World Human Development: 1870-2007

Leandro Prados de la Escosura

(Universidad Carlos II)

Paper to be presented at the Conference "Wellbeing and inequality in the long run: measurement, history and ideas", Universidad Carlos III de Madrid and Fundación Ramón Areces (Madrid, May 31 and June 1, 2012)

This is a draft**. Comments are most welcome.**

World Human Development: 1870-2007[1]

Abstract

How has wellbeing evolved over time and across regions? How does the *West* compare to the *Rest*? What determines their differences? These questions are addressed using an historical index of human development. A sustained improvement has occurred since 1870. The absolute gap between *OECD* and the *Rest* widened over time, but an incomplete catching up –largely explained by education- has taken place since 1913. Since 1970, the *Rest* fell behind the *OECD* in terms of longevity. As the health transition occurred in the *Rest*, the contribution of life expectancy to human development improvement declined. Meanwhile, in the *OECD*, as longevity increased, the proportion of healthy years in total life expanded. A large variance in human development is noticeable in the *Rest* since 1970, with East Asia, Latin America and North Africa catching up to the OECD, while Central and Eastern Europe and Sub-Saharan Africa falling behind.

Keywords: Wellbeing, Human Development, HDI, Life Expectancy, Education

JEL Classification: O15, O50, I00, N30

Leandro Prados de la Escosura,
Universidad Carlos III de Madrid,
Departamento de Historia Económica e Instituciones
and Instituto Figuerola de Historia y Ciencias Sociales,
Edificio Foronda, 7.0.14
Calle Madrid, 126
28903 Getafe (Madrid), Spain
Tel. +34 916249623
leandro.prados.delaescosura@uc3m.es
http://www.uc3m.es/portal/pae/portal/dpto_historia_economica_inst/profesorado/leandro_prados_escosura

[1] I thank Facundo Alvaredo, Ewout Frankema, and Jan-Pieter Smits for kindly sharing their data and seminar participants at the London School of Economics and Imperial College for their comments. Financial support from Fundación Rafael del Pino's 'Economic Freedom in History' research project and the HI-POD Project, Seventh Research Framework Programme Contract no. 225342, is gratefully acknowledged.

How has world wellbeing evolved over the long run? How does the *West* compare to the *Rest*? How do developing regions compare to each other? What determines their differences? Economists usually address these questions in terms of per capita income. Human welfare 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 such as infant mortality, life expectancy at birth, height, literacy, and school enrolment have been used individually or combined (physical quality of life, basic needs, or, more recently, human development indices) to provide measures of wellbeing beyond GDP. In this paper, these recurring questions will be addressed with a multidimensional approach, that of human development which, beyond the conventional measure of wellbeing (GDP per head), stresses its health and knowledge dimensions.[2]

Human development was originally defined as "a process of enlarging people's choices"(UNDP 1990: 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). Thus, human development can be depicted as a measure of positive freedom (Desai 1991: 356), by which individuals are granted access to goods and services that allow them to develop their personal potential.

Human development dimensions are proxied by life expectancy at birth, education, and discounted *per capita* income (its log) –the latter as a surrogate for other dimensions of human development- (UNDP, 2001: 240) and, then, combined into a single index (HDI) in which all of them are considered indispensable and, hence, assigned equal weights. However, in this reduced index form agency and freedom are left aside. Without agency –that is, the ability for a person to pursue and realize her own goals in life - and freedom the human development index becomes a 'basic needs'

[2] There is an alternative to the capabilities approach followed here that investigates the association between per capita GDP and life expectancy (or education). The results vary widely from Pritchett and Summers (1996), 'wealthier is healthier' view to Acemoglu and Johnson (2007) negative impact of increasing longevity on economic growth.

index (Ivanov and Peleah 2010).[3] Thus, for example, the opportunities individuals have of exercising their political capabilities and participating in their community (Dasgupta and Weale 1992, Cheibub 2010) need to be simultaneously considered.

I will start by discussing the HDI, as defined by the United Nations Development Programme (UNDP), and, then, proposing an alternative historical index (*HIHD*).[4] Next, I will present the main results for the world and its main regions and focus on their differences over time. Lastly, I will investigate the role played by each dimension of human development in the index's aggregate performance over time and the extent to which they explain the observed differences between the *West* (here defined as the countries that composed the OECD prior to 1994, -*OECD*, hereafter-) and the *Rest*.[5]

As regards the time span considered, the 1870s represent a good choice, not only because of the lack of data on previous decades, but because main improvements in health (Easterlin 1999) and education (Easterlin 1981, Lindert 2004) started in Western Europe and the European Offshoots in the late nineteenth century. It is also then when social transfers -that is, policies of poor relief and unemployment compensation, hosing subsidies-, and public expenditure on health and education were introduced in Western Europe and its offshoots (Lindert 2004).

The main findings can be summarized as follows. A substantial improvement in world human development is observed since 1870 –and especially over 1913-1970-, although there is still significant room for improvement. The gap between the *OECD* and the *Rest* widened in absolute terms although an incomplete catching up has taken

[3] By agent is meant, in the capabilities terminology, 'someone who acts and brings about change and whose achievements can be judged in terms of her own values and objectives' (Sen 1999: 19).

[4] I will not discuss the human development index as a measure of wellbeing as it has recently been done (Klugman et al. 2011, Prados de la Escosura 2010).

[5] Before 1994 OECD members were: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland – only since 1990-, Ireland, Italy, Japan, Luxemburg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the UK and the US. Since no human development estimates have been obtained for Iceland and Luxemburg, these two countries are excluded from my own version of *OECD*. Turkey, although an OECD member, has been excluded from the OECD group and added to Asia in order to make the group more homogeneous in terms of development. New members joining since 1994 (and not included in my restricted definition) are: the Czech Republic, Estonia, Hungary, Israel, Poland, Slovakia, Slovenia, South Korea, and Mexico.

place since 1913 slowing down from 1970 onwards. The variance in regional behaviour has been large. During the last forty years East Asia –largely driven by China -, and more mildly Latin America and North Africa managed to catch up, while Central and Eastern Europe (driven by Russia) and Sub-Saharan Africa fell behind. Interestingly, the stagnation and, then, decline of human development in socialist Central and Eastern Europe, particularly, Russia –after a long period of success between the 1920s and 1960s-, has been paralleled by its success in East Asian socialist countries, China, especially, and in Cuba. However, a more comprehensive measure of human development including agency and freedom would sharply reduce human development in socialist countries equating it to simply 'basic needs'.

Education and, to less extent, life expectancy at birth appears behind the *Rest*'s limited catching-up in terms of human development up to 1970. Since then, all world regions in the *Periphery* have fallen behind the *OECD* in terms of the longevity index, as life expectancy at birth increased faster in the West while the proportion of healthy years out of the total life span rose –that is, morbidity compressed-. In the Rest, the health or epidemiological transition is the only period of substantial gains in longevity.[6] This largely explains the *Rest*'s failure to catch up with the *OECD* despite the educational expansion and the recovery of per capita income growth at the turn of the twentieth-first century.

Measuring Human Development

How progress in human development dimensions is measured matters. Usually, the original values of social variables (life expectancy, infant mortality, heights) are used untransformed in studies on the progress of human welfare (see, for example, Becker et al. 2005, Acemoglu and Johnson 2007, Hatton and Bray 2010). However, the bounded nature of life expectancy has raised concern about the use of original values of life expectancy at birth to comparing health changes between countries at different

[6] By health transition is understood the persistent gains in lower mortality and higher survival that takes place as infectious disease give way to chronic disease (Riley 2005a). Omran (1971: 736) defines the epidemiological transition as a long-term shift in mortality "whereby pandemics of infection are gradually displaced by degenerative and man-made diseases as the chief form of morbidity and primary cause of death".

income levels and at different phases of the health transition (Canning 2010, Cornia and Menchini 2006). In fact, when the original values of a social variable, which has biological 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 makes comparability 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. 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 Angus Deaton (2007) to conclude that '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 –and following Amartya Sen (1981)-, 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 according to the following formula,

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

Where *x* is the observed value of a given dimension of welfare, and *Mo* and *M* are the maximum and minimum values, or goalposts -which 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 dollars, respectively, and, in 1999, a logarithmic transformation was introduced to allow for diminishing returns of income in terms of human development as this indicator is employed as a crude proxy for those dimensions of wellbeing other than education and health (Anand and Sen 2000).[7]

In 2010 the *Human Development Report* (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.[8] In the case of income, PPP-adjusted per capita Gross National Income (GNI) replaced purchasing-power-adjusted GDP per head. The inclusion of GNI per capita represents an improvement as it captures the income accrued to residents of a country, not just the income produced in the country regardless the share retained at home.[9]

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 fixed minimum values, respectively. 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, the 40,000 PPP US dollars maximum represented, at the time of its introduction in the early 1990s, an upper bound that no country had ever reached. As such an upper limit has been overcome in current price

[7] Prior to 1999 per capita income was discounted above a certain threshold -the world average income- with Atkinson's formula for the utility of income. So, for example, the maximum level, $40,000 became just $5,448 in 1995 (UNDP 1995: 134). The logarithmic transformation implied, in turn, discounting all income, not just the income above a given level (UNDP 1999: 159).

[8] Previously, in the Human Development Report (UNDP 1994), mean years of schooling had been used. The education attainment index was the result of weighting the mean years of schooling index by one-third and the adult literacy rate index by two-thirds (UNDP 1994).

[9] Thus, GNI (or GNP) 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.

purchasing power parity (PPP) dollars, it was replaced by the maximum observed (108,211 PPP $ 2008). The minimum was set at 163 PPP $ US 2008.[10]

Up to 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.[11]

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 head) have been, then, recovered in the so-called 'hybrid' human development index due to its wider availability. 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: 3).

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 countries and over time. Thus, 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, achieving a 'basic' or minimum level of human development becomes the main goal.

[10] Since in the new UNDP HDI upper bounds represent the highest observed values in the time series since 1980, in the Human Development Report for 2011 the maxima for life expectancy and per capita GNI have been updated to 83.4 years and 107,721 PPP $ 2005, while the maxima for expected years of schooling and the mean years of schooling are 18.0 and 13.1, respectively. In the case of per capita GNI the minimum has been reduced to 100 PPP $ 2005 (UNDP 2011, p. 168).

[11] 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). There are serious discrepancies about the choice between arithmetic and geometric averages to combine the dimensions' indices. See, for example, the harsh critique of the new index in Ravallion (2010) and the response in Zambrano (2011).

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: 217).[12] Unfortunately, the 'deviation from fit' method only facilitates comparisons between countries starting from similar levels.[13]

It appears, therefore, that a linear transformation of the original values of each dimension -currently used in the HDI- does not provide a clear-cut solution to the comparability problem over space and time. In fact, it poses a further challenge. In Sen's words (1981: 292), "as, say, longevity becomes high, it becomes more of an achievement to raise it further".[14] Nanak Kakwani (1993: 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".[15]

[12] The Human Development Report 2010 defines the 'deviation from fit' as "a measure of progress that captures changes in a country's indicators relative to the average change for countries starting from the same point" (UNDP 2010: 26).

[13] Another option is provided by the 'shortfall' approach (Sen 1981: 292), which measures, for a given dimension, the relative fall in the distance between the country's initial level and some chosen upper bound. Thus, the shortfall is obtained as $Q(x_1, x_2) = (x_2 - x_1) / (M - x_1)$, where *x* is the observed value of a given dimension of welfare at time 1 and 2,and M, its maximum value. Unfortunately, the shortfall approach results are not additive (Kakwani 1993, p. 310). Contrary to the linear transformation, this method tends to favour the country with the higher initial level (Gidwitz et al. 2010: 19).

[14] Thus, the "intrinsic" value of a single "functioning", for example, the ability to live a healthy life, is not captured by its linear measure, since, as Srinivassan (1994: 240) argues, "a unit decrease in the deprivation in life expectancy at an initial life expectancy of, say, 40 years is not commensurate with the same unit decrease at 60 years".

[15] Molina and Purser (2010: 11) also stress the additional effort to increase human development's social dimensions at high levels. Kakwani's rationale has been challenged on the basis that any 'improvement in education attainment may not be more difficult as the level of education becomes higher and higher' (Tsui 1996: 302).

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

> "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."[16]

Another and, perhaps, more important reason for treating similar gains in longevity or education differently depending on the initial level is quality differences. It should be stressed that life expectancy at birth is just a crude proxy for 'a long and healthy life' (Engineer et al. 2009), and that literacy and enrolment rates are simply short cuts for access to knowledge, which are the actual goals of human development. Ideally, then, we should compute quality-adjusted education or health-adjusted life expectancy in order to provide adequate measures of human development dimensions.

Information on health-adjusted life expectancy (HALE), that is, the average number of years a person can expect to live in good health, is only available for recent years.[17] HALE has been computed at world scale since the mid-1990s (Murray and Lopez 1997) and its results indicate that the proportion of years lived without disability –'healthy life years' (HLY)– increases with the number of years lived, lending support

[16] An example of giving priority to the ethical aspect over the measurement of wellbeing is provided by Noorbakhsh (1998, p. 519) who modified the human development index by extending the principle of diminishing returns to education (but not to longevity for which the linear transformation was kept) on the basis that that 'under similar conditions the early "units" of educational attainments to a country should be of much higher value than the last ones'.

[17] Alternative concepts are 'quality-adjusted life years' (QALY) –an utilitarian social welfare concept-, according to which individuals value the quality of a life year in ill health as a fraction of one year in good health, and 'disability-adjusted life years' (DALY) where a life year with disability is valued by experts as a fraction of a year in good health (Canning 2010).

the compression of morbidity hypothesis (Fries 1980, 2003).[18] Thus, in Sub-Saharan Africa where life expectancy at birth was around 50 years, 15 per cent of life was lived with severe disability, while in the developed world its share only represented 8 per cent out of a life expectancy of 77 years (Murray and Lopez 1997: 1350).[19] Further research by Colin Mathers *et al*. (2001) confirmed these results and concluded that healthy life expectancy increases at a faster rate than total life expectancy, so that reductions in mortality and disability seem to go along.[20] On the basis of the WHO dataset for 2002, Mathers *et al*. (2004) found that adjusting longevity for quality of life widens the difference in health status between rich and poor countries.

Years of poor health corresponding to values of life expectancy at birth are presented for a large sample of countries in 2002 in Figure 1. A polynomial concave adjustment provides the best fit and shows that as life expectancy at birth rises, the number of years of disability increases less than proportionally until reaching an inflection point from which absolute years of poor health decline with additional years of life. Figure 2 provides, in turn, the proportion of years of good health in total life span that corresponds to values of life expectancy at birth. It can be observed a more than proportional gain in disability-free years of life as life expectancy increases. Such a gain is associated to improvements in the environment and to biomedical interventions (Fogel 2009: 17).

A similar association can be suggested between the increase in the number of years of schooling and the quality of the education received. On the basis of International tests of academic performance in mathematics and science since the 1960s Erik Hanushek and Dennis Kimko (2000) constructed indices of cognitive skills as

[18] The compression of morbidity hypothesis put forward by Fries (1980) posits that with improvements in survival, the prevalence of disability decreases and, therefore, the proportion of life lived with disability also declines. See also Fries (2003).

[19] Murray and Lopez (1997: 1350) conjecture, "if the cross-sectional regional patterns observed can be generalised to temporal trends, a 1-year improvement in life expectancy could be accompanied by slightly more than a 1-year improvement in HALE".

[20] Mathers et al. (2001) found for a sample of 191 countries in 1999 that 'years of healthy life lost due to disability represent 18% of total life expectancy in the bottom countries –mostly in SSA-, and decreases to around 8% in the countries with the highest healthy life expectancies'.

a measure of educational quality. The comparison of cognitive skills with gross rates of literacy and enrolment -which are not adjusted for quality- indicates that quality grows more than proportionally with increases in the quantity of education received (Figures 3 and 4).[21]

Since social indicators (life expectancy, literacy infant mortality, etc.) have, unlike GDP per head, 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[22],

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

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

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: 314) 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.[23]

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

Following Kakwani's proposal, the original values of the social, non-income dimensions of the index have been transformed using a convex achievement function (expression 3).

Thus, in the alternative historical index of human development, *HIHD*, as a social indicator reaches higher levels, its increases represent higher achievements than

[21] Hanushek and Kimko (2000) quality measures were normalized to facilitate the comparison with both literacy and enrolment rates. Thus, QL2* was transformed with expression [1] with 75 and 10 as maximum and minimum values. The resulting index ranged between 0 and 1.

[22] For example, in the case of longevity, "a further increase must be regarded as a greater achievement than an equal increase at lower levels of longevity, …the achievement must increase at a faster rate than the longevity" (Kakwani 1993: 313).

[23] See the extension of Kakwani's indices by Majumder and Chakravarty (1996).

had the same increase taken place at a lower level, while, in both the UNDP 'old' and 'hybrid' *HDI*, they reflect the same change regardless of its starting level.[24] 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 *L* and *E*,, and the adjusted *per capita* income as *UNY* –that as a 'black box' aiming at capturing non-health and education facets of wellbeing has not been revised-, the historical index of human development can be expressed as,

$$HIHD = L^{1/3}\, E^{1/3}\, UNY^{1/3} \qquad [4]$$

Sources and Procedures

A brief presentation of the sources and procedures used to construct indices for each dimension of human development is provided in this section. A more detailed explanation is offered in the Appendix.

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). In fact, most estimates come from Life Tables constructed on the assumption that the theoretical cohort is subject, throughout its existence, to the age-specific mortality rates observed in a sample population at a particular time. 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 (2005a, b), Flora (1983), the OxLAD database for Latin America (Astorga *et al*. 2003), which were completed with national sources. Dearth of data forced me occasionally to introduce some strong assumptions for the period before the health transition that, in

[24] If the same absolute changes of the example in footnote 3 are considered with the convex transformation (expression 3) and the new goalposts once again, 10 extra years of life expectancy would represent a 121 percent increase when the initial value of life expectancy is 30 years, a 69 percent increase if it is 40 years, and a 90 percent increase if it is 70 years.

developing regions, particularly those of Asia and Africa, often started during the Interwar years (1920-1939) or even later.[25]

Empirically, adult literacy is a far from uniform concept. Reading and writing do not necessarily go together in developing countries (Markussen 1990, Nilsson 1999) and, thus, the estimated literacy rate varies depending on whether a reading ability only or a reading and writing skills definition of literacy is used. The uncertainty about literacy rates even in recent times is evidenced by the wide discrepancies between the UNESCO and UNDP figures over the years 1980-1995 and, thus, in order to keep the consistency with those from the Human Development Reports, I have chosen the UNDP figures except for a few cases.[26]

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.). Thus, unadjusted rates will usually under-estimate gross enrolment rates, as, in the past, hardly any country's education extended to those aged 24 years. For the historical (pre-1980) estimates this downward bias has been corrected with the ratio between the gross and unadjusted enrolment rates in 1980.

[25] I have followed follow James Riley (2005a: 539) assertion: "for the pretransition period the assumption is … 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".

[26] These are the cases od Algeria in 1990 and Botswana in 1980.

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. With regard to the relevant population, see the Appendix.

Although the new goalposts have been accepted, due to the use of a convex achievement function, some minor modifications were introduced to improve the presentation of the results. Thus, for life expectancy at birth, UNDP (2010) maximum and minimum levels of 83.2 and 20 years have been adopted. However, since 20 years appears to be the *Homo sapiens* lowest life expectancy prior to the late 19th century (Fogel 2009: 13; Steckel 2009: 34), the lowest historical level for the period 1870-2007 has been set at 25 years.[27] In the case of education indicators (literacy and enrolment rates), UNDP values of M=100 and Mo=0 have been kept, but the highest and lowest historical values were set at 99 and 1 per cent, respectively.[28]

The UNHDI assumption that the marginal utility of *per capita* income declines as it reaches higher levels has been accepted. The fact that this transformed measure was chosen by the UNDP to proxy any dimension of wellbeing (excluding health and education) explains why such an astringent assumption has been kept. Were such an assumption relaxed, the range within which human development levels vary would

[27] Roy (2006: 349) points out, for example, that, in India, neither birth nor death rates could have been biologically different in the 1880s from those in the eighteenth or early nineteenth centuries as there were close to their biological floor. Truncating the lower part of the distribution by assuming a life expectancy 'floor' of 25 years, which is not far from the actual value in the poorest developing countries, both in the present and in the past, has the advantage of allowing the inclusion of countries for which no data are available. Moreover, given a minimum, M_o, of 20 years, the 25 years 'floor' of precludes a zero value for the transformed life expectancy and, consequently, for the *IHDI*. Using a 20 or 22 years 'floor' does not alter the results significantly.

[28] The assumption of 1 per cent as the lowest historical value for literacy and enrolment seems historically more reasonable than accepting zero, as the 'old' and hybrid *HDI* do, while a historical maximum of 99 per cent is also accepted for adult literacy in the *HDI*, but not in the hybrid HDI, in which the maximum observed level for the gross enrolment rate 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.

increase substantially.[29] Thus, in order to get the income index I have used the log of GDP per head in expression [1].

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).[30] 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: 254, Milanovic *et al*. 2011), below 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 head.[31] GDP per head (G-K 1990 $) data come from Maddison (2006, 2010) supplemented with historical national accounts (see Appendix).

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

[29] If the assumption of diminishing returns to income were relaxed, per capita GDP would drive the human development index, as it does not have an asymptotic upper bound, rendering, therefore, the HDI redundant. Zambrano (2011) provides a theoretical justification for the introduction of diminishing returns to income per head within the conceptual framework of the human development index.

[30] In the 2010 Human Development Report (UNDP 2010), expressed in 2008 international dollars, the lowest level observed since 1980 has been established in $163, which is equivalent to $108 in 1990 Geary-Khamis dollars. The highest per capita income level reached over the same time span, $ 108,211 international dollars of 2008, corresponds to $ 72,020 Geary-Khamis dollars of 1990. Such a figure has never been achieved in Geary-Khamis 1990 dollars (Maddison 2010) estimates, so I have chosen the observed maximum and minimum values over 1870-2007 in Maddison (2010) estimates.

[31] This lower bound for per capita income, which, no doubt, truncates the data set at the bottom, allows me to consider countries in earlier periods for which no data exist and that, otherwise, would reduce the country sample considered here.

respectively. These samples represent above 90 per cent of the world population (and practically 100 per cent after 1950). Since regional aggregates are highly coincidental for each of these samples, I decided there was no need for splicing them.[32]

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-. 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 the deceleration of the 1970s and 1980s gave way to an expansion from 1990 onwards (Figure 5 and Table 1).

A closer inspection indicates that the *HIHD* exhibits a systematically lower level than both the 'hybrid' and 'old' UNDP indices. A widening gap opens up between them over time in absolute terms, but not in relative ones, 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). Furthermore, in the *HIHD*, differences across countries deepen and, consequently, the gap between the West and the Rest of the world widens (Figure 10). When the alternative UNDP indices are contrasted, it appears that the 'hybrid' index remains systematically below the 'old' HDI.

Thus, according to the *HIHD*, there is significant room for improvement in world human development and, using the Human Development Report 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, according to the *UNDP* indices, the world belonged to the 'medium' level since the 1960s and would be now approaching the 'high' level.

Since the income index is the same in all indices (the *HIHD* and both UNDP indices), their differences derive from the way in which the original values of the social variables (life expectancy at birth and education) are transformed. The alternative

[32] The estimates for each of the four samples and the spliced series are at the reader's disposal.

indices for life expectancy and education (Figures 6 and 7) confirm the lower level but faster growth of the alternative Kakwani indices, and consequently, the widening gap between the UNDP linearly transformed indices and the historical non-linearly transformed alternative ones.

Moreover, when the 'old' and the 'hybrid' indices for social variables are compared, it appears that, in the case of life expectancy, the 'hybrid' index is above the 'old' one, while the opposite happens in the case of education. Thus, if a non-income index of human development –that is, only composed of education and longevity- is constructed, both UNDP indices become practically identical (Figure 8). Given the fact that the income index is the same in either case, this result implies that the difference between the 'old' and the 'hybrid' HDI stems almost exclusively from combining the indices for each dimension with an arithmetic and a geometric average, respectively.[33] Furthermore, by excluding income from the human development index, the absolute gap between the *HIHD* and the UNDP 'old' and 'hybrid' indices broadens.

Trends in world human development are affected by its regional evolution, particularly, by that of large regions exhibiting idiosyncratic behaviour such as, for example, China and India or Africa. It can be noticed that their exclusion from the aggregate world index raises the level of human development throughout 1870-2007 (Figure 9 and Table 2). Including Africa worsens the world level since 1950 and, especially, after 1990. The world without Africa shifts upwards and diverges from the world as a whole in terms of human development. In the case of China and India, their inclusion has a less negative impact on the world level from 1980 onwards as they experienced substantial gains in human development. Thus, there is a mild tendency to converge between the world without China and India and the world as a whole.

Does human development match he trends observed in real GDP per head? A growing trend is observed for both HIHD and per capita income up to World War I, although at a different pace, with an accelerating trend in GDP per head (Figure 10). The beginnings of large-scale health progress in health can be traced back to the 1880s and 1890s with the diffusion of the germ theory of disease (Riley 2005a, 2005b) and

[33] Another differential element, but of much less weight, derives from their different goalposts. The coincidence between the 'old' and the 'hybrid' indices should attenuate Ravallion (2010) reservations about the impact of the new way (2010) of aggregating human development dimensions on the HDI.

primary education experienced a significant advance over 1870-1913 (Benavot and Riddle 1988). Thus, improvements in human development dimensions paralleled economic growth due to globalization and industrialization. However, the negative impact of late nineteenth century urbanization on life expectancy and the lack of public policies on health and education appear as impediments to further improvement in human development (Easterlin 1999). It is during the Interwar years, however, that clear discrepancies emerged. While per capita GDP growth decelerated as world commodity and factor markets disintegrated (Lindert and Williamson 2003), human development progressed steadily as health and education practices became increasingly globalized. Could it be, then, hypothesised, a delayed impact on economic globalization on human development? Since 1950, advancement in human development has been hand-in-hand with growth in the world economy, although at a lower pace in the Golden Age (1950-73) and, again, since 2000.

Did the gap in human development between *OECD* and the *Rest* deepen over time? The answer provided by the alternative human development indices is negative. Relative to the *OECD*, the Rest showed stability up to 1913 and catching up thereafter, more intense up to 1970 –with the exception of the World War II years-, and weaker afterwards (Table 3). However, in the *HIHD* the *Rest* presents comparatively lower levels for the Rest and its catching-up to *OECD* slowed down dramatically after 1970 (Figure 11). Thus, while, according to the *HIHD*, the *Rest* represented only 50 percent of the *OECD* level in 2007, it reached 71 and 75 percent 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.

A deeper perception of world human development derives from comparing the performance of different regions in both absolute terms and relative to *OECD* (Figures 12 and 13). Table 4 compares levels and yearly rates of variation across regions. It appears that OECD countries entered the 'medium level' threshold in the 1960s, and have reached a 'high level' of human development (0.8) only recently.

Central and Eastern Europe (including Russia) experienced an impressive catching-up to the *OECD* countries from the 1920s, driven by Soviet Russia's gains in human development, that gave way to stagnation by the mid-1960s and, then, since

1990, to dramatic falling behind up to 2000. In the Soviet Union, significant achievements in health and education took place between 1920 and the 1960s, that can also been observed in socialist Central and Eastern Europe since 1950. However, strictly speaking, these achievements would fall short of being human development properly since freedom and agency are missing -as collectivisation, forced industrialisation, and political repression exemplify-, and should be better depicted, perhaps, as 'basic needs' achievements (Ivanov and Peleah 2010). In fact, restrictions of individual choice under socialism contradict the main goal of human development, namely, enlarging people choices and, therefore, the demise of socialism would represent an advance in terms of human development (Brainerd 2010a). A similar reasoning applies to countries under authoritarian or totalitarian regimes in Western Europe or elsewhere (with Fascism in Southern Europe is a case in point).

Latin America caught up to the *OECD* until 1980, although more intensively during the first half of the twentieth century. Asia, starting from low levels -similar to those of Africa up to the early 1920s-, improved significantly until 1970 and, again, at the turn of the century, driven by China's progress. 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. As a result of Central and Eastern Europe's falling behind and Asia's (especially China's) and North Africa's catching up a process of convergence between these regions with Latin America has taken place, while Sub-Saharan Africa was left behind and OECD forged ahead. Again, in developing countries, restrictions of agency and freedom under colonial rule or under authoritarian regimes after independence seriously weaken the achievements in human development, which could be better depicted as basic needs gains.

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 OCDE level of 1938 but in the Sub-Saharan region only represented that of 1890. On average, the *Rest* 's human development in 2007 had reached the level of *OECD* in 1950, by the

mid-1980s had achieved the *OECD* level in 1913 and, only by the mid-1950s, matched the *OECD* level in 1870.

Relative to *the Core*, the *Periphery* performed better in human development (Figure 11) than in income per head terms (Figure 14), 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. Furthermore, in 2007, real per capita GDP levels in Central and Eastern Europe (including Russia), Latin America, and China were those of the OECD in the early 1960s, the late 1950s and 1950, respectively. In turn, the income levels of North Africa, India, and the rest of Asia (excluding Japan) were similar to those of OECD in 1913, the 1890s, and 1938. As for Sub-Saharan Africa they corresponded to those of mid-nineteenth century OECD.

Long run gains in human development are driven by the progress of its social dimensions, longevity and education (Table 5).[34] Life expectancy was the dominant force in world human development during the twentieth century, especially during its first half (Figure 15). Health improvements can be depicted as movements along a health production function and shifts outwards in the health function (Preston 1975, Easterlin 1999). Movements along the curve would represent gains derived from economic growth, resulting in nutrition improvements, and, in turn, strengthening the immune system and reducing morbidity (Stolnitz 1955, McKeown *et al*. 1962, 1975, McKeown 1976, Fogel 2004). Shifts in the health function would capture technological change, that is, better knowledge, and would be have been responsible for the sustained increase in longevity since the late nineteenth century (McKinley and McKinley 1977, Riley 2005a, Loudon 2000, Cutler et al 2006Furthermore, health improvements derived from the diffusion of new technologies resulted not only in a longer life but also in longer healthy life years that increased more than proportionally as life became lengthier (Mathers et al. 2001, Murray and Lopez 1997).

