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Abstract

This paper provides a long-run view of well-being inequality at world scale based on a new historical dataset. Trends in social dimensions alter the view on inequality derived from per capita GDP. While in terms of income, inequality increased until the third quarter of the twentieth century; in terms of well-being, inequality fell steadily since World War I. The spread of mass primary education and the health transitions were its main drivers. The gap between the West and the Rest explains only partially the evolution of well-being inequality, as the dispersion within the developing regions has increasingly determined its evolution.

JEL classification: I00, N30, O15, O50

Keywords: Well-being, Inequality, Life Expectancy, Health Transition, Education, per capita GDP.

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Introduction

In the last one and a half centuries, substantial gains across the board are observed for main well-being dimensions (including per capita GDP, health, education, political voice, civil liberties, and personal security) (Maddison, 2006; Bourguignon and Morrisson, 2002; Morrisson and Murtin, 2009; Prados de la Escosura, 2015; Pinker, 2018). How have these gains been distributed? Do inequality trends in well-being dimensions concur? Did the gap between the *West* and the *Rest* of the world explain well-being inequality?

This paper approaches long-run well-being inequality from a multidimensional perspective inspired by the *capabilities* approach.[2] The *capabilities* approach makes well-being dependent on a combination of *functionings* (or achievements) and *capabilities* (the ability to choose among alternative bundles of functionings) [3]. Thus, well-being differences across countries will be assessed on a broad basis that includes not only the economic dimension (real per capita income), but also health (life expectancy at birth) and education (literacy and gross enrolment rates and years of schooling) dimensions. Differences in human development, 'a process of enlarging people's choices' (UNDP, 1990), which encompasses enjoying a healthy life, acquiring knowledge, and achieving a decent standard of living, will be also addressed.

The database comprises a large group of countries ranging between 96 and 164 and representing over 90 percent of the world population. The time span considered covers from the first globalization, the beginnings of mass primary education, and the eve of the epidemiological transition to the present, under another phase of globalization, with tertiary education spreading at world scale, and a new health transition under way.

A caveat is needed. In the present state of the art, it is not possible to derive measures of within-country inequality for the selected well-being dimensions over

[2] Alternatives are the welfare economics approach which values various dimensions of quality of life, including health, education, environment, etc. in monetary terms (Nordhaus and Tobin, 1972; Becker et al., 2005; Jones and Klenow, 2016; Gallardo Albarrán, 2017) and the Subjective Well-Being (SWB) approach, which places life satisfaction at its centre (Easterlin, 1974, Kahneman and Deaton, 2010; Veenhoven and Vengust, 2013).

[3] This paper is only inspired on the capabilities approach because, so far, I have focused on achievements only. See Ivanov and Peleah (2010).

such a large sample and long time span. The discussion will address, then, international inequality, in which national averages are employed.

The paper is organized as follows. In section II an overview of the empirical literature on multidimensional international inequality provides hypotheses to be explored from a long run perspective. Section III presents new well-being indices of life expectancy, literacy and school enrolment rates, and years of schooling, and human development. In section IV, long-run trends in inequality are provided for each well-being indicator and, then, a breakdown of inequality into the dispersion within the *West* and the *Rest* and the gap between them. The last section recaps and raises questions for further research.

The results challenge the view on long run inequality derived from real per capita GDP. Inequality in social dimensions declined after World War I, unlike income inequality that increased until the late twentieth century and only, then, declined. The spread of mass primary education and the health transitions drove the decline of well-being inequality. Moreover, its evolution is only partially explained by the *West-Rest* gap as the dispersion within developing regions progressively defined its trends.

Debating Well-being Inequality

Earlier quantitative assessments of international inequality were carried out on the basis of per capita GDP, focusing almost exclusively on the late twentieth century. A long-term deterioration in world distribution of income, led by a widening gap between developed and developing countries, was the prevailing consensus up to the 1980s (Theil 1979, 1989). Albert Berry, François Bourguignon, and Christian Morrisson (1983) challenged this view by pointing out that large countries were the main determinants of the exhibited trends.[4] Later, Branko Milanovic (2005, 2016) showed that international population-weighted inequality ('Inequality 2', in his typology) fell since the mid-twentieth century while unweighted inequality ('Inequality 1') experienced a sustained increase until 2000 and, then, declined.

[4] The determinant role played by China and India in the international income distribution is a recurrent feature in later studies, cf. Firebaugh (1999), Bourguignon and Morrisson (2002), Milanovic (2005), and Sala-i-Martin (2006).

In the last decades, as data on household surveys has become widely available, research shifted the focus to 'global' economic inequality, that is, income distribution among individuals, not just across countries' averages. The results from the new approach initially supported the view of a substantial increase in global inequality as widening inter-country income differentials more than offset the decline in within-country inequality (Korzeniewicz and Moran, 1997). The consensus was broken when Paul Schultz (1998) showed that inequality had fallen since the mid-1970s, as the contraction in inequality across countries cancelled any increases in within-country inequality. Schultz's findings led to a new, less pessimistic consensus that challenged the view of a widening gap between the world rich and poor in the late twentieth century. Glenn Firebaugh (1999) also noticed a remarkable stability in world income distribution between 1960 and 1989 since the divergence in income growth favourable to rich countries was offset by the faster population growth in poor countries. For the post-1980 era, Milanovic and John Roemer (2016) indicate that the level of global inequality ('Inequality 3') remained stable and high, and only declined since the early 2000s.[5]

Long run inequality has received little quantitative attention due to data constraints. Bourguignon and Morrisson (2002), on the basis of 33 "trans-national" units, concluded that world inequality was much higher in 1992 than in 1820. This resulted from a rise in inequality between the early nineteenth century and mid-twentieth century that tended to stabilize during the second half of the century. The main element behind long run world income inequality was the disparity across countries. Nonetheless, within-country income distribution dominated world inequality during the nineteenth century, while in the twentieth century cross-country income distribution prevailed. More refined estimates by Jan-Luiten van Zanden et al. (2014) tended to confirm Bourguignon and Morrisson's findings. Driven by between-country inequality, the dispersion of global income distribution increased over the long run, mostly up to 1950, stabilising thereafter, and experiencing a moderate rise from 1980 onwards.

[5] Dowrick and Akmal (2005) found, however, that inequality increased slightly between 1980 and 1993. Liberati (2015) confirmed Milanovic's finding and pointed out a moderate decline in global inequality since the beginning of the twentieth-first century.

Per capita income is just one well-being dimension and social scientists have also been looking at others such as health and education. Morrisson and Murtin (2013) provide a long run view of global education inequality on the basis of average years of schooling[6], finding a long-term reduction, mostly attributable to the diffusion of literacy. Goesling and Baker (2008) observed the declining dispersion of schooling years since 1980 and attributed it to the globalization of primary education.

The long run evolution of health inequality has been addressed by Bourguignon and Morrisson (2002) who estimated cross-country inequality for life expectancy at birth at scattered benchmarks, finding a sustained increase in inequality between 1820 and 1910, that stabilized up to 1929, and, then, declined sharply down to 1970, remaining unaltered until 1990. An update of the estimates shows a further decline in the 1990s (Morrisson and Fabrice Murtin, 2005). Thus, the late twentieth century levels of inequality were similar to those of the early nineteenth century.[7] Brian Goesling and Firebaugh (2004) found a decline in the 1980s that was reverted during the 1990s, and they largely attributed to the different pace at which life expectancy evolved across countries, particularly in Sub-Saharan Africa. Rati Ram (2006) concurred pointing out the contrast between the pre- and post-1990 periods and attributing the divergence in the 1990s to the role of HIV/AIDS. Goesling and David Baker (2008) stressed the uneven diffusion of health knowledge, practice, and technology across countries that, as Ryan Edwards (2011) observes, translated into steady, or even growing, international inequality in adult longevity between 1970 and 2000.

Whether to look at different well-being dimensions of individually or to resort to multidimensional indices presents a dilemma. On the one hand, the interpretation of individual indices is straightforward and that provides an advantage. On the other, if individual indices show conflicting tendencies, drawing general conclusions on its evolution becomes impossible (Decancq et al., 2009). This has led to constructing

[6] Morrison and Murtin (2013) use Bourguignon and Morrisson's trans-national units or "large" countries (32 rather than 33, in their case). It is worth noting that Morrison and Murtin also measure human capital inequality that in so far a monetary dimension of education is beyond this paper's scope.

[7] Goesling and Firebaugh (2004), on the basis of secondary literature, also hypothesised an inverted U shape evolution of health inequality over the last two centuries, starting from low levels that would have increased since the late nineteenth century and peaked in the Interwar years, to decline during the second half of the twentieth century.

composite indicators in which two main approaches, welfare and capabilities, can be distinguished.

The pioneer in addressing international inequality within a capabilities framework, Ram (1992), noticed a discrepancy between the high level of income inequality and the low level of human development inequality. Earlier, on the basis of the Physical Quality of Life Index, Ram (1980) had observed a sustained decline in well-being inequality over 1950-1970, at odds with the simultaneous rising trend observed for income. Later, Farhad Noorbakhsh (2006) pointed out a slow inequality reduction in human development during the last quarter of the twentieth century. More recently, Ricardo Martínez (2012) has found a decline in the international dispersion of human development between 1980 and 2010. In the only long run perspective available on human development, Morrisson and Murtin (2005) observed that the evolution of inequality for a slightly modified version of the UNDP HDI had an inverted U-shape with a turning point in 1930.[8]

Also inspired in Amartya Sen's capabilities approach, and on the basis of 'achievement indices' (see next section) for different social indicators (infant mortality rate, life expectancy at birth, and daily calorie and protein supply), Bart Hobijn and Philip Hans Franses (2001) disputed the view that standards of living converged in the late twentieth century suggesting an increase in unweighted inequality that resulted from a widening gap between Core and Periphery since the 1960s.[9]

The main stylized fact that derives from the surveyed literature is, therefore, a long-term rise in well--being inequality that peaked by the early-twentieth century and, then, gave way to a sustained decline. This is at odds with the evolution of international income distribution, in which dispersion rose up to a peak by 1950, stabilised and, then, declined. Can this depiction of the trends in well-being inequality

[8] More recently, Rijpma (2017) has constructed a comprehensive well-being index for the last two centuries on the basis of a wide range of indicators (income, health, education, political institutions, freedom, inequality, and personal security) and using a latent variable model. This composite index shows more intense improvement and stronger convergence over time than GDP per head. Also, Decancq et al. (2009) using a flexible index of multidimensional well-being showed a decline in unweighted inequality over 1975-2000.

[9] This conclusion was disputed by Neumayer (2003), who rejected Hobijn and Franses 'achievement indices' to assess inequality and using the original values of a set of social variables (life expectancy, infant survival, education enrolment, literacy, and telephone and television availability), restated the view of a reduction in inequality between 1960 and 2000.

be confirmed using a more rigorous conceptual approach and a more comprehensive database?

Measuring Well-being

How progress in non-economic dimensions of well-being is measured constitutes a far from negligible matter. Usually original values of social variables (life expectancy, height, or literacy) are employed (Acemoglu and Johnson, 2007; Becker et al., 2005; Bourguignon and Morrisson, 2002; Morrisson and Murtin, 2013; Hatton and Bray, 2010; Lindert, 2004). Non-income well-being indicators, such as life expectancy, height, infant mortality, literacy and enrolment rates or years of schooling, have, unlike GDP, asymptotic limits that reflect biological or physical maxima. This means that the use of original values for comparisons over space and time introduces biases, as the range of variation is very narrow, forcing smaller gains (both absolute and relative) as their levels get higher (Sen, 1981; Dasgupta, 1990; Cornia and Menchini, 2006). This objection is particularly relevant when an attempt is made at measuring the distribution of such variable across countries and over time, as the use of original values unavoidably leads towards convergence.

A transformation would be, then, required to measure changes within upper and lower bounds. A possibility is a linear transformation, such as the one used in the United Nations Development Programme's (UNDP) index of human development, which reduces the size of the denominator and, thus, widens the index's range. Indices for each dimension (I_x) are computed according as,

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

x being the observed value of a given dimension of welfare, and *Mo* and *M* the minimum and maximum values (goalposts). The index varies within 0 and 1.

However, using linearly transformed values does not solve the problem as absolute changes of identical size result in smaller measured improvement for the country with the higher initial level (Sen, 1981; Kakwani, 1993).[10] Consider, for example, two improvements in life expectancy at birth, one from 30 to 40 years and

[10] As Decancq et al. (2009) put it, the problem of spurious convergence remains, nonetheless, with a concave transformation as "it dampens the effect of increasing values at the higher end of the distribution" (p. 17).

another from 70 to 80 years. These increases are identical in absolute terms, but the second is smaller in proportion to the initial starting level.

Valuing equally identical increases in absolute terms at low and high levels may raise ethical objections, though. However, 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'. Such view is shared by Sen (1981: 292), who asserted, "as longevity becomes high, it becomes more of an achievement to raise it further". Moreover, giving more weight to saving the life of younger over older people implies an arbitrary value judgement (Deaton, 2006).

The shortcomings of a linear transformation of original values become more evident when quality is taken into account. Life expectancy at birth, and literacy and schooling rates are just crude proxies for a "long and healthy life" (Engineer et al., 2009) and for access to knowledge, respectively, which constitute the well-being aims in the capabilities approach.

Medical research concludes that healthy life expectancy increases in line (or even more than proportionally) with life expectancy at birth and that, as life expectancy raises, disability for the same age-cohort falls (Salomon et al., 2012; Mathers et al., 2001). In other words, the quality of life rises for each age cohort as life expectancy at birth increases.[11] Similarly, the quality of education, measured in terms of cognitive skills, grows as the quantity of education increases (Hanushek and Kimko,

[11] The decline in age-specific disability as life expectancy at birth increases is compatible, however, with the recent finding that years lost to disability (YLD) rise with life expectancy because YLD tend to concentrate at the end of life (Salomon et al., 2012). So, perhaps, the view that while longevity increases, periods of ill-health can be longer, but are lived in better health and less disability, due to medical technologic advance (Manton, 1982), qualifies Fries (1980) morbidity compression hypothesis (See the discussion in Fries et al., 2011 and Lindgren, 2016). Studying the United States over 1990-2005 Cutler et al. (2014) argued that the reduction in disabled life expectancy and the increase in disability-free life expectancy suggest the compression of morbidity. Also Chernew et al. (2016) found an increase in healthy life expectancy along a fall in disable life expectancy in the U.S. during 1992-2008. However, this finding is not confirmed on the basis of self-reported chronic disease and Beltrán-Sánchez et al. (2016) conclude that there is no clear evidence of compression of morbidity. The sceptical view also find support in the case of Europe, for which Heger and Kolodziej (2016) do not find that medical progress reduces the disabling impact of diseases, associating population ageing with an extension of morbidity.

2000; Altinok et al., 2014).[12] The bottom line is that more years of life and education imply higher quality of health and education during childhood and adolescence.

Unfortunately no historical data on health-adjusted life expectancy and quality-adjusted education measures for the broad country sample considered here are available before 1990. In fact, whether an association between mortality and morbidity existed between 1870 and 1990 remains an unknown (Riley, 1990; Howse, 2006; Bleakley, 2007, 2010). However, Nanak Kakwani's (1993) proposal of transforming social dimensions with a non linear function, in which achievements of the same absolute size have a larger impact as the starting point is higher, may provide a short-cut method to derive proxies for healthy life expectancy and cognitive skills on the basis of crude figures for life expectation at birth and literacy and enrolment rates and years of schooling.[13]

Kakwani (1993) constructed a normalised index from an achievement function in which an increase in the standard of living of a country at a higher level implies a greater achievement than would have been the case had it occurred at a lower level,

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

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

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) 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

[12] The correlation between quality and quantity of education over 1965-2010 appears high at world scale but declines when the sample is restricted to developed countries, suggesting that as the quantity of education gets higher, quality increases become more than proportional (Altinok et al., 2014).

[13] Life expectancy at birth defined, by the UN, as "The average number of years that a newborn could expect to live, if he or she were subject to the age-specific mortality rates of a given period" http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/health/life_expectancy.pdf . The rate of adult literacy is defined as the percentage of the population aged 15 years and over who is able to read and write. The unadjusted enrolment rate is the percentage of population aged 5-24 enrolled in primary, secondary, and tertiary education that has been corrected for the pre-1980 era to obtain gross enrolment rates (GER). Since 1980 GER are available. Years of schooling represent the average years of total schooling (primary, secondary, and tertiary) for population aged 25 and over. See the discussion, sources, and procedures in Prados de la Escosura (2018).

1. In this context, the linear transformation represents a particular case, for $\varepsilon = 0$, which yields expression [1] for each dimension of the index.[14]

Well-being inequality is also address here using a composite index, which represents an alternative to the UNDP's conventional HDI, a Historical Index of Human Development (HIHD) (Prados de la Escosura, 2015). As the conventional HDI, the HIHD includes as proxies for a healthy life, access to knowledge, and other aspects of well-being (not directly associated to health and education), measures of longevity (life expectancy at birth), education (years of schooling), and material well-being (discounted per capita income, in logs), respectively. The difference is that non-income variables are transformed non-linearly using expression [3], rather than linearly (as in the HDI), so increases of the same absolute size represent greater achievements the higher the level at which they take place. As regards the income dimension, it has been derived using expression [1] and per capita GDP in logs. Although this is a far from satisfactory solution, relaxing the assumption of diminishing returns to income would make per capita GDP –not having an asymptotic upper bound- the driver of the human development index, rendering the latter redundant.[15]

The HIHD has been obtained as a multiplicative combination of the transformed values of each dimension.[16] If we denote the non-linearly transformed values of life expectancy at birth and years of schooling as *L* and *S*, respectively, and the adjusted *per capita* income as *Y*, the historical index of human development is derived as,

$$HIHD = L^{1/3} S^{1/3} Y^{1/3} \qquad [4]$$

[14] In the case of life expectancy, maximum and minimum values accepted are 85 and 20 years, respectively, while 0 and 100 will be the upper and lower bounds for adult literacy and gross enrolment (primary, secondary and tertiary) rates, and 0 and 15 years are the goalposts in the case of years of schooling (UNDP, 2014). A 'floor' of 25 years has been assumed for of life expectancy at birth, while for literacy and enrolment rates, the highest and lowest historical values have been set at 99 and 1 per cent, respectively, and 0.01 years in the case of years of schooling. See the discussion, sources, and computation procedures in Prados de la Escosura (2018).

