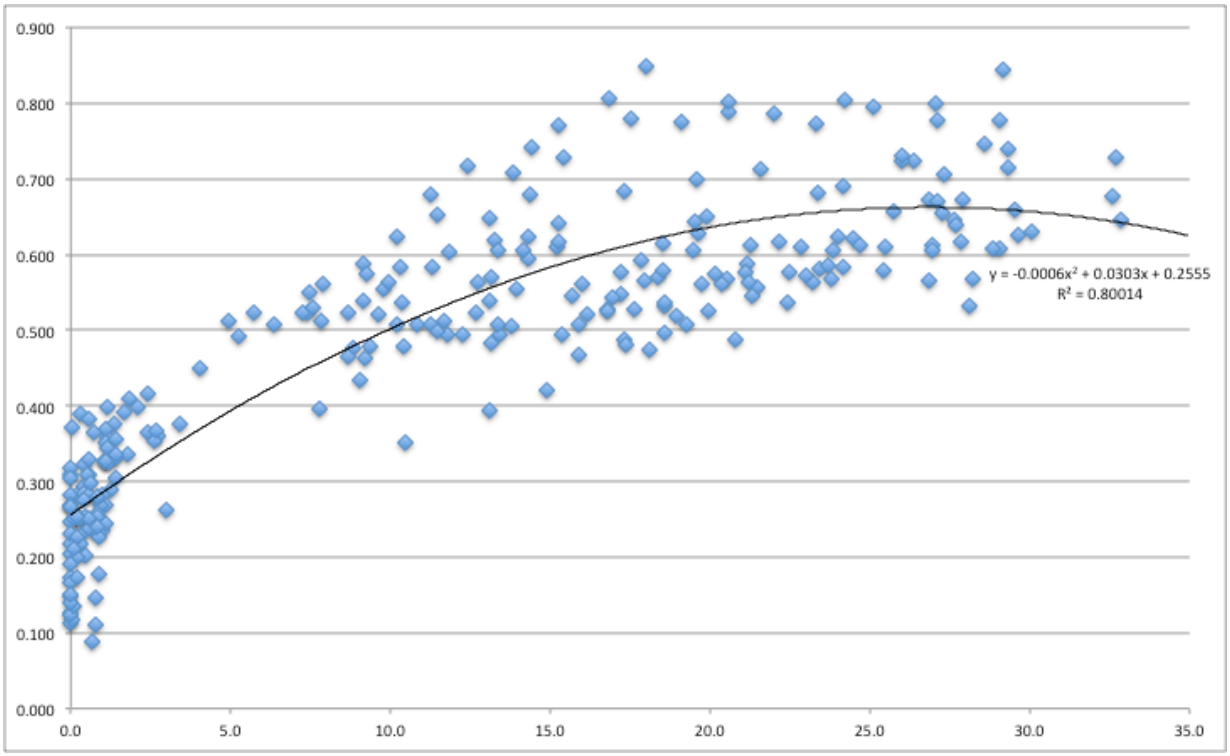

Figure 3. Human Development (vertical axis) and Social Transfers (% GDP) (horizontal axis) for a group of OECD countries, 1880-2000

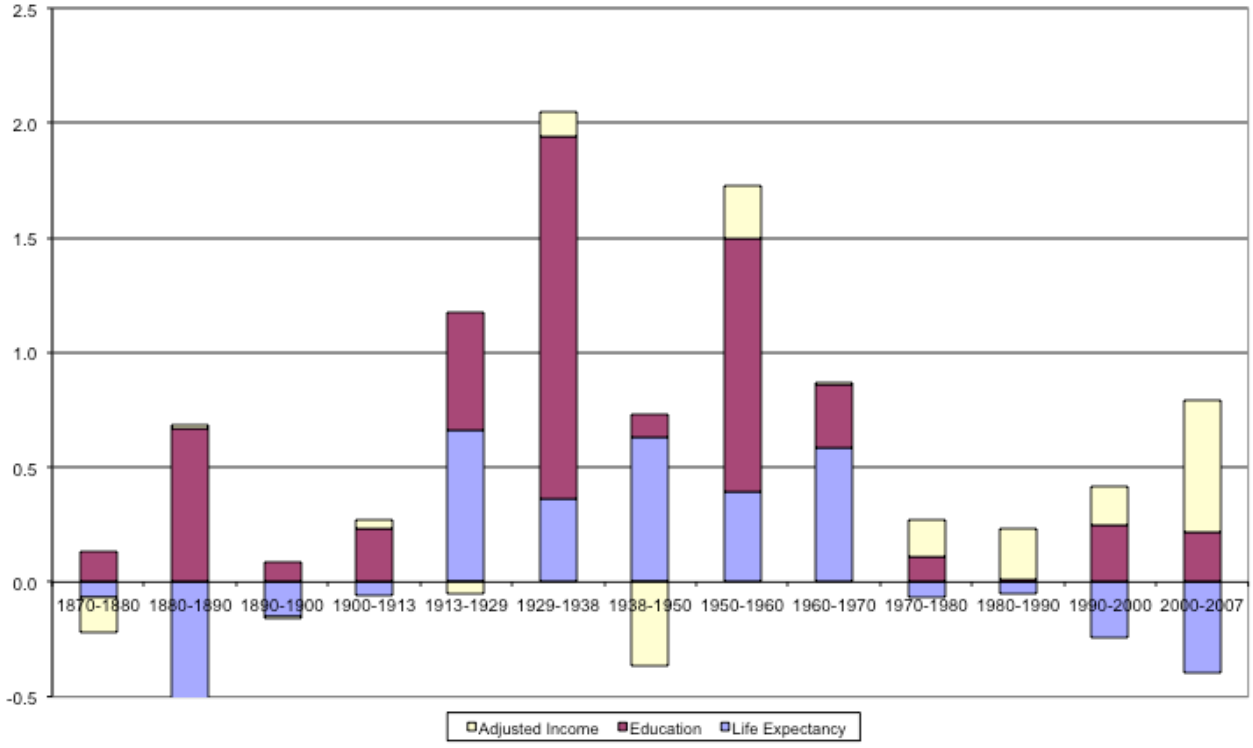

Figure 4. HIHD Catching-up with OECD in the *Rest*, 1870-2007 (%)