[34] The decomposition of IHDI growth into the rates of variation of its different dimension is made on the basis of expression [4]. Using low case to denote rates of variation in human development (*hihd*), life expectancy (*l*), education (*e*) and adjusted per capita income (*uny*) indices,

$$hihd = 1/3\ l + 1/3\ e + 1/3\ uny \qquad [5]$$

More specifically, the increase in longevity is associated with the diffusion of preventive methods of disease transmission -to which the diffusion of the germ theory of disease since the 1880s contributed significantly (Preston 1975)-, including low cost improvements in health and knowledge-dissemination (Riley 2001, 2005); with 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) – even though antibiotics were not affordable by most in developing countries until well into the second half of the twentieth century (Riley 2005b)-; and with the public provision of health (Loudon 2000, Cutler and Miller 2005).

Differences in the behaviour of human development's dimensions overtime appear between *OECD* and the *Rest*. In the case of developed countries, improvements in life expectancy have driven human development advance since 1880 (except for the 1960s) (Table 6 and Figure 16). The sustained progress in life expectancy during the late twentieth and early twenty-first century is associated to gains in healthy life years that represent 90 per cent of the years lived in *OECD* countries at the turn of the new century.[35] In the *Rest*, the role of life expectancy in human development advance is, despite its very impressive gains during 1913-1970, less decisive, especially after 1970, and education constitutes the driving force of human development in the long run (Table 7 and Figure 17a). Life expectancy gains in the *Rest* appear to slow down once the health transition takes place. Such a result is highlighted when the catching up to the *OECD* in the *Rest* is decomposed into the contributions of each of its dimensions (Table 8 and Figures 17b).[36] In the *Periphery*, with the exception of the 1880s and the 2000s, catching up to *OECD* concentrates between 1913 and 1970, and more intensely in the Interwar and, then, in the 1950s. Interestingly, these are years in which a large proportion of the Rest was still under colonial rule. Only after 2000, income per head has constituted the main element behind the *Rest*'s catching up.

A look at the immediate sources of catching up in the main regions of the Periphery is illuminating. Thus, in Eastern and Central Europe (Russia included) most

[35] Cf. http://www.conferenceboard.ca/hcp/details/health/life-expectancy.aspx#quality.

[36] Catching-up is measured as the difference in human development rate of variation between the *Rest* and *OECD*.

improvement in human development took place up to 1970 -more intensely in the 1890s and between the 1920s and 1950s, when catching up to the Core took place- (Figures 18a and 18b and Tables A.1a-A.1b in the Appendix). Human development progress collapsed after 1970, falling behind OECD, only to recover mildly after 2000. Education was the driving force (with remarkable intensity during the 1930s), but for the 1920s and, especially the 1940s, when life expectancy experienced dramatic advances and took the lead. Since 2000 income has become the main dimension of human development advancement. A glance at Russia's performance –the dominating country in the region- confirms and accentuates this depiction, although most of its catching-up was restricted to the 1890s and to the period 1913-1950.

The contrast between Western and Eastern Europe, especially for the post-1950 era, in which it also implied a distinction between socialist and capitalist societies, is better understood when the role of human development dimensions is considered. Life expectancy is the dimension in which differences are more striking. By the mid-1960s life expectancy at birth in the Soviet Union had practically converged to Western European levels after a dramatic improvement during the previous four decades, especially during the 1950s (Mazur 1969). Since the mid-1960s life expectancy fell with infant mortality rising after 1970. The expansion of health care to the whole population was particularly successful in fighting infectious disease and child mortality – a major determinant of life expectancy during the health transition- that fell rapidly between 1940 and 1965 but with low quality levels (Brainerd and Cutler 2005, Brainard 2010b). 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). Middle age and infant mortality are behind the stagnation and, then, collapse of life expectancy in the former Soviet Union. As early as the mid-1970s, Dutton (1979) attributed the decline in (male) longevity to diseases of the circulatory system, increasing death rates by accident, suicide, and poisoning, and alcoholism. After the demise of the Soviet regime the collapse of life expectancy in Russia is associated to alcohol consumption and to stress from the transition to market (unemployment uncertainty, rising inequality), along

with worsening of diets and health care and material deprivation (Shkolnikov et al. 2001, Cutler and Brainerd 2005, Brainerd 2010a).

Although not as severe and persistent as in the former Soviet Union, the collapse of socialism in Central and Eastern Europe brought with it a decline in life expectancy whose origins go back to the stagnation or increase in mortality levels since the mid-1960s. In successful reformers (former Czechoslovakia, Poland and Hungary) life expectancy recovered quickly and expanded since the mid-1990s (Brainerd and Cutler 2005, Stillman 2006, Brainerd 2010a).

In Latin America, human development experienced moderate and steady progress and catching-up between 1880 and 1980 (Figures 19.a-19.b and Tables A.2a-A.2.b). In this region too education is the leading dimension in human development, with a dominant role before 1900 and, especially, during the second half of the twentieth century (but for the 1980s). Life expectancy had a distinguished role during the early twentieth century, especially in the 1940s, when the strongest catching-up to OECD of the entire period considered took place. Interestingly, such an advance was not a result of widespread treatment of infectious diseases with sulpha drugs and antibiotics and vaccination against tuberculosis because it was not accessible for low income population, but of low-cost public health measures and the diffusion of hygienic practices, sometimes in periods of economic stagnation as early twentieth century British Guiana and Jamaica evidence (Mandle 1970, Riley 2005a). Latin America's weak convergence to developed countries in the late twentieth century deserves investigation. In particular, the role inequality may have played in restricting access to health and education could have been a serious obstacle for human development catching up.

Cuba, the only communist experience in the Americas, provides an interesting counterpoint to most of Latin America and former communist Europe. An impressive improvement in life expectancy has taken place since the 1959 Revolution in striking contrast with the country's poor economic performance (McGuire and Frankel 2005, Devereux 2010, Ward and Devereux 2010, 2012). Such a tendency did continue, however, existing trends during the first half of the twentieth century and was based on good health services for the urban poor and to less extent for the rural poor (Díaz-

Briquets 1981, McGuire and Frankel 2005). The mortality decline, initiated after the U.S. occupation -associated to sanitary and public health innovation- was largely independent from Cuba's level of economic development, although the economic expansion in the early twentieth century contributed to it (Díaz-Briquets 1981). Early twentieth century advance in health care implied that, by the eve of the 1959 Revolution, Cuba was above the average Latin American and Southern European country. From 1959 onwards, the success in fighting and eradicating infant mortality and, hence, increasing life expectancy is largely the result of the coercive power of the state over medical professionals and patients that has managed to overcome an inflexible and inefficient system, with poor infrastructure, lack of medicines, and high corruption (Devereux 2010, Mesa-Lago 2005). The case of Cuba provides an extreme case of contrast between the success in achieving 'basic needs' and the failure to enlarge people's choices –the core of human development- as agency and freedom are suppressed by the political regime.

Significant progress of human development has taken place in Asia during the last century although its regional variance is large. China experienced an impressive advancement and catching up in human development during the last hundred years, with special intensity in the Interwar (1913-1938) and the Golden Age (1950-1970), in which education, between 1929 and 1960, and life expectancy from 1913 to 1929 and in the 1960s, made the main contribution (Figures 20a-20b and Tables A.3a-A.3b). During the last forty years the income dimension has dominated progress in human development –a consequence of the post-1979 economic reforms and an unusual feature in international perspective- while its social components –life expectancy, in particular- had a minor role. Improvements in health slowed down after economic reforms (Cutler et al. 2006) and this has been attributed to the direct consequence of change in resource allocation resulting from the new economic policies (Dréze and Sen 2002).

India experienced steady advance in human development since the late nineteenth century, catching up to OECD over the last century, especially between 1913 and 1929 and during the 1940s and 1950s (Figures 21a-21b and Tables A.4a-A.4b). Education once again appears to be the main contributor to such advancement

in the long run, although life expectancy at birth drove it during the early twentieth century. Improvements in sanitation, medical care, and famine prevention contributed to reduce the impact of infectious disease (malaria, smallpox, cholera) during 1913-1950, a period of stagnant real income per head (McAlpin 1983, Roy 2006: 78, 311-312, Maddison 2010).[37] Interestingly, significant gains in human development dimensions were achieved before independence, a fact that raises the issue of how colonial rule affected wellbeing despite claims of under-investment and poor health infrastructure (Amrith 2009).[38] In the last three decades, the income dimension played a major role, along education, in human development progress, a feature associated -as in the case of China- to the economic impact of pro-market reforms, which has contributed to reduce the absolute extreme poverty rate by half since the early 1970s.[39] Dréze and Sen (2002) emphasise the coincidence between the slowdown in infant mortality reduction and the new economic policies and may help explaining why longevity contribution to human development has been so weak in recent times.[40]

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 (1950s and 1960s) (Figures 22a-22b and Tables A.5a-A.5b). Education and health improvements jointly contributed in the advancement of human development. As in the case of India, substantial health improvements were under colonial rule: mortality from smallpox, cholera and plague was reduced through specific public health measures in Indonesia, the Philippines, and Taiwan during the 1920s (Preston 1975).

[37] Health, however, has never been, since independence, a public policy priority of an otherwise a heavily interventionist state (Amrith 2009).

[38] In fact, since a 'floor' of 25 years has established for life expectancy at birth and the available evidence suggests the actual levels were lower (within 20-23 years range) up to 1920 (McAlpin 1983), the improvement would have been larger than reflected in my estimates.

[39] Kotwal et al. (2011: 1185) reckon that those living below 1.08 1993 $ PPP went down from 54.9 per cent in 1973-4 to 27.5 per cent in 2004-5.

[40] Despite the fact that those living below one dollar a day has been cut down by half since the mid-1970s, the share of those below double the poverty line remains unaltered at about 80 per cent (Kotwal et al. 2011: 1185)

Human development improved significantly in Africa between 1913 and 1980 and catching-up with OECD occurred as the result of advances in both health (especially in the 1930s and 1940s) and education (more intensively in the 1920s and from 1950 onwards). Since 1980, human development progress slowed down significantly and has been led by education.

When a distinction is made between North and Sub-Saharan regions, it can be observed that in North Africa, a steady 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 to catching-up to OECD over 1913-2000, especially in the central decades of the twentieth century and in the 1970s (Figures 23a-23b and Tables A.6a-A.6b).

South of the Sahara the period 1913-1980 is also the one of human development advancement 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, especially as economic growth per head collapsed during the last quarter of the twentieth century (Figure 24a-24b and Tables A.7a-A.7b). The stagnation of life expectancy -largely as a result of HIV-AIDS-, together with the contraction in *per capita* income and the deceleration in the education expansion -associated to ethnic conflicts and unsound economic policies –occasionally inspired in the Soviet paradigm during the post-independence years- (Collier 2000)-, explain the weak advance in human development and the region's falling behind. The recovery of human development in the 2000s has been helped by the recovery in economic activity and, to less extent, in life expectancy, but education remained the main force behind its advance.

Conclusions

Human development provides a multidimensional approach to wellbeing and, arguably, a measure of positive freedom. Reconstructing its trends since 1870 allows us to establish the extent to which progress took place, how differences between the *OECD* and the *Rest*, and across regions, emerged and developed, and what were its immediate causes. A substantial but incomplete improvement in world human development has taken place during the last one and a half centuries, although it was

the period between World War I and the oil shocks of the 1970s the one in which wellbeing expanded intensively and across the board.

Substantial gains took place across the board in longevity and education and, thus, in human development, between 1920 and 1950, just at the time of an economic globalization backlash. This paradox calls for an explanation. Was there a deferred impact of economic globalization on human development dimensions?

The last four decades have witnessed a deceleration in human development advancement and a widening of the absolute gap between the West (*OECD*) and the *Rest*. Nonetheless, a large variance in regional behaviour is concealed behind the *Rest*. 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 communist Europe and Sub-Saharan Africa.

Differences in the behaviour of human development dimensions help to explain the gap between *OECD* and 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 progress and catching up until the central decades of the twentieth century and, as the demographic and epidemiological transition faded away, its dynamic role diminished (Figure 25). 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, negative in Sub-Saharan Africa and Russia and former communist countries in Europe. Why was life expectancy unable to make a significant contribution to human development progress in the *Rest* once the health transition was completed? This is an issue deserves further research as does incorporating agency and freedom into a more comprehensive measure of human development.

References

Acemoglu, D. and S. Johnson (2007), 'Disease and Development: The Effects of Life Expectancy on Economic Growth', *Journal of Political Economy* 115, 6: 925-985.

Allen, R.C. (1994), 'The Standard of Living in the Soviet Union, 1928-1940', *Journal of Economic History* 58 (4): 1063-1089.

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

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

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

Becker, C. and D. Bloom (1998), 'The Demographic Crisis in the Former Soviet Union: Introduction', *World Development* 26, 11:1913-1919.

Benavot, A. and P. Riddle (1988), 'The Expansion of Primary Education, 1870-1940: Trends and Issues', *Sociology of Education* 61, 3: 191-210

Brainerd, E. (2010a), Human Development in Eastern Europe and the CIS Since 1990, UNDP Human Development Reports Research Paper 2010/16

Brainerd, E. (2010b), 'Reassessing the Standard of Living in the Soviet Union: An Analysis Using Archival and Anthropometric Data', *Journal of Economic History* 70, 1: 83-117.

Brainerd, E. and D.M. Cutler (2005), 'Autopsy on an Empire: Understanding Mortality in Russia and the Former Soviet Union', *Journal of Economic Perspectives* 19, 1: 107-130.

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

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

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

Cornia, G.A. and L. Mencini (2006), Health Improvements and Health Inequality during the Last 40 Years, WIDER Research Paper 2006/10

Crafts, N. (2002), 'The Human Development Index, 1870-1999: Some Revised Estimates', *European Review of Economic History* 6, 3: 395-405.

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

Cutler, D., A. Deaton and A. Lleras-Muney (2006), 'The Determinants of Mortality', *Journal of Economic Perspectives* 20, 3: 97-120

Dasgupta, P. (1990), 'Well-Being and the Extent of its Realization in Poor Countries', *Economic Journal* 100, 400: 1-32

Dasgupta, P. and M. Weale (1992), 'On Measuring the Quality of Life', *World Development* 20, 1: 119-131

Deaton, A. (2006), Global Patterns of Income and Health: Facts, Interpretations, and Policies, NBER Working Papers Desai, M. (1991), 'Human Development: Concept and Measurement', *European Economic Review* 35: 350-357.

Devereux, J. (2010), The Health of the Revolution: Explaining the Cuban Health Care Paradox' (mimeo)

Díaz-Briquets, S. (1981), 'Determinants of Mortality Transition in Developing Countries Before and After the Second World War: some Evidence from Cuba', *Population Studies* 35, 3: 399-411.

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

Dutton, J. Jr. (1979). Changes in Soviet Mortality Patterns, 1959-77, *Population and Development Review* 5, 2: 267-291

Easterlin, R.A. (1981), 'Why Isn't the Whole World Developed?', *Journal of Economic History* 51, 1: 1-19.

Easterlin, R.A. (1999), 'How Beneficient is the Market? A Look at the Modern History of Mortality', *European Review of Economic History* 3, 3: 257-94

Easterly, W. (1999), 'Life after Growth', *Journal of Economic Growth* 4, 3: 239-76. Underlying data available at: http://www.worldbank.org/html/prdmg/grthweb/growtht.htm

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

Engineer, M.H., Roy, N., Fink, S. (2010). “Healthy” human development indices, *Social Indicators Research* 99, 61-80

Feinstein, C. (1998), ‘Pessimism Perpetuated: real wages and the standard of living in Britain during and after the industrial revolution’, *Journal of Economic History* 58: 625–658

Fleurbaey, M. (2009), “Beyond GDP: The Quest for a Measure of Social Welfare”, *Journal of Economic Literature* 47, 4: 1029–75.

Flora, P. (1973), ‘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*, London: Sage, pp. 213-58.

Flora, P. (1983), *State, Economy, and Society in Western Europe 1815-1975. A Data Handbook in Two Volumes*, Frankfurt: Campus Verlag.

Fogel, R.W. (1999), ‘Catching-up with the Economy’, *American Economic Review* 89 (1): 1-21

Fogel, R.W. (2009), ‘Biotechnology and the Burden of Age-Related Diseases’, in in D. Eltis, F.D. Lewis and K.L. Sokoloff (eds.), *Human Capital and Institutions. A Long-run View*, New York: Cambridge University Press, pp. 11-26

Fries J.F. (1980). Aging, natural death, and the compression of morbidity, *New England Journal of Medicine* 303: 130–135.

Fries, J.F. (2003). Measuring and Monitoring Success in Compressing Morbidity, *Annals of Internal Medicine*, 139: 455-459.

Gidwitz, Z.,Heger, M.P., Pineda, J., Rodríguez, F. (2010). Understanding performance in human development: a cross-national study. UNDP Human Development Reports Research Paper 2010/42

Hanushek, E.A. and D.D. Kimko (2000). Schooling, Labor-Force Quality, and the Growth of Nations, *American Economic Review* 90 (5): 1184-1208.

Hartwell, R.M. and S.L. Engerman (2003), ‘Capitalism’, in J. Mokyr (ed.), *The Oxford Encyclopedia of Economic History*, New York: Oxford University Press, I, pp. 319-325.

Hayami, Y. and V.W. Ruttan (1985), *Agricultural Development An International Perspective*, Baltimore: Johns Hopkins University Press.

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

Jayachandran, S., A. Lleras-Muney, and K.V. Smith (2010), 'Modern Medicine and the Twentieth Century Decline in Mortality: Evidence on the Impact of Sulfa Drugs', *American Economic Journal: Applied Economics* 2, 2: 118-46.

Kakwani, N. (1993), 'Performance in Living Standards. An International Comparison', *Journal of Development Economics* 41: 307-36.

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

Kotwal, A., B. Ramaswami, and W. Wadhwa (2011), 'Economic Liberalization and India Economic Growth: What's the Evidence?', *Journal of Economic Literature* 49, 4: 1152-1199.

Lindert, P.H. (2004), *Growing Public. Social Spending and Economic Growth Since the Eighteenth Century*, Cambridge: Cambridge University Press, 2 vols.

Lindert, P.H. and J.G. Williamson (2003), 'Does Globalization Make the World More Unequal?', in M. Bordo, A.M. Taylor and J.G. Williamson (eds.), *Globalization in Historical Perspective*, Chicago: University of Chicago Press.

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

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

Maddison, A. (2010) Statistics on world population, GDP and per capita GDP, 1-2008 AD. Last update: March 2010, horizontal file http://www.ggdc.net/maddison/

Majumder, A. and S.R. Chakravarty (1996), 'Achievement and Improvement in Living Standards', *Journal of Development Economics* 50: 189-195.

Mandle, J.R. (1970), 'The Decline of Mortality in British Guiana, 1911-1960', *Demography* 7, 3: 301-315

Markevich, A. and M. Harrison (2011), 'Great War, Civil War, and Recovery: Russia's National Income, 1913-1928', *Journal of Economic History* 71,3: 672-703.

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

Mathers, C. D., Sadana, R., Salomon, J.A.,Murray, C.J.L., Lopez, A.D. (2001). Healthy life expectancy in 191 countries, *Lancet* 357, 1685–1691

Mathers, C.D., K.M. Iburg, J.A. Salomon, A. Tandon, S. Chatterji, B. Ustu¨n, B., et al. (2004). Global patterns of healthy life expectancy in year 2002, *BioMed Central Public Health* 4, 66 http://www.biomedcentral.com/1471-2458/4/66

Mazur, D.P. (1969). Expectancy of Life at Birth in 36 Nationalities of the Soviet Union: 1958-60. *Population Studies* 23, 2: 225-246.

McAlpin, M.B. (1983), 'Famines, Epidemics, and Population Growth: The Case of India', *Journal of Interdisciplinary History* 14, 2: 351-366.

McGuire and L.B. Frankel (2005), 'Mortality Decline in Cuba, 1900-1959: Patterns, Comparisons, and Causes', *Latin American Research Review* 40, 2: 83-116.

McKeown, T. and R.G. Record (1962), 'Reasons for the Decline of Mortality in England and Wales during the Nineteenth Century'*, Population Studies* 16: 94-122

McKeown, T., R.G. Record, and R.D. Turner (1975), 'An Interpretation of the Decline of Mortality in England and Wales during the Twentieth Century', *Population Studies* 29, 3: 391-422.

McKinlay, J.B. and S.M. McKinlay (1977), '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, 3: 405-28

Milanovic, B., P.H. Lindert, and J.G. Williamson (2011). Measuring ancient inequality, *Economic Journal* 121 (551), 255-272

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

Mitchell, B. R. (2003b), *International Historical Statistics: The Americas, 1750–2000*, 5th ed. New York: Palgrave Macmillan.

Mitchell, B. R. (2003c), *International Historical Statistics: Europe 1750-2000*, New York: Palgrave Macmillan.

Murray, C.J.L., Lopez, A.D. (1997). Regional patterns of disability-free life expectancy and disability-adjusted life expectancy: Global Burden of Disease Study. *Lancet* 349: 1347-1352.

Nilsson, A. (1999), 'What Do Literacy Rates in the 19th Century Really Signify? New Light on an Old Problem from Unique Swedish Data', *Paedagogica Historica* 35, 2: 275-296

Noorbakhsh, F. (1998), 'A Modified Human Development Index', *World Development* 26, 3: 517-28

Omran, A.R. (1971), 'The Epidemiological Transition: A Theory of Epidemiology of Population Change', *Milbank Memorial Fund Quarterly* 49, 4: 509-538. Reprinted in *Milibank Quarterly* 83,4: 731-757

O'Rourke, K.H. and J.G. Williamson (2005), 'From Malthus to Ohlin: Trade, Industrialisation and distribution since 1500', *Journal of Economic Growth* 10: 5-34

Prados de la Escosura, L. (2010). Improving human development: A long-run view, *Journal of Economic Surveys* 24 (5), 841-894

Pritchett, L. and L.H. Summers (1996), 'Wealthier is Healthier', *Journal of Health Economics* 31, 4: 841-868

Pryor, F.L. (2010a), *Capitalism Reassessed*, New York: Cambridge University Press.

Pryor, F.L. (2010b), 'Capitalism and Freedom?', *Economic Systems* 34, 1: 91-104.

Ravallion, M. (2010). Troubling tradeoffs in the human development index. World Bank Policy Research Working Paper 5484

Riley, J.C. (2005a), *Poverty and Life Expectancy. The Jamaica Paradox*, New York: Cambridge University Press.

Riley, J.C. (2005b), "The Timing and Pace of Health Transitions Around the World", *Population and Development Review* 31, 4: 741-64

Rodrik, D., Trade, Social Insurance, and the Limits to Globalization, NBER Working Papers 5905.

Roy, T. (2006), *The Economic History of India 1857-1947*, 2nd edition, New Delhi: Oxford University Press.

Sagar, A .D. and A. Najam (1998), 'The Human Development Index: A Critical Review', *Ecological Economics* 25: 249-64.

Sen, A.K. (1973), *On Economic Inequality*, Oxford: Clarendon Press.

Sen, A.K. (1981). Public Action and the quality of life in developing countries, *Oxford Bulletin of Economics and Statistics* 43 (4), 287-319

Sen, A.K. (1997), 'Human Capital and Human Capability', *World Development* 25, 12: 1959-61

Sen, A.K. (1999), *Development as Freedom*, Oxford: Oxford University Press.

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

Srinivassan, T.N. (1994), 'Human Development: A New Paradigm or Reinvention of the Wheel?', *American Economic Review, Papers and Proceedings* 84, 2: 238-43.

Steckel, R.H. (2009), '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*, New York: Cambridge University Press, pp. 27-45

Stillman, S. (2006), '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, 1:104-146.

Stolnitz, G.J., 'A Century of International Mortality Trends', *Population Studies* 9, 1: 24-55

Tsui, K-Y (1996), 'Improvement Indices of Well-Being', *Social Choice and Welfare* 13, 3: 291-303

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

UNESCO (1957), *World Illiteracy at Mid-Century. A Statistical Study*, Paris: UNESCO.

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

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

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

United Nations Development Program [UNDP] (1990), *Human Development Report*, New York: Oxford University Press.

United Nations Development Program [UNDP] (1994), *Human Development Report*, New York: Oxford University Press.

United Nations Development Program [UNDP] (1995), *Human Development Report*, New York: Oxford University Press.

United Nations Development Program [UNDP] (1999), *Human Development Report*, New York: Oxford University Press.

United Nations Development Program [UNDP] (2001), *Human Development Report*, New York: Oxford University Press.

United Nations Development Program [UNDP] (2009), *Human Development Report*, New York: Oxford University Press.

United Nations Development Program [UNDP] (2010), *Human Development Report*, New York: Oxford University Press.

United Nations Development Program [UNDP] (2011), *Human Development Report*, New York: Oxford University Press.

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

Ward, M. and J. Devereux (2012), 'The Road Not Taken: Pre-Revolutionary Cuban Living Standards in Comparative Perspective', *Journal of Economic History* 72 (1): 104-132.

World Bank (2010), *World Development Indicators Database*, Washington D.C.: World Bank. http://data.worldbank.org/data-catalog. .

Zambrano, E. (2011), Functionings, Capabilities and the 2010 Human Development Index. UNDP Human Development Reports Research Paper 2011/11

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

Panel A: HIHD Levels

	HIHD	Hybrid HDI	'Old' HDI
1870	0.076	0.173	0.206
1880	0.083	0.187	0.224
1890	0.095	0.210	0.247
1900	0.107	0.230	0.271
1913	0.122	0.257	0.300
1929	0.157	0.316	0.359
1938	0.185	0.359	0.402
1950	0.210	0.397	0.461
1960	0.263	0.476	0.534
1970	0.307	0.535	0.597
1980	0.334	0.573	0.634
1990	0.367	0.613	0.671
2000	0.416	0.659	0.713
2007	0.460	0.702	0.745
Panel B: Average Growth Rates (%)			
1870-1880	1.0	0.8	0.8
1880-1890	1.4	1.1	1.0
1890-1900	1.2	0.9	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
1913-1938	1.7	1.3	1.2
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 in the World and excluding China and India and Africa, 1870-2007***

Panel A: HIHD Levels

	World	World excluding China and India	World excluding Africa	World excluding Sub-Saharan Africa
1870	0.076	0.115	0.077	0.077
1880	0.083	0.125	0.085	0.085
1890	0.095	0.143	0.098	0.098
1900	0.107	0.160	0.111	0.110
1913	0.122	0.179	0.127	0.126
1929	0.157	0.220	0.164	0.163
1938	0.185	0.257	0.194	0.192
1950	0.210	0.272	0.221	0.219
1960	0.263	0.321	0.276	0.274
1970	0.307	0.363	0.322	0.320
1980	0.334	0.391	0.350	0.348
1990	0.367	0.419	0.388	0.386
2000	0.416	0.456	0.445	0.443
2007	0.460	0.495	0.494	0.491

Panel B: Average Growth Rates (%)

1870-1880	1.0	0.9	1.0	1.0
1880-1890	1.4	1.3	1.4	1.4
1890-1900	1.2	1.2	1.2	1.2
1900-1913	1.0	0.9	1.0	1.0
1913-1929	1.6	1.3	1.6	1.6
1929-1938	1.8	1.7	1.8	1.8
1938-1950	1.1	0.5	1.1	1.1
1950-1960	2.2	1.6	2.2	2.2
1960-1970	1.5	1.2	1.6	1.6
1970-1980	0.9	0.7	0.8	0.9
1980-1990	0.9	0.7	1.0	1.0
1990-2000	1.3	0.8	1.4	1.4
2000-2007	1.4	1.2	1.5	1.5
1870-1913	1.1	1.0	1.2	1.2
1913-1938	1.7	1.4	1.7	1.7
1950-1970	1.9	1.4	1.9	1.9
1970-1990	0.9	0.7	0.9	0.9
1990-2007	1.3	1.0	1.4	1.4
1870-1913	1.1	1.0	1.2	1.2
1913-1970	1.6	1.2	1.6	1.6
1970-2007	1.1	0.8	1.2	1.2
1870-2007	1.3	1.1	1.4	1.4

Table 3 ***Human Development in OECD and the Rest, 1870-2007***

Panel A: HIHD Levels

	OECD	The Rest	Rest excluding China and India	Rest excluding Africa	Rest excluding Sub-Saharan Africa
1870	0.175	0.040	0.054	0.041	0.041
1880	0.192	0.044	0.060	0.044	0.044
1890	0.220	0.051	0.070	0.052	0.052
1900	0.246	0.057	0.082	0.058	0.058
1913	0.277	0.065	0.095	0.067	0.067
1929	0.334	0.094	0.131	0.098	0.098
1938	0.366	0.124	0.176	0.129	0.129
1950	0.417	0.148	0.190	0.154	0.154
1960	0.482	0.203	0.240	0.212	0.212
1970	0.541	0.249	0.283	0.259	0.259
1980	0.593	0.278	0.313	0.290	0.290
1990	0.658	0.315	0.343	0.331	0.331
2000	0.745	0.363	0.373	0.386	0.386
2007	0.809	0.405	0.408	0.433	0.433
Panel B: Average Growth Rates (%)					
1870-1880	0.9	0.8	1.1	0.9	0.9
1880-1890	1.4	1.5	1.5	1.6	1.6
1890-1900	1.1	1.0	1.6	1.1	1.1
1900-1913	0.9	1.1	1.1	1.1	1.1
1913-1929	1.2	2.3	2.0	2.4	2.4
1929-1938	1.0	3.1	3.3	3.1	3.1
1938-1950	1.1	1.5	0.6	1.5	1.5
1950-1960	1.4	3.2	2.3	3.2	3.2
1960-1970	1.2	2.0	1.7	2.0	2.0
1970-1980	0.9	1.1	1.0	1.1	1.1
1980-1990	1.0	1.2	0.9	1.3	1.3
1990-2000	1.2	1.4	0.8	1.6	1.6
2000-2007	1.2	1.6	1.3	1.6	1.6
1870-1913	1.1	1.1	1.3	1.2	1.2
1913-1938	1.1	2.6	2.5	2.6	2.6
1950-1970	1.3	2.6	2.0	2.6	2.6
1970-1990	1.0	1.2	1.0	1.2	1.2
1990-2007	1.2	1.5	1.0	1.6	1.6
1870-1913	1.1	1.1	1.3	1.2	1.2
1913-1970	1.2	2.4	1.9	2.4	2.4
1970-2007	1.1	1.3	1.0	1.4	1.4
1870-2007	1.1	1.7	1.5	1.7	1.7