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

[16] Since all dimensions are considered indispensable, they are assigned equal weights (UNDP, 2010). Upper and lower bounds and maximum and minimum levels for life expectancy and years of schooling are those of footnote 14. In the case of per capita income, the upper and lower bounds, expressed in Geary-Khamis [G-K] 1990 dollars, $46,949 and $100, respectively. A 'floor' of $300 has been accepted. See the discussion in Prados de la Escosura (2018).

Trends in Well-being Inequality

Is well-being inequality higher in the world today than it was in the late nineteenth century? Can we distinguish different phases in its evolution? How do different dimensions of well-being compare? What were the main drivers of inequality?

The overview of the literature shows that most studies address inequality in social dimensions of well-being using their original values (and, occasionally, their linear transformation) but this approach tends to bias the results favouring convergence. Such spurious tendency is mitigated here, if not totally suppressed, by resorting to Kakwani non-linear transformation of health and education dimensions (see Hobijn and Franses, 2001). Therefore, the results presented in this section should provide a more accurate picture of well-being inequality trends.

Alternative inequality measures are chosen, as they differ in their sensitivity to different parts of the distribution. Thus, Atkinson class A(ε) indices (in which ε represents an inequality aversion parameter usually ranging from 0.5 to 2.5) –with the larger ε, the more sensitive the index is to differences at the bottom of the distribution-, for which I have chosen ε=2, is one option. The Gini coefficient, which is more sensitive to the middle (mode) of the distribution, is also selected. Lastly, entropy indices G(0), which corresponds to Henri Theil's (1967) population weighted index, also known as Mean Logarithmic Deviation (MLD), and G(1), or Theil's income weighted index, known for short, as Theil, are considered. In entropy indices G(α), the more positive (negative) α, the more sensitive the index is to differences at the top (bottom) of the distribution. Hence, MLD is more sensitive to the bottom, and Theil to the top of the distribution.

Two types of inequality estimates are presented here, inequality between country averages in which all countries are given the same weight, regardless their size, that is, Milanovic's (2005) Inequality 1; and inequality between country averages but weighted by countries size, so a large country counts more than a small one, namely, Milanovic's Inequality 2. The unweighted measure of inequality (Inequality 1) allows for the fact that policies are implemented at country level and impact on its citizens' well-being. Besides, weighted measures (Inequality 2) are very sensitive to the

performance of highly populated countries. However, Inequality 2, although implicitly assumes perfectly equal within-country distribution, does get us closer to a measure of world distribution by assigning higher value to more populated countries (Milanovic, 2005: 7-8). Unfortunately, no data on within-country distribution of social dimensions of well-being are available for such a large sample and time span.[17]

Different country samples have been used in the alternative inequality estimates, for which the longer the time span, the narrower the spatial coverage. Thus, over the entire time span, 1870-2015, 96 countries are considered, its number rising up to 105, 138, 155, and 164 countries for the samples starting in 1913, 1950, 1980, and 1990, respectively. The country samples represent above 90 per cent of the world population. The results of these samples have been spliced using as benchmark the more recent period, which has larger country coverage (Prados de la Escosura, 2018).

Does population-weighted international inequality (Inequality 2) provide a good proxy for global inequality, that is, inequality among world inhabitants (Inequality 3)? This would be the case if between-country inequality, rather than within-country inequality, drives global inequality.[18] Evidence on global inequality estimates both for per capita income and education supports this hypothesis (Bourguignon and Morrisson, 2002: van Zanden et al., 2013; Morrisson and Murtin, 2013). It will be, then, assumed here that inter-country dispersion provides a lower bound measure of global inequality.[19]

As international inequality has been usually assessed in terms of per capita GDP, I will start by looking at inequality in average incomes so the conventional yardstick is provided.[20] If we firstly delve into unweighted measures (Inequality 1), a sustained increase in income inequality appears for those indices sensitive to

[17] Clio Infra https://www.clio-infra.eu/ efforts to provide inequality measures for education and income fall short of the amount of data required in my estimates.
[18] This assertion only applies in the context of perfectly decomposable entropy indices, but for the Gini, the overlap component, which tends to evolve in opposite direction to between-country inequality, also matters (Milanovic, 2005: 25).
[19] It could also be argued that the dispersion in social dimensions tends to be significant lower than in the case of income, namely, the longevity or education gap between the rich and the poor is less than proportional to their income gap.
[20] The data sources and procedures are exposed in Prados de la Escosura (2018). The country estimates for the different well-being dimensions examined here are accessible at http://espacioinvestiga.org/home-hihd/?lang=en.

changes at the bottom of the distribution: in the Atkinson coefficient, A(ε=2), all the way to 2000, stabilising hereafter; also in the MLD, but for flattening between the 1950s and 1980s, and falling with the new century (Figure 1a and Table 1). Meanwhile, for the Theil, a measure sensitive to the top of the distribution, the rise in inequality stopped in 1950, opening the way to a steady decline down to 1990 and shadowing MLD behaviour henceforth. The Gini, more sensitive to the middle of the distribution, also peaked in 1950, stabilising thereafter but fluctuating along the Theil. It is worth stressing the sharp increase in inequality between the end of the Great Depression and 1950 across all inequality measures that may be attributed to the uneven impact of World War II.

When population-weighted inequality across countries (inequality 2), is examined, all indices show a sustained rise up to 1950, slowing down to the 1980s, and declining thereafter (Figure 1b and Table 1). Indices' behaviour, nonetheless, differed since the mid-twentieth century, with the Gini and the Theil, rather stable and only falling since 2000, and the MLD and Atkinson rising and falling, with 1980 as a turning point.

Population and GDP expanded at different pace across countries over the long run. Did inequality rise because per capita income GDP grew at different rates across countries, or just because population grew faster in countries with either low or high income? A way to provide an answer is to simulate the yearly rates at which, other things being equal, inequality would have evolved had all countries enjoyed identical per capita income (population) growth.[21] The results from the simulation indicate that differences in the pace of economic growth across countries explain the evolution of income inequality, while no significant impact derives from the dispersion in rates of population growth (Table 2).

There is a consensus in the literature about the impact of large countries on population-weighted inequality, but how much do they condition Inequality 2 levels and trends? Excluding India and China allow us to find out how much of the described trends in international income inequality results from their evolution

[21] The practical way of carrying out the simulation here has been computing weighted inequality measures in which initial level of population has been kept constant over specific periods: 1870-1913, 1913-1950, 1950-1990, and 1990-2015.

(Figure 2 and Table 3). It appears that the two large Asian countries contributed significantly to a higher level of international inequality until 1990, particularly over 1913-1980, and to its reduction thereafter. Alternatively, excluding Sub-Saharan Africa allows us to observe that, since the mid-1980s, this region has gradually contributed to raising international income inequality.

A further question is the extent to which inequality 2 is driven by the gap between advanced and developing countries and by the dispersion within each of these two groups. Here advanced countries comprise those belonging to the OECD prior to its enlargement in 1994 (*OECD*, for short, or the *West*, as this group of countries is indistinctively labelled throughout the paper).[22] It can be noticed that the gap between the *West* and the *Rest* was the main contributor to the aggregate level of inequality until the mid-1950s, on the basis of the MLD, and for the entire time span considered in terms of the Theil. The dispersion within the two groups explains trends in international inequality over 1930-2000, both the sustained rise between the early 1930s and mid-1970s and its reduction from 1980 to 2000 (Figures 3a and 3b and Table 4). A closer look shows that it was the growing disparity between developing regions what determined the levels and trends of post-1950 international income inequality (Table 4, col. 6).

Does international inequality in social dimensions of well-being replicate trends and levels of income inequality? Access to knowledge is a component of welfare to be considered. Three alternative measures of education are considered here: the literacy rate, a stock variable that is certainly the most relevant one in early stages of development but that has also been considered as the main driver of the dispersion over the long run of a more complete indicator, years of schooling (Morrison and Murtin, 2013). The gross enrolment rate for primary, secondary, and tertiary education, a flow variable that probably captures better formal education and, since

[22] In this paper, *OECD*, or the *West*, coincides largely – but not completely – with the membership of the Organisation for Economic Co-operation and Development (OECD) up to 1994: Western Europe, its 'Western Offshoots', and Japan. Western Europe includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Three OECD members are excluded: Iceland and Luxemburg are left out for lack of human development estimates; Turkey is counted with Asia in order to reduce group heterogeneity in terms of development. 'Western Offshoots' consists of Australia, Canada, New Zealand and the United States.

most of its progress has been achieved through public education, provides a measure of government intervention. Lastly, years of schooling, another stock variable, is the most comprehensive metric but has, nonetheless, the downside of its lower country coverage.[23]

High levels of inequality I and II -well above those for per capita income and life expectancy at birth- are observed for all access to knowledge proxy measures in the late nineteenth and early twentieth century, prior to the diffusion of mass primary education (Benavot and Riddle, 1988; Lindert, 2004).

In the case of literacy, both Inequality I and II started from high levels and experienced steady decline throughout most of the twentieth century, even though the levels remained high until its last quarter (Figures 4a and 5b). For example, the Gini moved from 0.7 to 0.3 over 1870-2015 but was still at 0.5 in 1970 and only fell below 0.4 by 1990. Moreover, when measured by the Atkinson index, inequality remained stable until mid-twentieth century following, then, a long run and steady decline (Table 5).

In terms of enrolment, inequality fell to the early 1980s, but suffered a reversal in the 1990s, stabilising thereafter (Figures 5a and 5b). Only in the case of the Atkinson index, the decline of Inequality 1 was deferred until the second half of the twentieth century (Table 6). As in the case of literacy, inequality levels remained high until mid-twentieth century (it only fell below 0.4 in the 1950s).

Inequality in years of schooling fell steadily since World War I, except for the Atkinson index that initiated its decline afterwards (since 1938 and 1929 for the unweighted and population-weighted measures, respectively) (Figures 6a and 6b). Nonetheless, inequality was still high in the third quarter of the twentieth century with a Gini of 0.45 as late as 1975 (Table 7).

In all education measures, the dispersion of its improvement across countries, rather than the variance of population growth, explains the inequality contraction over the long run (Table 8).

In order to ascertain the extent to which large countries conditioned population-weighted measures of inequality, I have simulated literacy, enrolment, and

[23] Also the less detailed discussion of the dataset sources by their authors Lee and Lee (2016) and Barro and Lee (2013) has been taken into account. See Prados de la Escosura (2018).

years of schooling inequality in the absence of China and India, firstly, and, then, in the absence of the Sub-Saharan African region (Figures 7a, 7b, and 7c). It appears that China and India contributed to higher levels of inequality in the Interwar years when measured in terms of literacy; prior to World War II, in terms of enrolment; and between 1913 and 1960, in years of schooling; and, then, to lower levels in the 1960s and from 1990 onwards (literacy), and since 1950 and 1970 (enrolment and years of schooling, respectively). Interestingly, China and India also contributed to lower inequality in terms of literacy and years of schooling prior to 1900. Sub-Saharan Africa contributed to higher inequality since 1890 (literacy) and 1950 (enrolment), and from the 1920s onwards (years of schooling), but also to lower inequality prior to 1900 in the case of enrolment (Tables 9-11).

How do trends in education inequality compare to those obtained by Morrisson and Murtin (2013)? These authors computed inter-country education inequality on the basis of the original values of average years of schooling and, therefore, the resulting level of inequality is systematically lower than those provided here, as bounded variables exhibit a spurious tendency towards convergence. Nonetheless, inequality fell in Morrisson and Murtin's estimates, as also happened when I replicated the measurement of inequality using original values of the education variables (literacy and gross enrolment rates and years of schooling). Nonetheless, the reduction of inequality was much less intense than when computed on the basis on Kakwani indices and, in the case of enrolment, no reversal appears in the 1990s (Figures 8a, 8b, and 8c).

Breaking down aggregate inequality 2 into inequality between *OECD* countries and the rest of the world and inequality within each of the two groups reveals that, in the case of literacy, the gap between the *West* and the *Rest* made the main contribution to the level of international inequality until the early 1930s, according to the Theil, and had a similar contribution to that of the dispersion within each group until 1900 according to the MLD; but largely drove total inequality until mid-twentieth century (World War II, MLD; 1950, Theil). Henceforth, the dispersion in literacy standards within the two groups was the main driver (Table 12 and Figures 9a and 9b). A closer inspection reveals that it was actually the dispersion within the developing regions what drove inequality trends since mid-twentieth century (Table 12, col. 6).

In the case of enrolment, the gap between the *West* and the *Rest* represented the largest share of international inequality until the twentieth century (1900 for the MLD and 1930 for the Theil) and only drove inequality trends until the 1920s, when within-group inequality -largely within the *Rest*- took over, except for the 1990s (Table 13 and Figures 10a and 10b). Thus, although educational practices became increasingly globalised since the interwar years, were diffused unevenly in developing regions (Table 13, col. 6).

When measured in years of schooling, both the level and trend of inequality are determined by the dispersion within the *West* and the *Rest* (Table 14), and more specifically the latter, according to the MLD, but only since 1950, on the basis of the Theil (Figures 11a and 11b).

Longevity is an essential well-being dimension. Inequality trends in life expectancy, as measured by different unweighted indices, provide a common picture, although less intense when computed by the Gini coefficient (Table 15). Different phases can be identified for unweighted and population-weighted inequality. Inequality 1 rose up to the early 1920s, but for a reversal between 1900 and 1913. Then, a sustained inequality decline took place between the late 1920s and mid-1980s, more intense during the late thirties and forties. The declining trend reverted after 1990, with inequality going back to its level of the mid-1970s by the mid-2000s, stabilising later and returning to the level of the late 1990s by 2015 (Figure 12a). In the case of Inequality 2, the evolution was similar but for more intense increase up to the mid-1920s when higher levels were reached, and a sharper contraction to 1985, followed by a milder reversal up to 2005 (Figure 12b).

The performance of large countries had a far from negligible impact on inequality 2 (Table 16). India and China contributed significantly to rise of inequality up to the mid-1920s and, then, partly offset its reduction until the mid-1950s. In particular, the high mortality in China during Mao's Great Leap Forward caused the dramatic increase in inequality brought inequality back to the pre-World War II high level by 1960. Since the 1960s, China and India have contributed to the inequality decline (Figure 13). Excluding Sub-Saharan Africa does not alter world inequality trends, but reduces its level up to the early 1920s and increases it from the late 1920s onwards, especially, since the mid-1960s.

It is also worth noting that the variance in life expectancy gains across countries, rather than the dispersion in population growth, is what explains the inequality decline over the long run (Table 17).

How do inequality trends in life expectancy compare to those obtained by previous studies? Bourguignon and Morrisson (2002) computed inequality 2 on the basis of the original values of life expectancy at birth and, since bounded variables tend to converge over time, the level of inequality is systematically lower than in my estimates; nonetheless, their estimates also exhibit a sustained decline. This inequality underestimate is confirmed by the comparison between life expectancy inequality measures computed from original values and Kakwani indices. Furthermore, the inequality measure obtained from original values does not capture the post-1985 reversal (Figure 14).

Trends in inequality 2 have been decomposed into between-group inequality, that is, the gap between the *OECD* and the *Rest* of the world, and inequality within each of these two groups (Table 20). It is only up to World War II, that the gap between the *West* and the *Rest* made the largest contribution to international inequality; thereafter, within group inequality became its main contributor (Figures 15a and 15b). However, the dispersion within *OECD* and the *Rest* drove inequality trends up to the 1920s, while the reduction in the gap between the *West* and the *Rest* steered the decline in aggregate inequality between 1929 and 1970. The post-1990 increase in inequality was due to the dispersion within the *Rest* (Table 18).

So far trends in life expectancy inequality have been drawn, but how can they be explained? And why are so different from those of per capita income?

Health improvements can be depicted in terms of a health function (Preston, 1975). Movements along the function represent gains that can be attributed to economic growth and result in nutrition improvements -that strengthen the immune system and reduce morbidity (Stolnitz, 1955; McKeown et al., 1962, 1975; Fogel, 2004)- and in the public provision of health (Loudon, 2000; Cutler and Miller, 2005). Outward shifts in the health function capture, in turn, medical technological change, which has been the main contributor to the long run increase in longevity since the late nineteenth century (McKinlay and McKinlay, 1977; Riley, 2005b; Cutler et al., 2006).

The epidemiological or health transition –that is, the phase in which persistent gains in lower mortality and higher survival are achieved as infectious disease gives way to chronic disease as the main cause of death (Omran, 1971; Riley, 2001)- is associated to the diffusion of the germ theory of disease since the 1880s (Preston, 1975) that led to the introduction of new vaccines since the 1890s. Moreover, medical technological progress introduced new drugs to cure infectious diseases -sulpha drugs since the late 1930s (Easterlin 1999) and antibiotics since the 1950s-, contributing to spread the health transition (Easterlin, 1999; Jayachandran et al., 2010; Lindgren, 2016).

However, widespread gains in longevity that lay beneath the decline in life expectancy inequality during the globalisation backlash (1914-1950), a time of economic distress, demand further explanations that are also linked to the germ theory of disease. Thus, improvements in public health –often at low cost, as low incomes prevented the purchase of the new drugs- and the diffusion of preventive methods of disease transmission and knowledge dissemination through school education contributed to reducing infant mortality and maternal death, two major determinants of the increase in life expectancy at birth in developing regions (Riley, 2001).

During the epidemiological transition substantial achievements in longevity were attained but not shared equally within societies and across countries. Lack of economic means and basic scientific knowledge prevented a fast and wide diffusion of new medical technology and health practice across countries. Thus, in the late nineteenth and early twentieth century, the increase in life expectancy inequality can be associated to the fact that the first health transition was unevenly distributed and initially restricted to advanced western countries.

The gradual international diffusion of the health transition between the 1920s and the 1970s helps to explain the reduction in life expectancy inequality. Its contraction was particularly intense during the 1930s and 1940s, at a time of stagnant or declining average incomes in many countries and increasing international income inequality as a result of the Great Depression and World War II (Table 1 and Figures 2a and 2b). This was due to the improvement of life expectancy in countries of low per

capita income levels as a consequence of the first health transition (Mandle, 1970; Reher, 2003; Riley, 2005a).