Table 4 ***Human Development across World Regions, 1870-2007***

Panel A: HIHD Levels

	OECD	Central and 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	0.032
1900	0.246	0.119	0.083	0.040	0.035	0.042	0.044	0.034
1913	0.277	0.133	0.106	0.040	0.041	0.053	0.050	0.037
1929	0.334	0.187	0.137	0.064	0.060	0.088	0.069	0.048
1938	0.366	0.266	0.156	0.081	0.070	0.113	0.080	0.061
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 and 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	0.7
1880-1890	1.4	1.7	1.7	2.5	1.7	1.5	0.9	0.9
1890-1900	1.1	2.0	1.6	-0.4	0.1	1.3	1.0	0.7
1900-1913	0.9	0.9	1.9	0.0	1.2	1.9	1.0	0.7
1913-1929	1.2	2.1	1.6	3.0	2.4	3.2	2.0	1.7
1929-1938	1.0	3.9	1.4	2.5	1.8	2.8	1.5	2.6
1938-1950	1.1	1.9	2.7	1.2	2.7	0.7	2.8	2.3
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	0.8	0.7
1913-1938	1.1	2.8	1.5	2.8	2.2	3.0	1.8	2.0
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	0.8	0.7
1913-1970	1.2	2.3	1.9	3.0	2.4	2.5	2.3	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 5 ***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	0.047	0.069	0.272
1900	0.107	0.054	0.079	0.291
1913	0.122	0.062	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
1913-1938	1.7	0.9	0.7	0.1
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 6 ***Human Development and its Dimensions: the OECD, 1870-2007***

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.175	0.085	0.158	0.398
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
1913-1938	1.1	0.6	0.4	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 7 ***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	0.062	0.051	0.263
1938	0.124	0.079	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
1913-1938	2.6	1.2	1.3	0.1
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	2.4	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

Table 8 ***Catching up in the Rest, 1870-2007***

HIHD Catching-up Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	-0.1	-0.1	0.1	-0.1
1880-1890	0.2	-0.5	0.7	0.0
1890-1900	-0.1	-0.2	0.1	0.0
1900-1913	0.2	-0.1	0.2	0.0
1913-1929	1.1	0.7	0.5	0.0
1929-1938	2.1	0.4	1.6	0.1
1938-1950	0.6	0.7	0.3	-0.4
1950-1960	1.7	0.4	1.1	0.2
1960-1970	0.9	0.6	0.3	0.0
1970-1980	0.2	-0.1	0.1	0.2
1980-1990	0.0	-0.1	-0.1	0.2
1990-2000	0.2	-0.2	0.2	0.2
2000-2007	0.4	-0.4	0.2	0.6
1870-1913	0.1	-0.2	0.3	0.0
1913-1938	1.5	0.6	0.9	0.0
1950-1970	1.3	0.5	0.7	0.1
1970-1990	0.1	-0.1	0.0	0.2
1990-2007	0.3	-0.3	0.2	0.3
1870-1913	0.1	-0.2	0.3	0.0
1913-1970	1.2	0.6	0.7	0.0
1970-2007	0.2	-0.2	0.1	0.3
1870-2007	0.6	0.1	0.4	0.0

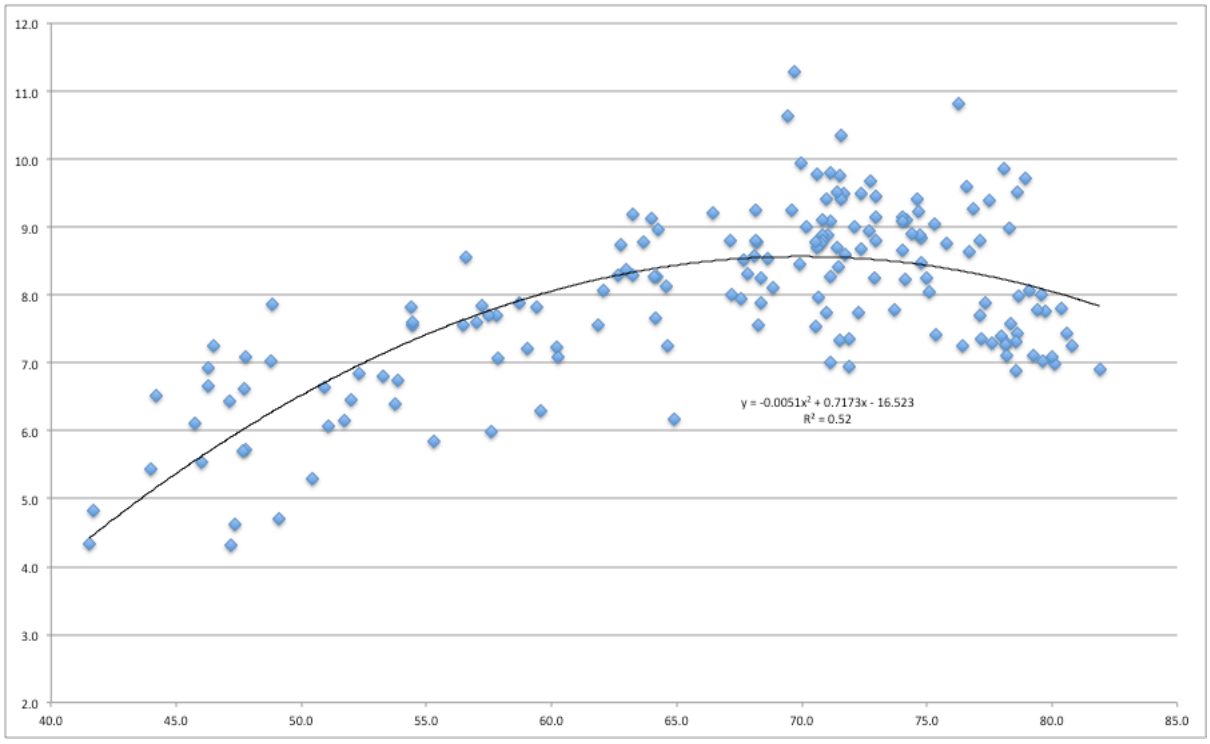

Figure 1. Years of poor health (vertical axis) versus life expectancy at birth (horizontal axis) in 2002.

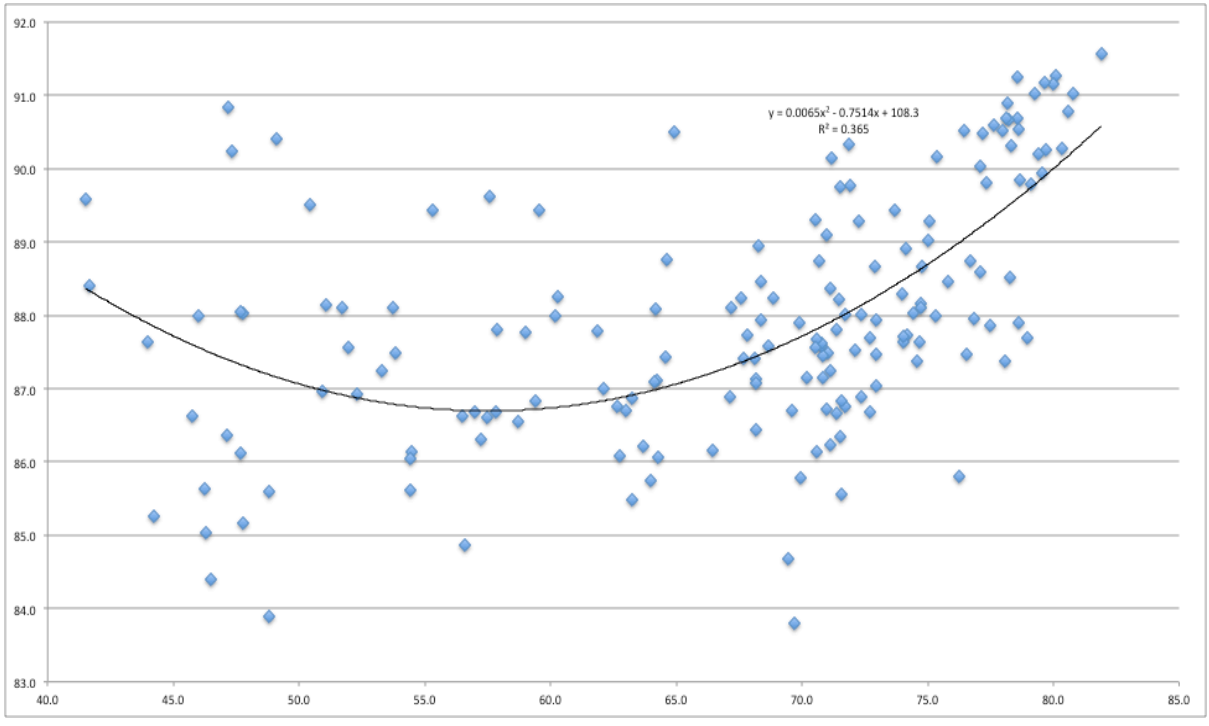

Figure 2. Years of good health (vertical axis) versus life expectancy at birth (horizontal axis) in 2002 (%)

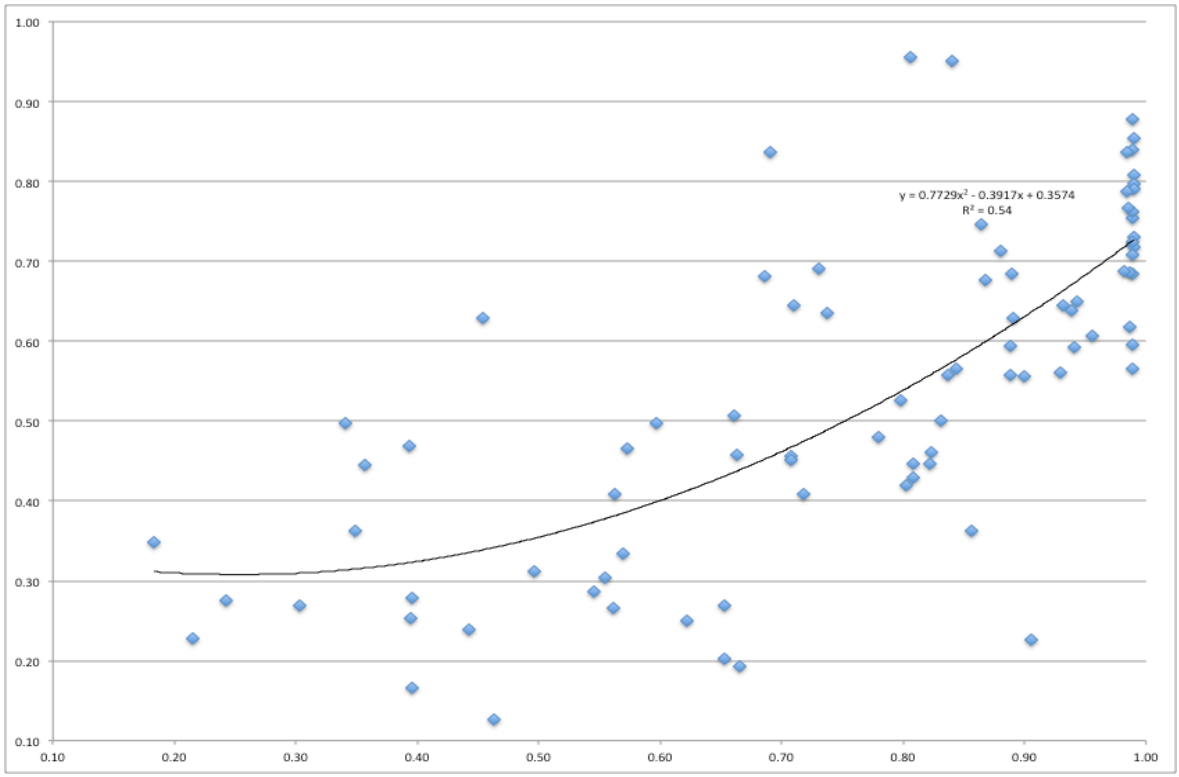

Figure 3. Cognitive skills (Hanuskek and Kimko 1990) [normalized] (vertical axis) versus literacy rate (horizontal axis), 1960-1990

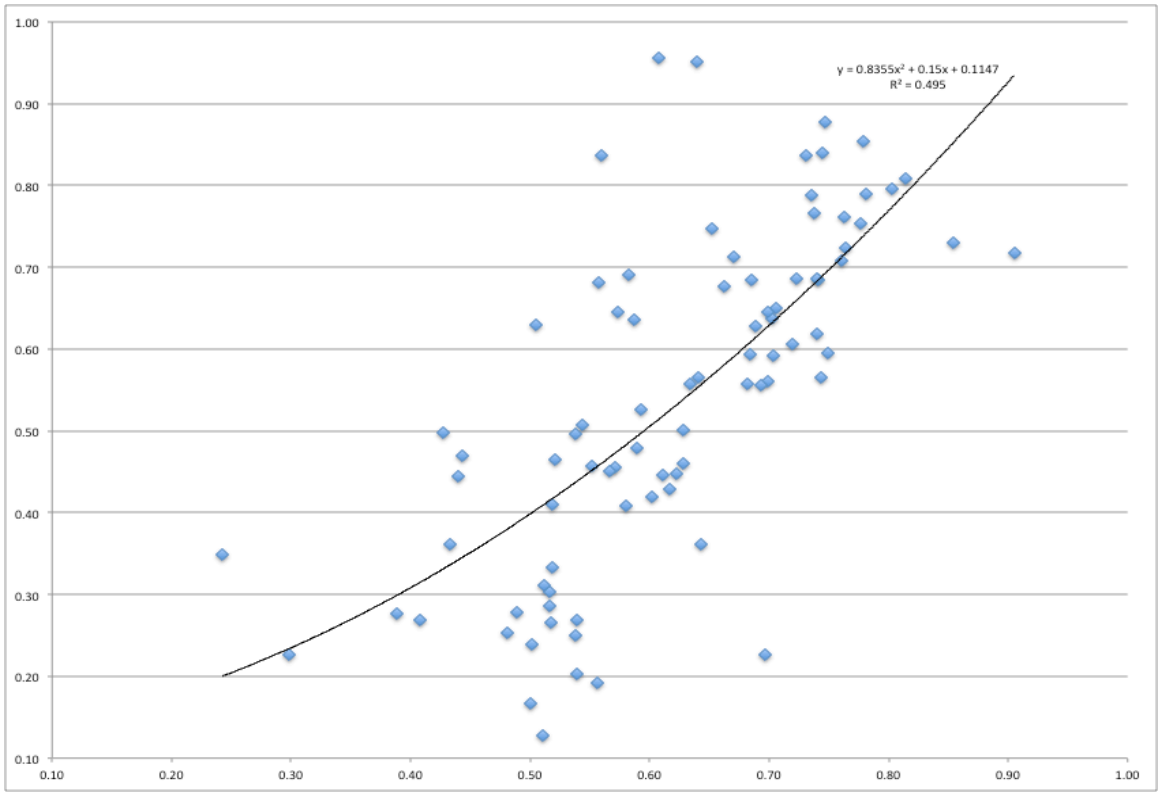

Figure 4. Cognitive skills (Hanuskek and Kimko 1990) [normalized] (vertical axis) versus enrolment rate (horizontal axis), 1960-1990

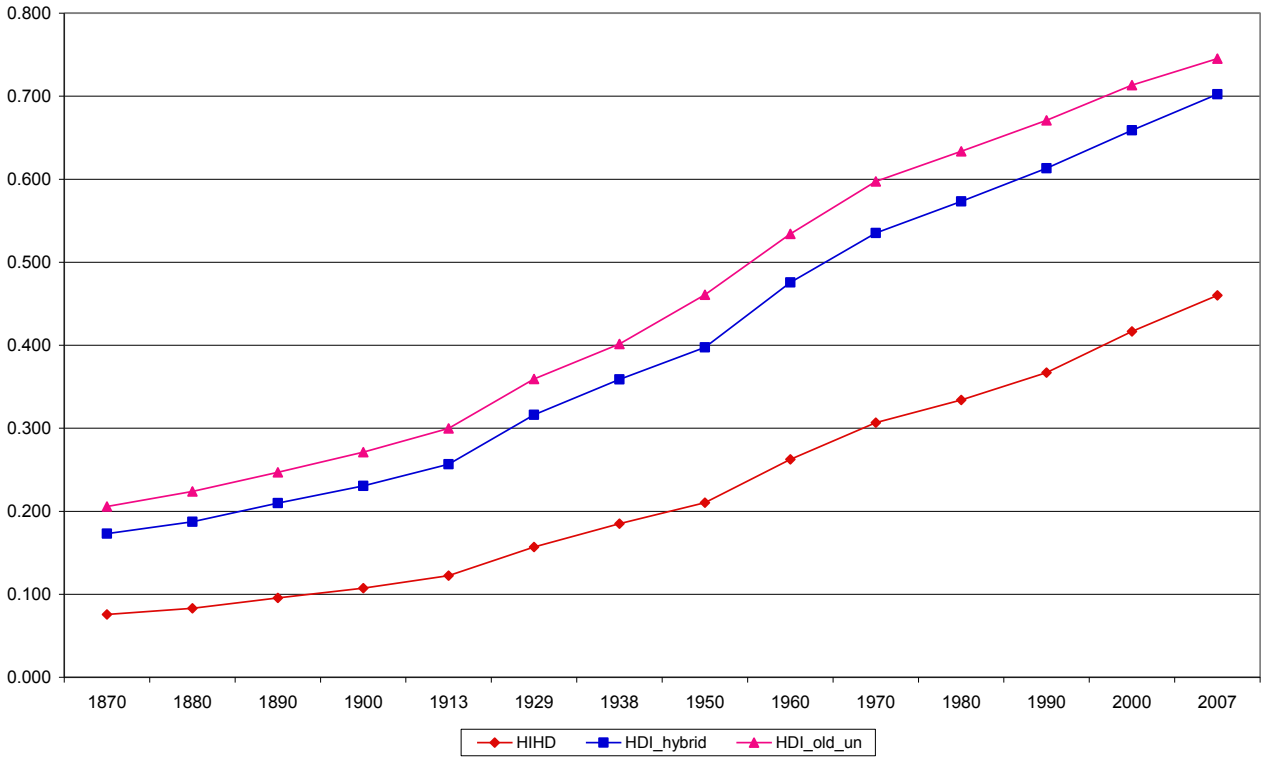

Figure 5 World Human Development: HIHD and 'hybrid' and 'old' HDI, 1870-2007

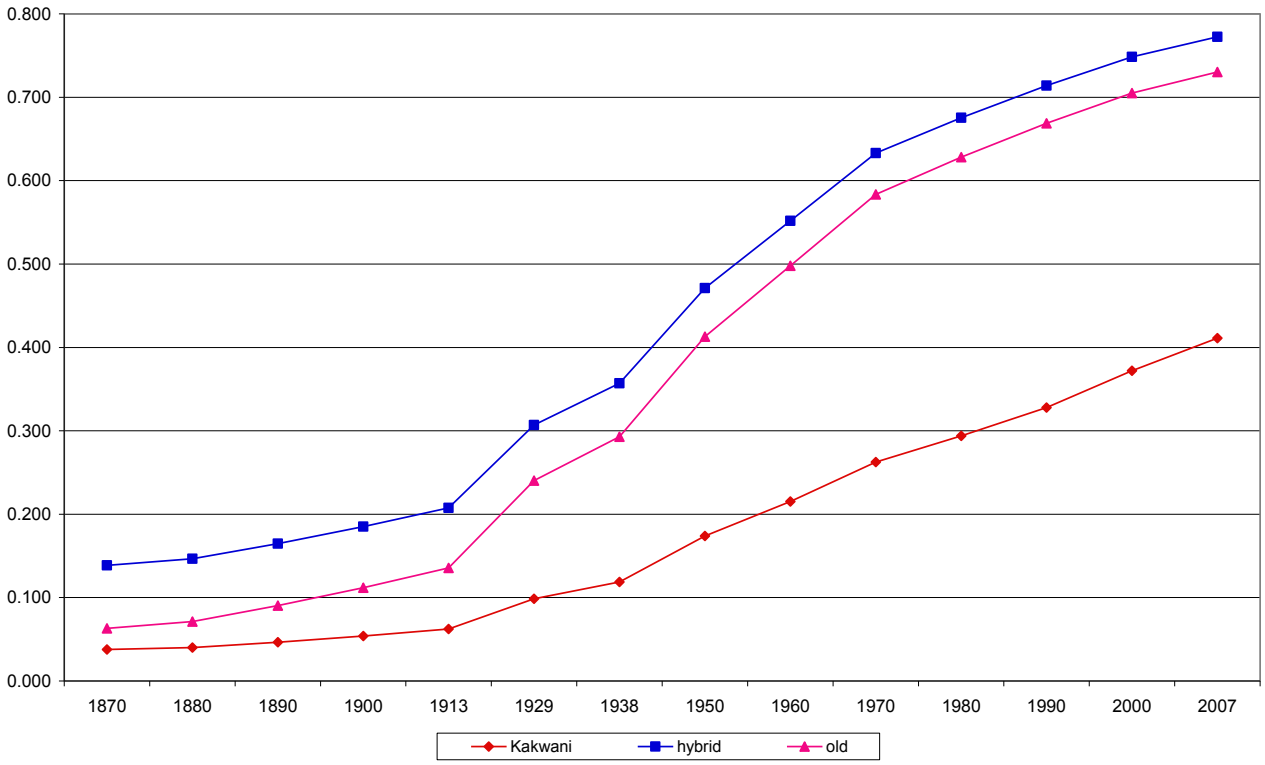

Figure 6 World Life Expectancy: Kakwani, 'hybrid' and 'old' UNDP indices, 1870-2007

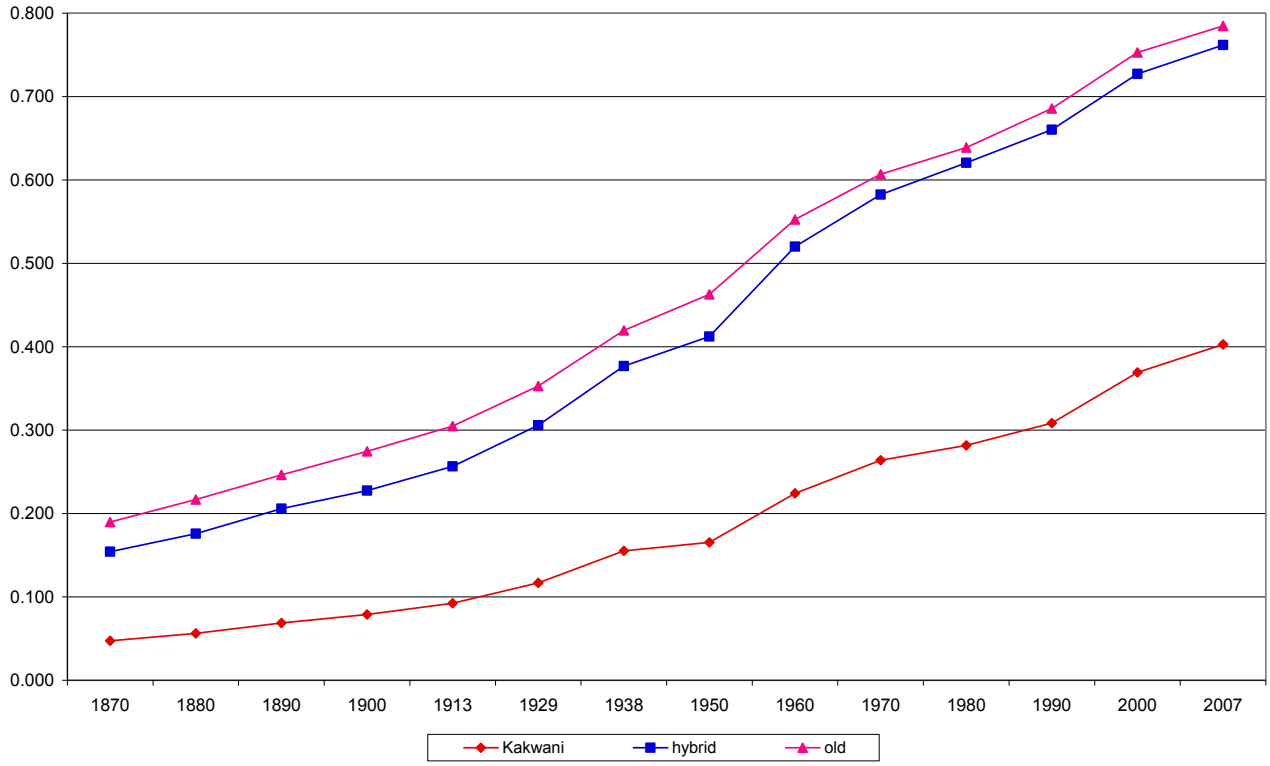

Figure 7 World Education: Kakwani, 'hybrid' and 'old' UNDP indices, 1870-2007

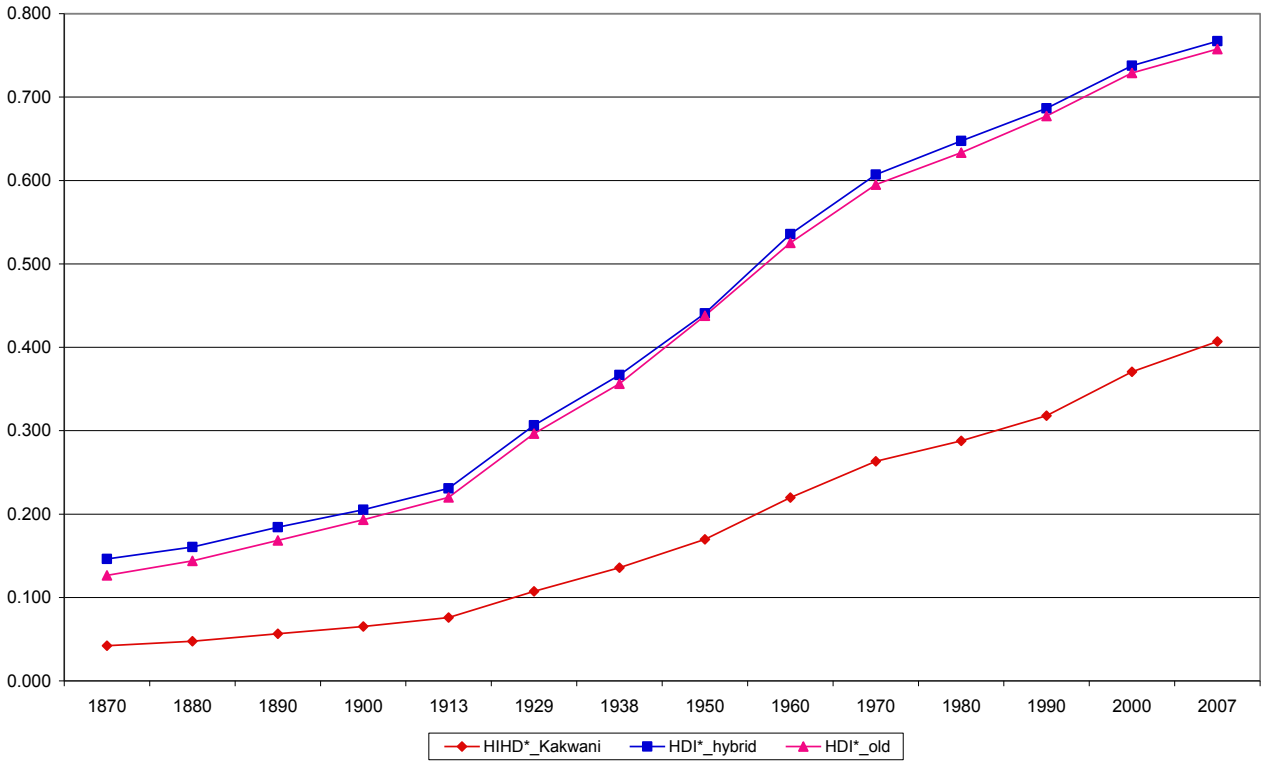

Figure 8 World Human Development (excluding Per Capita Income): HIHD*, 'hybrid' and 'old' HDI*, 1870-2007

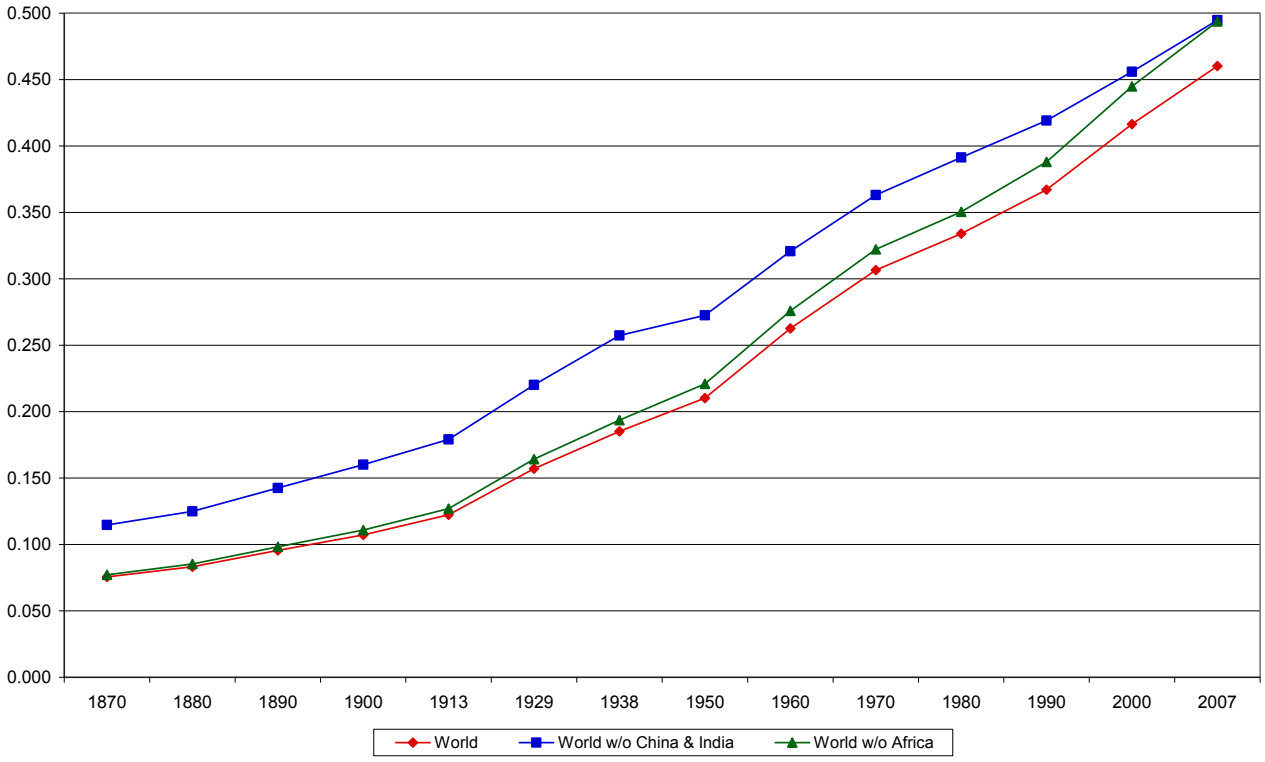

Figure 9 Human Development in the World and excluding China and India and Africa, 1870-2007

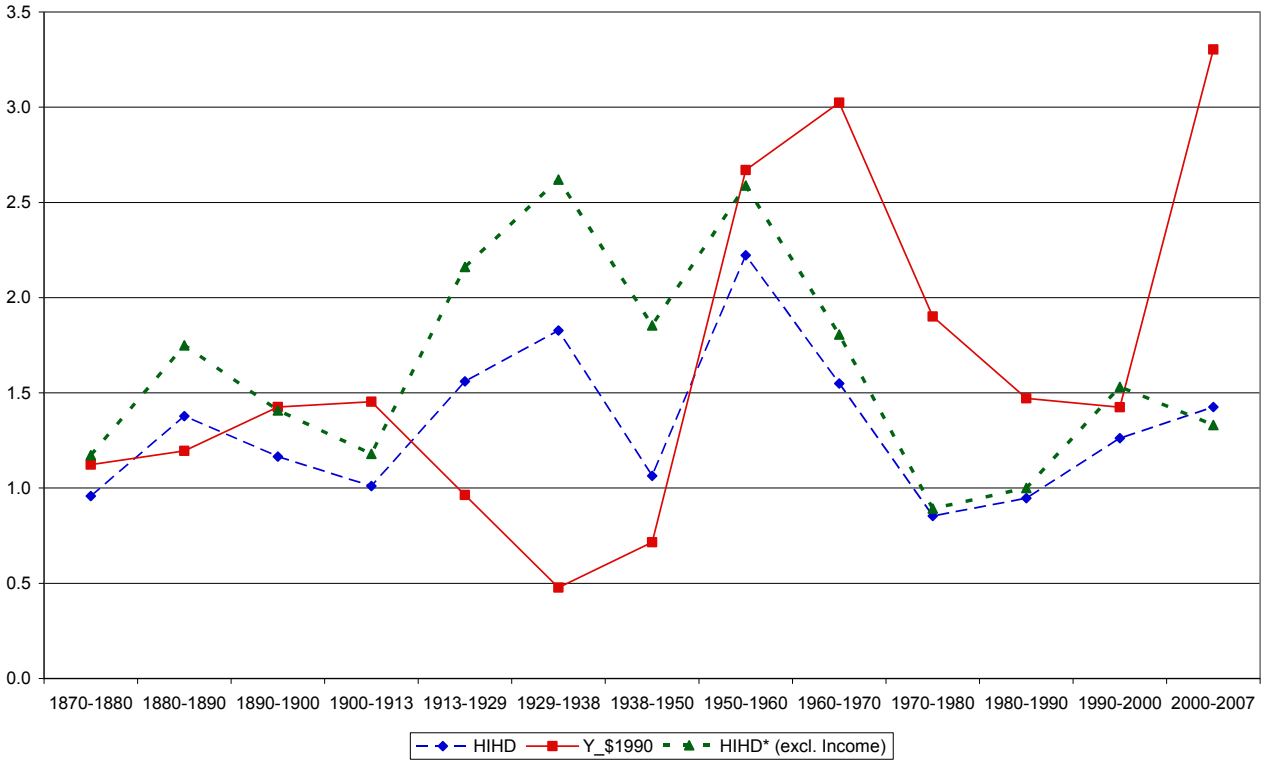

Figure 10 Growth of World Real GDP per Head and Human Development (with and without income) (%)

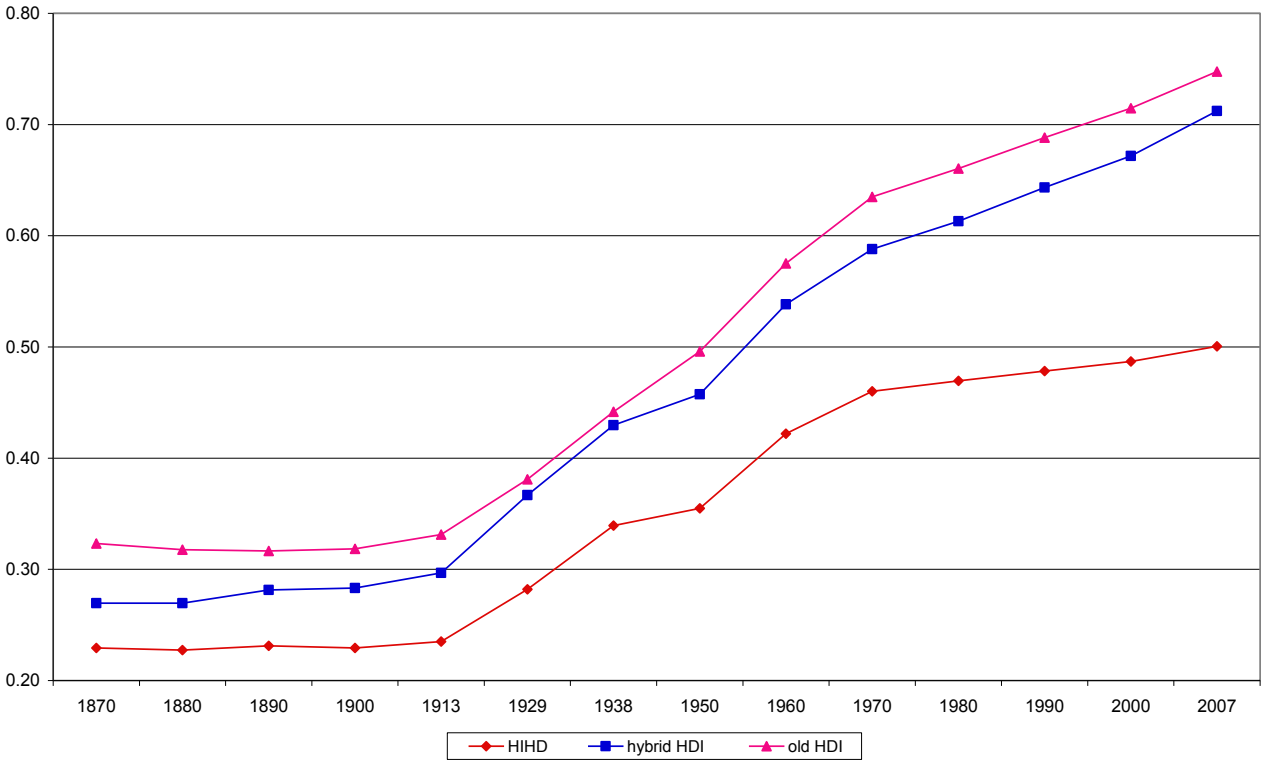

Figure 11 Human Development in the Rest as a share of OECD: Alternative Indices (HIHD and hybrid and old HDI), 1870-2007

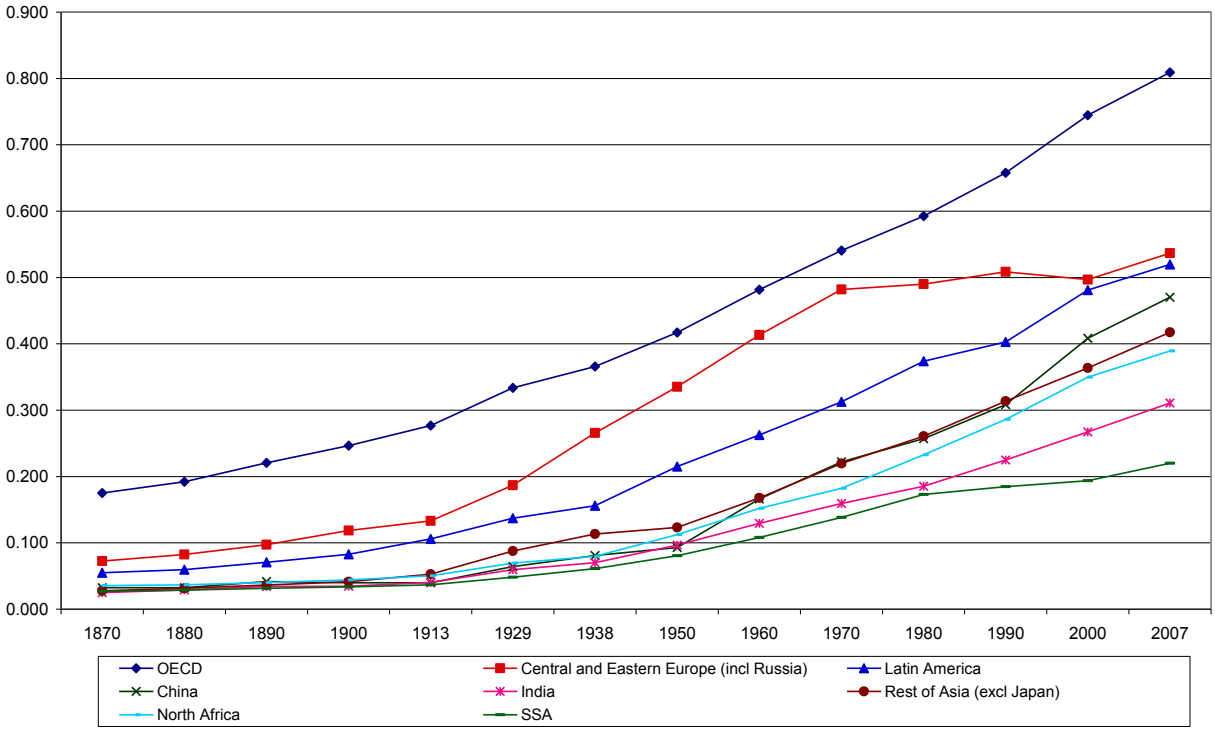

Figure 12 HIHD across World Regions, 1870-2007

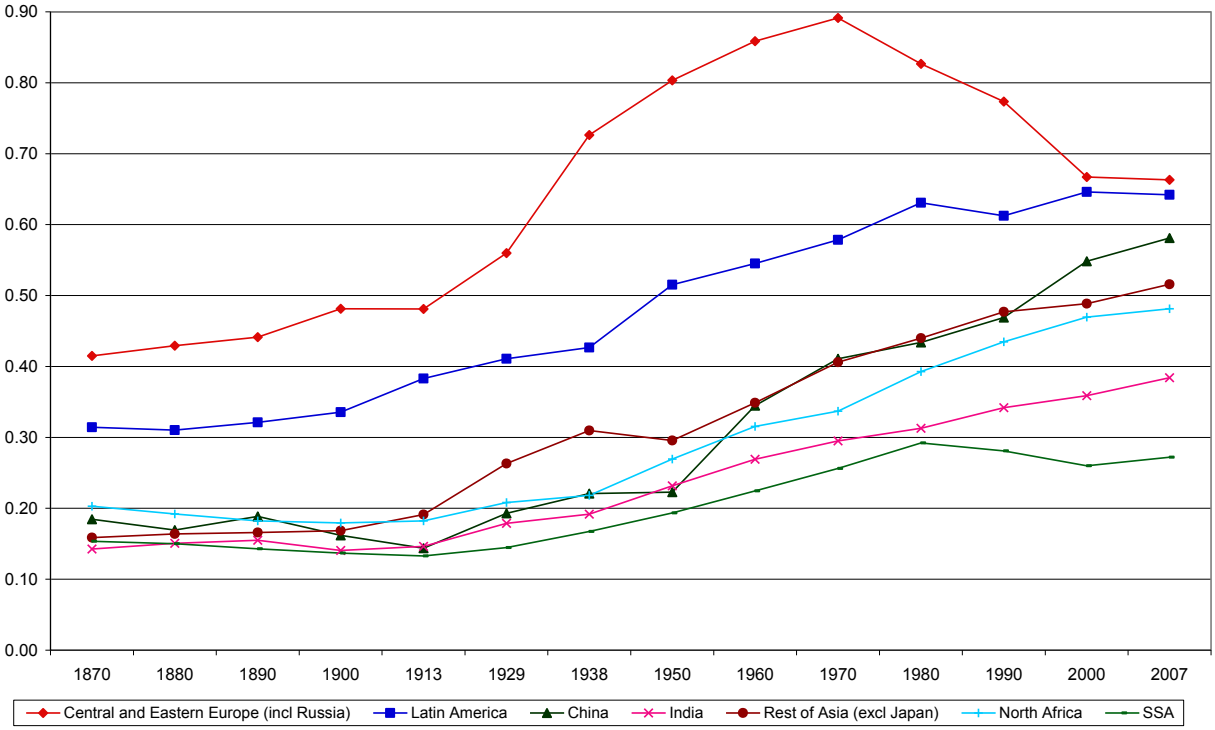

Figure 13 Relative HIHD across Developing Regions, 1870-2007 (OECD = 1)

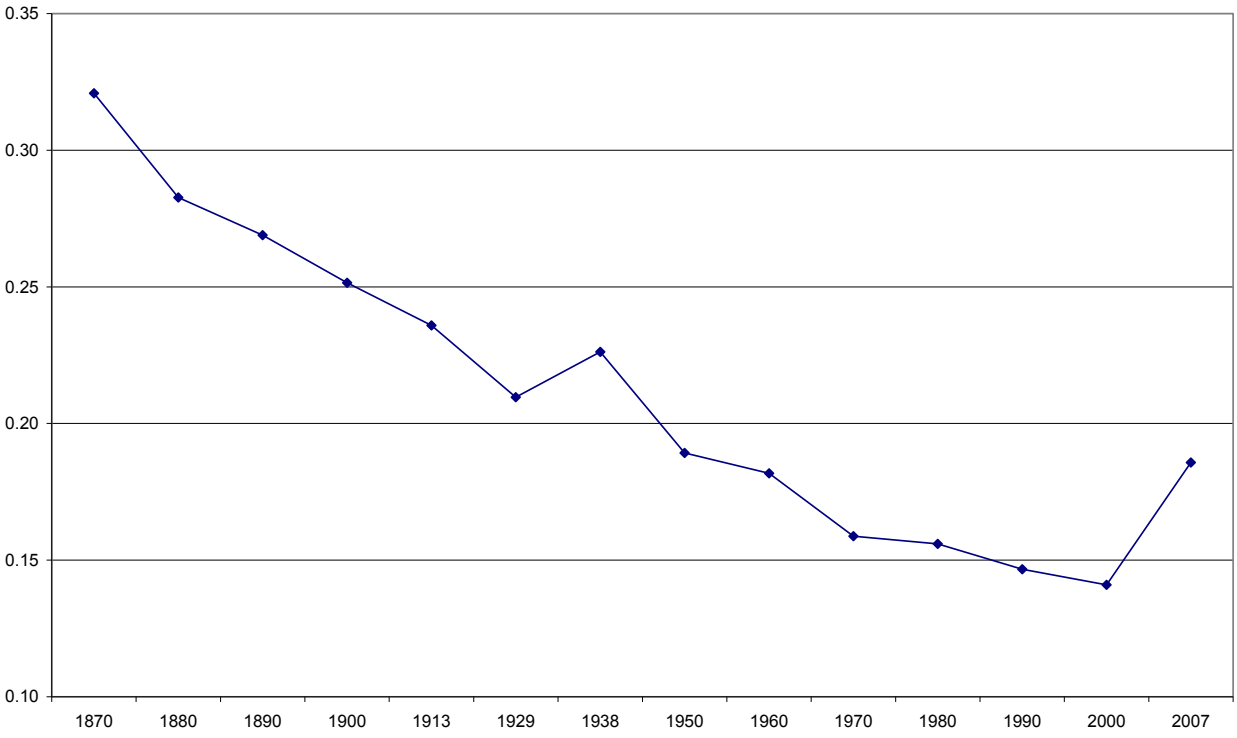

Figure 14 Relative Real GDP per Head in the Rest, 1870-2007 (OECD = 1)

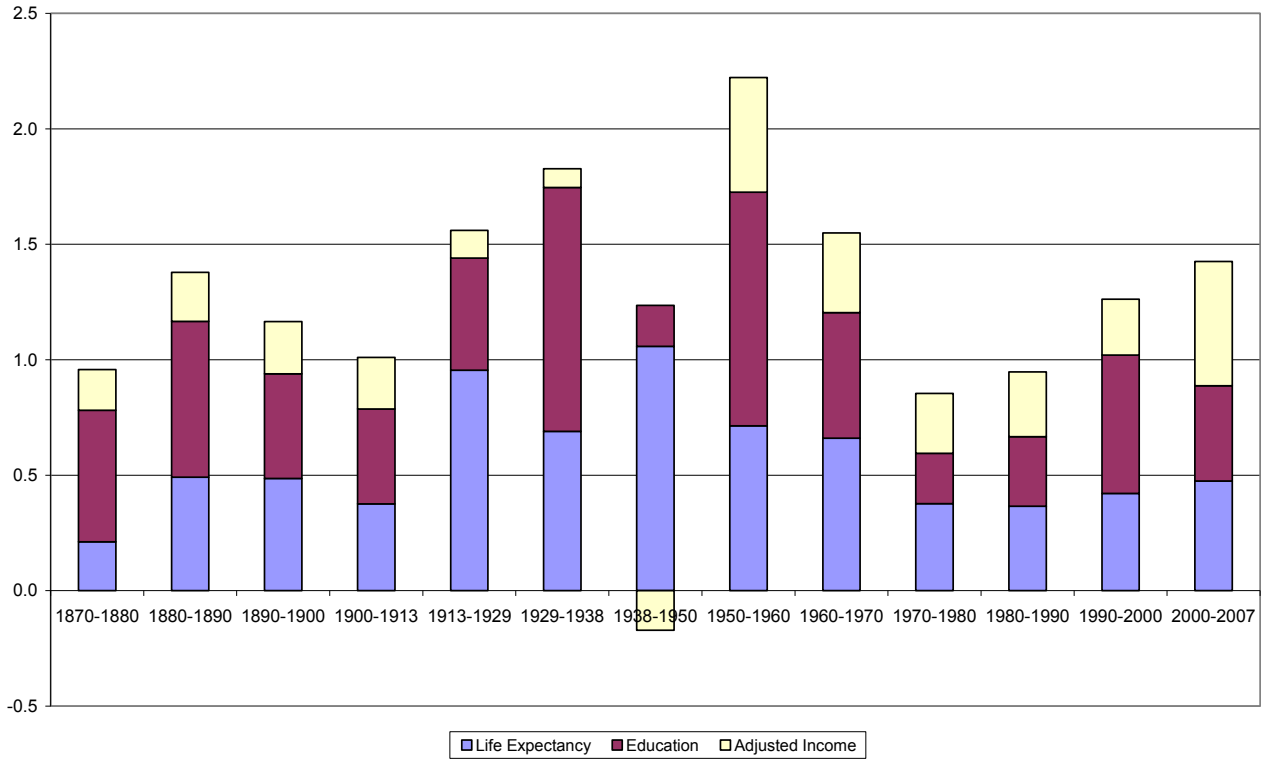

Figure 15 HIHD Growth and its Decomposition in the World, 1870-2007 (%)

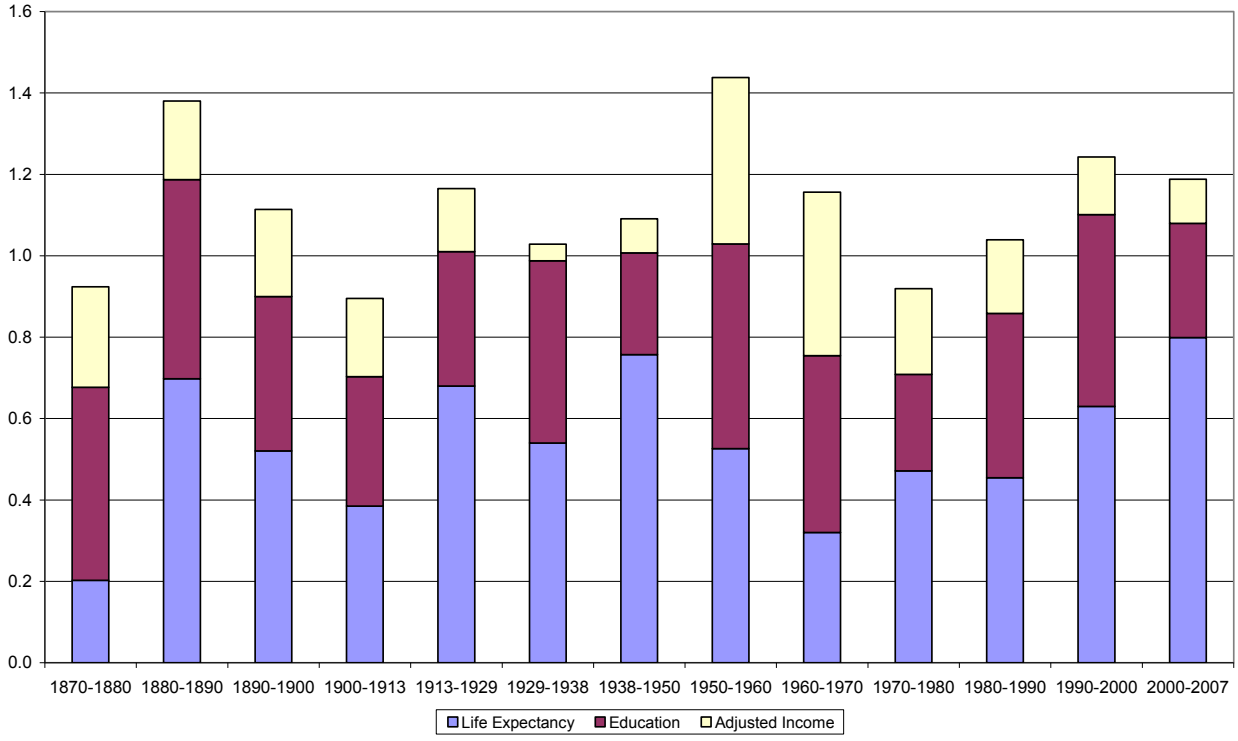

Figure 16 HIHD Growth and its Decomposition in *OECD*, 1870-2007 (%)

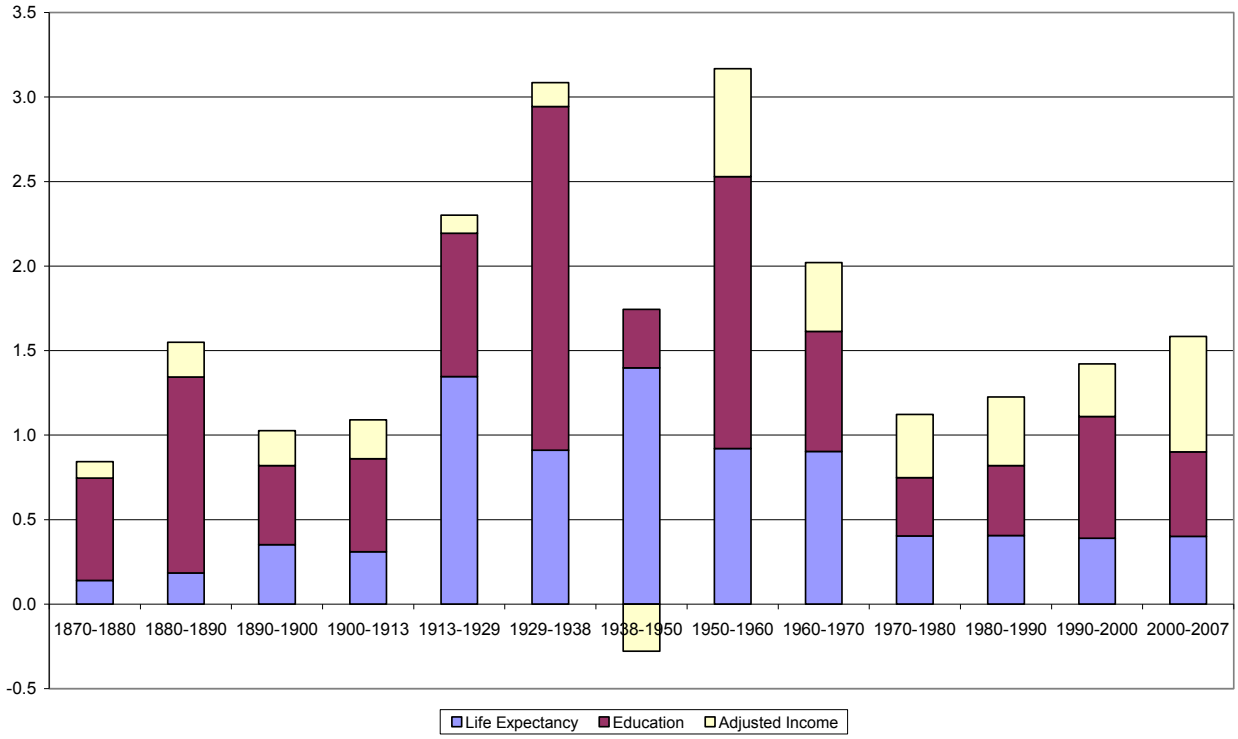

Figure 17a HIHD Growth and its Decomposition in the *Rest*, 1870-2007 (%)

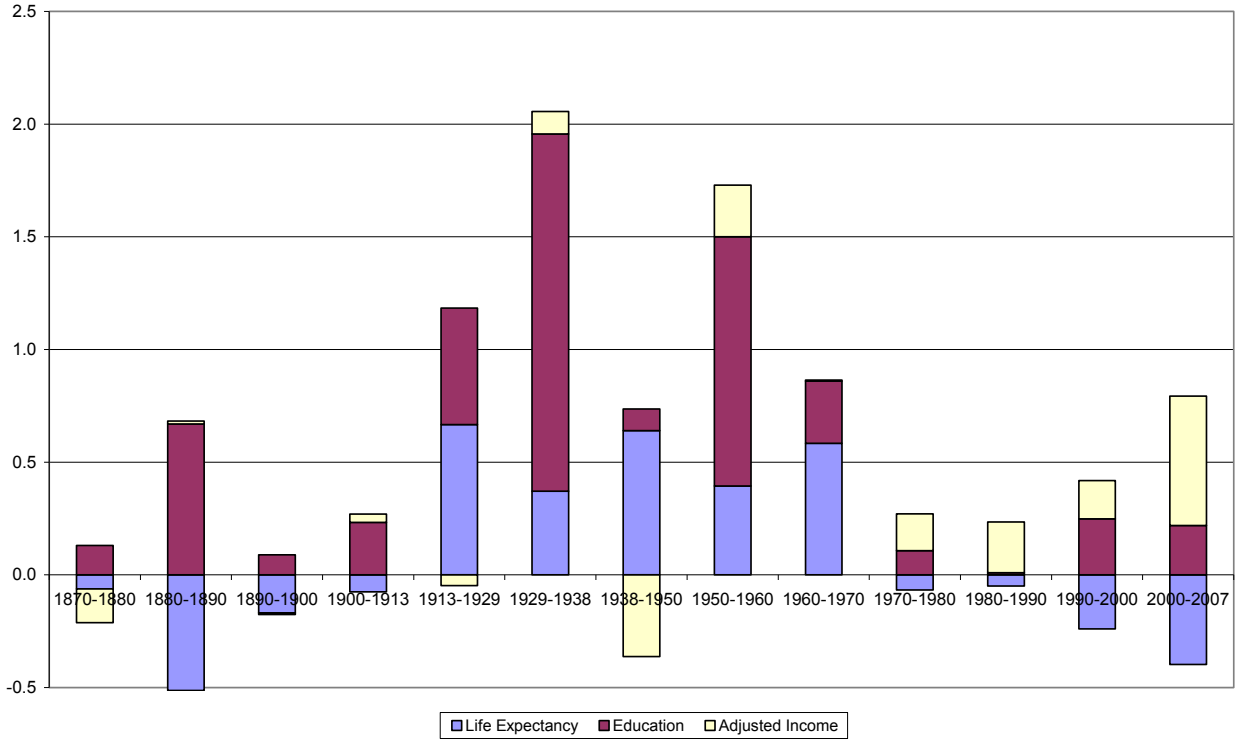

Figure 17b HIHD Catching-up with *OECD* in the *Rest*, 1870-2007 (%)

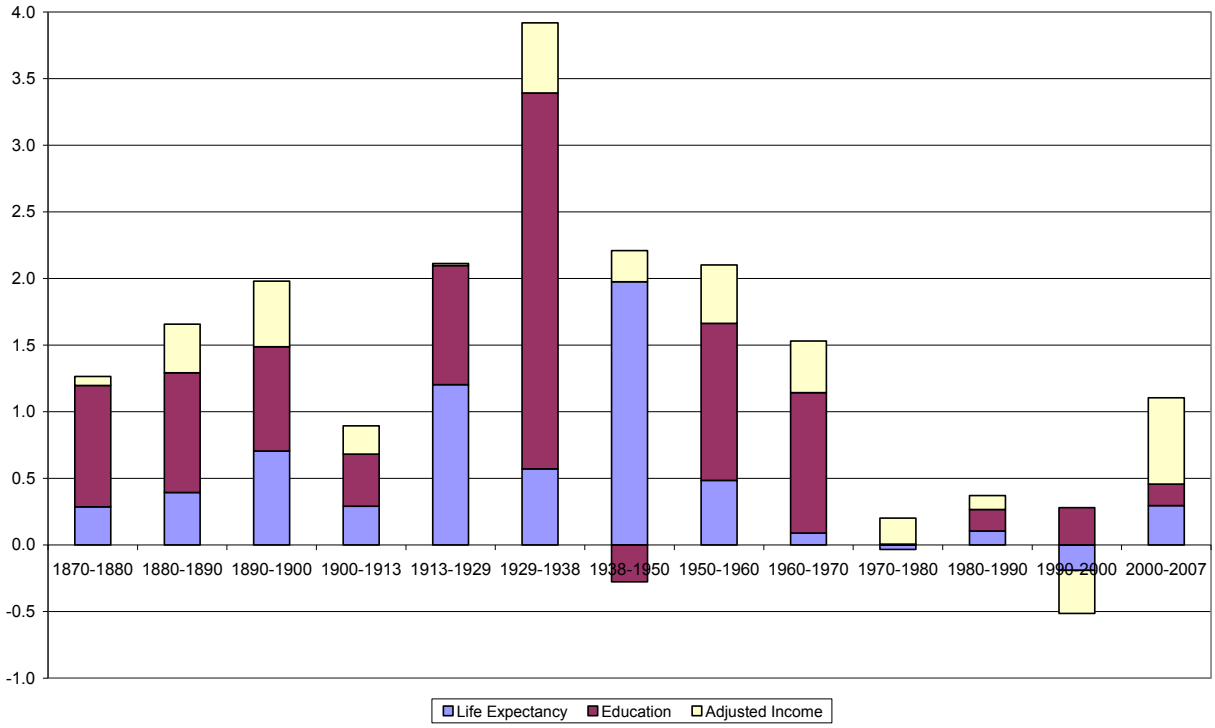

Figure 18a HIHD Growth and its Decomposition in Central and Eastern Europe (including Russia), 1870-2007 (%)