The increase in life expectancy inequality after 1990 may be associated, not just to the impact of HIV-AIDS in Sub Saharan Africa or to the demise of socialism in Eastern Europe, but also to a second health transition that so far has been restricted to the *West*. In this new transition, mortality and morbidity fall among the elderly as a result of new medical knowledge that has permitted a better treatment of respiratory and cardiovascular disease and vision problems (particularly, cataract surgery) (Cutler et al., 2006; Chernew et al., 2016; Eggleston and Fuchs, 2012). The rise in longevity has also been helped by better nutrition in early years of life. The result is people living not just longer life but longer healthy life years (Mathers et al., 2001; Murray and Lopez, 1997; Salomon et al., 2012).[24]

To sum up, episodes of rising international inequality in life expectancy in the late nineteenth and early twentieth century and, then, in the late twentieth and early twentieth-first century, coincide with the early stages of the epidemiological and the second health transitions, respectively, and result from the uneven diffusion of new medical knowledge and technology and health practices.

Thus, an association could be proposed between the level of longevity and its international distribution. The Gini that corresponds to different levels of life expectancy at birth (both estimated from Kakwani indices) is presented in Figure 16a. An inverted U shape curve relationship results that could be deemed a Health Kuznets Curve.[25] The driving force of the Health Kuznets Curve (HKC) would be the spread of the health transitions across countries. The uneven diffusion of the epidemiological or first transition would account for its rise, while its gradual diffusion across the globe would explain its decline. It is worth noting that the HKC shows a steep rise reaching a peak at low levels of life expectancy and a smoother and longer decline.

[24] Politics may have also contributed to shape inequality trends. It has been argued that autocracies successfully fought mortality through government intervention during the first health transition, but democracies facilitated the new health transition with fewer constraints on medical innovation, so gains in life expectancy have been larger in democratic than in authoritarian countries since the late twentieth century (Devereux, 2010; Mackenbach, 2013).

[25] This depiction of the Health Kuznets Curve differs from the one proposed by Costa-Font et al. (2018) who compare income-related health inequality and per capita income. In my case, both levels and inequality measures correspond to life expectancy.

Moreover, it could be insinuated that the closing of the Health Kuznets Curve gave way to a new one. The new HKC appears, nonetheless, to have been short-lived as longevity differences across countries resulting from the uneven diffusion of the second health transition (Cutler et al. 2006) have been offset, at least temporarily, by the recovery of life expectancy in Sub Saharan Africa and in former socialist Europe.

The same exercise has been replicated on the basis of untransformed values of life expectancy at birth with similar results but for the emergence of a second HKC (Figure 16b).

Since the different well-being dimensions discussed exhibit contradictory trends, a look at the international distribution of a composite measure such as the Historical Index of Human Development (HIHD) seems warranted.[26]

The evolution of human development inequality 1 shows that, after a phase of stability in the late nineteenth century, but for the increase of the Atkinson index, it experienced a sustained decline between the 1900s and 1980s and, then, stabilised for the rest of the twentieth century, resuming its decline since 2010 (Figure 17a and Table 19). In the case of Inequality 2, it rose up to 1900 for those indices more sensitive to changes at the bottom in the distribution (MLD and Atkinson) and the subsequent decline was more intense across the board up to the 1980s and, then, continued at steady, but slower, pace until 2015 (Figure 17b).

It is worth noting that, as in the case of its dimensions, it is the variance in human development gains across countries, rather than the dispersion in population growth, what explained inequality evolution (Table 20).

Large countries affected significantly the evolution of Inequality 2. China and India contributed to raising its level until 1960 and reducing it since the mid-1970s (Figure 18). Sub Saharan Africa has made a sustained contribution to raising inequality since the mid-1960s, especially after 1990 (Table 21).

When aggregate inequality 2 is decomposed into the gap between the *West* and the *Rest* and the dispersion within both groups, it appears that the gap made the largest contribution to the level of international inequality up to 1900 for the MLD and

[26] The HIHD used here is an adaptation of the 2010 (UNDP, 2010) index and uses average years of total schooling for population aged 25 and over as the measure of education. See the discussion of the alternative HIHD estimates in Prados de la Escosura (2018).

the 1930s for the Theil (Figures 190a and 19b and Table 22), while the dispersion within the two groups, especially in the *Rest*, took over from mid-twentieth century onwards (Table 26). However, inequality trends were driven by the gap between the *West* and the *Rest* up to the early 1960s.

Given the multiplicative composition of the human development index (expression 4), when measured with an entropy index, a breakdown of human development inequality can be performed into the equally weighted sum of each components' inequality -life expectancy (L), years of schooling (S), and adjusted income (Y)-, plus a residual, that accounts for the disparities between the components' distributions (Martínez, 2016: 417-418).

$$MLD_{hihd} = 1/3\ MLD_L + 1/3\ MLD_S + 1/3\ MLD_Y + R \qquad [5]$$

$$Theil_{hihd} = 1/3\ Theil_L + 1/3\ Theil_S + 1/3\ Theil_Y + R \qquad [6]$$

It can be observed that the level of human development inequality depended chiefly on the distribution of education over the long run, while longevity raised inequality up to the mid-1920s and its contribution faded away since the early 1960s (Figures 20a and 20b and Table 23).

Concluding Remarks

Well-being inequality has declined over time. The globalisation of mass primary education and the health transitions appear as the main drivers of such an equalising trend. The gap between the *West* and the *Rest* explains only partially the evolution of well-being inequality as the dispersion within developing regions increasingly determined its trends.

The diffusion of the health transitions has driven life expectancy inequality. During most of the twentieth century, as the epidemiological transition spread across the globe, life expectancy rose and its dispersion fell. Then, it came to a halt as the transition was completed. At the turn of the century, a new, second health transition, linked to the successful fight against cardiovascular and respiratory disease, emerged, extending life expectancy of the elderly in the developed world and provoking an increase in health inequality.

These findings are at odds with the view on long run inequality derived from real per capita GDP. While population-weighted income inequality increased until the third quarter of the twentieth century, inequality in social dimensions declined since World War I. Furthermore, the contrast between inequality in terms of income and human development is striking (Figure 21) and challenges the idea that per capita income provides a good predictor of welfare trends.

Why inequality declined in terms of social dimensions, but not of GDP per head? Was it due to public policy, or to the fact that medical technology is a public good? Why has there been no second health transition in the *Rest*? Is it the outcome of inequalising new medical technologies, or of lack of public policies? As the new medical technologies become accessible, is it foreseeable a decline in life expectancy inequality in the twentieth-first century? Answering these challenging questions requires an ambitious research programme.

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Table 1

International Inequality in Real Per Capita GDP, 1870-2015

	Unweighted				Population weighted			
	MLD	Theil	Gini	Atkinson (ε=2)	MLD	Theil	Gini	Atkinson (ε=2)
1870	0.26	0.32	0.40	0.36	0.17	0.20	0.32	0.25
1880	0.29	0.36	0.42	0.39	0.21	0.25	0.36	0.30
1890	0.31	0.38	0.44	0.42	0.25	0.28	0.39	0.34
1900	0.33	0.40	0.45	0.44	0.29	0.32	0.43	0.39
1913	0.37	0.44	0.47	0.48	0.35	0.36	0.46	0.45
1925	0.39	0.45	0.48	0.50	0.38	0.40	0.48	0.48
1929	0.42	0.47	0.49	0.53	0.40	0.41	0.49	0.50
1933	0.38	0.44	0.47	0.49	0.32	0.33	0.44	0.44
1938	0.42	0.48	0.49	0.53	0.40	0.39	0.48	0.51
1950	0.48	0.54	0.52	0.58	0.56	0.54	0.55	0.62
1955	0.48	0.53	0.52	0.58	0.53	0.51	0.54	0.60
1960	0.47	0.49	0.51	0.58	0.55	0.51	0.54	0.62
1965	0.46	0.44	0.50	0.59	0.57	0.52	0.55	0.62
1970	0.48	0.45	0.51	0.61	0.60	0.54	0.56	0.64
1975	0.48	0.41	0.50	0.62	0.62	0.54	0.56	0.66
1980	0.48	0.40	0.49	0.63	0.62	0.55	0.56	0.66
1985	0.48	0.39	0.49	0.63	0.59	0.56	0.56	0.64
1990	0.51	0.42	0.50	0.65	0.62	0.59	0.57	0.64
1995	0.56	0.46	0.52	0.68	0.57	0.57	0.56	0.63
2000	0.58	0.47	0.53	0.70	0.56	0.57	0.55	0.62
2005	0.58	0.45	0.52	0.71	0.50	0.50	0.52	0.61
2010	0.54	0.42	0.50	0.70	0.41	0.40	0.47	0.58
2015	0.53	0.41	0.50	0.70	0.38	0.36	0.45	0.58

Table 2

Population Growth Dispersion: Contribution to Real Per Capita GDP Inequality (population-weighted MLD and Theil)

	MLD		Theil	
	Actual	Fixed Initial Population	Actual	Fixed Initial Population
1870	**0.18**	**0.18**	**0.21**	**0.21**
1880	0.22	0.22	0.25	0.25
1890	0.26	0.25	0.28	0.28
1900	0.31	0.30	0.33	0.32
1913	0.36	0.35	0.37	0.37
1913	**0.36**	**0.36**	**0.37**	**0.37**
1925	0.40	0.39	0.41	0.40
1929	0.42	0.42	0.42	0.41
1933	0.34	0.34	0.34	0.34
1938	0.42	0.43	0.40	0.40
1950	0.57	0.58	0.55	0.53
1950	**0.57**	**0.57**	**0.55**	**0.55**
1955	0.55	0.55	0.53	0.52
1960	0.56	0.57	0.52	0.52
1965	0.58	0.59	0.54	0.53
1970	0.61	0.62	0.56	0.54
1975	0.63	0.64	0.56	0.53
1980	0.63	0.65	0.57	0.54
1985	0.61	0.63	0.57	0.54
1990	0.62	0.64	0.59	0.55
1990	**0.62**	**0.62**	**0.59**	**0.59**
1995	0.57	0.57	0.57	0.56
2000	0.56	0.55	0.57	0.55
2005	0.50	0.48	0.50	0.48
2007	0.47	0.45	0.46	0.43
2010	0.41	0.39	0.40	0.37
2015	0.38	0.35	0.36	0.32

Table 3

International Inequality in Real GDP per head, 1870-2015: The Contribution of China and India and Sub Saharan Africa (population-weighted MLD)

	Actual	Excluding China and India	Excluding Sub Saharan Africa
1870	0.17	0.17	0.17
1880	0.21	0.21	0.21
1890	0.25	0.22	0.24
1900	0.29	0.23	0.29
1913	0.35	0.25	0.35
1925	0.38	0.29	0.38
1929	0.40	0.29	0.40
1933	0.32	0.23	0.32
1938	0.40	0.26	0.40
1950	0.56	0.39	0.56
1955	0.53	0.39	0.53
1960	0.55	0.39	0.55
1965	0.57	0.42	0.56
1970	0.60	0.44	0.60
1975	0.62	0.45	0.61
1980	0.62	0.46	0.61
1985	0.59	0.50	0.57
1990	0.62	0.56	0.58
1995	0.57	0.61	0.52
2000	0.56	0.63	0.50
2005	0.50	0.61	0.42
2010	0.41	0.56	0.32
2015	0.38	0.55	0.28

Table 4

Decomposing International Inequality in Real Per Capita GDP, 1870-2015 (population-weighted MLD and Theil)

MLD

	Within-group	Between-group	TOTAL	*OECD*	The *Rest*
1870	0.03	0.14	0.17	0.05	0.03
1880	0.04	0.17	0.21	0.05	0.04
1890	0.06	0.19	0.25	0.05	0.06
1900	0.08	0.21	0.29	0.05	0.09
1913	0.11	0.23	0.35	0.05	0.13
1925	0.12	0.26	0.38	0.06	0.13
1929	0.14	0.26	0.40	0.05	0.16
1933	0.12	0.20	0.32	0.04	0.14
1938	0.18	0.23	0.40	0.06	0.20
1950	0.27	0.29	0.56	0.12	0.30
1955	0.25	0.28	0.53	0.09	0.28
1960	0.28	0.27	0.55	0.06	0.32
1965	0.29	0.28	0.57	0.05	0.34
1970	0.34	0.26	0.60	0.03	0.40
1975	0.37	0.24	0.62	0.03	0.43
1980	0.38	0.24	0.62	0.02	0.43
1985	0.34	0.25	0.59	0.03	0.39
1990	0.34	0.28	0.62	0.02	0.39
1995	0.30	0.27	0.57	0.02	0.34
2000	0.28	0.28	0.56	0.02	0.31
2005	0.26	0.24	0.50	0.03	0.29
2010	0.24	0.18	0.41	0.02	0.26
2015	0.23	0.15	0.38	0.03	0.26

Theil

	Within-group	Between-group	TOTAL	*OECD*	The *Rest*
1870	0.04	0.16	0.20	0.04	0.03
1880	0.04	0.20	0.25	0.04	0.04
1890	0.06	0.22	0.28	0.05	0.07
1900	0.07	0.25	0.32	0.05	0.10
1913	0.09	0.27	0.36	0.05	0.13
1925	0.09	0.30	0.40	0.05	0.15
1929	0.10	0.30	0.41	0.05	0.17
1933	0.09	0.24	0.33	0.03	0.15
1938	0.13	0.27	0.39	0.05	0.21
1950	0.20	0.34	0.54	0.11	0.30
1955	0.17	0.34	0.51	0.08	0.29
1960	0.18	0.33	0.51	0.05	0.33
1965	0.19	0.33	0.52	0.04	0.35
1970	0.22	0.32	0.54	0.03	0.42
1975	0.24	0.30	0.54	0.02	0.44
1980	0.24	0.31	0.55	0.02	0.44
1985	0.23	0.32	0.56	0.03	0.41
1990	0.23	0.36	0.59	0.02	0.43
1995	0.21	0.36	0.57	0.02	0.38
2000	0.19	0.37	0.57	0.02	0.35
2005	0.18	0.32	0.50	0.02	0.30
2010	0.16	0.23	0.40	0.02	0.25
2015	0.16	0.20	0.36	0.03	0.23

Table 5

International Inequality in Literacy, 1870-2015
(Kakwani Indices)

	Unweighted				Population weighted			
	MLD	**Theil**	**Gini**	**Atkinson (ε=2)**	**MLD**	**Theil**	**Gini**	**Atkinson (ε=2)**
1870	1.45	1.06	0.73	0.94	1.14	0.87	0.67	0.92
1880	1.46	1.02	0.72	0.95	1.03	0.84	0.67	0.89
1890	1.48	1.00	0.72	0.96	1.02	0.84	0.67	0.89
1900	1.44	0.94	0.70	0.96	1.04	0.81	0.67	0.91
1913	1.42	0.92	0.69	0.96	1.02	0.79	0.66	0.89
1925	1.30	0.81	0.66	0.96	1.00	0.76	0.65	0.87
1929	1.26	0.79	0.65	0.95	0.99	0.75	0.65	0.87
1933	1.20	0.76	0.64	0.95	0.95	0.71	0.63	0.86
1938	1.17	0.73	0.63	0.95	0.85	0.64	0.60	0.84
1950	1.02	0.64	0.60	0.92	0.69	0.50	0.54	0.81
1955	0.86	0.58	0.57	0.87	0.61	0.46	0.51	0.76
1960	0.78	0.54	0.55	0.84	0.56	0.43	0.50	0.73
1965	0.67	0.48	0.52	0.79	0.50	0.39	0.48	0.69
1970	0.56	0.42	0.50	0.73	0.46	0.38	0.47	0.63
1975	0.51	0.38	0.47	0.69	0.43	0.36	0.46	0.59
1980	0.43	0.33	0.45	0.63	0.38	0.34	0.45	0.54
1985	0.38	0.30	0.42	0.59	0.34	0.30	0.42	0.50
1990	0.33	0.25	0.39	0.54	0.28	0.25	0.39	0.43
1995	0.29	0.23	0.37	0.50	0.25	0.23	0.37	0.41
2000	0.25	0.19	0.34	0.45	0.22	0.19	0.34	0.38
2005	0.23	0.18	0.32	0.43	0.20	0.18	0.33	0.35
2010	0.20	0.16	0.30	0.41	0.17	0.15	0.30	0.32
2015	0.19	0.14	0.29	0.38	0.16	0.14	0.29	0.31

Table 6

International Inequality in Gross Enrolment, 1870-2015
(Kakwani Indices)

	Unweighted				Population weighted			
	MLD	Theil	Gini	Atkinson (ε=2)	MLD	Theil	Gini	Atkinson (ε=2)
1870	0.98	0.77	0.64	0.79	1.42	1.12	0.76	0.93
1880	0.99	0.75	0.64	0.81	1.43	1.05	0.74	0.95
1890	0.95	0.68	0.61	0.81	0.94	0.79	0.66	0.83
1900	0.95	0.65	0.60	0.82	1.05	0.80	0.67	0.87
1913	0.87	0.59	0.58	0.81	0.92	0.69	0.63	0.85
1925	0.71	0.48	0.52	0.79	0.62	0.52	0.55	0.72
1929	0.66	0.44	0.51	0.77	0.55	0.46	0.52	0.68
1933	0.63	0.43	0.50	0.76	0.56	0.46	0.51	0.69
1938	0.60	0.40	0.49	0.77	0.62	0.50	0.54	0.74
1950	0.48	0.32	0.43	0.73	0.33	0.27	0.41	0.61
1955	0.41	0.28	0.40	0.69	0.25	0.20	0.35	0.54
1960	0.32	0.24	0.38	0.57	0.19	0.15	0.30	0.43
1965	0.25	0.20	0.34	0.47	0.17	0.14	0.30	0.36
1970	0.22	0.17	0.32	0.44	0.15	0.13	0.28	0.30
1975	0.20	0.15	0.30	0.41	0.13	0.11	0.26	0.28
1980	0.16	0.12	0.27	0.35	0.11	0.09	0.24	0.22
1985	0.14	0.11	0.25	0.32	0.11	0.10	0.25	0.21
1990	0.15	0.12	0.26	0.31	0.12	0.12	0.27	0.22
1995	0.17	0.15	0.29	0.33	0.14	0.15	0.28	0.24
2000	0.19	0.18	0.32	0.35	0.16	0.16	0.30	0.26
2005	0.18	0.18	0.33	0.31	0.14	0.15	0.30	0.23
2010	0.17	0.17	0.32	0.28	0.13	0.14	0.28	0.21
2015	0.17	0.17	0.32	0.27	0.12	0.13	0.27	0.20

Table 7

International Inequality in Years of Schooling, 1870-2015
(Kakwani Indices)

	Unweighted				Population weighted			
	MLD	**Theil**	**Gini**	**Atkinson (ε=2)**	**MLD**	**Theil**	**Gini**	**Atkinson (ε=2)**
1870	0.90	0.58	0.57	0.95	0.81	0.57	0.58	0.90
1880	0.95	0.60	0.58	0.97	1.32	0.89	0.70	1.00
1890	0.96	0.61	0.58	0.98	1.38	0.87	0.69	1.02
1900	0.95	0.59	0.58	0.98	1.09	0.78	0.66	0.95
1913	1.04	0.63	0.59	1.00	1.39	0.92	0.71	1.03
1925	0.90	0.56	0.57	0.97	1.16	0.78	0.66	0.99
1929	0.82	0.53	0.55	0.93	1.01	0.71	0.63	0.95
1933	0.79	0.51	0.55	0.93	0.88	0.65	0.62	0.90
1938	0.74	0.49	0.54	0.91	0.79	0.61	0.60	0.86
1950	0.65	0.46	0.52	0.84	0.62	0.52	0.55	0.74
1955	0.60	0.43	0.50	0.80	0.53	0.46	0.52	0.68
1960	0.55	0.40	0.49	0.77	0.48	0.43	0.51	0.64
1965	0.52	0.38	0.48	0.73	0.42	0.38	0.48	0.59
1970	0.49	0.37	0.47	0.71	0.39	0.36	0.47	0.57
1975	0.44	0.34	0.45	0.67	0.36	0.34	0.45	0.53
1980	0.38	0.29	0.42	0.62	0.32	0.31	0.42	0.48
1985	0.32	0.24	0.39	0.56	0.26	0.26	0.39	0.42
1990	0.28	0.22	0.36	0.52	0.23	0.23	0.37	0.38
1995	0.25	0.20	0.35	0.48	0.21	0.21	0.35	0.35
2000	0.24	0.19	0.34	0.45	0.19	0.19	0.33	0.32
2005	0.23	0.18	0.33	0.43	0.18	0.18	0.32	0.30
2010	0.22	0.18	0.33	0.41	0.17	0.17	0.32	0.29
2015	0.20	0.16	0.32	0.37	0.15	0.15	0.29	0.25

Table 8

Population Growth Dispersion: Contribution Education Inequality (population-weighted MLD)

	Literacy		Gross Enrolment		Years of Schooling	
	Actual	Fixed Initial Population	Actual	Fixed Initial Population	Actual	Fixed Initial Population
1870	**1.03**	**1.03**	**1.25**	**1.25**	**0.78**	**0.78**
1880	0.93	0.92	1.27	1.27	1.27	1.27
1890	0.92	0.90	0.83	0.82	1.33	1.32
1900	0.95	0.92	0.93	0.93	1.05	1.02
1913	0.92	0.90	0.81	0.82	1.33	1.34
1913	**0.92**	**0.92**	**0.81**	**0.81**	**1.33**	**1.33**
1925	0.90	0.90	0.54	0.53	1.11	1.09
1929	0.90	0.89	0.48	0.47	0.97	0.96
1933	0.86	0.85	0.49	0.49	0.84	0.84
1938	0.77	0.75	0.55	0.54	0.76	0.76
1950	0.67	0.59	0.33	0.26	0.61	0.58
1950	**0.67**	**0.67**	**0.33**	**0.33**	**0.61**	**0.61**
1955	0.59	0.59	0.24	0.24	0.52	0.52
1960	0.55	0.55	0.19	0.19	0.47	0.47
1965	0.49	0.49	0.17	0.17	0.41	0.41
1970	0.45	0.46	0.15	0.15	0.39	0.39
1975	0.42	0.43	0.13	0.13	0.36	0.36
1980	0.37	0.38	0.11	0.10	0.31	0.31
1985	0.33	0.34	0.11	0.11	0.26	0.26
1990	0.28	0.28	0.12	0.13	0.23	0.23
1990	**0.28**	**0.28**	**0.12**	**0.12**	**0.23**	**0.23**
1995	0.25	0.25	0.14	0.14	0.21	0.21
2000	0.22	0.21	0.16	0.15	0.19	0.18
2005	0.20	0.19	0.14	0.14	0.18	0.17
2007	0.19	0.18	0.13	0.13	0.17	0.16
2010	0.17	0.16	0.13	0.13	0.17	0.16
2015	0.16	0.15	0.12	0.12	0.15	0.14

Table 9

International Inequality in Literacy, 1870-2015: The Contribution of China and India and Sub Saharan Africa (MLD) (Kakwani Indices)

	Actual	Excluding China and India	Excluding Sub Saharan Africa
1870	1.14	1.12	1.15
1880	1.03	1.10	1.02
1890	1.02	1.11	1.00
1900	1.04	1.08	1.01
1913	1.02	0.97	0.97
1925	1.00	0.85	0.96
1929	0.99	0.82	0.95
1933	0.95	0.78	0.90
1938	0.85	0.76	0.79
1950	0.69	0.69	0.58
1955	0.61	0.62	0.52
1960	0.56	0.59	0.48
1965	0.50	0.52	0.43
1970	0.46	0.47	0.41
1975	0.43	0.43	0.38
1980	0.38	0.39	0.35
1985	0.34	0.35	0.31
1990	0.28	0.30	0.25
1995	0.25	0.28	0.23
2000	0.22	0.25	0.20
2005	0.20	0.23	0.18
2010	0.17	0.20	0.14
2015	0.16	0.19	0.13

Table 10

International Inequality in Gross Enrolment, 1870-2015: The Contribution of China and India and Sub Saharan Africa (MLD) (Kakwani Indices)

	Actual	Excluding China and India	Excluding Sub Saharan Africa
1870	1.42	1.05	1.51
1880	1.43	0.98	1.52
1890	0.94	0.90	0.97
1900	1.05	0.79	1.08
1913	0.92	0.68	0.93
1925	0.62	0.47	0.61
1929	0.55	0.44	0.53
1933	0.56	0.43	0.55
1938	0.62	0.47	0.60
1950	0.33	0.38	0.27
1955	0.25	0.30	0.19
1960	0.19	0.25	0.14
1965	0.17	0.23	0.13
1970	0.15	0.19	0.11
1975	0.13	0.16	0.09
1980	0.11	0.13	0.09
1985	0.11	0.13	0.10
1990	0.12	0.14	0.11
1995	0.14	0.17	0.12
2000	0.16	0.19	0.13
2005	0.14	0.17	0.13
2010	0.13	0.16	0.12
2015	0.12	0.16	0.11

Table 11

International Inequality in Years of Schooling, 1870-2015: The Contribution of China and India and Sub Saharan Africa (MLD) (Kakwani Indices)

	Actual	Excluding China and India	Excluding Sub Saharan Africa
1870	0.81	1.47	0.82
1880	1.32	1.44	1.34
1890	1.38	1.39	1.41
1900	1.09	1.26	1.07
1913	1.39	0.83	1.40
1925	1.16	0.69	1.15
1929	1.01	0.63	1.00
1933	0.88	0.59	0.86
1938	0.79	0.55	0.77
1950	0.62	0.50	0.60
1955	0.53	0.48	0.50
1960	0.48	0.46	0.45
1965	0.42	0.43	0.39
1970	0.39	0.41	0.37
1975	0.36	0.40	0.34
1980	0.32	0.35	0.29
1985	0.26	0.30	0.24
1990	0.23	0.29	0.22
1995	0.21	0.26	0.19
2000	0.19	0.25	0.17
2005	0.18	0.23	0.15
2010	0.17	0.22	0.15
2015	0.15	0.19	0.13

Table 12

Decomposing International Inequality in Literacy (population-weighted): MLD and Theil (Kakwani Indices)

MLD

	Within-group	Between-group	TOTAL	*OECD*	*The Rest*
1870	0.61	0.48	1.14	0.19	0.69
1880	0.51	0.47	1.03	0.18	0.58
1890	0.49	0.48	1.02	0.17	0.55
1900	0.58	0.42	1.04	0.15	0.68
1913	0.54	0.43	1.02	0.13	0.64
1925	0.58	0.39	1.00	0.09	0.70
1929	0.62	0.35	0.99	0.08	0.75
1933	0.63	0.30	0.95	0.07	0.76
1938	0.63	0.22	0.85	0.07	0.76
1950	0.54	0.16	0.69	0.05	0.65
1955	0.49	0.13	0.61	0.04	0.58
1960	0.47	0.10	0.56	0.04	0.56
1965	0.40	0.11	0.50	0.03	0.47
1970	0.37	0.10	0.46	0.02	0.43
1975	0.34	0.09	0.43	0.02	0.39
1980	0.30	0.08	0.38	0.02	0.35
1985	0.27	0.07	0.34	0.01	0.31
1990	0.21	0.07	0.28	0.01	0.23
1995	0.19	0.06	0.25	0.01	0.22
2000	0.17	0.05	0.22	0.00	0.20
2005	0.16	0.05	0.20	0.00	0.18
2010	0.14	0.03	0.17	0.00	0.16
2015	0.14	0.02	0.16	0.00	0.16

Theil

	Within-group	Between-group	TOTAL	*OECD*	*The Rest*
1870	0.27	0.54	0.87	0.14	0.49
1880	0.27	0.51	0.84	0.13	0.50
1890	0.26	0.52	0.84	0.13	0.52
1900	0.30	0.47	0.81	0.12	0.63
1913	0.27	0.47	0.79	0.10	0.59
1925	0.29	0.43	0.76	0.07	0.69
1929	0.33	0.39	0.75	0.06	0.75
1933	0.34	0.34	0.71	0.06	0.73
1938	0.38	0.25	0.64	0.05	0.73
1950	0.32	0.18	0.50	0.04	0.56
1955	0.31	0.15	0.46	0.03	0.51
1960	0.32	0.12	0.43	0.03	0.50
1965	0.27	0.13	0.39	0.02	0.42
1970	0.26	0.12	0.38	0.02	0.40
1975	0.25	0.11	0.36	0.02	0.37
1980	0.24	0.10	0.34	0.01	0.34
1985	0.22	0.09	0.30	0.01	0.30
1990	0.16	0.09	0.25	0.01	0.22
1995	0.15	0.07	0.23	0.01	0.20
2000	0.13	0.05	0.19	0.00	0.17
2005	0.12	0.05	0.18	0.00	0.16
2010	0.11	0.03	0.15	0.00	0.14
2015	0.11	0.03	0.14	0.00	0.14

Table 13

Decomposing International Inequality in Gross Enrolment (population-weighted): MLD and Theil (Kakwani Indices)

MLD					
	Within-group	**Between-group**	**TOTAL**	***OECD***	***The Rest***
1870	0.51	0.79	1.42	0.09	0.61
1880	0.69	0.66	1.43	0.08	0.84
1890	0.41	0.47	0.94	0.06	0.49
1900	0.57	0.43	1.05	0.06	0.70
1913	0.55	0.35	0.92	0.04	0.68
1925	0.39	0.22	0.62	0.06	0.47
1929	0.34	0.20	0.55	0.04	0.41
1933	0.40	0.16	0.56	0.04	0.48
1938	0.56	0.08	0.62	0.04	0.69
1950	0.24	0.09	0.33	0.04	0.28
1955	0.18	0.06	0.25	0.04	0.22
1960	0.16	0.04	0.19	0.04	0.18
1965	0.15	0.03	0.17	0.07	0.16
1970	0.12	0.03	0.15	0.02	0.14
1975	0.11	0.02	0.13	0.01	0.13
1980	0.09	0.02	0.11	0.00	0.11
1985	0.09	0.02	0.11	0.02	0.10
1990	0.09	0.03	0.12	0.03	0.10
1995	0.08	0.06	0.14	0.06	0.09
2000	0.10	0.06	0.16	0.03	0.11
2005	0.09	0.05	0.14	0.03	0.10
2010	0.07	0.06	0.13	0.03	0.08
2015	0.07	0.05	0.12	0.02	0.07

Theil					
	Within-group	**Between-group**	**TOTAL**	***OECD***	***The Rest***
1870	0.22	0.81	1.12	0.08	0.73
1880	0.28	0.69	1.05	0.07	0.93
1890	0.21	0.52	0.79	0.05	0.56
1900	0.27	0.48	0.80	0.05	0.73
1913	0.27	0.39	0.69	0.04	0.66
1925	0.25	0.25	0.52	0.06	0.47
1929	0.22	0.23	0.46	0.04	0.40
1933	0.26	0.19	0.46	0.03	0.47
1938	0.42	0.09	0.50	0.04	0.67
1950	0.16	0.11	0.27	0.04	0.24
1955	0.12	0.07	0.20	0.03	0.17
1960	0.11	0.05	0.15	0.04	0.14
1965	0.11	0.03	0.14	0.06	0.13
1970	0.10	0.03	0.13	0.02	0.13
1975	0.09	0.02	0.11	0.01	0.11
1980	0.08	0.02	0.09	0.00	0.10
1985	0.08	0.03	0.10	0.02	0.09
1990	0.08	0.04	0.12	0.03	0.10
1995	0.08	0.07	0.15	0.06	0.08
2000	0.09	0.07	0.16	0.03	0.11
2005	0.09	0.07	0.15	0.03	0.10
2010	0.07	0.07	0.14	0.03	0.09
2015	0.07	0.06	0.13	0.02	0.08

Table 14

Decomposing International Inequality in Years of Schooling (population-weighted): MLD and Theil (Kakwani Indices)

MLD

	Within-group	Between-group	TOTAL	*OECD*	*The Rest*
1870	0.63	0.20	0.81	0.29	0.94
1880	0.86	0.46	1.32	0.28	1.12
1890	0.90	0.48	1.38	0.25	1.21
1900	0.59	0.48	1.09	0.19	0.77
1913	0.86	0.53	1.39	0.13	1.05
1925	0.76	0.40	1.16	0.10	0.93
1929	0.67	0.34	1.01	0.09	0.82
1933	0.58	0.30	0.88	0.09	0.71
1938	0.53	0.27	0.79	0.09	0.63
1950	0.41	0.21	0.62	0.08	0.49
1955	0.34	0.18	0.53	0.08	0.40
1960	0.31	0.17	0.48	0.08	0.36
1965	0.27	0.15	0.42	0.09	0.30
1970	0.25	0.14	0.39	0.10	0.28
1975	0.23	0.13	0.36	0.11	0.26
1980	0.21	0.11	0.32	0.11	0.22
1985	0.18	0.09	0.26	0.10	0.19
1990	0.15	0.08	0.23	0.08	0.16
1995	0.14	0.07	0.21	0.07	0.15
2000	0.13	0.06	0.19	0.05	0.14
2005	0.11	0.06	0.18	0.04	0.12
2010	0.10	0.06	0.17	0.04	0.11
2015	0.09	0.06	0.15	0.03	0.10

Theil

	Within-group	Between-group	TOTAL	*OECD*	*The Rest*
1870	0.41	0.17	0.57	0.26	0.93
1880	0.46	0.42	0.89	0.25	1.17
1890	0.42	0.44	0.87	0.22	1.11
1900	0.33	0.44	0.78	0.19	0.80
1913	0.34	0.56	0.92	0.13	0.88
1925	0.32	0.44	0.78	0.09	0.74
1929	0.31	0.39	0.71	0.08	0.67
1933	0.30	0.34	0.65	0.08	0.61
1938	0.29	0.31	0.61	0.08	0.57
1950	0.26	0.25	0.52	0.07	0.48
1955	0.24	0.21	0.46	0.07	0.41
1960	0.23	0.20	0.43	0.07	0.36
1965	0.20	0.18	0.38	0.08	0.29
1970	0.19	0.17	0.36	0.09	0.26
1975	0.18	0.16	0.34	0.10	0.24
1980	0.17	0.13	0.31	0.10	0.21
1985	0.15	0.11	0.26	0.10	0.18
1990	0.13	0.10	0.23	0.08	0.16
1995	0.12	0.09	0.21	0.07	0.15
2000	0.11	0.08	0.19	0.05	0.13
2005	0.10	0.08	0.18	0.04	0.12
2010	0.09	0.08	0.17	0.04	0.11
2015	0.08	0.07	0.15	0.02	0.10

Table 15

International Inequality in Life Expectancy, 1870-2015
(Kakwani Indices)

	Unweighted				Population weighted			
	MLD	**Theil**	**Gini**	**Atkinson (ε=2)**	**MLD**	**Theil**	**Gini**	**Atkinson (ε=2)**
1870	0.21	0.24	0.35	0.30	0.22	0.25	0.36	0.30
1880	0.23	0.25	0.37	0.32	0.24	0.26	0.37	0.33
1890	0.26	0.27	0.39	0.36	0.30	0.32	0.42	0.40
1900	0.28	0.28	0.41	0.38	0.35	0.35	0.44	0.45
1913	0.27	0.27	0.40	0.38	0.39	0.37	0.46	0.49
1925	0.30	0.29	0.42	0.41	0.41	0.37	0.47	0.52
1929	0.26	0.26	0.39	0.38	0.24	0.25	0.38	0.36
1933	0.25	0.24	0.38	0.37	0.23	0.23	0.37	0.34
1938	0.21	0.21	0.36	0.32	0.20	0.21	0.35	0.30
1950	0.16	0.15	0.31	0.28	0.16	0.16	0.31	0.27
1955	0.15	0.14	0.30	0.27	0.15	0.15	0.30	0.25
1960	0.15	0.14	0.30	0.26	0.20	0.19	0.34	0.32
1965	0.13	0.12	0.28	0.24	0.10	0.10	0.25	0.19
1970	0.12	0.11	0.26	0.22	0.08	0.08	0.22	0.16
1975	0.11	0.10	0.25	0.22	0.08	0.07	0.21	0.15
1980	0.10	0.09	0.23	0.19	0.07	0.06	0.19	0.13
1985	0.09	0.08	0.22	0.18	0.06	0.06	0.19	0.12
1990	0.09	0.08	0.22	0.19	0.06	0.06	0.19	0.13
1995	0.10	0.09	0.23	0.21	0.07	0.06	0.19	0.14
2000	0.11	0.09	0.24	0.21	0.07	0.07	0.20	0.14
2005	0.11	0.10	0.25	0.22	0.08	0.07	0.21	0.15
2010	0.11	0.10	0.25	0.21	0.08	0.07	0.21	0.15
2015	0.09	0.09	0.24	0.17	0.06	0.06	0.19	0.12

Table 16

International Inequality in Life Expectancy, 1870-2015: The Contribution of China and India and Sub Saharan Africa (MLD) (Kakwani Indices)