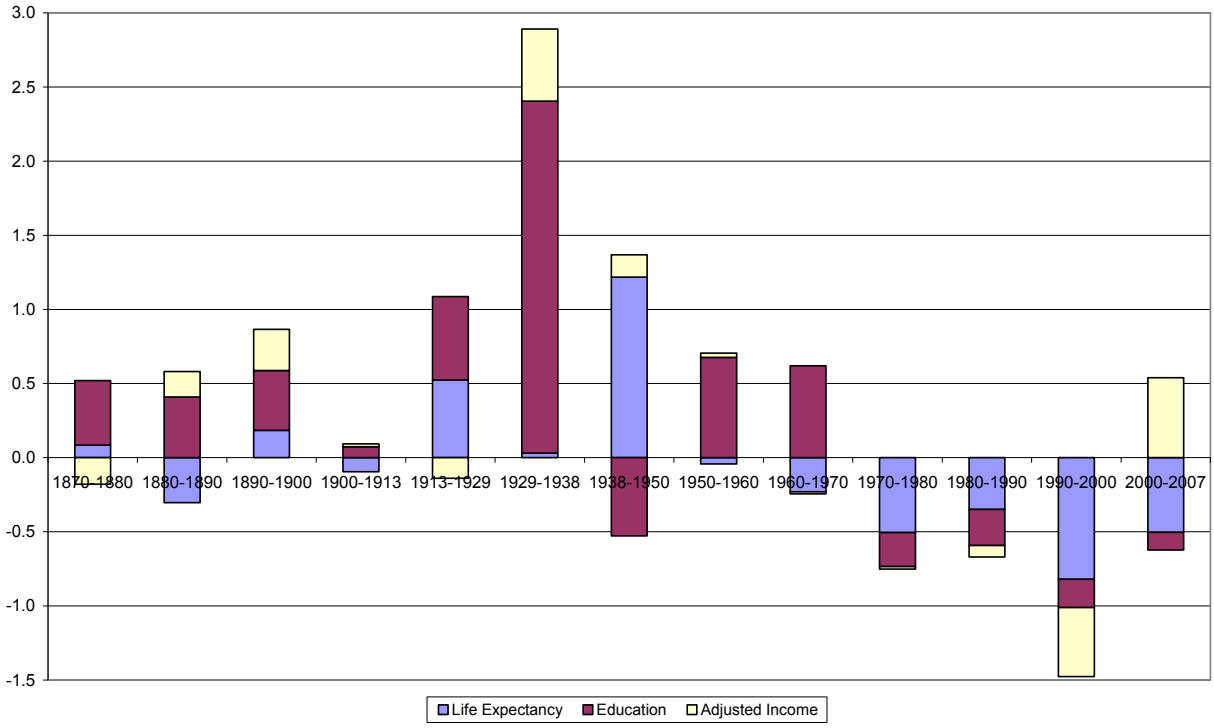

Figure 18b HIHD Catching-up with *OECD* in Central and Eastern Europe (including Russia), 1870-2007 (%)

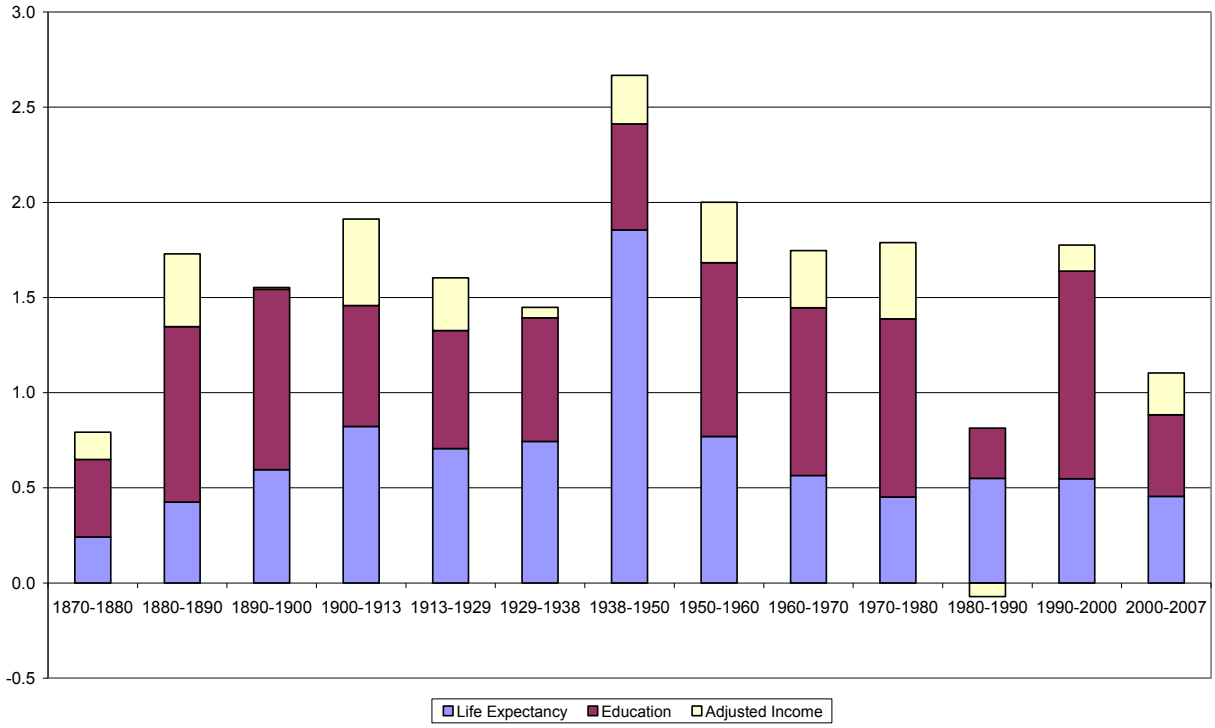

Figure 19a HIHD Growth and its Decomposition in Latin America, 1870-2007 (%)

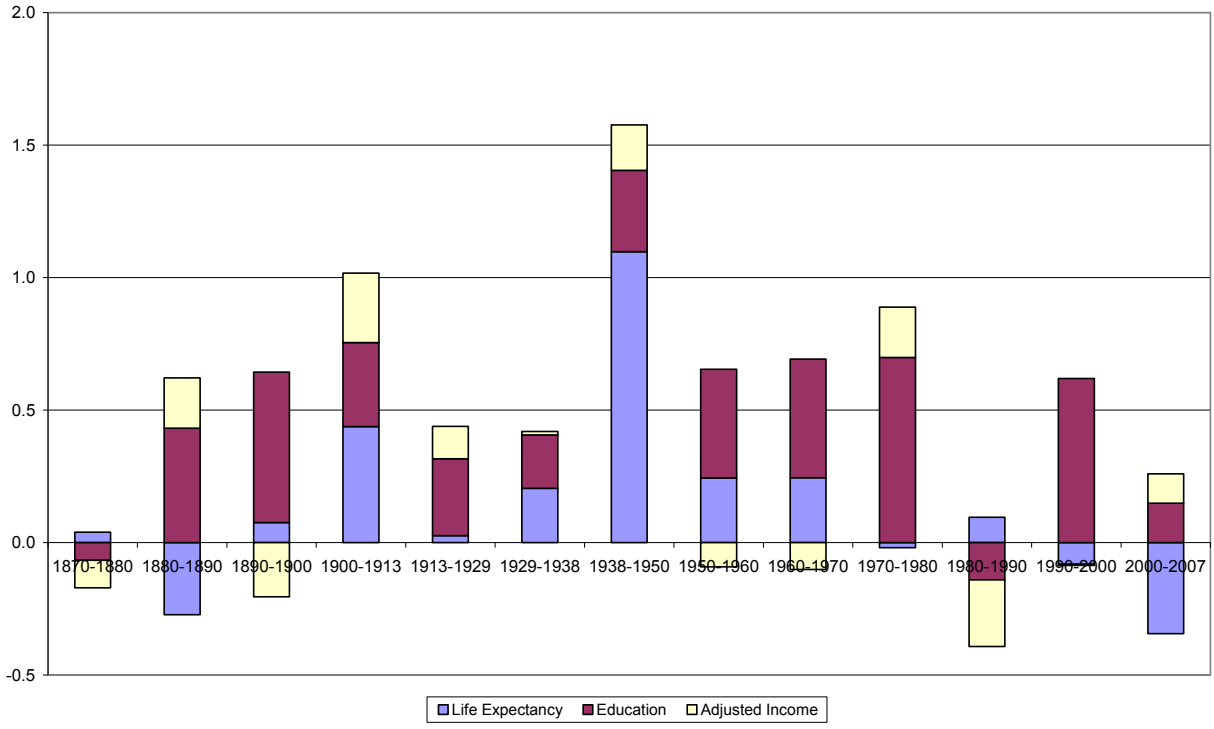

Figure 19b HIHD Catching-up with *OECD* in Latin America, 1870-2007 (%)

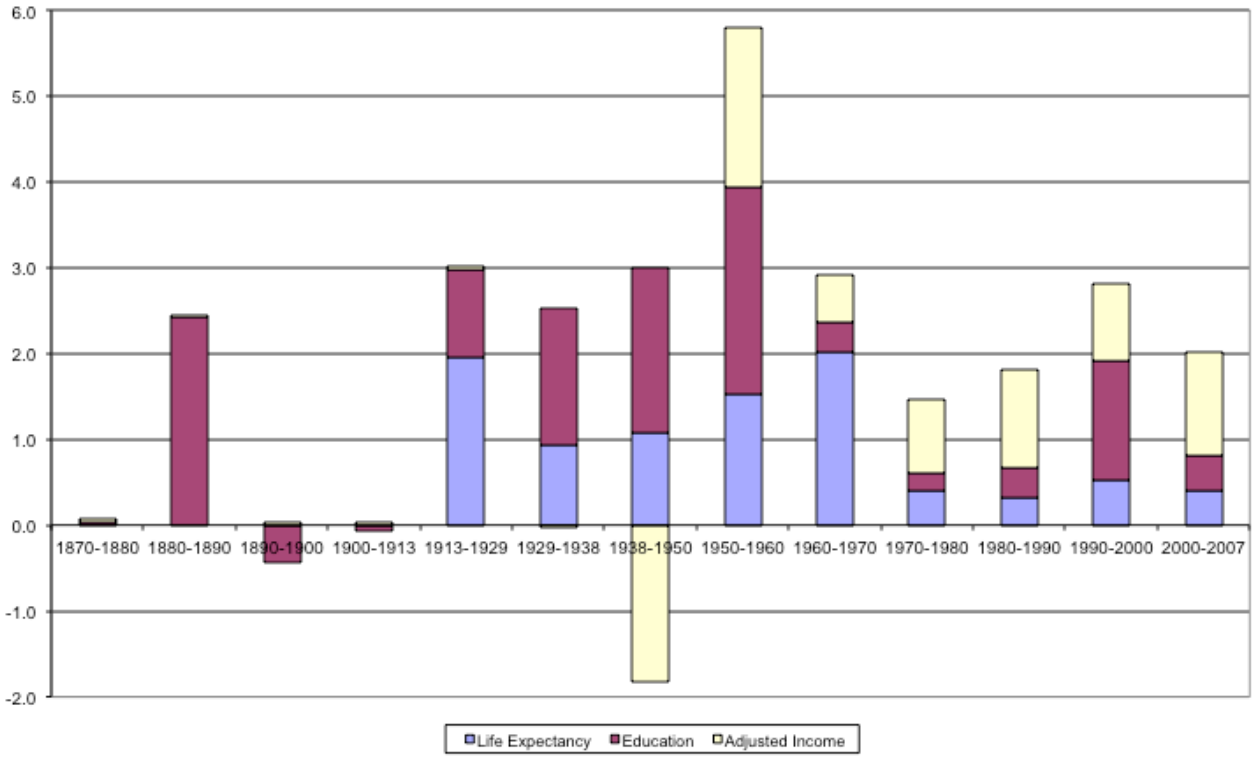

Figure 20a HIHD Growth and its Decomposition in China, 1870-2007 (%)

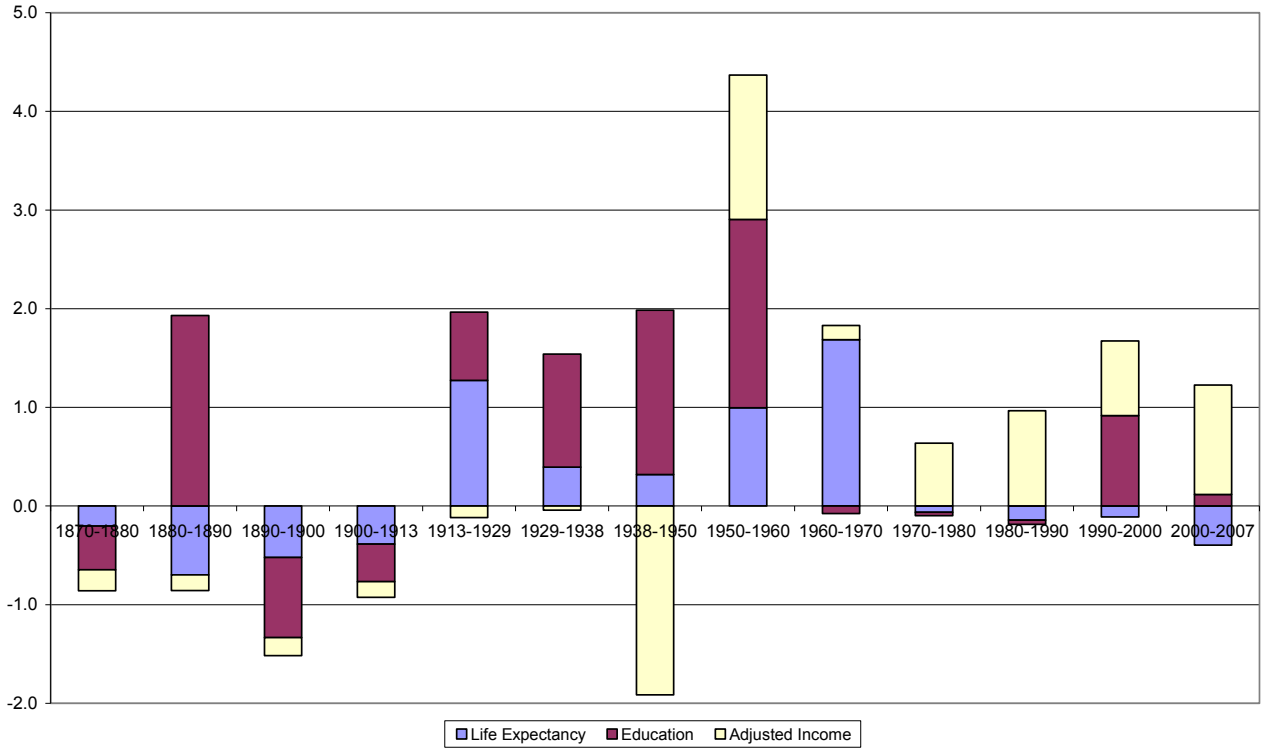

Figure 20b HIHD Catching-up with *OECD* in China, 1870-2007 (%)

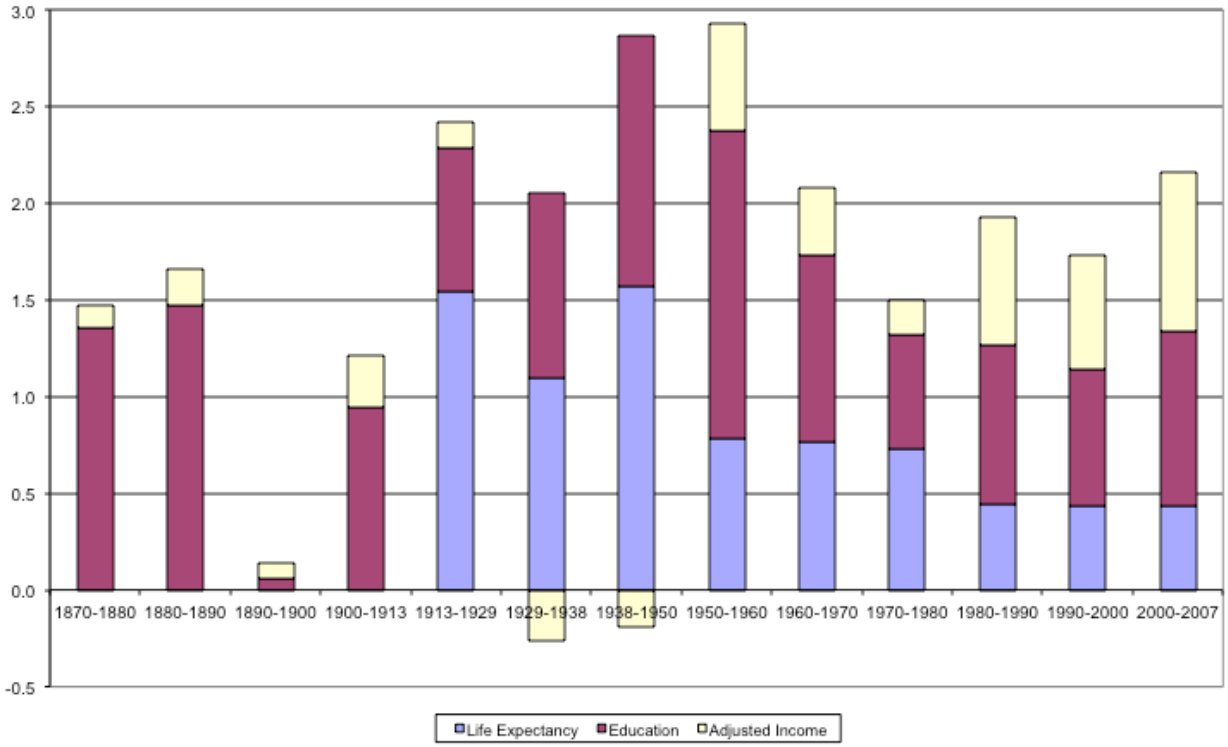

Figure 21a HIHD Growth and its Decomposition in India, 1870-2007 (%)

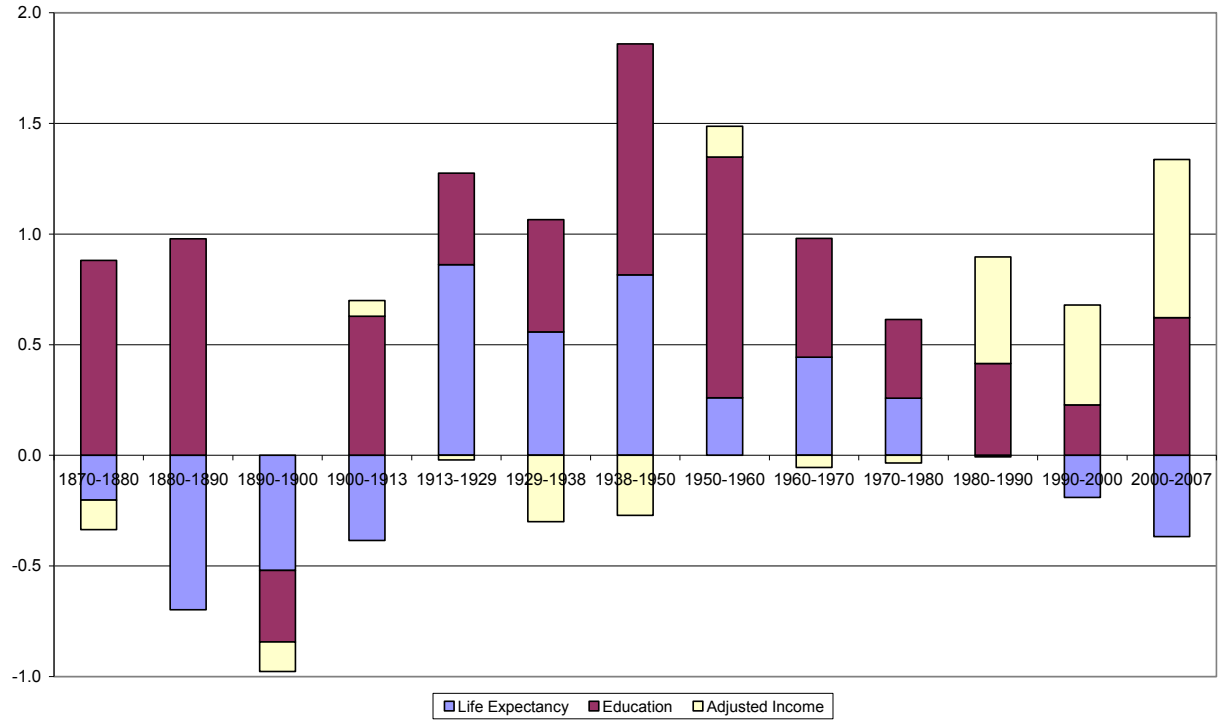

Figure 21b HIHD Catching-up with *OECD* in India, 1870-2007 (%)

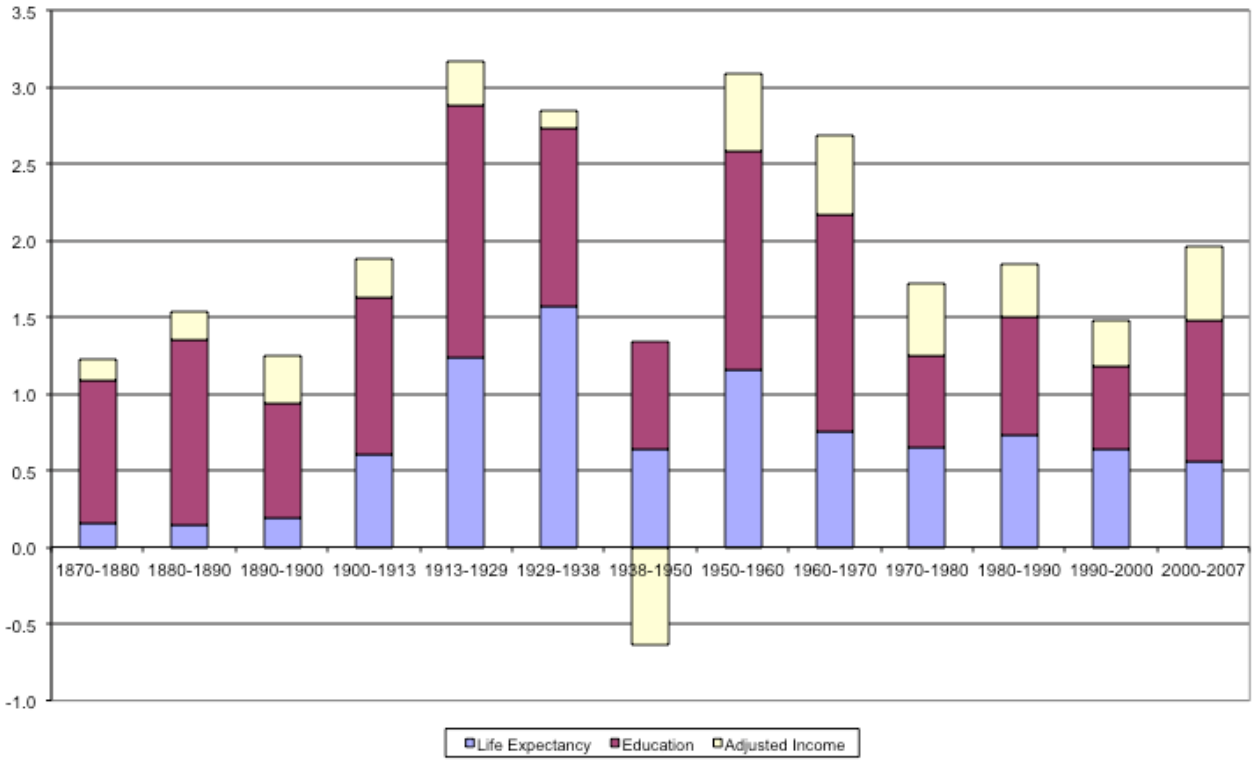

Figure 22a HIHD Growth and its Decomposition in the Rest of Asia (excl. Japan, China, and India), 1870-2007 (%)

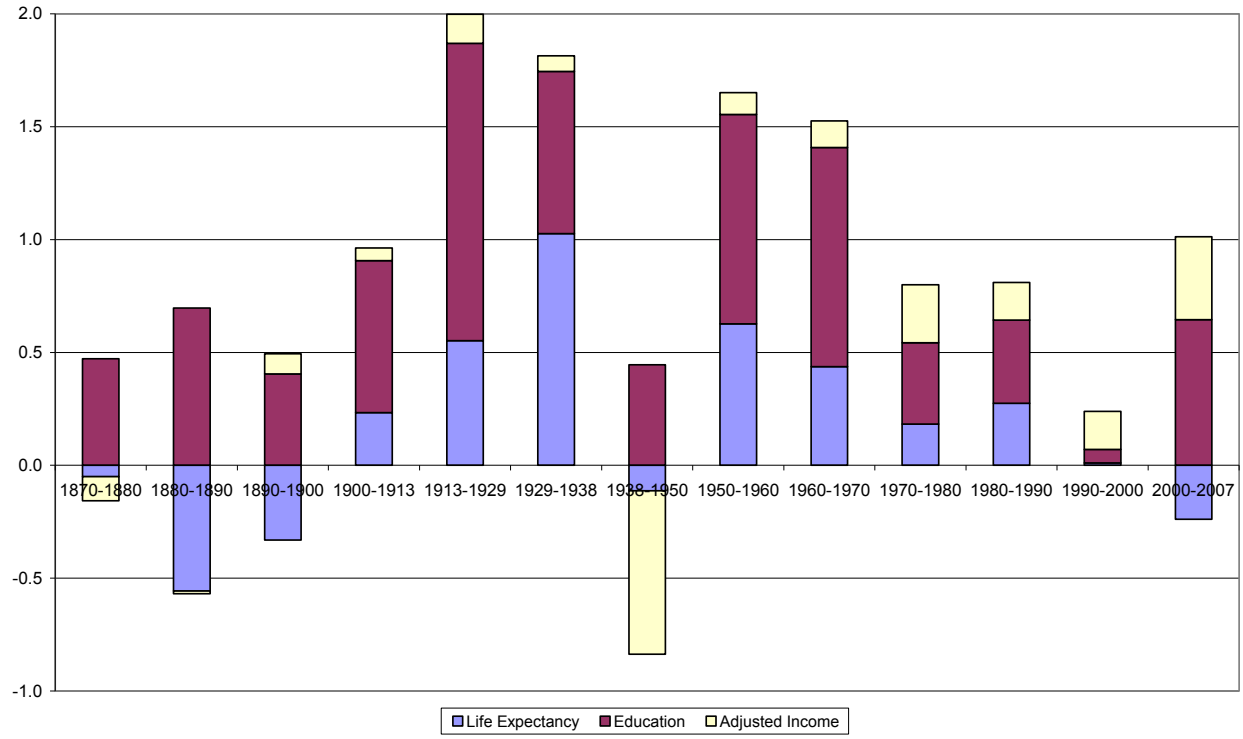

Figure 22b HIHD Catching-up with *OECD* in the Rest of Asia (excl. Japan, China, and India), 1870-2007 (%)

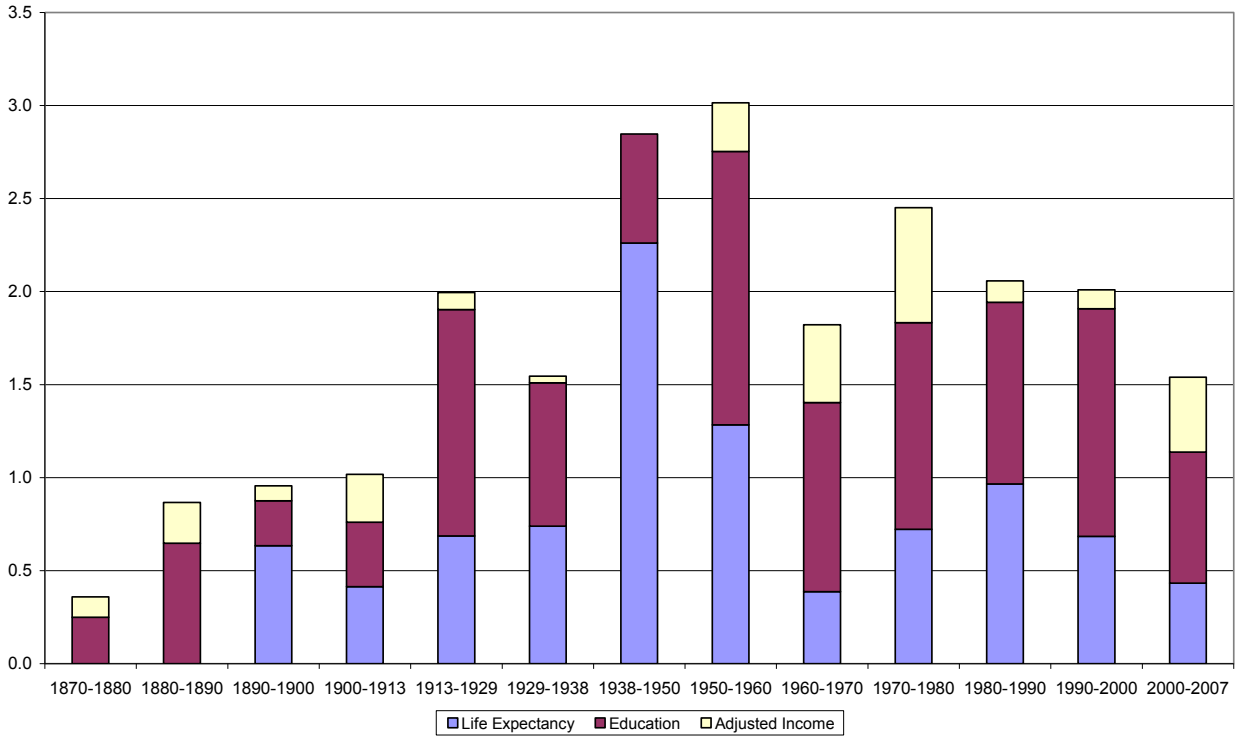

Figure 23a HIHD Growth and its Decomposition in North Africa, 1870-2007 (%)

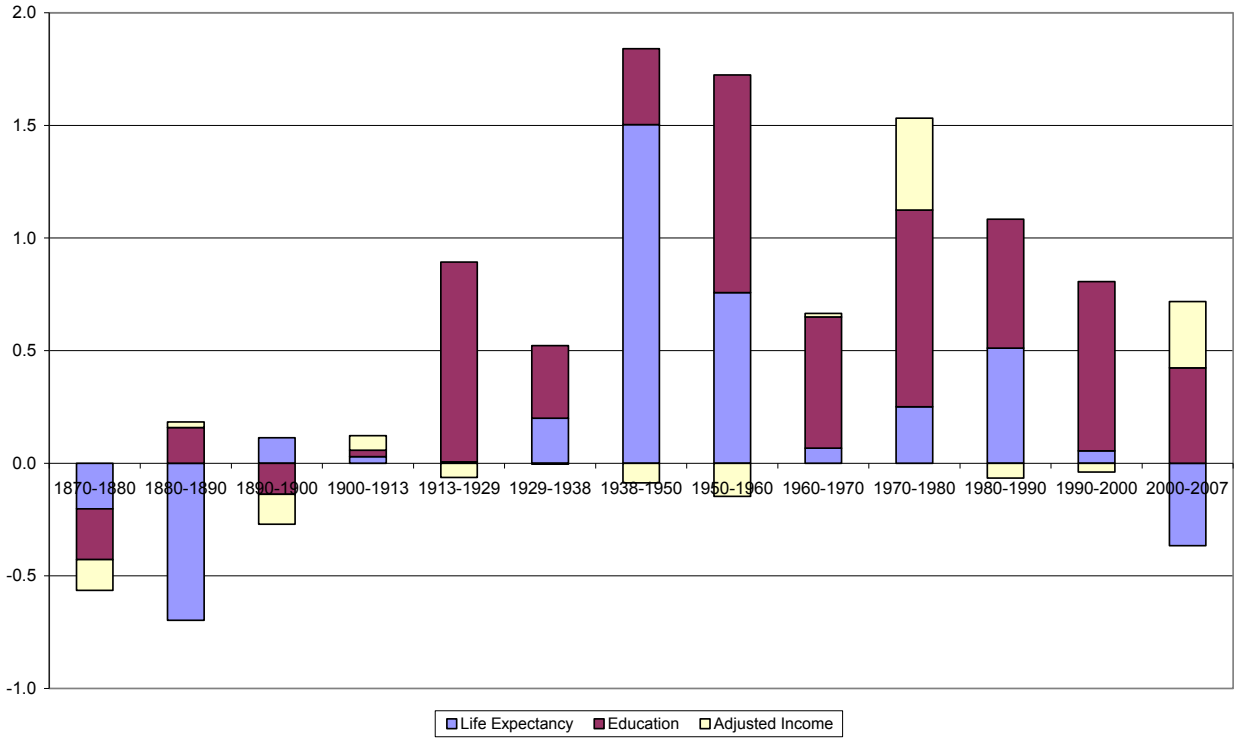

Figure 23b HIHD Catching-up with *OECD* in North Africa, 1870-2007 (%)

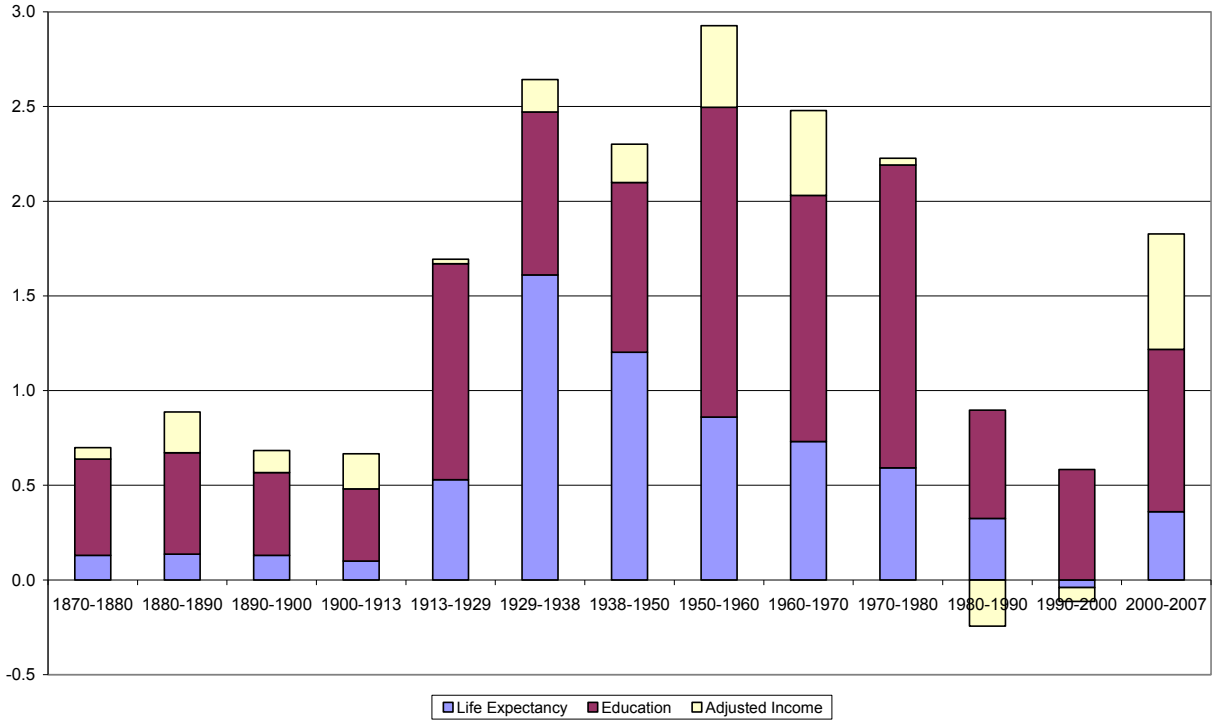

Figure 24a HIHD Growth and its Decomposition in Sub-Saharan Africa, 1870-2007 (%)

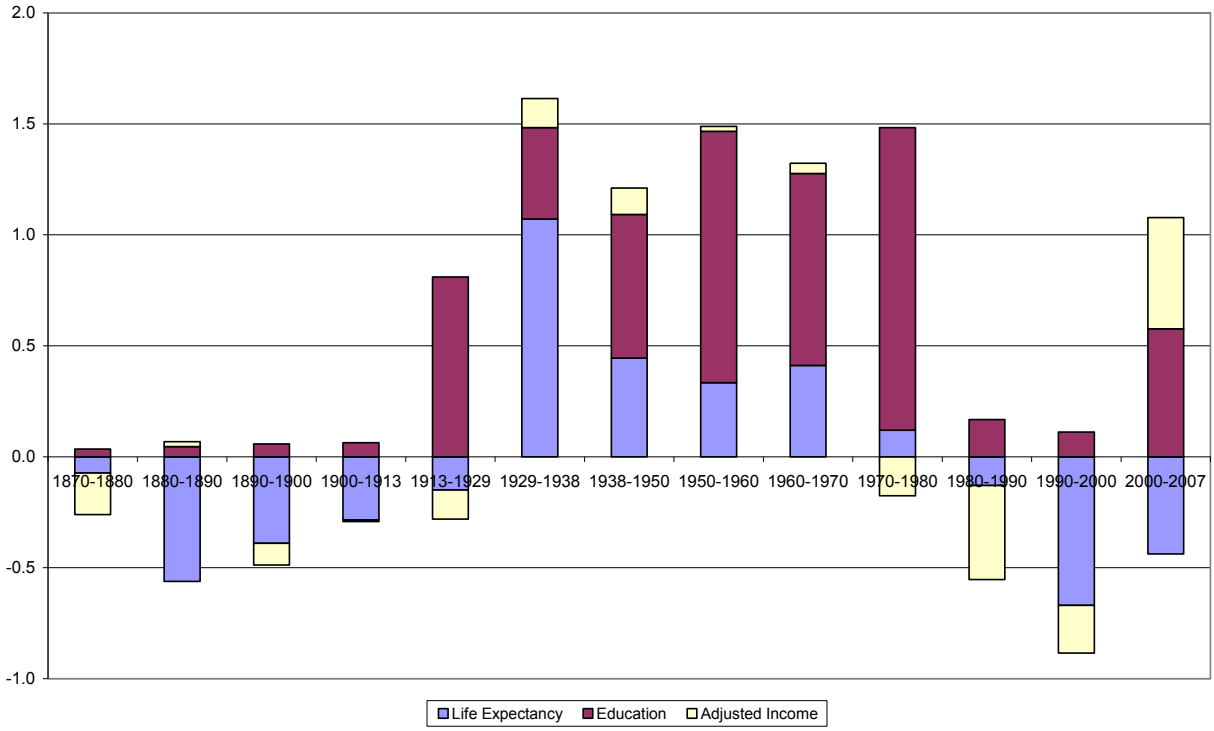

Figure 24b HIHD Catching-up with *OECD* in Sub-Saharan Africa, 1870-2007 (%)

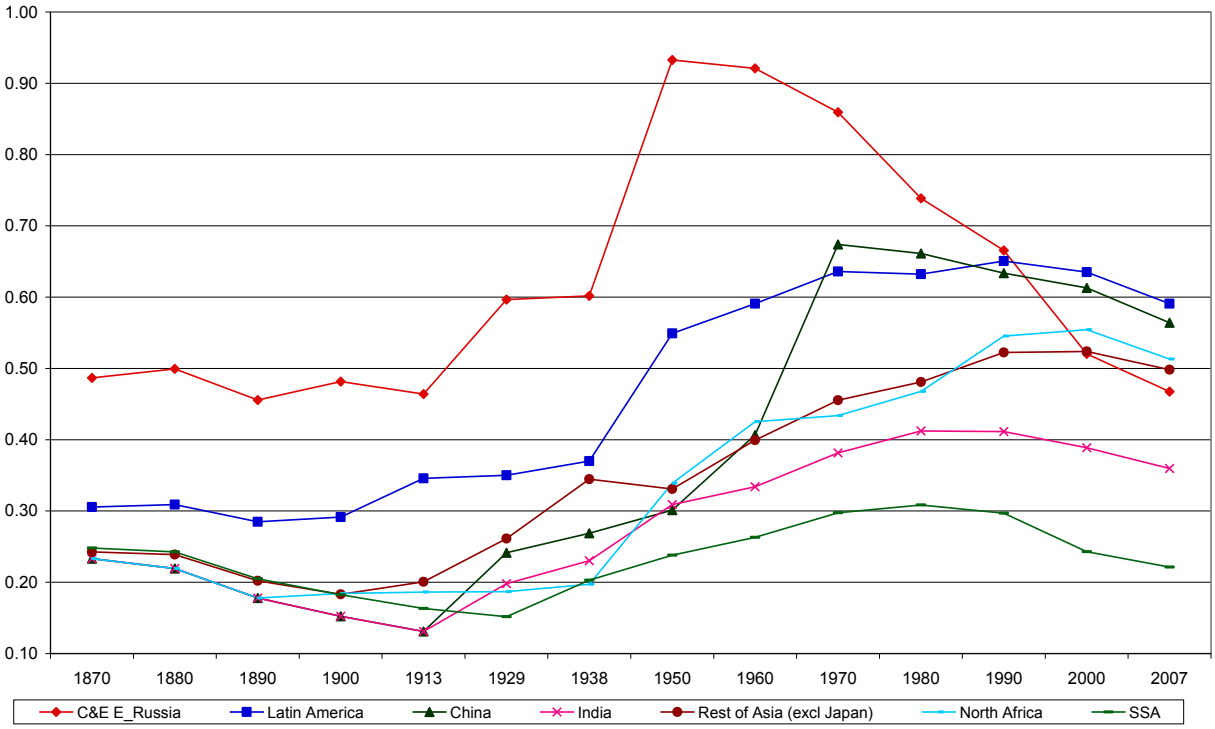

Figure 25 Life Expectancy Kakwani Indices in World Regions 1870-2007 (*OECD* = 1)

Data Appendix. Sources and Procedures

Life Expectancy at birth

In the "Technical Notes" to the United Nations (2000), Demographic Yearbook Historical Supplement 1948-1997 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". In the Life Tables, estimates are based upon the assumption that "the theoretical cohort is subject, throughout its existence, to the age-specific mortality rates observed at a particular time. Thus, the levels of mortality prevailing at the time a life table is constructed are assumed to remain unchanged in the future until all members of the cohort have died".

Unless reference is made to a specific country's sources, 2010 Human Development Report (UNDP 2010) provides the data on life expectancy at birth for most countries over 1980-2007. The United Nations (2000), Demographic Yearbook Historical Supplement completes the dataset from 1950 onwards. For 1870-1938, most data come from Riley (2005b, 2005c), Flora (1983), OxLAD database (Astorga et al. 2003) (supplemented with the working sheets prepared by Shane and Barbara Hunt and kindly provided by Pablo Astorga), and Arriaga (1968. Otherwise, data derive from national sources. Occasionally, some strong assumptions had to be made, especially for the case of Africa.

Africa

The demographic transition was comparatively delayed in Africa and usually it did not take place until the 1920s, when life expectancy at birth had mean and median values of 26.4 and 25.4 years, respectively (Riley 2005b). Thus, in the absence of data, life expectancy at birth before 1929 was assumed to be 25 years –that is, the discretionally established minimum historical value-. Lower bound estimates for the 1940s (and even occasionally 1950) were accepted for 1938 in absence of direct estimates. The bias introduced by these assumptions is not significant and, therefore, should not condition the results.

Algeria, 1930s, Riley (2005b); 1929 assumed to be the same as Tunisia's.

Angola, 1938, Riley (2005b)

Benin, 1938, Riley (2005b)

Botswana (1870-1938) assumed to be identical to Namibia.

Djibouti (1938) assumed to be equal to Sudan's.

Libya (1929-1938), assumed to be identical to Egypt's.

Cameroon, 1929 and 1938 (assumed to be equal to the lower bound estimate for 1950), Riley (2005b).

Angola, Benin, Chad, Eritrea, Ethiopia, Gabon, The Gambia, Niger, Sudan, Togo, 1929, assumed to be as Nigeria's.

Burkina Faso, Burundi, CAR, Congo, D.R. Congo, Côte d'Ivoire, Liberia, Mali, Mauritania, Rwanda, Tanzania, 1929, assumed to be as in Ghana.

Côte d'Ivoire, 1938, Riley (2005b)

Egypt, 1929 and 1938, Fargues (1986)

Ethiopia, 1938, Riley (2005b)

Ghana, 1929, Riley (2005b); 1938, Bourguignon and Morrison (2002)

Kenya, Riley (2005b) provides an estimate of 23.5 years for the 1930s. Thus, the 25 years historical minimum value was assigned to the pre-1938 period.

Lesotho, Madagascar, and Malawi, 1929, assumed to be as in Mauritius.

Mauritius, 1920s, Riley (2205b); 1930s, assumed to be the same as in 1942-6, UN (1993)

Morocco, 1929 and 1938, assumed to be as Tunisia's.

Mozambique, 1929 and 1938 assumed to be as in Angola's.

Namibia, 1870-1900, assumed to evolve as South Africa; 1900, assumed to be the same as for blacks in Cape Colony, Simkins *et al*. (1989); 1938, Notkola *et al*. (2000). Northern Namibia figure adjusted with the ratio all Namibia to Northern Namibia c. 1960.

Nigeria, 1929, average of Ayeni (1976) for 1931, cited in Riley (2005b)

Senegal, 1938, average of Riley (2005b)

South Africa, 1880-1913, Simkins *et al*. (1989); 1929 and 1938, van Tonder and van Eeden (1975), cited in Riley (2005b).

Tunisia, 1929, Riley (2005b); 1938 assumed to be the same as Algeria's.

Uganda, Riley (2005b) provides a figure of 23.9 years for the 1930s (c. 1935), so the minimum historical value of 25 years has been assigned to the period 1850-1938

Zambia, 1929 and 1938 assumed to be the same as Zimbabwe's.

Zimbabwe, Riley (2005b) gives 26.4 years for the 1930s. Thus, I have assigned the minimum goalpost to the years 1850-1929.

The Americas

Argentina, 1870-1890, Recchini de Lattes and Lattes (1975).

Canada, United Nations (2000) level for 1938 backwards projected for pre-1938 period with Bourbeau et al. (1997) in order to maintain consistence over time.

Chile, 1890-1900, and Uruguay, 1870-1900, assumed to have evolved along Argentina.

Uruguay, 1900-1938, Ministerio de Salud Pública (2001),

Life expectancy in Colombia, 1870-1900, Cuba, 1860-1900, Panama, 1880-1900, Honduras, 1890-1900, Puerto Rico, 1860-90, and Venezuela, 1880-1900, has been assumed to evolve along Costa Rica's.

Paraguay, 1900, Arriaga (1968)

Peru, 1913-1938, assumed to evolve along Bolivia's, and Puerto Rico, 1900-1950 along Cuba's.

Puerto Rico, 186//70-1890, assumed it evolves along Costa Rica; 1890, Riley (2005b); 1900-1938, UN (1993).

Jamaica, 1880-1938, Riley (2005: 198); 1870-1880, assumed it evolves along Costa Rica

Trinidad-Tobago, 1860-1900, assumed to evolve along Jamaica's.

U.S.A., 1870-1890, Haines (1994)

In the absence of life expectancy estimates for early years projecting the available figures with infant survival rates 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 (the historical minimum).

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

China, 1938, upper bound in 1936 respectively, Riley (2005b); 1929, Caldwell et al. (1986), cited in Lavely and Wong (1998).

Hong Kong SAR, assumed to have evolved at the same rate of variation as Taiwan's, 1900-1938

India, 1890-1938, McAlpin (1983); extrapolated to 1880 with Visaria and Visaria (1982).

Indonesia, 1929, Riley (2005b)

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

Korea, 1913, Riley (2005b) provides a figure of 23.5 years for 1915. Since the historical lower bound was assumed to be 25 years, this value was assigned to the pre-1913 era; 1929, derived by increasing the initial figure by 0.87 yearly as suggested by Riley (2005b); 1938, UN (1993).

Lao PDR, 1929, assumed to evolve as Vietnam's.

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

Nepal, 1925-33, assumed to evolve as India.

Singapore, 1929-1938 figures obtained by projecting 1950 level backwards with the infant survival rate; 1870-1925, assumed to evolve at the same pace as Malaysia's.

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

Taiwan, 1890-1938, Cha and Wu (2002); 1950, Glass and Grebenik (1967); 1980-2007, english.moe.gov.tw/public/Attachment/9101916565871.pdf; 2000-2007, Tsai (2008)

Thailand, 1938, Vallin (1976)

Turkey, pre-1913, and 1929, assumed to evolve at the same yearly rate of change as Greece's; 1913, Pamuk (2007); 1938, Shorter and Macura (1982)

Oceania

Australia, 1870-1900, Whitwell et al. (1997)

New Zealand (adjusted for Maori population), 1870, Riley (2005b); 1880-1890, Glass and Grebenik (1967)

Europe

Austria, 1870, Helczmanovski (1979); 1880-1890, interpolated from data in Helczmanovski (1979), Glass and Grebenik (1967: 82), and the UN (1993)

Belgium, 1870, Deprez (1979); 1880-1900, Flora (1983); 1929, UN (1993)

Bulgaria, 1870-1890, assumed to move along Greece's.

Cyprus, since life expectancy levels in Cyprus and Greece in 1890 were identical and those for 1938, very close, I assumed they were the same up to 1929. Figures for 1890 and 1938, from Riley (2005b)

Czechoslovakia, 1870-1913, Sbr (1962); 1890, Riley (2005b)

Finland, 1870-1990, Kannisto et al. (1999)

France, 1870-1900, Flora (1983)

Germany, 1870-1890, Flora (1983)

Greece, 1870-1913, Valaoras (1960)

Hungary, 1870-1900, assumed to evolve along Austria's.

Ireland, 1850-1900, assumed to evolve along the U.K.'s

Italy, 1881, and 1901, Zamagni (1990); 1870-1938, Conte et al. (2007)

Poland, 1870-1913, assuming it evolved as Czechoslovakia's.

Portugal, 1850-1913, Leite (2005); 1929, Veiga (2005); 1938, UN (1993)

Romania, assumed to evolve along Greece, 1870-1890, and along Bulgaria's, 1890-1929.

Russia, 1870-1913, Pressat (1985), European Russia; 1929, European Soviet Union; 1938, Soviet Union

Spain, 1870-1938, Dopico and Reher (1998); 1950-2000, Nicolau (2005) and Goerlich and Pinilla (2005)

Sweden, 1870-1965, Keyfitz and Fleiger (1968), reproduced in Sandberg and Steckel (1997).

United Kingdom, 1850-1900, Floud and Harris (1997).

Yugoslavia, assumed to evolve along Greece's, 1870-1890, and along Bulgaria's, 1890-1929. For 1929 and 1938 life expectancy was estimated by projecting the available figures with infant survival rates for 1950.

Literacy

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. While, from a conceptual point of view, there are no objections to the UNESCO definition of a literate person, namely, those "who can, with understanding, both read and write a short simple statement on his

everyday life" (quoted in Nilsson 1999: 278), assessing a person's literacy is quite a different issue.

Reading and writing do not necessarily go together in developing societies and prior to the diffusion of the schooling system the lag between acquiring the ability to read and to write can be as wide as a century or more (Markussen 1990, Nilsson 1999). Hence, the literacy rate would vary wildly depending on whether a wide (read ability only) or a narrow (reading and writing skills) definition of literacy is used, and how it is actually measured (with marriage signatures being particularly misleading in pre-industrial societies). Moreover, becoming literate is far more difficult and time-intensive in countries which languages employ Chinese characters (Taira 1971, Honda 1997). In practice, although classifying a person as truly literate should imply that she is able to read and write, it not always possible make such a precise distinction for the past (Nilsson 1999: 279). This has led to historians to focus on estimating the share of illiterate population (Flora 1973). Unfortunately, historical data are far from homogeneous and, therefore, the results will suffer from biases, which, nonetheless, will not condition decisively long run trends.

Most data since 1980 are from the Human Development Report (UNDP 2009). For 1950-1980 data come from UNESCO (1970, 2002) and the World Bank (2010), completed with Banks (2010), Hayami and Ruttan (1985), and Easterly (1999). Pre-1950 figures are mainly taken from UNESCO (1953, 1957), Flora (1973, 1983), OxLAD database (Astorga et al. 2003) (plus the working sheets prepared by Shane and Barbara Hunt and kindly provided by Pablo Astorga) and Newland (1991). Otherwise, data derive from the national sources given below.

In the absence of estimates, literacy rates have been projected backwards with the rate of primary enrolment or with years of primary education (from Morrisson and Murtin 2009). In the post-1960 period, the literacy rate has been occasionally derived by assuming that the illiteracy rate was identical to the share of population with no schooling provided by Barro and Lee (2002, 2010) and Cohen and Soto (2007)

Africa

Data for Guinea, Madagascar, Mali, Mauritius, Niger, Senegal, and Togo, 1970-80, come from Ouane and Amon-Tanoh (1990).

Literacy rates have been projected backwards with the rate of primary enrolment for Algeria (1870-80, 1938), Burkina Faso (1929 and 1938), Burundi (1929 and 1938), Cape Verde (1929 and 1938), Chad (1929 and 1938), Congo (1929 and 1938), Congo D. R. (1929 and 1938), Djibouti (1938), Equatorial Guinea (1929 and 1938), Ethiopia and Eritrea (1938), The Gambia (1929), Ghana (1870-1938), Guinea-Bissau (1938), Guinea (1913-1938), Kenya (1929-1938), Lesotho (1890-1938), Liberia (1890-1938), Mauritius (1870-1929), Namibia (1913-1938), Nigeria (1900-1938), Réunion (1900-1938), Rwanda (1929 and 1938), Seychelles (1900-1938), Sierra Leone (1870-1938), South Africa (1925-1929), Sudan (1913-1938), Swaziland (1938), Tanzania (1929-1938), Togo (1929 and 1938), Tunisia (1900-1913), Uganda (1900-1938), Zambia (1900-1938), and Zimbabwe (1900-1938).

Literacy rates have been projected backwards with years of primary education for the population above 15 years (Morrisson and Murtin 2009) for Angola (1870-1938), Benin (1870-1938), Botswana (1900-1938), Cameroon (1870-1938), Côte d'Ivoire (1870-1938), Eritrea and Ethiopia (1870-1929), Kenya (1870-1913), Lesotho (1870-1880), Madagascar (1870-1938), Malawi (1870-1938), Mali (1870-1938), Mozambique (1870-1880), Morocco (1870-1900), Senegal (1870-1880), and Tunisia (1870-1890).

Botswana (1870-1900) and Namibia (1870-1900) have been assumed to evolve along South Africa, Swaziland (1870-1933), as Lesotho's. Libya (1870-1900) is assumed to be as Egypt's. Djibouti (1870-1929), was assumed to evolve along Sudan.

The Americas

Chile, 1870, Braun et al. (2000)

Cuba, 1870-1890, Newland (1991)

Nicaragua, 1900, Núñez (2005)

U.S., 1870-1890, 1960-1970, Costa and Steckel (1997)

Literacy rates have been backwards projected with the rate of primary enrolment for Bolivia, 1870-1890, and Puerto Rico, 1870-1890.

Literacy rates have been backwards projected with years of primary education for the population above 15 years (Morrisson and Murtin (2009) for Dominican Republic, 1870-1900; El Salvador, 1870-1890; Uruguay, 1870-1890, and Venezuela, 1870-1880.

Asia

China, 1870, 1913, Morrisson and Murtin (2007)

India, 1890, 1938, Tomlinson (1993)

Japan, 1870, Steckel and Floud (1997); 1880-1890 (by assuming that the rate of primary enrolment was a good approximation), Hanley (1990); 1900-1938, Honda (1997)

Korea, 1929, Kimura (1990)

Australia, 1870, Vamplew (1987); 1890-1900, Steckel and Foud (1997b)

Literacy rates have been projected backwards with the rate of primary enrolment for Cambodia and Laos, 1913-1938; China, 1929; Hong Kong, 1870-1913; India, 1870-1880, 1929; Indonesia, Taiwan, and Vietnam, 1900-1938; Iran, Jordan, Malaysia and Myammar, 1929; Israel, Lebanon, Sri Lanka, and Syria, 1920-1938; Korea, 1913; Fiji, 1900-1913, 1929-38.

Literacy rates have been backwards projected with years of primary education for the population above 15 years (Morrisson and Murtin (2009) for Iraq, 1870-1938; Malaysia, 1870-1900; Myammar, 1870-80; Philippines, 1870-1913; Syria, 1870-1900; Thailand, 1880-1913, 1929.

Europe

Austria, 1880-1913, Flora (1983)

Belgium, 1938, Banks (2010)

Czechoslovakia, 1880-1900, Flora (1983); 1938, Banks (2010)

Finland, 1870, Crafts (1997); 1880-90, Myllantaus (1990); 1900, Flora (1983); 19295-60, Banks (2010).

Germany, 1950, Banks (2010)

Greece, 1929-1950, Banks (2010)

Ireland, 1870-1900, Flora (1983); 1913, Crafts (1997)

Italy, 1870-80, Flora (1983); 1890, 1960, Conte et al. (2007); 1938, Banks (2010)

Poland, 1870-90, assumed to evolve along Hungary's; 1900, Flora (1983); 1929-1960, Banks (2010)

Portugal, 1880, Reis (1993); 1880-1890, 1913-1938, Nunes (1993)

Romania, 1929-1960, Banks (2010)

Russia, 1870-1960, Mironov (1991, 1993)

Spain, 1870-1880, Núñez (2005); 1890-1930, Reher (personal communication); Viñao (1990)

Sweden, 1870-1960, Banks (2010).

Yugoslavia//Serbia, 1929-1990, Banks (2010)

U.K., 1870-1960, Banks (2010).

Literacy rates have been backwards projected with the rate of primary enrolment for Albania, 1920-1938; Cyprus, 1880-1900.

Literacy rates have been backwards projected with years of primary education (Morrisson and Murtin (2009) for Bulgaria, 1870-1880.

Enrolment

Figures on enrolment rates, apparently straightforward, present difficulties of interpretation. The usual measurement procedure is to divide the number of students by the relevant school-age population cohort. For example, primary enrolment rate defined as the share of children receiving primary education over population aged 5 to 14 years, keeping this yardstick fixed over time. This ways the unadjusted (primary) enrolment rate is obtained. Such age span is, however, longer than primary schooling, leading to an under-estimate. Even worse, comparability is fraught with difficulties as the length of primary or secondary schooling changes across countries and over time, and, therefore, biases of an unknown sign are introduced (Benavot and Riddle 1988: 195; Nilsson 1999: 282). Alas, up to the mid-twentieth century, the only kind of enrolment rate that can be easily computed for a large number of countries and over a long time-span is the unadjusted one. UNESCO, OECD, and the World Bank provide gross enrolment rates, in which the denominator is adjusted to the age bracket for each type of schooling (primary, secondary, tertiary) for the present. The difficulty here is that enrolment rates above 100 percent can appear, as under-age and/or over-age students are included in the numerator. Eliminating them is, thus, required to obtain the net enrolment rate.