	Actual	Excluding China and India	Excluding Sub Saharan Africa
1870	0.22	0.20	0.23
1880	0.24	0.21	0.24
1890	0.30	0.25	0.31
1900	0.35	0.26	0.36
1913	0.39	0.25	0.39
1925	0.41	0.24	0.41
1929	0.24	0.23	0.24
1933	0.23	0.21	0.22
1938	0.20	0.19	0.20
1950	0.16	0.16	0.15
1955	0.15	0.14	0.14
1960	0.20	0.14	0.20
1965	0.10	0.12	0.09
1970	0.08	0.10	0.07
1975	0.08	0.09	0.06
1980	0.07	0.08	0.05
1985	0.06	0.08	0.04
1990	0.06	0.08	0.04
1995	0.07	0.09	0.04
2000	0.07	0.10	0.04
2005	0.08	0.11	0.05
2010	0.08	0.11	0.05
2015	0.06	0.09	0.04

Table 17

Population Growth Dispersion: Contribution to Life Expectancy Inequality (population-weighted MLD and Theil) (Kakwani indices)

	MLD		Theil	
	Actual	Fixed Initial Population	Actual	Fixed Initial Population
1870	**0.22**	**0.22**	**0.24**	**0.24**
1880	0.24	0.24	0.26	0.26
1890	0.30	0.30	0.31	0.32
1900	0.35	0.35	0.35	0.35
1913	0.39	0.40	0.37	0.39
1913	**0.39**	**0.39**	**0.37**	**0.37**
1925	0.41	0.41	0.37	0.37
1929	0.25	0.25	0.24	0.24
1933	0.23	0.23	0.23	0.23
1938	0.20	0.20	0.20	0.20
1950	0.17	0.16	0.17	0.16
1950	**0.17**	**0.17**	**0.17**	**0.17**
1955	0.15	0.16	0.15	0.15
1960	0.20	0.21	0.19	0.19
1965	0.11	0.11	0.10	0.10
1970	0.09	0.09	0.08	0.08
1975	0.08	0.08	0.07	0.07
1980	0.07	0.07	0.06	0.06
1985	0.06	0.06	0.06	0.06
1990	0.06	0.06	0.06	0.06
1990	**0.06**	**0.06**	**0.06**	**0.06**
1995	0.07	0.07	0.06	0.06
2000	0.07	0.07	0.07	0.06
2005	0.08	0.07	0.07	0.07
2007	0.08	0.07	0.07	0.07
2010	0.08	0.07	0.07	0.07
2015	0.06	0.06	0.06	0.06

Table 18

Decomposing International Inequality in Life Expectancy (population-weighted): MLD and Theil (Kakwani Indices)

MLD

	Within-group	Between-group	TOTAL	*OECD*	*The Rest*
1870	0.07	0.15	0.22	0.04	0.08
1880	0.08	0.15	0.24	0.04	0.09
1890	0.10	0.20	0.30	0.03	0.12
1900	0.14	0.21	0.35	0.02	0.16
1913	0.16	0.22	0.39	0.02	0.20
1925	0.20	0.21	0.41	0.02	0.24
1929	0.09	0.15	0.24	0.01	0.11
1933	0.09	0.14	0.23	0.01	0.10
1938	0.07	0.13	0.20	0.01	0.09
1950	0.10	0.07	0.16	0.01	0.12
1955	0.09	0.06	0.15	0.00	0.11
1960	0.13	0.07	0.20	0.00	0.16
1965	0.07	0.03	0.10	0.00	0.08
1970	0.06	0.02	0.08	0.00	0.07
1975	0.06	0.02	0.08	0.00	0.06
1980	0.05	0.02	0.07	0.00	0.05
1985	0.04	0.02	0.06	0.00	0.05
1990	0.04	0.02	0.06	0.00	0.05
1995	0.05	0.02	0.07	0.00	0.05
2000	0.05	0.02	0.07	0.00	0.06
2005	0.06	0.02	0.08	0.00	0.06
2010	0.06	0.02	0.08	0.00	0.06
2015	0.05	0.02	0.06	0.01	0.05

Theil

	Within-group	Between-group	TOTAL	*OECD*	*The Rest*
1870	0.07	0.17	0.25	0.04	0.09
1880	0.08	0.18	0.26	0.03	0.11
1890	0.09	0.23	0.32	0.03	0.15
1900	0.10	0.25	0.35	0.02	0.19
1913	0.11	0.25	0.37	0.02	0.23
1925	0.13	0.24	0.37	0.01	0.25
1929	0.07	0.17	0.25	0.01	0.12
1933	0.07	0.16	0.23	0.01	0.11
1938	0.06	0.15	0.21	0.01	0.10
1950	0.08	0.08	0.16	0.01	0.13
1955	0.08	0.07	0.15	0.00	0.12
1960	0.11	0.08	0.19	0.00	0.17
1965	0.06	0.04	0.10	0.00	0.08
1970	0.05	0.03	0.08	0.00	0.07
1975	0.05	0.02	0.07	0.00	0.06
1980	0.04	0.02	0.06	0.00	0.05
1985	0.04	0.02	0.06	0.00	0.05
1990	0.04	0.02	0.06	0.00	0.05
1995	0.04	0.02	0.06	0.00	0.05
2000	0.05	0.02	0.07	0.00	0.06
2005	0.05	0.02	0.07	0.00	0.06
2010	0.05	0.02	0.07	0.00	0.06
2015	0.04	0.02	0.06	0.01	0.05

Table 19

International Inequality in Human Development, 1870-2015

	Unweighted				Population weighted			
	MLD	Theil	Gini	Atkinson (ε=2)	MLD	Theil	Gini	Atkinson (ε=2)
1870	0.47	0.43	0.49	0.56	0.53	0.53	0.54	0.58
1880	0.48	0.43	0.49	0.58	0.55	0.53	0.55	0.61
1890	0.48	0.42	0.49	0.59	0.59	0.54	0.56	0.64
1900	0.49	0.40	0.48	0.61	0.62	0.54	0.56	0.68
1913	0.38	0.32	0.43	0.54	0.51	0.45	0.52	0.62
1925	0.32	0.27	0.41	0.49	0.45	0.39	0.49	0.58
1929	0.29	0.25	0.39	0.45	0.33	0.31	0.44	0.46
1933	0.27	0.24	0.38	0.43	0.29	0.28	0.41	0.42
1938	0.25	0.22	0.37	0.40	0.27	0.26	0.40	0.40
1950	0.21	0.18	0.34	0.36	0.23	0.22	0.37	0.35
1955	0.20	0.17	0.33	0.34	0.20	0.19	0.34	0.31
1960	0.19	0.16	0.32	0.33	0.20	0.20	0.35	0.32
1965	0.17	0.15	0.31	0.31	0.15	0.15	0.31	0.26
1970	0.16	0.14	0.30	0.29	0.14	0.13	0.29	0.23
1975	0.15	0.13	0.29	0.28	0.12	0.12	0.28	0.22
1980	0.13	0.12	0.27	0.26	0.11	0.11	0.26	0.19
1985	0.12	0.10	0.25	0.24	0.10	0.09	0.24	0.17
1990	0.12	0.10	0.25	0.23	0.09	0.09	0.23	0.16
1995	0.11	0.10	0.24	0.23	0.08	0.08	0.22	0.15
2000	0.11	0.10	0.24	0.22	0.08	0.08	0.22	0.15
2005	0.11	0.09	0.24	0.21	0.08	0.07	0.21	0.14
2010	0.10	0.09	0.24	0.20	0.07	0.07	0.21	0.14
2015	0.09	0.08	0.23	0.18	0.06	0.06	0.19	0.11

Table 20

Population Growth Dispersion: Contribution to Human Development Inequality (population-weighted MLD and Theil) (Kakwani indices)

	MLD		Theil	
	Actual	Fixed Initial Population	Actual	Fixed Initial Population
1870	0.53	0.53	0.52	0.52
1880	0.55	0.55	0.52	0.52
1890	0.59	0.58	0.53	0.54
1900	0.61	0.61	0.53	0.54
1913	0.51	0.51	0.44	0.46
1913	0.51	0.51	0.44	0.44
1925	0.44	0.44	0.38	0.38
1929	0.33	0.33	0.31	0.30
1933	0.29	0.29	0.27	0.27
1938	0.27	0.27	0.26	0.26
1950	0.23	0.23	0.22	0.22
1950	0.23	0.23	0.22	0.22
1955	0.20	0.20	0.20	0.20
1960	0.20	0.21	0.20	0.20
1965	0.15	0.16	0.15	0.15
1970	0.14	0.14	0.13	0.13
1975	0.12	0.13	0.12	0.12
1980	0.11	0.11	0.11	0.11
1985	0.10	0.10	0.10	0.10
1990	0.09	0.09	0.09	0.09
1990	0.09	0.09	0.09	0.09
1995	0.08	0.08	0.08	0.08
2000	0.08	0.08	0.08	0.07
2005	0.08	0.07	0.07	0.07
2010	0.07	0.07	0.07	0.06
2015	0.06	0.06	0.06	0.06

Table 21

International Inequality in Human Development, 1870-2015: The Contribution of China and India and Sub Saharan Africa (MLD)

	Actual	Excluding China and India	Excluding Sub Saharan Africa
1870	0.53	0.41	0.54
1880	0.55	0.41	0.56
1890	0.59	0.43	0.60
1900	0.62	0.42	0.62
1913	0.51	0.31	0.52
1925	0.45	0.26	0.45
1929	0.33	0.24	0.32
1933	0.29	0.22	0.28
1938	0.27	0.21	0.27
1950	0.23	0.19	0.23
1955	0.20	0.18	0.19
1960	0.20	0.17	0.20
1965	0.15	0.16	0.14
1970	0.14	0.14	0.13
1975	0.12	0.14	0.11
1980	0.11	0.12	0.10
1985	0.10	0.11	0.08
1990	0.09	0.11	0.08
1995	0.08	0.11	0.07
2000	0.08	0.11	0.06
2005	0.08	0.10	0.06
2010	0.07	0.10	0.05
2015	0.06	0.09	0.04

Table 22

Decomposing International Inequality in Human Development (population-weighted): MLD and Theil

MLD

	Within-group	Between-group	TOTAL	OECD	The Rest
1870	0.21	0.31	0.53	0.05	0.25
1880	0.24	0.31	0.55	0.04	0.28
1890	0.27	0.31	0.59	0.04	0.32
1900	0.30	0.31	0.62	0.04	0.36
1913	0.26	0.25	0.51	0.03	0.32
1925	0.24	0.20	0.45	0.03	0.29
1929	0.16	0.17	0.33	0.02	0.19
1933	0.15	0.14	0.29	0.02	0.18
1938	0.14	0.13	0.27	0.03	0.16
1950	0.13	0.10	0.23	0.02	0.16
1955	0.12	0.08	0.20	0.02	0.14
1960	0.12	0.08	0.20	0.01	0.15
1965	0.09	0.06	0.15	0.01	0.11
1970	0.08	0.05	0.14	0.01	0.10
1975	0.08	0.05	0.12	0.02	0.09
1980	0.07	0.04	0.11	0.02	0.08
1985	0.06	0.03	0.10	0.01	0.07
1990	0.05	0.03	0.09	0.01	0.06
1995	0.05	0.03	0.08	0.01	0.06
2000	0.05	0.03	0.08	0.01	0.05
2005	0.05	0.03	0.08	0.01	0.05
2010	0.05	0.03	0.07	0.00	0.05
2015	0.04	0.02	0.06	0.00	0.04

Theil

	Within-group	Between-group	TOTAL	OECD	The Rest
1870	0.16	0.36	0.53	0.05	0.31
1880	0.16	0.35	0.53	0.04	0.34
1890	0.17	0.36	0.54	0.04	0.36
1900	0.17	0.35	0.54	0.04	0.37
1913	0.15	0.28	0.45	0.03	0.31
1925	0.15	0.23	0.39	0.02	0.28
1929	0.11	0.19	0.31	0.02	0.20
1933	0.11	0.17	0.28	0.02	0.18
1938	0.11	0.15	0.26	0.02	0.17
1950	0.11	0.11	0.22	0.02	0.17
1955	0.10	0.10	0.19	0.02	0.15
1960	0.10	0.09	0.20	0.01	0.15
1965	0.08	0.07	0.15	0.01	0.11
1970	0.07	0.06	0.13	0.01	0.10
1975	0.07	0.05	0.12	0.01	0.09
1980	0.06	0.05	0.11	0.01	0.08
1985	0.05	0.04	0.09	0.01	0.07
1990	0.05	0.04	0.09	0.01	0.06
1995	0.05	0.04	0.08	0.01	0.06
2000	0.04	0.03	0.08	0.01	0.05
2005	0.04	0.03	0.07	0.01	0.05
2010	0.04	0.03	0.07	0.00	0.05
2015	0.03	0.03	0.06	0.00	0.04

Table 23

Dimensions' Contributions to Human Development Inequality (population-weighted): MLD and Theil

MLD

	Life Expectancy	Years of Schooling	Adjusted Income	Residual
1870	0.07	0.27	0.01	0.18
1880	0.08	0.44	0.01	0.02
1890	0.10	0.46	0.01	0.02
1900	0.12	0.36	0.02	0.12
1913	0.13	0.46	0.02	-0.10
1925	0.14	0.39	0.02	-0.10
1929	0.08	0.34	0.02	-0.11
1933	0.08	0.29	0.02	-0.09
1938	0.07	0.26	0.02	-0.08
1950	0.05	0.21	0.03	-0.06
1955	0.05	0.18	0.02	-0.05
1960	0.07	0.16	0.02	-0.05
1965	0.03	0.14	0.02	-0.04
1970	0.03	0.13	0.02	-0.04
1975	0.02	0.12	0.02	-0.04
1980	0.02	0.11	0.02	-0.04
1985	0.02	0.09	0.02	-0.03
1990	0.02	0.08	0.02	-0.02
1995	0.02	0.07	0.01	-0.02
2000	0.02	0.06	0.01	-0.02
2005	0.03	0.06	0.01	-0.02
2010	0.03	0.06	0.01	-0.02
2015	0.02	0.05	0.01	-0.02

Theil

	Life Expectancy	Years of Schooling	Adjusted Income	Residual
1870	0.08	0.19	0.01	0.25
1880	0.09	0.30	0.01	0.13
1890	0.11	0.29	0.01	0.13
1900	0.12	0.26	0.02	0.14
1913	0.12	0.31	0.02	0.00
1925	0.12	0.26	0.02	-0.02
1929	0.08	0.24	0.02	-0.03
1933	0.08	0.22	0.02	-0.03
1938	0.07	0.20	0.02	-0.03
1950	0.05	0.17	0.03	-0.03
1955	0.05	0.15	0.02	-0.03
1960	0.06	0.14	0.02	-0.03
1965	0.03	0.13	0.02	-0.03
1970	0.03	0.12	0.02	-0.03
1975	0.02	0.11	0.02	-0.03
1980	0.02	0.10	0.02	-0.03
1985	0.02	0.09	0.02	-0.03
1990	0.02	0.08	0.02	-0.02
1995	0.02	0.07	0.01	-0.02
2000	0.02	0.06	0.01	-0.02
2005	0.02	0.06	0.01	-0.02
2010	0.02	0.06	0.01	-0.02
2015	0.02	0.05	0.01	-0.02