In our case, since the rate of unadjusted total enrolment includes primary, secondary, and tertiary enrolment numbers in the numerator and the population aged 5-24 in the denominator, differences between gross and net rates are negligible. The resulting unadjusted rates tend to under-estimate gross enrolment rates, as historically education was not extended to population aged 24 years. Using the ratio

between gross all enrolment rates (GER) and the unadjusted rates (UER) for each country (i) in 1980, I corrected the bias in my historical, pre-1980 estimates (j),

$$GER_{ij} = (GER_{i1980} / UER_{i1980}) * UER_{ij}$$

Unless reference is made to a specific country's sources, most of the data from 1980 onwards comes from UNDP Human Development Report (2009), completed with UNESCO (2010). Enrolment estimates for the pre-1970 era are from Banks (2010) and Mitchell (2003a, 2003b, 2003c), Flora (1983), Newland (1991), OxLAD database (Astorga et al. 2003) (Pablo Astorga kindly supplemented it with the working sheets prepared by Shane and Barbara Hunt), and UNESCO (2010).

For the pre-World War II era, in the absence of direct estimates, Benavot and Riddle (1998) and Frankema (2011), and Lindert (2004), estimates of primary enrolment rates, and primary plus secondary education enrolment rates, respectively, have been used.

For those countries for which no evidence on enrolment was available at given dates, the closer enrolment rates have been projected backwards with the average years of schooling among the population above 15 (Morrisson and Murtin 2009).

Occasionally, for nineteenth and early twentieth century countries (mostly African and Asian) the total -that is, primary, secondary, and tertiary- enrolment rate has been obtained by adjusting the primary or primary and secondary enrolment ratio with the ratio resulting from dividing the share of population aged 5-14 years of age by the share of population aged 5-24. This crude procedure implies the assumption that secondary and tertiary enrolment numbers represent a negligible proportion of the relevant population cohort.

The relevant population was derived as follows. Firstly, I computed the share of population aged 5-24 (and 5-14) over total population at census years from Mitchell (2003a, 2003b, 2003c) that was, then, interpolated log-linearly to derive yearly series and, finally, its result multiplied by total population figures (see below). The population share of those aged 5-24 years of age for missing countries, as it is often the case for Africa, has been replaced with that of a neighbour country with a similar demographic transition.

Africa

Algeria, 1870-1960, and Tunisia, 1929-1938, 1960, Fargues (1986)

Total enrolment rates have been derived with primary enrolment rates provided by UNESCO (1953, 1957) [U], Benavot and Riddle (1988) []B&R] and Frankema (2011) [F], adjusted with the ratio of those aged 5-14 years to those aged 5-24 years, for the following countries and years: Angola (F), 1890-1929; Benin (B&R,F), 1890-1938; Botswana (F,U), 1890-1938, 1960; Burkina Faso (B&R,F), 1913-1950; Burundi (F,U) 1929-1950; Cameroon (B&R), 1890-1929; CAR (B&R,F), 1900-1950; Chad(B&R), 1900-1938; Congo (B&R,F), 1900-1950; Congo, D.R. (U), 1929-1950; Côte d'Ivoire, (B&R,F),1900-1950, 1960; Djibouti (F), 1938-1960; Egypt (B&R), 1890-1900; Equatorial Guinea (F), 1938, 1960; Ethiopia (F), 1938; Gabon (B&R,F), 1900-1950; The Gambia (B&R,F), 1900-1938, 1955-1960; Ghana (F), 1870, 1890; Guinea (B&R,F), 1913-1950, 1960; Guinea-Bissau (F), 1938-1960; Kenya (B&R), 1938; Lesotho (B&R,F) 1890-1938, 1960; Madagascar (B&R,U), 1920-1938; Malawi (F), 1900-1938; Mali (B&R), 1913-1933; Mauritania (B&R), 1913-1938; Mauritius (B&R), 1870-1900, 1929, 1938; Mozambique (B&R), 1938; Namibia (B&R,F), 1913-1960; Niger (B&R,F), 1913-1938; Nigeria (B&R,F), 1929-1950, 1960; Réunion (B&R,U), 1900-1950; Rwanda (U,F), 1929-1950; Senegal (B&R,F), 1913-1960; Seychelles (B&R,U), 1900-1950; Sierra Leone (F), 1870-1890, 1950; Somalia (F,U), 1938-1950; Sudan (B&R), 1913-1933; Swaziland (F,U), 1938-1950; Tanzania (B&R,F) 1938, 1960; Togo (B&R,U) 1913-1950; Uganda (F,B&R,U), 1900-1950; Zambia (F), 1900-1955; Zimbabwe (F), 1900, 1938-1960.

For those countries for which no evidence on enrolment was available at given dates the closer enrolment rates have been projected backwards with the average years of schooling among the population above 15 (Morrisson and Murtin 2009) to fill missing values for the cases of Egypt (1870-1880), Kenya (1870-1913), Madagascar (1870-1900), Malawi (1870-1890), Mozambique (1870-1913), and Tunisia (1870-1890).

In the absence of enrolment data for particular countries, I have assumed they evolved as a neighbouring country or one with similar features. Thus, Djibouti (1913-1929) was assumed to move along Sudan, and Libya (1870-1938) as Egypt. Enrolment rates for Botswana (1870-1890), Lesotho (1870-1880) and Namibia (1870-1900) have been derived with the rate of variation of South Africa over the relevant period, and

Swaziland (1870-1929) with Lesotho's. Also, it was assumed that Guinea-Bissau (1970) moved along Senegal, The Gambia (1870-1890) as Ghana, and Tanzania (1890-1913) as Uganda.

Nigeria's shares of population aged 5-24 (and 5-14) over total population have also been accepted for Benin, Cameroon, Equatorial Guinea, and Togo. South Africa's have been adopted for Botswana, Lesotho, Namibia, and Swaziland. Mali's shares have been adopted for Burkina Faso, CAR, Chad, Congo, The Gambia, Guinea, Guinea-Bissau, Mauritania, Niger, and Senegal. Uganda's, in turn, are used for Burundi, Congo D.R., and Rwanda. Then, Ghana's are employed for Cape Verde, Côte d'Ivoire, Gabon, Liberia, and Sierra Leone, and Kenya's for Somalia. Lastly, Mozambique's were accepted for Comoros and Madagascar, Egypt's for Djibouti, Ethiopia, and Sudan, Algeria's for Libya, and Tanzania's for Malawi.

The Americas

Puerto Rico, 1870-1880, Newland (1991)

Venezuela, 1870-1890, Newland (1991)

All enrolment derived with primary enrolment in Benavot and Riddle (1988), adjusted with the ratio of those aged 5-14 years to those aged 5-24 years, for Dominican Rep., 1870-1913; Ecuador, 1870-1880.

All enrolment rates have been backwards projected with years of primary education for the population above 15 years (Morrisson and Murtin (2009) for Cuba, 1870-1890; Honduras, 1870-1880; Panama, 1870-1890, and Paraguay, 1870-1880.

Asia

China, 1890-1913, assumed to evolve as Hong Kong's.

Hong-Kong assumed to have evolved as China, 1960-1980, and Kuwait as Iraq, 1950-1960.

Bahrein, 1950-1970, and Brunei-Darassalam, Oman, Qatar, and UAE, 1950-1980, assumed to evolve along Kuwait's.

All enrolment derived with primary enrolment in Benavot and Riddle (1988), adjusted to all enrolment with the ratio of those aged 5-14 years to those aged 5-24 years, for Cambodia, 1929 and 1938; Iraq, 1913; Israel and Laos, 1920-38 1929 and 1938; Philippines, Taiwan, and Fiji, 1900; Syria, 1900-1913.

All enrolment rates have been backwards projected with years of primary education for the population above 15 years (Morrisson and Murtin (2009) for India and Myanmar, 1870; Iran and Iraq, 1870-1900; Philippines and Syria, 1870-1890; Thailand, 1800-1900; Turkey, 1870-1880.

Population aged 5-24 (and 5-14) share in total population in Syria accepted for Lebanon and that of China for Nepal.

Europe

Italy, 1870, 1913, 1929, Conte et al. (2007)

Portugal, 1880-1913, Reis (1993), primary enrolment

Spain, 1870-1980, Núñez (2005)

Population aged 5-24 (and 5-14) share in total population for Cyprus, Turkey's and Greece's, weighted by the shares of Turkish and Greek in total population.

All enrolment derived with primary enrolment in Benavot and Riddle (1988), adjusted to all enrolment with the ratio of those aged 5-14 years to those aged 5-24 years, for Czechoslovakia, 1913; Denmark, 1870; Romania, 1870.

All enrolment derived with primary and secondary enrolment in Lindert (2004), adjusted to all enrolment with the ratio of those aged 5-14 years to those aged 5-24 years (Mitchell 2003c), for Ireland, 1870-1900; Italy, 1870; Switzerland, 1870; UK, 1870-1900.

All enrolment rates have been backwards projected with years of primary education for the population above 15 years (Morrisson and Murtin (2009) for Bulgaria, 1870-1880.

Per Capita GDP

GDP per head is expressed in 1990 Geary-Khamis dollars. Unless stated below, post-1950 GDP per head data come from Maddison (2006, 2010) completed with Conference Board (2010), since 1995. Occasionally, Conference Board estimates have been accepted for the entire post-1950 period, as it is the case of China, whose estimates were adjusted to the recent findings of the 2005 PPP round. Otherwise, for specific countries shown below, Maddison's per capita GDP levels (usually) for 1950 have been projected backwards with volume indices of real per capita GDP taken from historical national accounts.

Africa

Algeria, 1870-1950, Maddison (2006: 577-580). Levels for 1890, 1900, 1925, and 1938 were interpolated.

Egypt, 1870-1950, Maddison (2006: 577). Pamuk (2006) and Yousef (2002) also provide estimates. Pamuk's figures match closely Maddison's estimates while Yousef's levels for 1870-1913 are lower.

Ghana, (Maddison 2006) estimates on the basis of Szereszewski (1965)

South Africa, Nominal GDP estimates for 1913-1950 (Stadler 1963) were deflated with Alvaredo and Atkinson (2010) price index, and divided by population figures from Feinstein (2005: 257-8) in order to obtain per capita GDP. These estimates were projected backwards to 1880 with Bourguignon and Morrisson (2002) conjectures and Maddison (2010) guessestimates for 1870 was accepted.

As for the rest of the countries, given the lack of data on Africa's GDP (Jerven 2010), limited to Maddison's (2010) conjectures for the continent as a whole at 1870, 1900, 1913, and 1940 benchmarks, indirect estimates by Prados de la Escosura (2012) have been accepted.[41]

The Americas

Data for twentieth-century Latin America -except for Cuba (see below)- comes from CEPAL (2009) from 1950 onwards, and from Astorga and Fitzgerald (1998) and OxLAD database (Astorga *et al*. 2003). Otherwise national sources have been used.

Argentina, Della Paolera *et al*. (2003), 1884-1950, assuming the rate of growth over 1870-84 was identical to that for 1884-90. The alternative option of projecting backwards the level for 1884 to 1875 with Cortés Conde (1997) casts too low a figure. I assumed the level for 1870 was identical to that of 1875.

Brazil, 1870-1950,Goldsmith, (1986)

Bolivia, 185//70-1950, Herranz-Loncán and Pérez Cajías (2011).

Chile, 1870-1950,Díaz, Lüders and Wagner (2007)

Colombia, 1870-1905, Kalmanovitz Krauter and López Rivera (2009) and data kindly provided by Salomón Kalmanovitz in private communication; 1905-1950, GRECO (2002).

[41] There are unpublished estimates for Sub-Saharan African GDP, 1910-1950, by Smits (2006).

Cuba, up to 1902, Santamaría (2005); 1902-1958, Ward and Devereux (2009); 1958 onwards, Maddison (2010)

An important caveat in the case of Cuba is that Maddison (2006) level for 1990 has not 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 percent 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.

Ecuador, 1870-1890, I assumed it evolved as Peru over 1880-1900, yielding $447 for 1880, and I arbitrarily assumed a per capita GDP of $400 for 1870.

Mexico, 1870-1900, Coatsworth (1989: 41); 1896-1950, INEGI (1995)

Peru, 1870-1950, Seminario (2011)

Uruguay, 1870-1938, Bértola (1998)

Venezuela, 1870-1950, Baptista (1997)

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, 1950-2007, and St. Kitts and Nevis, St. Vincent and the Grenadines, 1990-2007, Maddison (2006, 2010), Conference Board (2010), and Bulmer-Thomas (personal communication)

Trinidad-Tobago, 1950-1970, Maddison (2010)

Jamaica, 1870-1929, Eisner (1961); 1938, Maddison (2010)

Puerto Rico, 1950-2007, Maddison (2010)

Canada, 1870-1926, Urquhart (1993); 1926-1976, Statistics Canada (2004)

U.S., 1870-1950, Kendrik (1961); 1950-2007, Bureau of Economic Activities (BEA)

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)

Bhutan, Brunei, and Maldives, Maddison (2006).

Korea, 1913-1938, Cha and Kim (2006); 1890, Bourguignon and Morrisson (2002)

Myammar, 1880-1890, assumed to evolve along India.

Philippines, 1890, Bourguignon and Morrisson (2002).

Turkey, 1880, Altug et al. (2008); 1890, Bourguignon and Morrisson (2002)

Taiwan, 1880-1890, assumed to evolve as China's; 1900, Cha and Wu (2002).

Oceania

New Zealand, 1870-1938, Greasley and Oxley (2000a, 2000b)

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)

Czechoslovakia, Poland, Romania, Yugoslavia, 1880, computed with Good (1994) ratio of 1880 GDP per head to the average GDP per head of 1870 and 1890 applied to Maddison's (2010) average levels for 1870 and 1890.

Cyprus, 1913-2007, Apostolides (2011). I assumed the level for 1913 was identical to that for 1921.

Denmark, 1850-1938, Hansen (1974)

France, 1870-1950, Toutain (1997)

Finland, 1870-1990, Hjerppe (1996)

Germany, Nominal GDP, 1950-2000, IMF (2010); 1901-1913, 1925-1949, Spoerer and Ritschl (1997); 1901 level backwards projected to 1870 with Hoffmann *et al*. (1965). Real GDP derived by deflating Nominal GDP. The deflator comes from IMF, 1960-2000; Spoerer and Ritschl (1997), 1901-1960; Hoffmann *et al*. (1965), 1870-1901.

Greece, 1870-1938, Kostelenos *et al*. (2007), moving base series

Hungary, 1870-1913, Maddison (2009) level for 1913 projected backwards to 1870 with Schulze (2000) estimates for Imperial Hungary, under the assumption that movements in real output per head in Modern Hungary reflected those in Imperial Hungary; 1913-1938, Eckstein (1955: 175) for Modern (Republic of) Hungary, as defined by the Treaty of Trianon (1919).

Italy, 1870-1913, Fenoaltea (2005)

Netherlands, 1870-1913, Smits et al. (2000), average of income, output and expenditure estimates; 1921-1938, Bakker et al. (1990)

Norway, 1870-2000, Grytten (2004)

Portugal, 1850-1910, Lains (2006); 1910-1950, Batista et al. (1997)

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, 1870-2007, Prados de la Escosura (2003, updated)

Sweden, 1870-2000, Krantz and Schön (2007).

United Kingdom, 1850-1985, Mitchell (1988)

Population

All figures are adjusted to refer to mid-year and to take into account the territorial changes and are derived from Maddison (2010) and and Mitchell (2003a, 2003b, 2003c), completed for Latin America and the Caribbean with OxLAD database (Astorga et al. 2003), 1900-1938, and CEPAL (2009), 1950-2007. Otherwise, national sources were used.

Spain, 1870-2000, Nicolau (2005)

Turkey, 1870-1913, Pamuk (2006, 2007)

Cyprus, 1929-1938, Apostolides (2011)

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 derived by assuming the average growth rate for countries in the region.

Table A.1a ***Human Development and its Dimensions: Central and Eastern Europe (including Russia), 1870-2007***

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.073	0.041	0.036	0.259
1880	0.082	0.045	0.047	0.264
1890	0.097	0.051	0.061	0.295
1900	0.119	0.063	0.078	0.342
1913	0.133	0.070	0.091	0.371
1929	0.187	0.125	0.139	0.374
1938	0.266	0.146	0.298	0.431
1950	0.335	0.298	0.269	0.469
1960	0.413	0.344	0.384	0.535
1970	0.482	0.354	0.526	0.601
1980	0.490	0.350	0.527	0.637
1990	0.509	0.362	0.554	0.657
2000	0.497	0.341	0.602	0.596
2007	0.537	0.363	0.623	0.683

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	1.3	0.3	0.9	0.1
1880-1890	1.7	0.4	0.9	0.4
1890-1900	2.0	0.7	0.8	0.5
1900-1913	0.9	0.3	0.4	0.2
1913-1929	2.1	1.2	0.9	0.0
1929-1938	3.9	0.6	2.8	0.5
1938-1950	1.9	2.0	-0.3	0.2
1950-1960	2.1	0.5	1.2	0.4
1960-1970	1.5	0.1	1.1	0.4
1970-1980	0.2	0.0	0.0	0.2
1980-1990	0.4	0.1	0.2	0.1
1990-2000	-0.2	-0.2	0.3	-0.3
2000-2007	1.1	0.3	0.2	0.6
1870-1913	1.4	0.4	0.7	0.3
1913-1938	2.8	1.0	1.6	0.2
1950-1970	1.8	0.3	1.1	0.4
1970-1990	0.3	0.0	0.1	0.1
1990-2007	0.3	0.0	0.2	0.1
1870-1913	1.4	0.4	0.7	0.3
1913-1970	2.3	0.9	1.0	0.3
1970-2007	0.3	0.0	0.2	0.1
1870-2007	1.5	0.5	0.7	0.2

Table A.1b ***Catching-up in Central and Eastern Europe (including Russia), 1870-2007***

HIHD Catching-up Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	0.3	0.1	0.4	-0.2
1880-1890	0.3	-0.3	0.4	0.2
1890-1900	0.9	0.2	0.4	0.3
1900-1913	0.0	-0.1	0.1	0.0
1913-1929	0.9	0.5	0.6	-0.1
1929-1938	2.9	0.0	2.4	0.5
1938-1950	0.8	1.2	-0.5	0.2
1950-1960	0.7	0.0	0.7	0.0
1960-1970	0.4	-0.2	0.6	0.0
1970-1980	-0.8	-0.5	-0.2	0.0
1980-1990	-0.7	-0.3	-0.2	-0.1
1990-2000	-1.5	-0.8	-0.2	-0.5
2000-2007	-0.1	-0.5	-0.1	0.5
1870-1913	0.3	0.0	0.3	0.1
1913-1938	1.6	0.3	1.2	0.1
1950-1970	0.5	-0.1	0.6	0.0
1970-1990	-0.7	-0.4	-0.2	0.0
1990-2007	-0.9	-0.7	-0.2	-0.1
1870-1913	0.3	0.0	0.3	0.1
1913-1970	1.1	0.4	0.6	0.1
1970-2007	-0.8	-0.5	-0.2	0.0
1870-2007	0.3	0.0	0.3	0.0
1913-1950	1.4	0.6	0.6	0.1
1950-1990	-0.1	-0.3	0.2	0.0
1950-2007	-0.3	-0.4	0.1	0.0

Table A.2a ***Human Development and its Dimensions: Latin America, 1870-2007***

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.055	0.026	0.026	0.249
1880	0.060	0.028	0.029	0.260
1890	0.071	0.032	0.038	0.291
1900	0.083	0.038	0.051	0.292
1913	0.106	0.052	0.065	0.349
1929	0.137	0.074	0.088	0.398
1938	0.156	0.090	0.105	0.404
1950	0.215	0.175	0.128	0.443
1960	0.263	0.221	0.168	0.488
1970	0.313	0.262	0.219	0.534
1980	0.374	0.300	0.290	0.602
1990	0.403	0.354	0.314	0.589
2000	0.481	0.417	0.435	0.614
2007	0.520	0.459	0.476	0.642

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	0.8	0.2	0.4	0.1
1880-1890	1.7	0.4	0.9	0.4
1890-1900	1.6	0.6	0.9	0.0
1900-1913	1.9	0.8	0.6	0.5
1913-1929	1.6	0.7	0.6	0.3
1929-1938	1.4	0.7	0.6	0.1
1938-1950	2.7	1.9	0.6	0.3
1950-1960	2.0	0.8	0.9	0.3
1960-1970	1.7	0.6	0.9	0.3
1970-1980	1.8	0.5	0.9	0.4
1980-1990	0.7	0.6	0.3	-0.1
1990-2000	1.8	0.5	1.1	0.1
2000-2007	1.1	0.5	0.4	0.2
1870-1913	1.5	0.5	0.7	0.3
1913-1938	1.5	0.7	0.6	0.2
1950-1970	1.9	0.7	0.9	0.3
1970-1990	1.3	0.5	0.6	0.2
1990-2007	1.5	0.5	0.8	0.2
1870-1913	1.5	0.5	0.7	0.3
1913-1970	1.9	0.9	0.7	0.2
1970-2007	1.4	0.5	0.7	0.2
1870-2007	1.6	0.7	0.7	0.2

Table A.2b ***Catching-up in Latin America, 1870-2007***

HIHD Catching-up Growth and its Decomposition (%)

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

Table A.3a *Human Development and its Dimensions: China, 1870-2007*

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.032	0.020	0.010	0.177
1880	0.033	0.020	0.010	0.178
1890	0.042	0.020	0.020	0.180
1900	0.040	0.020	0.018	0.182
1913	0.040	0.020	0.017	0.184
1929	0.064	0.051	0.028	0.188
1938	0.081	0.065	0.043	0.188
1950	0.093	0.096	0.086	0.097
1960	0.166	0.152	0.177	0.170
1970	0.222	0.277	0.197	0.201
1980	0.257	0.314	0.209	0.259
1990	0.308	0.344	0.233	0.365
2000	0.408	0.402	0.354	0.478
2007	0.470	0.438	0.385	0.617

HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	0.1	0.0	0.0	0.0
1880-1890	2.5	0.0	2.4	0.0
1890-1900	-0.4	0.0	-0.4	0.0
1900-1913	0.0	0.0	-0.1	0.0
1913-1929	3.0	2.0	1.0	0.0
1929-1938	2.5	0.9	1.6	0.0
1938-1950	1.2	1.1	1.9	-1.8
1950-1960	5.8	1.5	2.4	1.9
1960-1970	2.9	2.0	0.4	0.5
1970-1980	1.5	0.4	0.2	0.8
1980-1990	1.8	0.3	0.4	1.1
1990-2000	2.8	0.5	1.4	0.9
2000-2007	2.0	0.4	0.4	1.2
1870-1913	0.5	0.0	0.4	0.0
1913-1938	2.8	1.6	1.2	0.0
1950-1970	4.4	1.8	1.4	1.2
1970-1990	1.6	0.4	0.3	1.0
1990-2007	2.5	0.5	1.0	1.0
1870-1913	0.5	0.0	0.4	0.0
1913-1970	3.0	1.5	1.4	0.0
1970-2007	2.0	0.4	0.6	1.0
1870-2007	2.0	0.8	0.9	0.3

Table A.3b *Catching-up in China, 1870-2007*

HIHD Catching-up Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	-0.9	-0.2	-0.4	-0.2
1880-1890	1.1	-0.7	1.9	-0.2
1890-1900	-1.5	-0.5	-0.8	-0.2
1900-1913	-0.9	-0.4	-0.4	-0.2
1913-1929	1.8	1.3	0.7	-0.1
1929-1938	1.5	0.4	1.1	0.0
1938-1950	0.1	0.3	1.7	-1.9
1950-1960	4.4	1.0	1.9	1.5
1960-1970	1.8	1.7	-0.1	0.1
1970-1980	0.5	-0.1	0.0	0.6
1980-1990	0.8	-0.1	0.0	1.0
1990-2000	1.6	-0.1	0.9	0.8
2000-2007	0.8	-0.4	0.1	1.1
1870-1913	-0.6	-0.4	0.0	-0.2
1913-1938	1.7	1.0	0.9	-0.1
1950-1970	3.1	1.3	0.9	0.8
1970-1990	0.7	-0.1	0.0	0.8
1990-2007	1.3	-0.2	0.6	0.9
1870-1913	-0.6	-0.4	0.0	-0.2
1913-1970	1.8	1.0	1.0	-0.2
1970-2007	0.9	-0.2	0.2	0.8
1870-2007	0.8	0.2	0.5	0.1

Table A.4a *Human Development and its Dimensions: India, 1870-2007*

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.025	0.020	0.004	0.178
1880	0.029	0.020	0.007	0.184
1890	0.034	0.020	0.010	0.195
1900	0.035	0.020	0.010	0.200
1913	0.041	0.020	0.015	0.221
1929	0.060	0.042	0.022	0.236
1938	0.070	0.056	0.028	0.220
1950	0.097	0.099	0.045	0.206
1960	0.130	0.125	0.072	0.242
1970	0.160	0.157	0.096	0.269
1980	0.185	0.196	0.115	0.284
1990	0.225	0.224	0.147	0.346
2000	0.267	0.255	0.181	0.413
2007	0.311	0.279	0.219	0.491

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	1.5	0.0	1.4	0.1
1880-1890	1.7	0.0	1.5	0.2
1890-1900	0.1	0.0	0.1	0.1
1900-1913	1.2	0.0	0.9	0.3
1913-1929	2.4	1.5	0.7	0.1
1929-1938	1.8	1.1	1.0	-0.3
1938-1950	2.7	1.6	1.3	-0.2
1950-1960	2.9	0.8	1.6	0.5
1960-1970	2.1	0.8	1.0	0.3
1970-1980	1.5	0.7	0.6	0.2
1980-1990	1.9	0.4	0.8	0.7
1990-2000	1.7	0.4	0.7	0.6
2000-2007	2.2	0.4	0.9	0.8
1870-1913	1.1	0.0	1.0	0.2
1913-1938	2.2	1.4	0.8	0.0
1950-1970	2.5	0.8	1.3	0.4
1970-1990	1.7	0.6	0.7	0.4
1990-2007	1.9	0.4	0.8	0.7
1870-1913	1.1	0.0	1.0	0.2
1913-1970	2.4	1.2	1.1	0.1
1970-2007	1.8	0.5	0.7	0.5
1870-2007	1.8	0.6	1.0	0.2

Table A.4b *Catching-up in India, 1870-2007*

HIHD Catching-up Growth and its Decomposition (%)

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

Table A.5a ***Human Development and its Dimensions: Rest of Asia (excluding Japan), 1870-2007***

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.028	0.021	0.005	0.207
1880	0.031	0.022	0.007	0.216
1890	0.037	0.023	0.010	0.228
1900	0.042	0.024	0.012	0.250
1913	0.053	0.030	0.018	0.275
1929	0.088	0.055	0.039	0.315
1938	0.113	0.084	0.053	0.325
1950	0.123	0.106	0.069	0.258
1960	0.168	0.149	0.106	0.300
1970	0.220	0.187	0.161	0.351
1980	0.261	0.228	0.192	0.404
1990	0.314	0.284	0.243	0.448
2000	0.364	0.344	0.285	0.492
2007	0.417	0.387	0.346	0.543

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	1.2	0.2	0.9	0.1
1880-1890	1.5	0.1	1.2	0.2
1890-1900	1.3	0.2	0.8	0.3
1900-1913	1.9	0.6	1.0	0.2
1913-1929	3.2	1.2	1.6	0.3
1929-1938	2.8	1.6	1.2	0.1
1938-1950	0.7	0.6	0.7	-0.6
1950-1960	3.1	1.2	1.4	0.5
1960-1970	2.7	0.8	1.4	0.5
1970-1980	1.7	0.7	0.6	0.5
1980-1990	1.8	0.7	0.8	0.3
1990-2000	1.5	0.6	0.5	0.3
2000-2007	2.0	0.6	0.9	0.5
1870-1913	1.5	0.3	1.0	0.2
1913-1938	3.0	1.4	1.5	0.2
1950-1970	2.9	1.0	1.4	0.5
1970-1990	1.8	0.7	0.7	0.4
1990-2007	1.7	0.6	0.7	0.4
1870-1913	1.5	0.3	1.0	0.2
1913-1970	2.5	1.1	1.3	0.1
1970-2007	1.7	0.7	0.7	0.4
1870-2007	2.0	0.7	1.0	0.2

Table A.5b ***Catching-up in the Rest of Asia (excl. Japan), 1870-2007***

HIHD Catching-up Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	0.3	-0.1	0.5	-0.1
1880-1890	0.1	-0.6	0.7	0.0
1890-1900	0.2	-0.3	0.4	0.1
1900-1913	1.0	0.2	0.7	0.1
1913-1929	2.0	0.6	1.3	0.1
1929-1938	1.8	1.0	0.7	0.1
1938-1950	-0.4	-0.1	0.4	-0.7
1950-1960	1.7	0.6	0.9	0.1
1960-1970	1.5	0.4	1.0	0.1
1970-1980	0.8	0.2	0.4	0.3
1980-1990	0.8	0.3	0.4	0.2
1990-2000	0.2	0.0	0.1	0.2
2000-2007	0.8	-0.2	0.6	0.4
1870-1913	0.4	-0.1	0.6	0.0
1913-1938	1.9	0.7	1.1	0.1
1950-1970	1.6	0.5	0.9	0.1
1970-1990	0.8	0.2	0.4	0.2
1990-2007	0.5	-0.1	0.3	0.2
1870-1913	0.4	-0.1	0.6	0.0
1913-1970	1.3	0.5	0.9	-0.1
1970-2007	0.6	0.1	0.3	0.2
1870-2007	0.9	0.2	0.6	0.0

Table A.6a *Human Development and its Dimensions: North Africa, 1870-2007*

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.036	0.020	0.009	0.239
1880	0.037	0.020	0.010	0.247
1890	0.040	0.020	0.012	0.264
1900	0.044	0.024	0.013	0.270
1913	0.050	0.028	0.015	0.299
1929	0.069	0.039	0.027	0.312
1938	0.080	0.048	0.034	0.315
1950	0.112	0.108	0.042	0.315
1960	0.152	0.159	0.065	0.341
1970	0.182	0.179	0.088	0.386
1980	0.233	0.222	0.122	0.465
1990	0.286	0.296	0.164	0.481
2000	0.350	0.364	0.237	0.496
2007	0.389	0.399	0.274	0.540

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	0.4	0.0	0.2	0.1
1880-1890	0.9	0.0	0.6	0.2
1890-1900	1.0	0.6	0.2	0.1
1900-1913	1.0	0.4	0.3	0.3
1913-1929	2.0	0.7	1.2	0.1
1929-1938	1.5	0.7	0.8	0.0
1938-1950	2.8	2.3	0.6	0.0
1950-1960	3.0	1.3	1.5	0.3
1960-1970	1.8	0.4	1.0	0.4
1970-1980	2.5	0.7	1.1	0.6
1980-1990	2.1	1.0	1.0	0.1
1990-2000	2.0	0.7	1.2	0.1
2000-2007	1.5	0.4	0.7	0.4
1870-1913	0.8	0.3	0.4	0.2
1913-1938	1.8	0.7	1.1	0.1
1950-1970	2.4	0.8	1.2	0.3
1970-1990	2.3	0.8	1.0	0.4
1990-2007	1.8	0.6	1.0	0.2
1870-1913	0.8	0.3	0.4	0.2
1913-1970	2.3	1.1	1.0	0.2
1970-2007	2.1	0.7	1.0	0.3
1870-2007	1.7	0.7	0.8	0.2

Table A.6b ***Catching-up in North Africa, 1870-2007***

HIHD Catching-up Growth and its Decomposition (%)

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

Table A.7a *Human Development and its Dimensions: Sub-Saharan Africa, 1870-2007*

Panel A: Levels

	HIHD	Life Expectancy	Education	Adjusted Income
1870	0.027	0.021	0.005	0.168
1880	0.029	0.022	0.006	0.171
1890	0.032	0.023	0.008	0.182
1900	0.034	0.024	0.009	0.189
1913	0.037	0.025	0.010	0.203
1929	0.048	0.032	0.017	0.205
1938	0.061	0.049	0.022	0.215
1950	0.081	0.076	0.030	0.231
1960	0.108	0.098	0.049	0.263
1970	0.139	0.123	0.072	0.301
1980	0.173	0.146	0.117	0.304
1990	0.185	0.161	0.138	0.282
2000	0.194	0.159	0.165	0.276
2007	0.220	0.172	0.197	0.314

Panel B: HIHD Growth and its Decomposition (%)

	HIHD	Contribution of Life Expectancy	Contribution of Education	Contribution of Adjusted Income
1870-1880	0.7	0.1	0.5	0.1
1880-1890	0.9	0.1	0.5	0.2
1890-1900	0.7	0.1	0.4	0.1
1900-1913	0.7	0.1	0.4	0.2
1913-1929	1.7	0.5	1.1	0.0
1929-1938	2.6	1.6	0.9	0.2
1938-1950	2.3	1.2	0.9	0.2
1950-1960	2.9	0.9	1.6	0.4
1960-1970	2.5	0.7	1.3	0.4
1970-1980	2.2	0.6	1.6	0.0
1980-1990	0.7	0.3	0.6	-0.2
1990-2000	0.5	0.0	0.6	-0.1
2000-2007	1.8	0.4	0.9	0.6
1870-1913	0.7	0.1	0.5	0.1
1913-1938	2.0	0.9	1.0	0.1
1950-1970	2.7	0.8	1.5	0.4
1970-1990	1.4	0.5	1.1	-0.1
1990-2007	1.0	0.1	0.7	0.2
1870-1913	0.7	0.1	0.5	0.1
1913-1970	2.3	0.9	1.2	0.2
1970-2007	1.3	0.3	0.9	0.0
1870-2007	1.5	0.5	0.9	0.2

Table A.7b *Catching-up in Sub-Saharan Africa, 1870-2007*

HIHD Catching-up Growth and its Decomposition (%)

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

References

Altug, S., A. Filiztekin, and S. Pamuk (2008), 'Sources of Long-term Growth for Turkey, 1880-2005', *European Review of Economic History* 12, 3: 393-430.