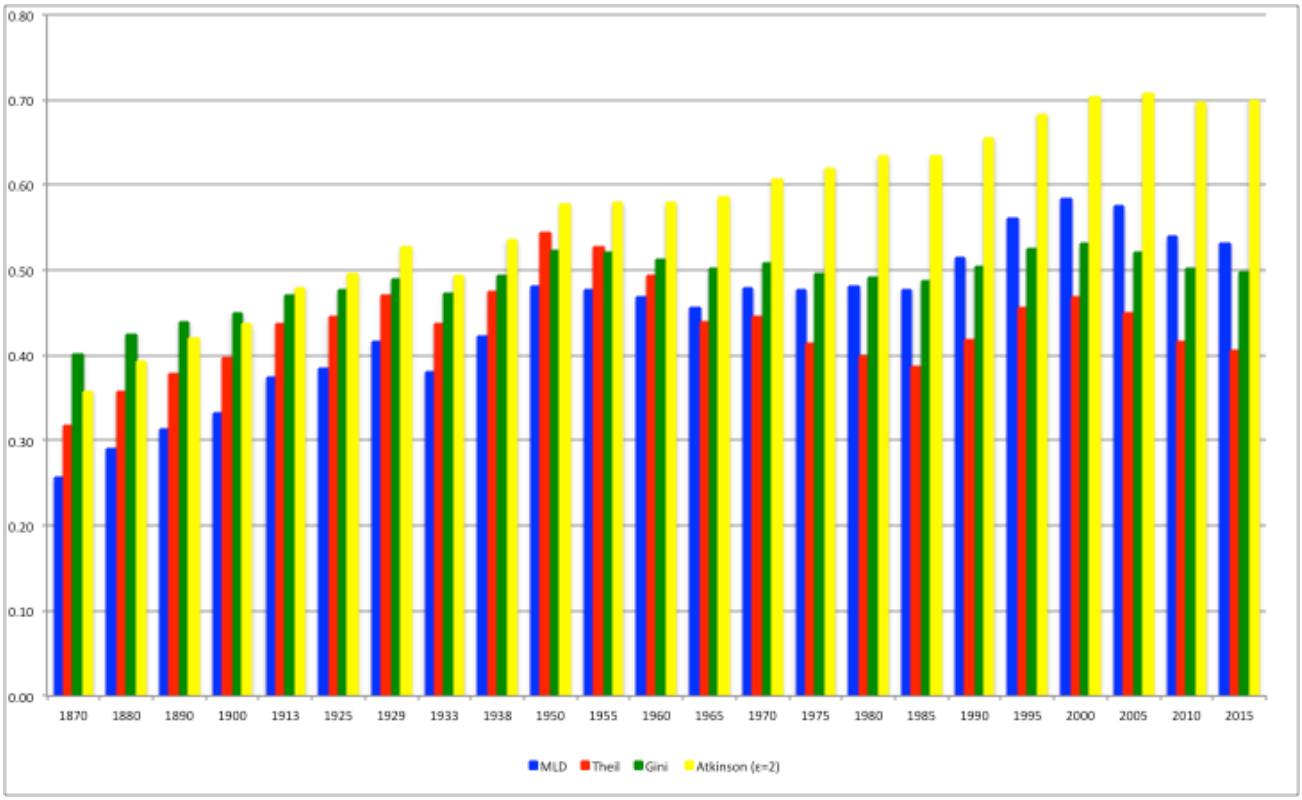

Figure 1a. Unweighted Inequality in Real Per Capita GDP, 1870-2015

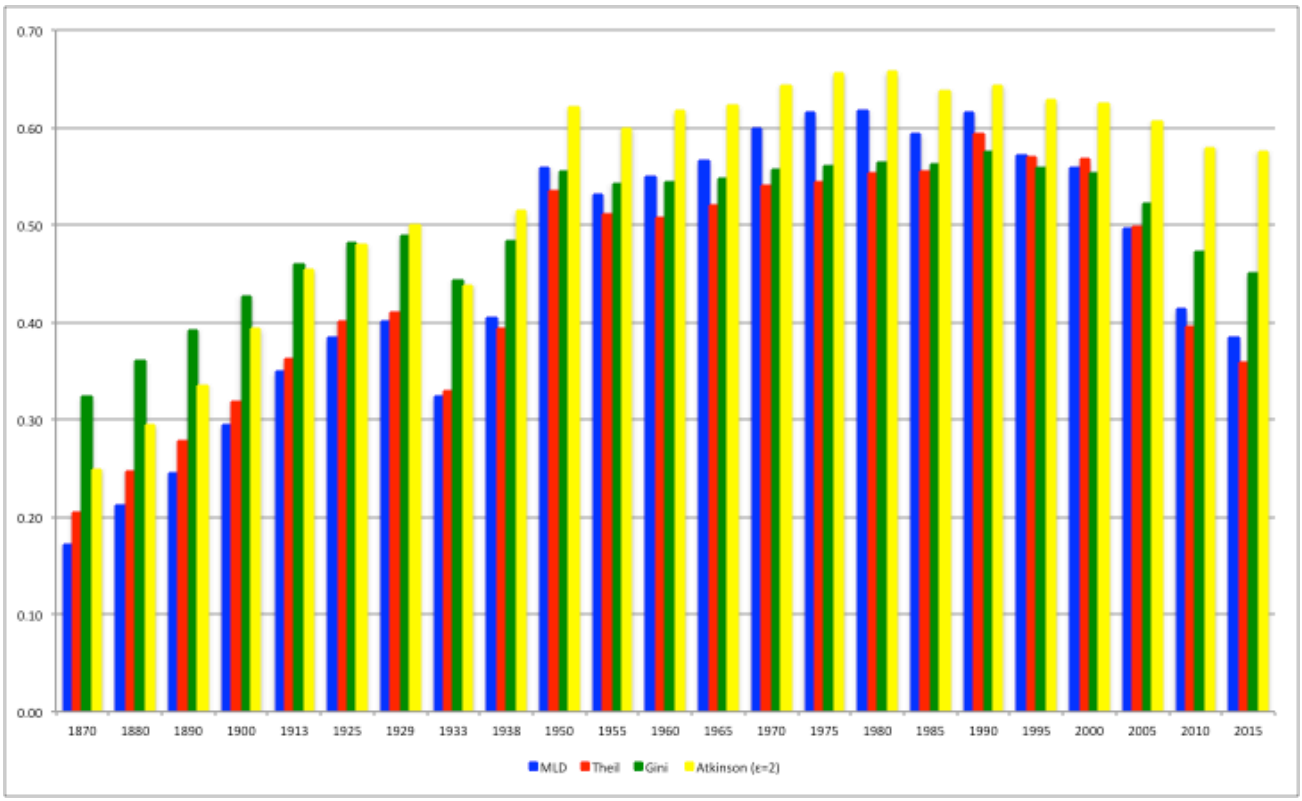

Figure 1b. Population-weighted Inequality in Real Per Capita GDP, 1870-2015

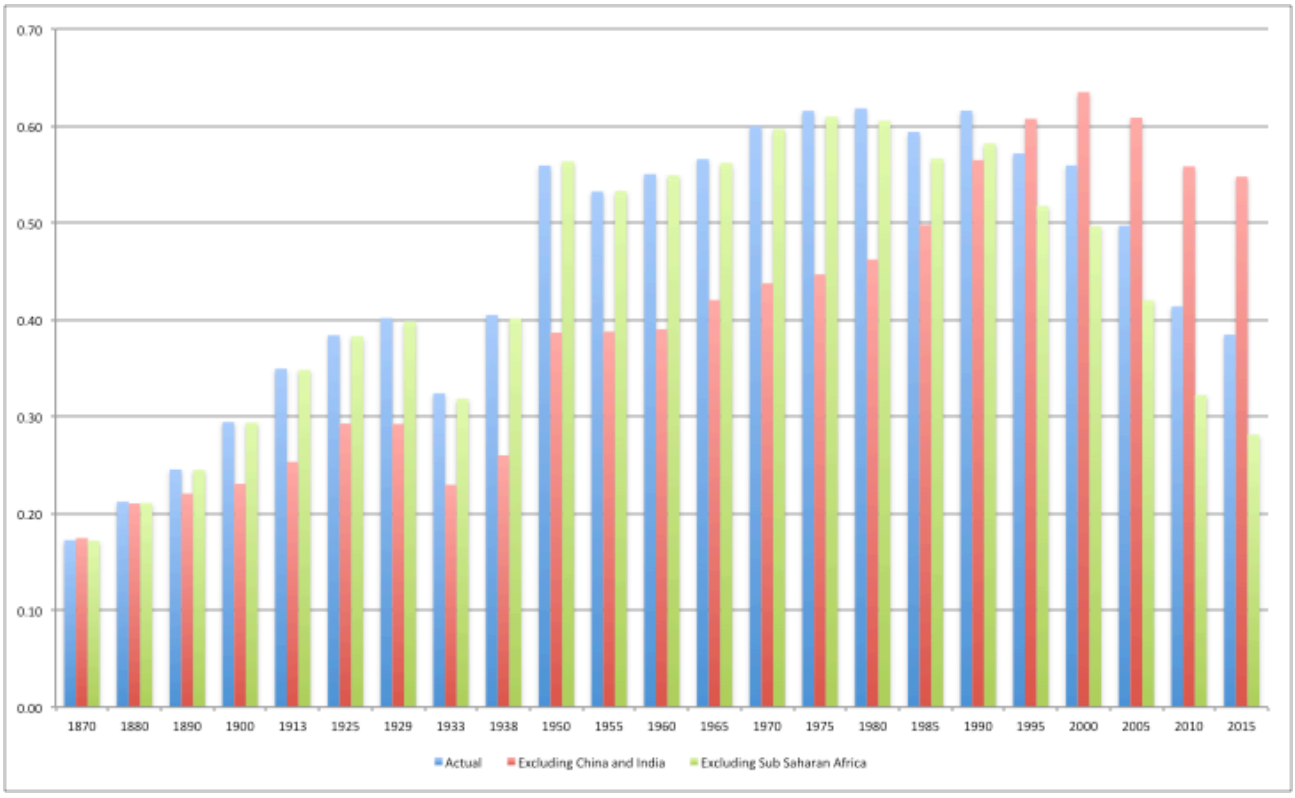

Figure 2. Population-weighted Inequality in Real GDP per Head: The Contribution of China and India and Sub Saharan Africa, 1870-2015 (MLD)

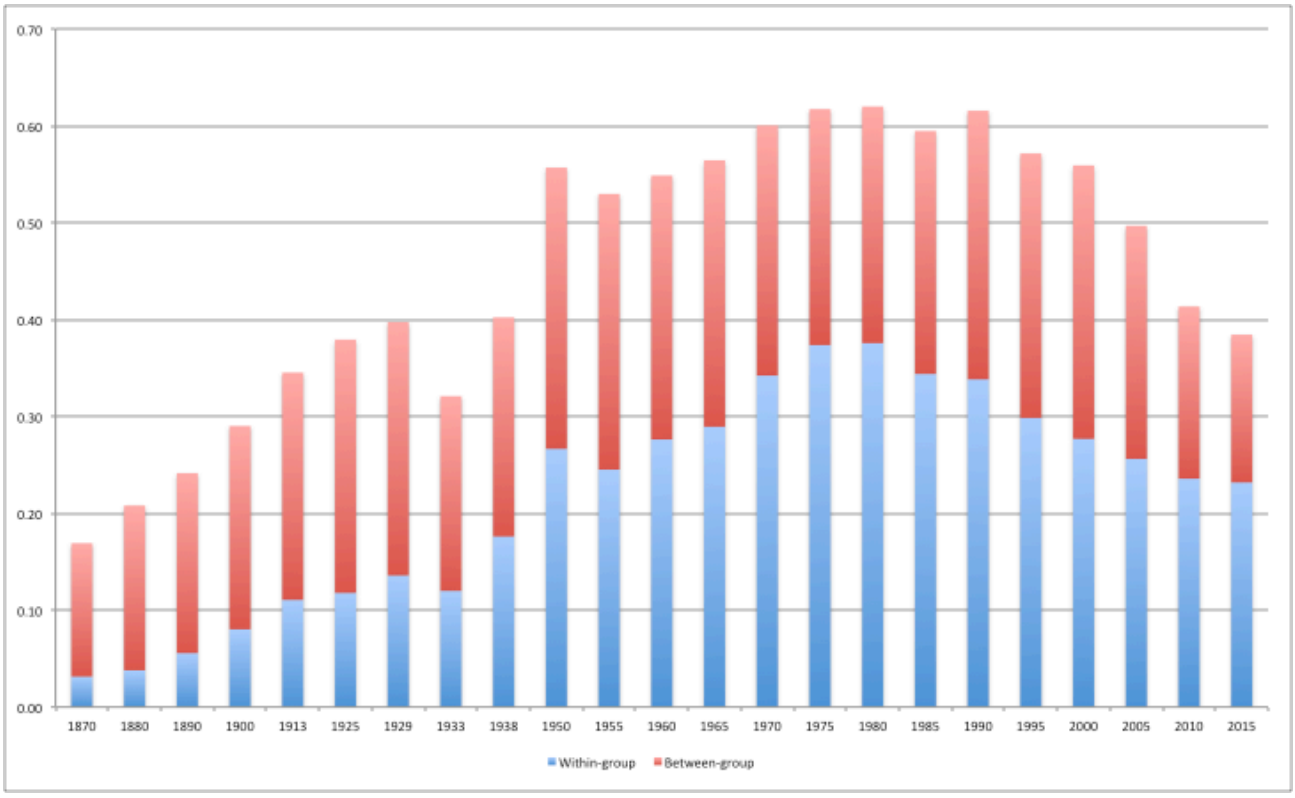

Figure 3a. Decomposing Population-weighted Inequality in Real Per Capita GDP, 1870-2015 (MLD).

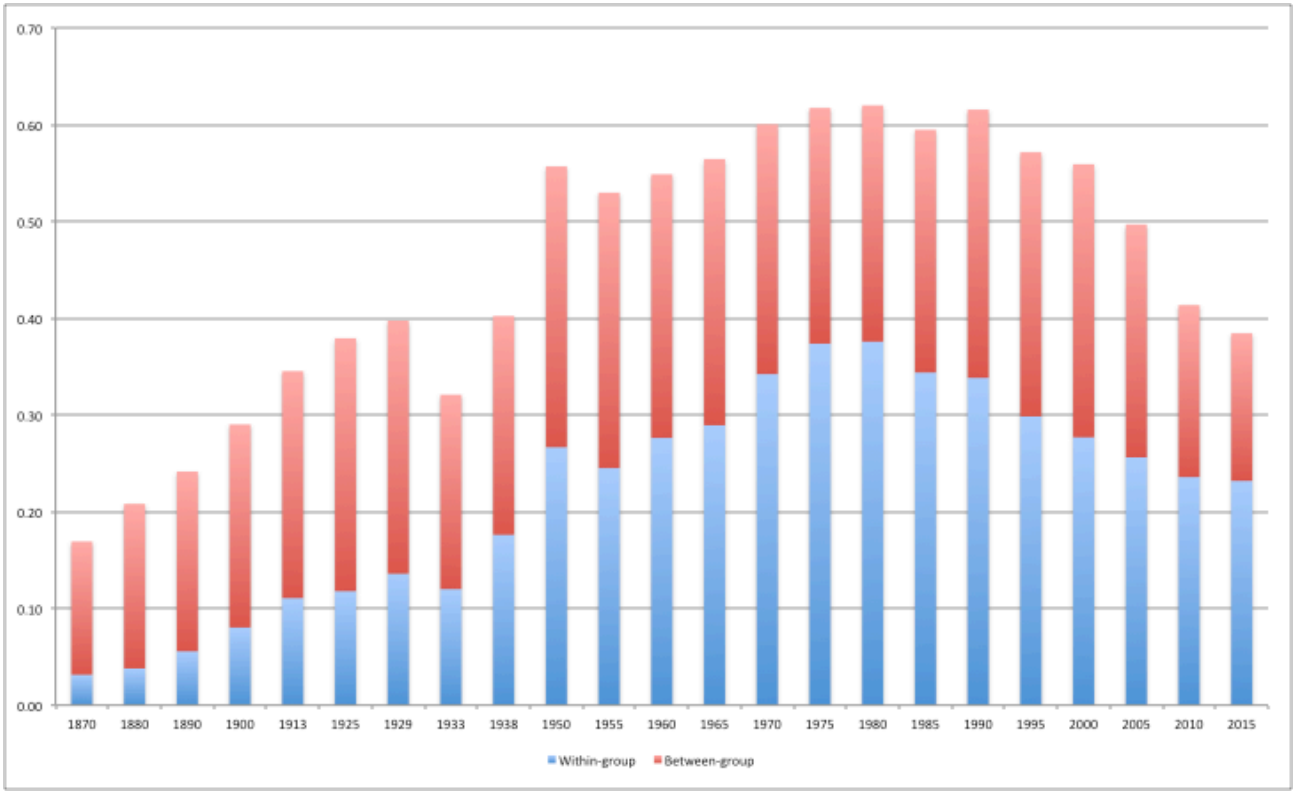

Figure 3b. Decomposing Population-weighted Inequality in Real Per Capita GDP, 1870-2015 (Theil).

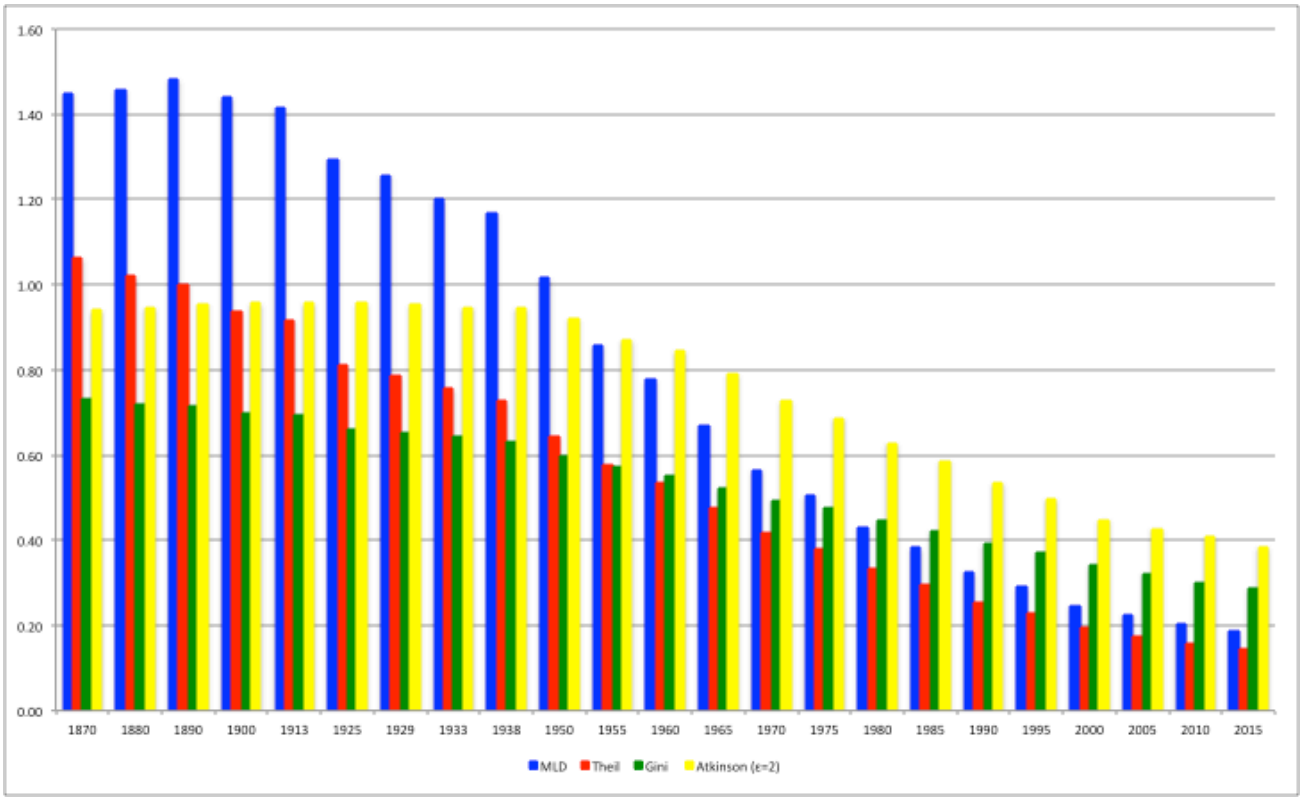

Figure 4a. Unweighted Inequality in Literacy, 1870-2015 (Kakwani Index)