Alvaredo, F., and A.B. Atkinson (2010), Colonial rule, apartheid and natural resources: top incomes in South Africa 1903-2005. OxCarre Research paper 46/2010.

Apostolides, A. (2011), The growth of two small economies in the Great Depression: GDP estimation for Cyprus and Malta during the interwar period (1921-1938). MPRA Paper No. 30276 http://mpra.ub.uni-muenchen.de/30276/

Arriaga, E. E. (1968), *New Life Tables for Latin American Populations in the Nineteenth and Twentieth Centuries*, Population Monographs Series No. 3, Berkeley: Institute of International Studies, University of California.

Astorga, P. and V. Fitzgerald (1998), 'Statistical Appendix', in R. Thorp, *Progress, Poverty and Exclusion An Economic History of Latin America in the 20th Century*. Washington: Inter-American Development Bank, pp. 307-65.

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

Ayeni, O. (1976), 'Retrospective Estimates of Mortality from the Nigerian Medical Censuses of 1930-1932: A Research Note', *Nigerian Journal of Economic and Social Studies* 18: : 461-9.

Bakker, G.P., den, T.A. Huitker and C.A. van Bochove (1990), 'The Dutch Economy 1921-1938: Revised Macroeconomic Data for the Interwar Period', *Review of Income and Wealth* 36: 187-206.

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

Baptista, A. (1997), *Bases cuantitativas de la economía venezolana, 1830–1995*, Caracas: Fundación Polar.

Barro, R., Lee, J.W. (2002). International data on educational attainment: updates and implications. Harvard University Center for International Development CID Working Paper No. 42. Accompanying dataset available at: http://www.ksg.harvard.edu/CID

Barro, R., Lee, J.W. (2010). New data set of educational attainment in the world, 1950-2010. NBER Working Paper 15902 http://www.nber.org/papers/w15902

Batista, D., C. Martins, M. Pinheiro and J. Reis (1997), *New Estimates of Portugal's GDP 1910-1958*, Lisbon: Banco de Portugal.

Benavot, A. and P. Riddle (1988), 'The Expansion of Primary Education, 1870-1940: Trends and Issues', *Sociology of Education* 61, 3: 191-210

Bértola, L. (1998), *El PBI de Uruguay, 1870–1936 y otras estimaciones*, Montevideo: Universidad de la República.

Bourbeau, J. Légaré and V. Émond (1997), *New Birth Cohort Life Tables for Canada and Quebec, 1801-1991*, Statistics Canada, Demographic Division, Research Paper No. 3. Available at: www.statcan.ca

Bourguignon, F. and C. Morrisson (2002), 'Inequality among World Citizens', *American Economic Review* 92, 4: 727-44 (data available at http://www.delta.ens.fr/XIX)

Braun, J., M. Braun, I. Briones, and J. Díaz (2000), 'Economía chilena, 1810-1995. Estadísticas históricas', Pontificia Universidad Católica de Chile, Instituto de Economía, Documento de Trabajo no. 187

Brundenius C. and A. Zimbalist (1989), *The Cuban Economy: Measurement and Analysis of Socialist Performance*, Baltimore: Johns Hopkins University Press.

Bureau of Economic Analysis (BEA) (2010), *GDP by Industry, 1910 to 2009*. Available at http://www.bea.gov/industry/iotables/prod/table_list.cfm?anon=56082

Buyst, E. (1997), 'New GNP Estimates for the Belgian Economy during the Interwar Period'. *Review of Income and Wealth* 43: 357-75.

Caldwell, J., M. Bracher, G. Santow, and P. Caldwell (1986), 'Population Trends in China—A Perspective Provided by the 1982 Census', in C. Li (ed.), *A Census of One Billion People*. Hong Kong: Republic of China Population Census Office, pp. 352-91.

Cha, M.S. and N. N. Kim (2006), 'Korea's First Industrial Revolution, 1911-40', Naksungdae Institute of Economic Research [NIER] Working Papers Series 2006-3 Available at: http://www.naksung.re.kr/papers/wp2006-3.pdf

Cha, M.S. and T.M. Wu (2002), 'Colonial Transition to Modern Economic Growth in Korea and Taiwan' (mimeo)

Coatsworth, J.H. (1989), 'The decline of the Mexican economy, 1800-1860', in R. Liehr (ed.), *América Latina en la época de Simón Bolívar. La formación de las economías nacionales y los intereses económicos europeos 1800-1850*, Berlin: Colloquium, pp. 27-53

Cohen, D and M. Soto (2007), "Growth and Human Capital: Good Data, Good Results', *Journal of Economic Growth* 12, 1: 51–76.

Comisión Económica para América Latina y el Caribe [CEPAL] (2009), 'América Latina y el Caribe. Series históricas de estadísticas económicas 1950-2008', *Cuadernos Estadísticos* 37 Available at: http://www.eclac.cl/deype/cuaderno37/index.htm

Conference Board (2010), *Total Economy Database, January 2010*, http://www.conference-board.org/economics/database.cfm

Conte, L., G. della Torre, and M. Vasta (2007), 'The Human Development Index in Historical Perspective: Italy from Political Unification to the Present Day', Quaderni Università degli Studi di Siena, Dipartimento di Economia Politica No. 491.

Cortés Conde, R. (1997), *La economía argentina en el largo plazo*, Buenos Aires: Editorial Sudamericana/ Universidad de San Andrés.

Costa, D.L. and R.H. Steckel (1997), 'Long-Term Trends in Health, Welfare, and Economic Growth in the United States', in R.H. Steckel and R. Floud (eds.), *Health and Welfare during Industrialization*, Chicago: University of Chicago Press, pp. 47-89.

Crafts, N. (1997), 'The Human Development Index and Changes in Standards of Living: Some Historical Comparisons', *European Review of Economic History* 1, 3: 299-322.

Della Paolera, G., A. M. Taylor, and C. G. Bozolli (2003), 'Historical Statistics', in G. Della Paolera and A. M. Taylor (eds.), *A New Economic History of Argentina*, New York: Cambridge University Press (with CD-ROM), pp. 376–85.

Deprez, P. (1979), 'The Low Countries'. in W. R. Lee (ed.), *European Demography and Economic Growth*, London: Croom Helm, pp. 236-83.

Díaz, J., R. Lüders, and G. Wagner (2007), 'Economía Chilena 1810-2000. Producto total y sectorial. Una nueva mirada', Pontificia Universidad Católica de Chile, Documento de trabajo 315

Dopico, F. and D.S. Reher (1998), *El declive de la mortalidad en España, 1860-1930*, Asociación de Demografía Histórica, Monografía No. 1.

Easterly, W. (1999), 'Life after Growth', *Journal of Economic Growth* 4, 3: 239-76. Underlying data available at: http://www.worldbank.org/html/prdmg/grthweb/growtht.htm

Eckstein, A. (1955), 'National Income and Capital Formation in Hungary, 1900-1950, *Income and Wealth*, V: 150-223.

Eisner, G. (1961), *Jamaica, 1830-1930: A Study in Economic Growth*, Manchester: Manchester University Press

Fargues, P. (1986), 'Un siècle de transition démographique en Afrique méditerranéenne 1885-1985', *Population* 41, 2: 205-32

Feinstein, C.H. (2005), *An Economic History of South Africa. Conquest, Discrimination and Development*, Cambridge: Cambridge University Press.

Fenoaltea, S. (2005), 'The Growth of the Italian Economy, 1861-1913: Preliminary Second-generation Estimates', *European Review of Economic History* 9: 273-312.

Flora, P. (1973), '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*, London: Sage, pp. 213-58.

Flora, P. (1983), *State, Economy, and Society in Western Europe 1815-1975. A Data Handbook in Two Volumes*, Frankfurt: Campus Verlag.

Floud, R. and B Harris (1997), 'Health, Height, and Welfare: Britain, 1700-1980', in R.H. Steckel and R. Floud (eds.), *Health and Welfare during Industrialization*, Chicago: University of Chicago Press, pp. 91-126.

Frankema, E. (2011), The origins of formal education in Sub-Saharan Africa. Was British rule more benign? CGEH Working Paper Series no. 5 http://www.cgeh.nl/working-paper-series/

Glass, D.V. and E. Grebenik (1967), 'World Population, 1800-1950', in H.J. Habakkuk and M. Postan (eds.), *Cambridge Economic History of Europe* Vol. VI. *The Industrial Revolutions and After: Incomes, Population, and Technological Change* (I), Cambridge: Cambridge University Press, Part I, pp. 56-138.

Goerlich Gisbert, F. and R. Pinilla Pallejá (2005), 'Esperanza de vida y potencial de vida a lo largo del siglo XX en España', *Revista de Demografía Histórica* 23, 2: 79-109.

Goldsmith, R. W. (1961), 'The economic growth of Tsarist Russia: 1860-1913', *Economic Development and Cultural Change* 9: 441-475.

Goldsmith, R. W. (1986), *Desenvolvimento financeiro sob um século de inflaçao*, Rio de Janeiro: Harper & Row do Brasil

Good, D.F. (1994), (1994), 'The Economic Lag of Central and Eastern Europe: Income Estimates for the Habsburg Successor States, 1870-1910', *Journal of Economic History* 54, 4: 869-891.

Greasley, D. and L. Oxley (2000a), 'Measuring New Zealand's GDP 1865–1933', *Review of Income and Wealth* 46, 351–368

Greasley, D. and L. Oxley (2000b), 'Outside the Club: New Zealand's Economic Growth 1870–1993', *International Review of Applied Economics* 14: 173–192

GRECO (Grupo de Estudios de Crecimiento Económico) (2002), *El Crecimiento económico colombiano en el Siglo XX*, Bogotá: Banco de la República–Fondo de Cultura Económica

Gregory, P. (1982), *Russian National Income*. Cambridge: Cambridge University Press.

Grimm, M., K. Harttgen, S. Klasen, and M. Misselhorn (2008), 'A Human Development Index by Income Groups', *World Development* 36, 12: 2527-2546.

Grytten, O.H. (2004), 'The Gross Domestic Product for Norway 1830-2003', in Eitrheim, Ø., J.T. Klovland and J.F. Qvigstad (eds.), *Historical Monetary Statistics for Norway 1819-2003*, Norges Bank Occasional Papers no. 35, Oslo: Norges Bank, pp. 241-288.

Haines, M. (1994), 'Estimated Life Tables for the United States, 1850-1900', National Bureau of Economic Research Working Paper Series on Historical Factors in Long Run Growth No. 15.

Hanley, S.B. (1990), 'The Relationship between Education and Economic Growth', in G. Tortella (ed.), *Education and Economic Development since the Industrial Revolution*, Valencia: Generalitat Valenciana, pp. 69-87.

Hansen, S.A. (1974), *Økonomisk vækst i Danmark*, Copenhagen: Akademisk Forlag.

Hayami, Y. and V.W. Ruttan (1985), *Agricultural Development An International Perspective*, Baltimore: Johns Hopkins University Press.

Helczmanovski, H. (1979), 'Austria-Hungary', in W. R. Lee (ed.), *European Demography and Economic Growth*, London: Croom Helm, pp. 27-78.

Hjerppe, R. (1996), *Finland's Historical National Accounts 1860-1994: Calculation Methods and Statistical Tables*. Jyväskylä: J.Y.H.L.

Hoffmann, W.G., Grumbach, F. Hesse, H. (1965), *Das Wachstum der Deutschen Wirtschaft seit der Mitte des 19.Jahrhunderts*. Berlin: Springer.

Honda, G. (1997), 'Differential Structure, Differential Health: Industrialization in Japan, 1868-1940', in R.H. Steckel and R. Floud (eds.), *Health and Welfare during Industrialization*, Chicago: University of Chicago Press, pp. 251-84.

Horlings, E. (1997), The Contribution of the Service Sector to Gross Domestic Product in Belgium, 1835-1990. Utrecht: Universiteit Utrecht (mimeo).

IMF (2003), International Financial Statistics, CD Rom

INEGI (1995), *Estadísticas históricas de México*, México DF: INEGI.

International Monetary Fund (IMF) (2010), *International Financial Statistics*, Washington D.C.: IMF.

Jannetta, A.B. and S.H. Preston (1991), 'Two Centuries of Mortality Change in Central Japan: The Evidence from a Temple Death Register', *Population Studies* 45, 3: 417-36.

Jerven, M. (2010). African growth recurring: an economic history perspective on African growth episodes, 1690-2010. Economic History of Developing Regions 25 (2), 127-154

Johansson, S.R. and C. Mosk (1987), 'Exposure, Resistance and Life Expectancy: Disease and Death during the Economic Development of Japan, 1900-1960', *Population Studies* 41, 2: 207-35.

Kalmanovitz Krauter, S. and E. López Rivera (2009), *Las cuentas nacionales de Colombia en el siglo XIX*, Bogotá: Universidad de Bogotá Jorge Tadeo Lozano.

Kannisto, V., M. Nieminen, and O. Turpeinen (1999), 'Finnish Life Tables since 1751', *Demographic Research* 1, 1 Available at: www.demographic-research.org/Volumes/Vol1/1

Kendrick, J.W. (1961), *Productivity Trends in the United States*, Princeton: National Bureau of Economic Research.

Keyfitz, N. and W. Fleiger (1968), *World Population: An Analysis of Vital Data*, Chicago: University of Chicago Press.

Kimura, M. (1990), 'Diffusion of Primary Education in Korea', in G. Tortella (ed.), *Education and Economic Development since the Industrial Revolution*, Valencia: Generalitat Valenciana, pp. 337-53.

Kostelenos, G. and Associates (2007), *Gross Domestic Product, 1830-1939* (in Greek). Athens: Centre of Planning and Economic Research (KEPE).

Krantz, O. and L. Schön (2007), *Swedish Historical National Accounts 1800-2000. Aggregate Output Series*, Lund: Lund University.

Lains, P. (2006), 'Growth in a Protected Environment: Portugal, 1850-1950', *Research in Economic History* 24: 121-63.

Langford, C. and P. Storey (1993), 'Sex Differentials in Mortality Early in the Twentieth Century: Sri Lanka and India Compared', *Population and Development Review* 19, 2: 263-82.

Lavely, W. and R. B. Wong (1998), 'Revising the Malthusian Narrative: The Comparative Study of Population Dynamics in Late Imperial China', *Journal of Asian Studies* 57, 3: 714-48.

Lee, W. R. (1979), 'Germany', in W. R. Lee (ed.), *European Demography and Economic Growth*, London: Croom Helm, pp. 144-95.

Leite, Joaquim da Costa (2005), 'Populaçao e crescimento económico', in P. Lains and A. Ferreira da Silva (eds.), *História Económica de Portugal 1700-2000* Vol. II *O Século XIX*, Lisboa: Impresa de Ciências Sociais, pp. 43-81.

Lindert, P.H. (2004), *Growing Public. Social Spending and Economic Growth since the Eighteenth Century*, Cambridge: Cambridge University Press, 2 vols..

Maddison, A. (1995), *Monitoring the World Economy, 1820-1992*. Paris: OECD Development Centre.

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

Maddison, A. (2010) Statistics on world population, GDP and per capita GDP, 1-2008 AD. Last update: March 2010, horizontal file http://www.ggdc.net/maddison/

Markevich, A. and M. Harrison (2011), 'Russia's Real National Income: The Great War, Civil War, and Recovery, 1913 to 1928', *Journal of Economic History* 71 (3): 672-703.

Marschalck, P. (1987), 'The Age of Demographic Transition: Mortality and Fertility', in K.J. Bade (ed.), *Population, Labour and Migration in 19th and 20th Century Germany*, Leamington Spa/Hamburg; Berg, pp. 15-33.

Mazur, D. P. (1969), 'Expectancy of Life at Birth in 36 Nationalities of the Soviet Union: 1958-60', *Population Studies* 23, 2: 225-46.

McAlpin, M.B. (1983), 'Famines, Epidemics, and Population Growth: The Case of India', *Journal of Interdisciplinary History* 14, 2: 352-66.

Ministerio de Salud Pública (2001), *Tablas de Mortalidad del Uruguay por sexo y edad / 1908 - 1999*, Montevideo: Ministerio de Salud Pública, Dirección General de la Salud, Departamento de Estadística.

Mironov, B.N. (1991), 'The Development of Literacy in Russia and the USSR from the Tenth to the Twentieth Centuries', *History of Education Quarterly* 31, 2: 229-52.

Mironov, B.N. (1993), 'Educación y desarrollo económico en Rusia, siglos XIX y XX', in C. E. Núñez, and G. Tortella (eds.), *La maldición divina. Ignorancia y atraso en perspectiva histórica*, Madrid: Alianza, pp. 271-306.

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

Mitchell, B. R. (2003b), *International Historical Statistics: The Americas, 1750–2000*, 5th ed. New York: Palgrave Macmillan.

Mitchell, B. R. (2003c), *International Historical Statistics: Europe 1750-2000*, New York: Palgrave Macmillan.

Mitchell, B.R. (1988), *British Historical Statistics*. Cambridge: Cambridge University Press.

Morrisson, C. and F. Murtin (2007), 'Education Inequalities and the Kuznets Curves: a Global Perspective since 1870', Paris School of Economics Working Papers 2007-12.

Morrisson, C. and F. Murtin (2009), 'The Century of Education', *Journal of Human Capital* 3, 1: 1-42 (and data appendix)

Myllantaus (1990), 'Education in the Making of Modern Finland', in G. Tortella (ed.), *Education and Economic Development since the Industrial Revolution*, Valencia: Generalitat Valenciana, pp. 153-71.

Newland, C. (1991), 'La educación elemental en Hispanoamérica: desde la independencia hasta la centralización de los sistemas educativos nacionales', *Hispanic American Historical Review* 71, 2. 335-64.

Nicolau, R. (2005), 'Población, salud y actividad', in A. Carreras and X. Tafunell (eds.), *Estadísticas Históricas de España. Siglos XIX-XX*, 3 vols, Madrid: Fundación BBVA, II, pp. 77-154

Notkola, V., I.M. Timaeus and H. Siiskonen (2000), 'Mortality Transition in the Ovamboland Region of Namibia, 1930-1990', *Population Studies* 54, 2: 153-67.

Nunes, A.B. (1993), 'Education and Economic Growth in Portugal: A Simple Regression Approach', *Estudos de Economia* 13, 2: 181-205.

Núñez, C.E. (2005), 'Educación', in A. Carreras and X. Tafunell (eds.), *Estadísticas Históricas de España, siglos XIX y XX*, Bilbao: Fundación BBBV.

Núñez, J. (2005), 'Signed with an X: Methodology and Data Sources for Analyzing the Evolution of Literacy in Latin America and the Caribbean, 1900-1950', *Latin American Research Review* 40, 2: 117-35.

Ouane, A. and Y. Amon-Tanoh (1990), 'Literacy in French-Speaking Africa: A Situational Analysis', *African Studies Review* 33, 3: 21-38.

Pamuk, S. (2006), 'Estimating Economic Growth in the Middle East since 1820', *Journal of Economic History* 66, 3: 809-28

Pamuk, S. (2007), 'Economic Change in Twentieth Century Turkey: Is the Glass More than Half Full?', American University of Paris Working Paper No. 41.

Prados de la Escosura, L. (2003), *El progreso económico de España, 1850-2000*, Madrid: Fundación BBVA, updated.

Prados de la Escosura, L. (2012), Output per head in pre-independence Sub-Saharan Africa: quantitative conjectures, paper to be presented at the IEHA WEHC, Stellenbosch.

Pressat, R. (1985), 'Historical Perspectives on the Population of the Soviet Union', *Population and Development Review* 11, 2: 315-34.

Recchini de Lattes, Z. and A. E. Lattes (eds.) (1975), *La población de Argentina*, Buenos Aires: Instituto Nacional de Estadística y Censos.

Reis, J. (1993), 'El analfabetismo en Portugal en el siglo XIX: una interpretación', in C.E. Núñez and G. Tortella (eds.), *La maldición divina. Ignorancia y atraso en perspectiva histórica*, Madrid: Alianza, pp. 237-69.

Riley, J.C. (2005a), "Estimates of Regional and Global Life Expectancy, 1800-2001", *Population and Development Review* 31, 3: 537-43

Riley, J.C. (2005b), *Poverty and Life Expectancy. The Jamaica Paradox*, New York: Cambridge University Press.

Riley, J.C. (2005c), "The Timing and Pace of Health Transitions Around the World", *Population and Development Review* 31, 4: 741-64

Riley, J.C. (2005d), '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'. Available at: www.lifetable.de/RileyBib.htm

Ritschl, A. and M. Spoerer (1997), 'Das Bruttosozialprodukt in Deutschland nach den amtlichen Volseinkommes- und Sozialproduktsstatistiken 1901-1995', *Jahrbuch für Wirtschaftsgeschichte* 2: 27-54

Sandberg, L.G. and R.H. Steckel (1997), 'Was Industrialization Hazardous to Your Health? Not in Sweden', in R.H. Steckel and R. Floud (eds.), *Health and Welfare during Industrialization*, Chicago: University of Chicago Press, pp. 127-59.

Santamaría, A. (2005), 'Las cuentas nacionales de Cuba, 1690–2005' Centro de Estudios Históricos, Centro Superior de Investigaciones Científicas (mimeo)

Sarkar, N.K. (1951), 'A Note on Abridged Life Tables for Ceylon, 1900-1947', *Population Studies* 4, 4: 439-43.

Schulze, M.S., (2000) Patterns of Growth and Stagnation in the Late Nineteenth Century Habsburg Economy, *European Review of Economic History* 4, 3: 311-40.

Shorter, F.C. and Macura, M.(1982), *Trends in Fertility and Mortality in Turkey 1935–1975*, Washington, D.C.: National Academy Press.

Siampos, G.S. (1970), 'The Population of Cambodia, 1945-1980', *Milbank Memorial Fund Quarterly* 48: 317-60.

Simkins, Ch. and E. van Heyningen (1989), 'Mortality, and Migration in the Cape Colony, 1891-1904', *International Journal of African Historical Studies* 22, 1: 79-111.

Smits, J.P. (2006), 'Economic Growth and Structural Change in Sub Saharan Africa during the Twentieth Century: New Empirical Evidence', Unpublished Paper presented at the International Economic History Association Conference, Helsinki.

Smits, J.P., E. Horlings and J.L. van Zanden (2000), *Dutch GNP and its Components, 1800-1913*, Groningen: Groningen Growth and Development Centre Research Monograph no. 5.

Srb, V. (1962), 'Population Development and Population Policy in Czechoslovakia', *Population Studies* 16, 2: 147-59

Stadler, J. J. (1963), 'The Gross Domestic Product of South Africa 1911-1959', *South African Journal of Economics*, 31, 3: 185-208

Statistics Canada (2004), *Historical Statistics of Canada*. Available at: http://www.statcan.ca/

Steckel, R.H. and R. Floud (1997b), 'Conclusions', in R.H. Steckel and R. Floud (eds.), *Health and Welfare during Industrialization*, Chicago: University of Chicago Press, pp.423-49.

Szereszewski, R. (1965), *Structural Changes in the Economy of Ghana, 1891-1911*. London: Weidenfeld and Nicolson.

Taira, K. (1971), 'Education and Literacy in Meiji Japan: An Interpretation', *Explorations in Economic History* 8: 371-94.

Tonder, J. L. van and I. J. van Eeden (1975), *Abridged Life Tables for All the Population Groups in the Republic of South Africa (1921-70)*. Pretoria: Institute for Sociological, Demographic and Criminological Research, Human Sciences Research Council.

Toutain, J.C. (1997), 'Le produit intérieur brut de la France, 1789-1990', *Economies et Societés. Histoire Economique Quantitative*, 1, 11, 5-136

Tsai, W-H. (2008), "The growth of Taiwan's aging population and its socio-economic consequences", *Taiwanese Gerontological Forum* 1, 1: 1-10

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

UNESCO (1957), *World Illiteracy at Mid-Century. A Statistical Study*, Paris: UNESCO.

UNESCO (1958), *World Survey of Education Handbook,* II *Primary Education*, Paris: UNESCO.

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

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

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

United Nations (1949), *Demographic Yearbook 1948*, Lake Success, New York: United Nations.

United Nations (1954), *Report on International Definition and Measurement of Standards and Levels of Living*, New York: United Nations.

United Nations (1993), *Demographic Yearbook 1991 Special Issue: Population Ageing and the Situation of Elderly Persons*, New York: United Nations.

United Nations (2000), *Demographic Yearbook Historical Supplement 1948-1997*, New York: United Nations.

United Nations Development Program [UNDP] (2009), *Human Development Report*, New York: Oxford University Press.

United Nations Development Program [UNDP] (2010), *Human Development Report*, New York: Oxford University Press.

Urquhart, M.C. (1993), *Gross National Product, Canada 1870-1926: The Derivation of the Estimates*, Kingston: McGill-Queen's University Press.

Valaoras, V. (1960), 'A Reconstruction of the Demographic History of Modern Greece', *Miliband Memorial Fund Quarterly* 38: 114-39.

Vallin, J. (1976), 'La population de la Thailande', *Population* 31, 1: 153-75.

Vamplew, W. (ed.) (1987), *Australians. Historical Statistics*, Broadway: Fairfax, Syme, and Weldon.

Veiga, T. Rodrigues (2005), 'A transiçao demográfica', in in P. Lains and A. Ferreira da Silva (eds.), *História Económica de Portugal 1700-2000* Vol. III *O Século XX*, Lisboa: Impresa de Ciências Sociais, pp. 37-63.

Viñao Frago, A. (1990), 'The History of Literacy in Spain: Evolution, Traits, and Questions', *History of Education Quarterly* 30, 4: 573-99.

Visaria, L. and P. Visaria (1982), 'Population (1757-1947)', in D. Kumar (with M. Desai) (ed.), *Cambridge Economic History of India*, 2 vols Cambridge: Cambridge University Press, II, 463-532.

Ward, M. and J. Devereux (2012), "The Road Not Taken: Pre-Revolutionary Cuban Living Standards in Comparative Perspective", *Journal of Economic History* 71 (1): 104-132

Whitwell, G., Ch. de Souza, and S. Nicholas (1997), 'Height, Health, and Economic Growth in Australia', in R.H. Steckel and R. Floud (eds.), *Health and Welfare during Industrialization*, Chicago: University of Chicago Press, pp. 379-422.

World Bank (2010), *World Development Indicators Database*, Washington D.C.: World Bank. http://data.worldbank.org/data-catalog. .

Yousef, T.M. (2002), 'Egypt's Growth Performance under Economic Liberalism: A Reassessment with New GDP Estimates', *Review of Income and Wealth* 48, 4: 561-79.

Zamagni, V. (1990), *Dalla Perifería al Centro. La seconda rinascita economica dell'Italia 1861-1981*, Bologna: Il Mulino.
Zamagni, V. (1993), Zamagni, V., 'L'offerta di istruzione in Italia 1861-1987: un fattore dello sviluppo o un ostacolo?', Universita` degli Studi di Cassino, Dipartimento Economia e Territorio, Working Papers 4.