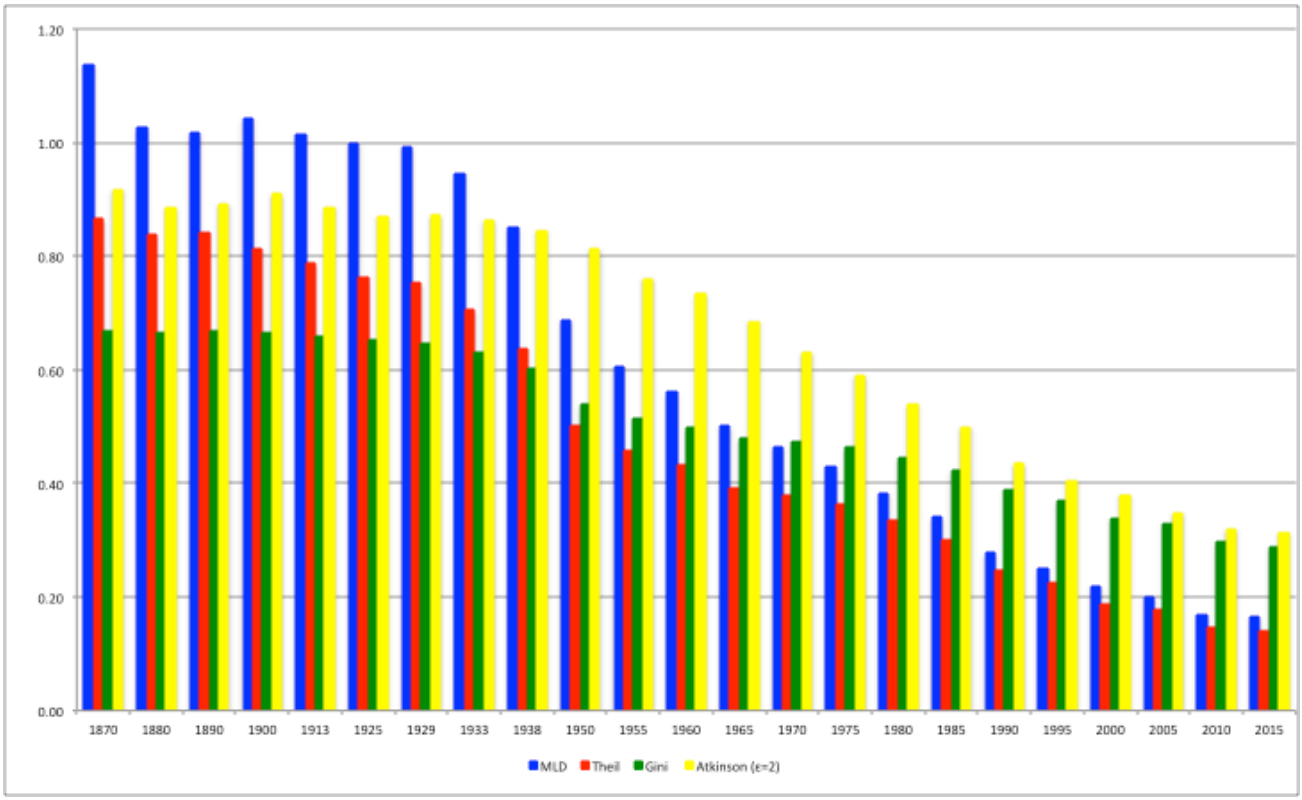

Figure 4b. Population-weighted Inequality in Literacy, 1870-2015 (Kakwani Index)

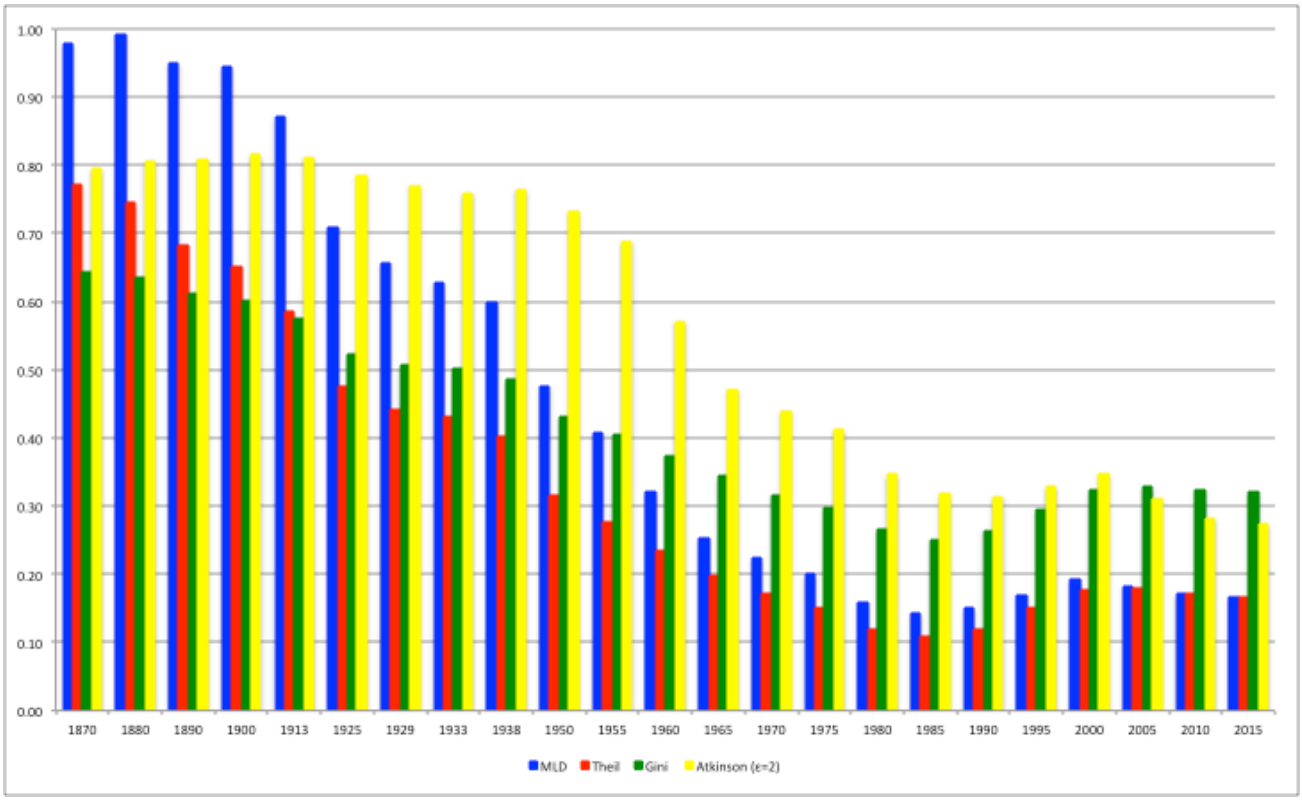

Figure 5a. Unweighted Inequality in Enrolment, 1870-2015 (Kakwani Index)

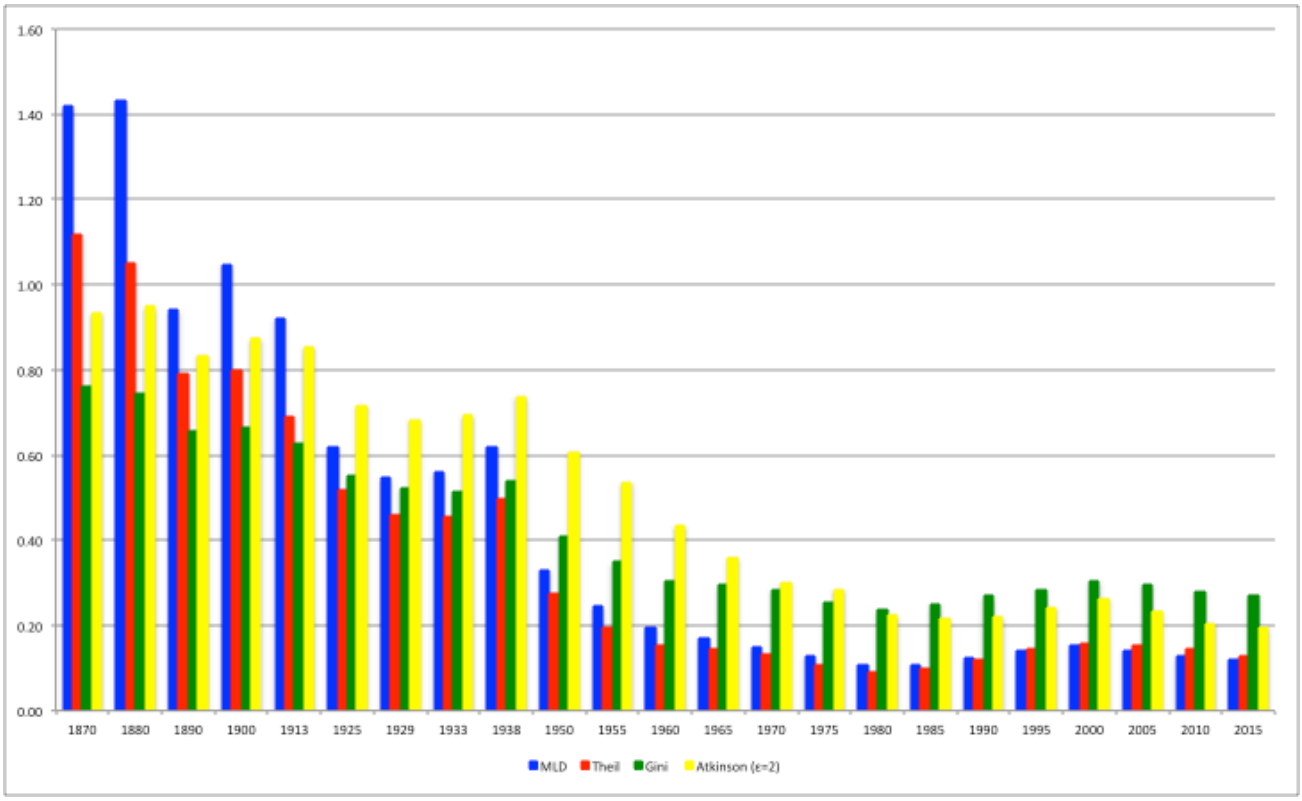

Figure 5b. Population weighted Inequality in Enrolment, 1870-2015 (Kakwani Index)

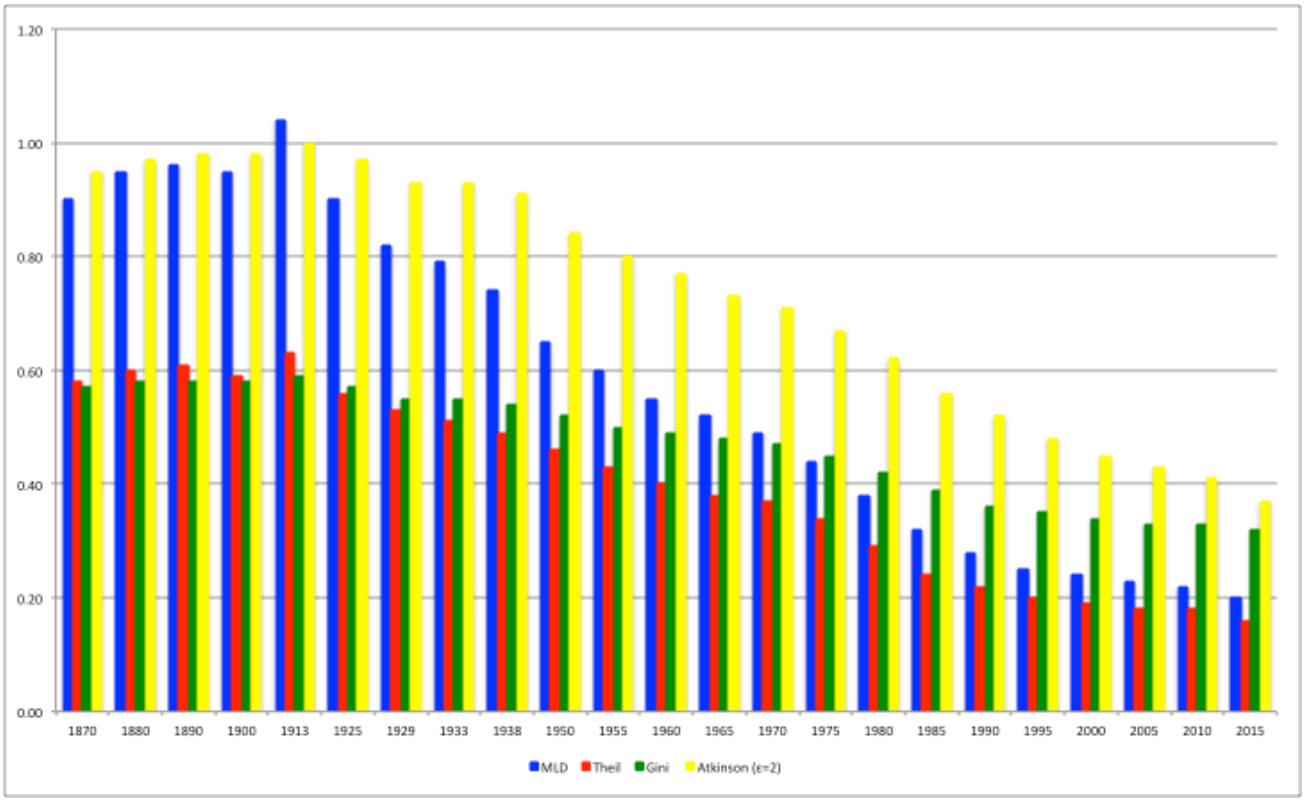

Figure 6a. Unweighted Inequality in Years of Schooling, 1870-2015 (Kakwani Index)

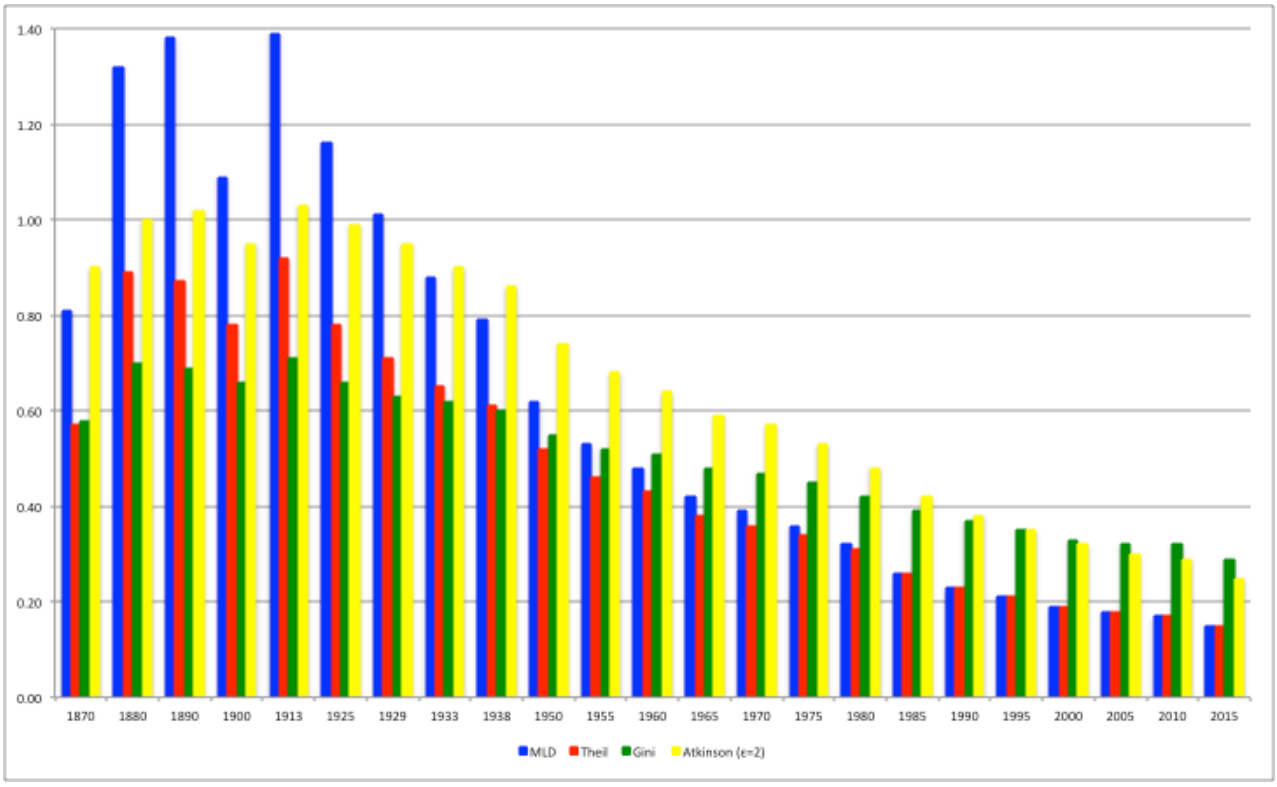

Figure 6b. Population-weighted Inequality in Years of Schooling 1870-2015 (Kakwani Index)

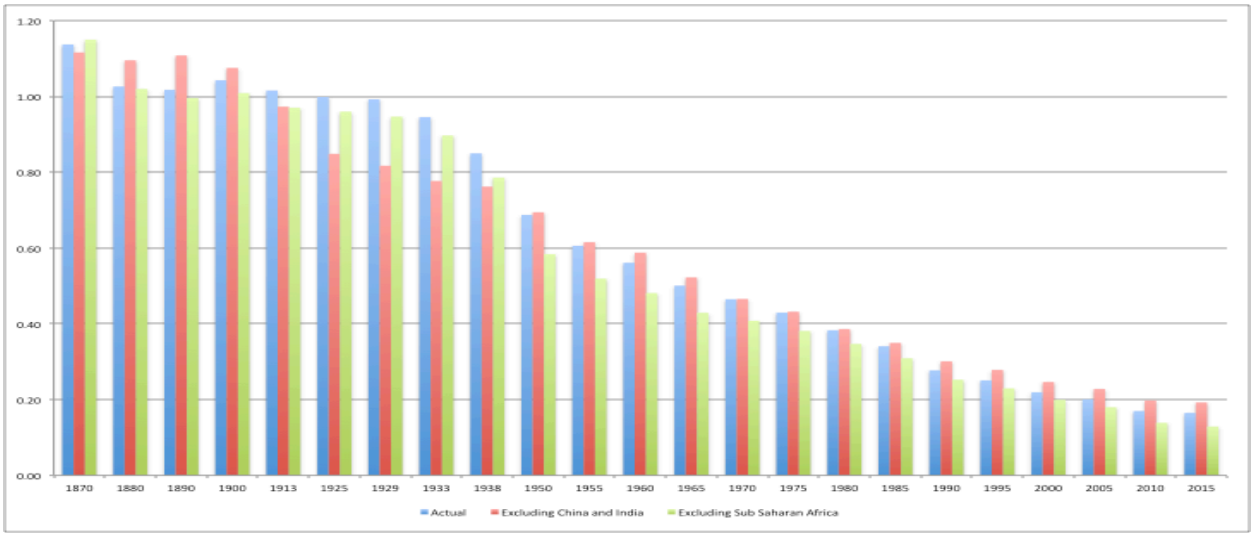

Figure 7a. Population-weighted Inequality in Literacy: The Contribution of China and India and Sub Saharan Africa, 1870-2015 (Kakwani Index) (MLD)

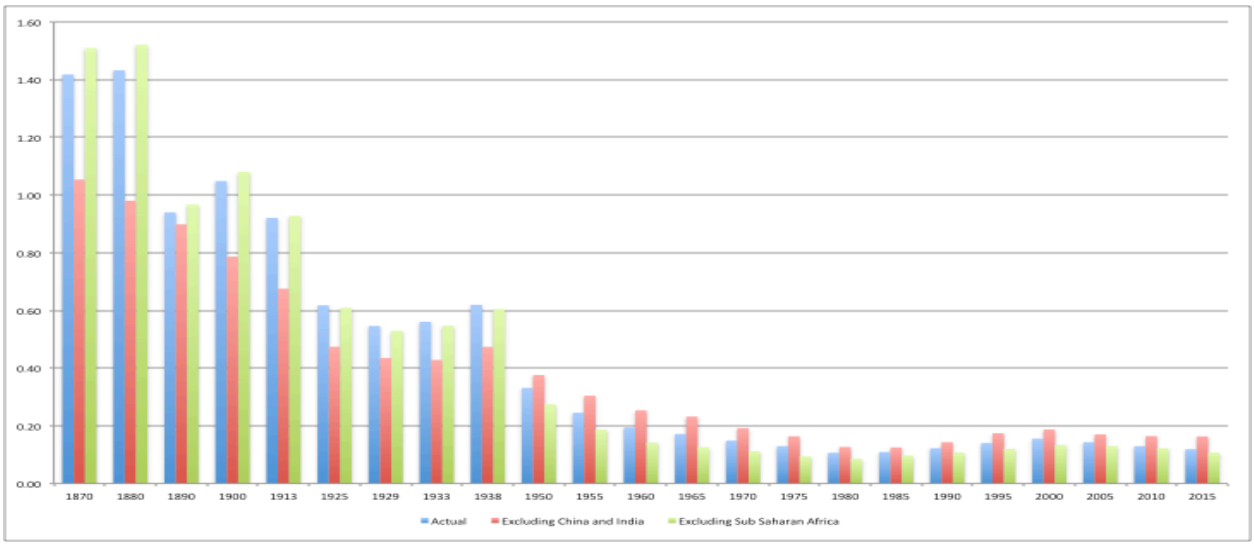

Figure 7b. Population-weighted Inequality in Enrolment: The Contribution of China and India and Sub Saharan Africa, 1870-2015 (Kakwani Index) (MLD)

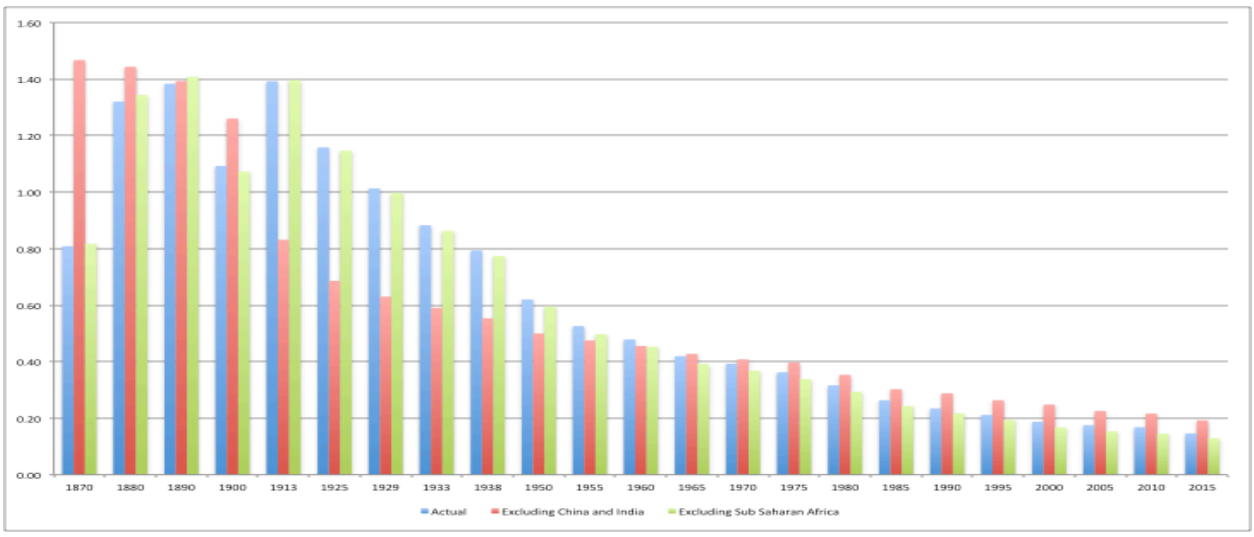

Figure 7c. Population-weighted Inequality in Years of Schooling: The Contribution of China and India and Sub Saharan Africa, 1870-2015 (Kakwani Index) (MLD)

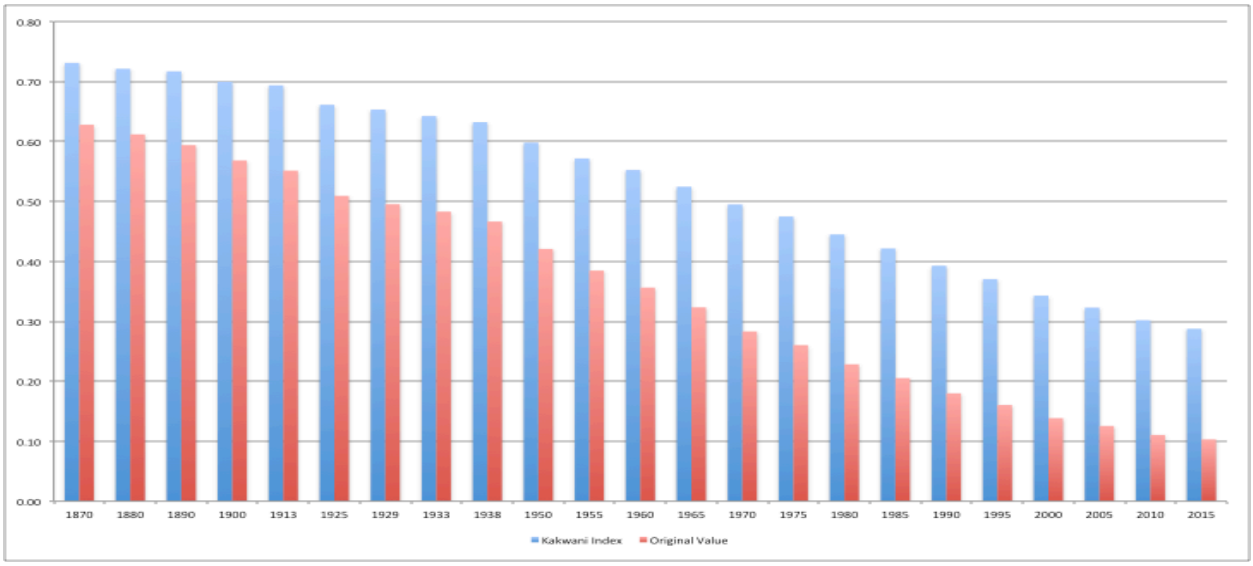

Figure 8a. Population-weighted Inequality in Literacy (Gini): Kakwani Index and Original Values

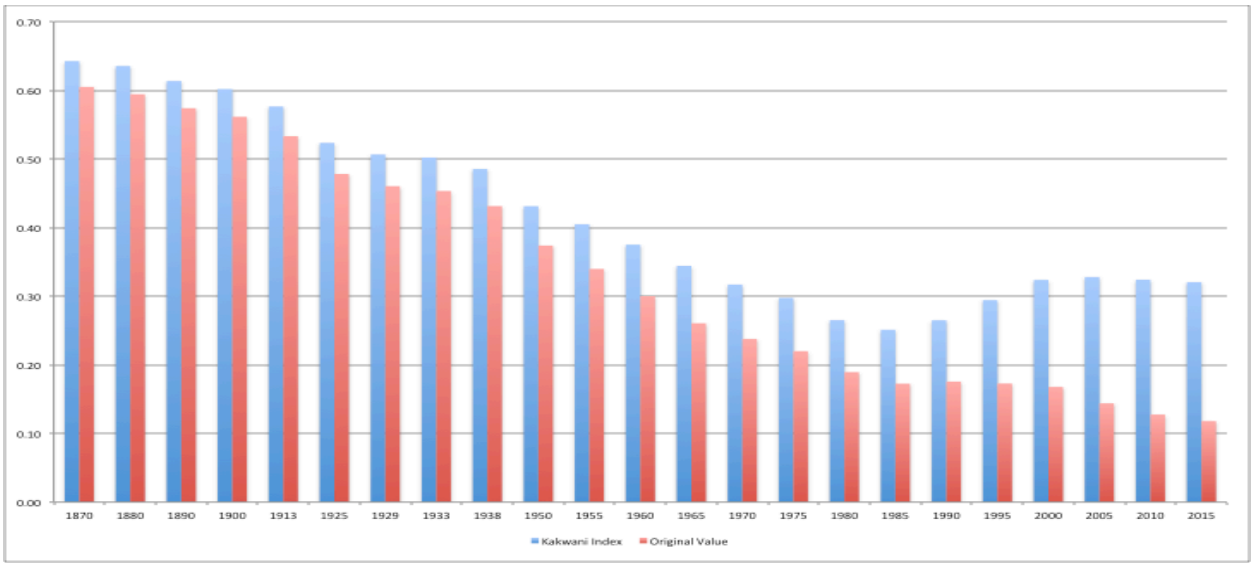

Figure 8b. Population-weighted Inequality in Enrolment (Gini): Kakwani Index and Original Values

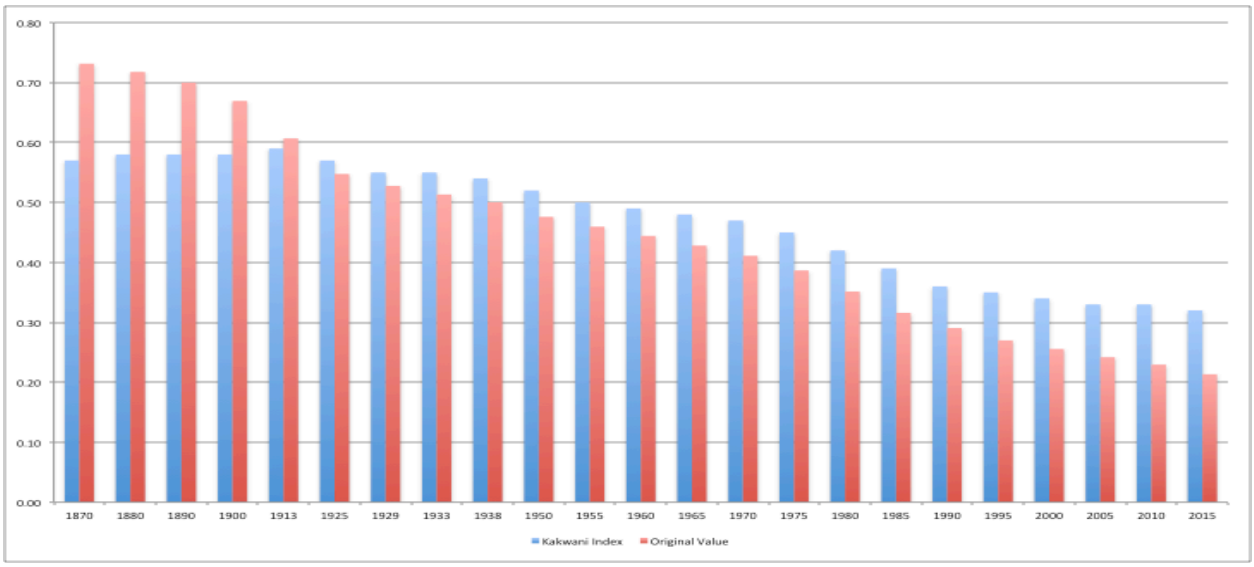

Figure 8c. Population-weighted Inequality in Schooling Years (Gini): Kakwani Index and Original Values

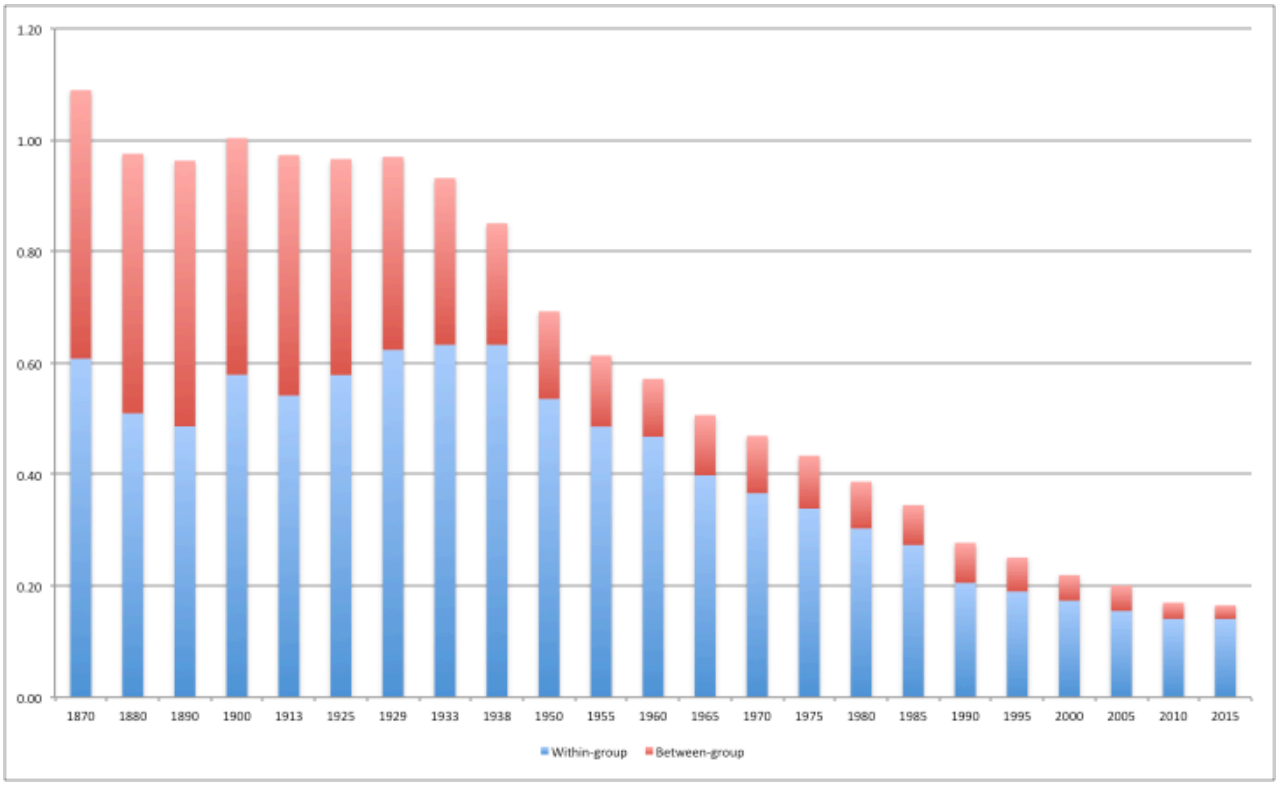

Figure 9a. Decomposing Population-weighted Inequality in Literacy, 1870-2015 (Kakwani Index) (MLD)

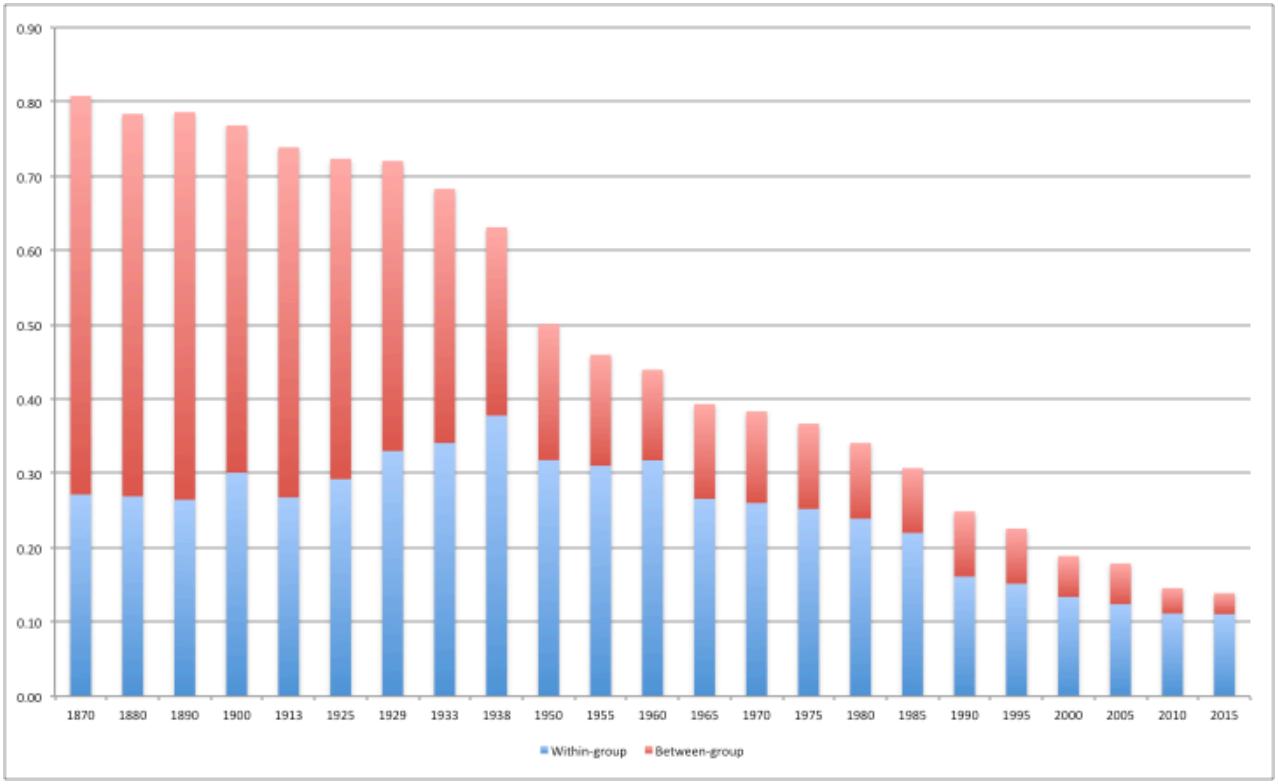

Figure 9b. Decomposing Population-weighted Inequality in Literacy, 1870-2015 (Kakwani Index) (Theil)

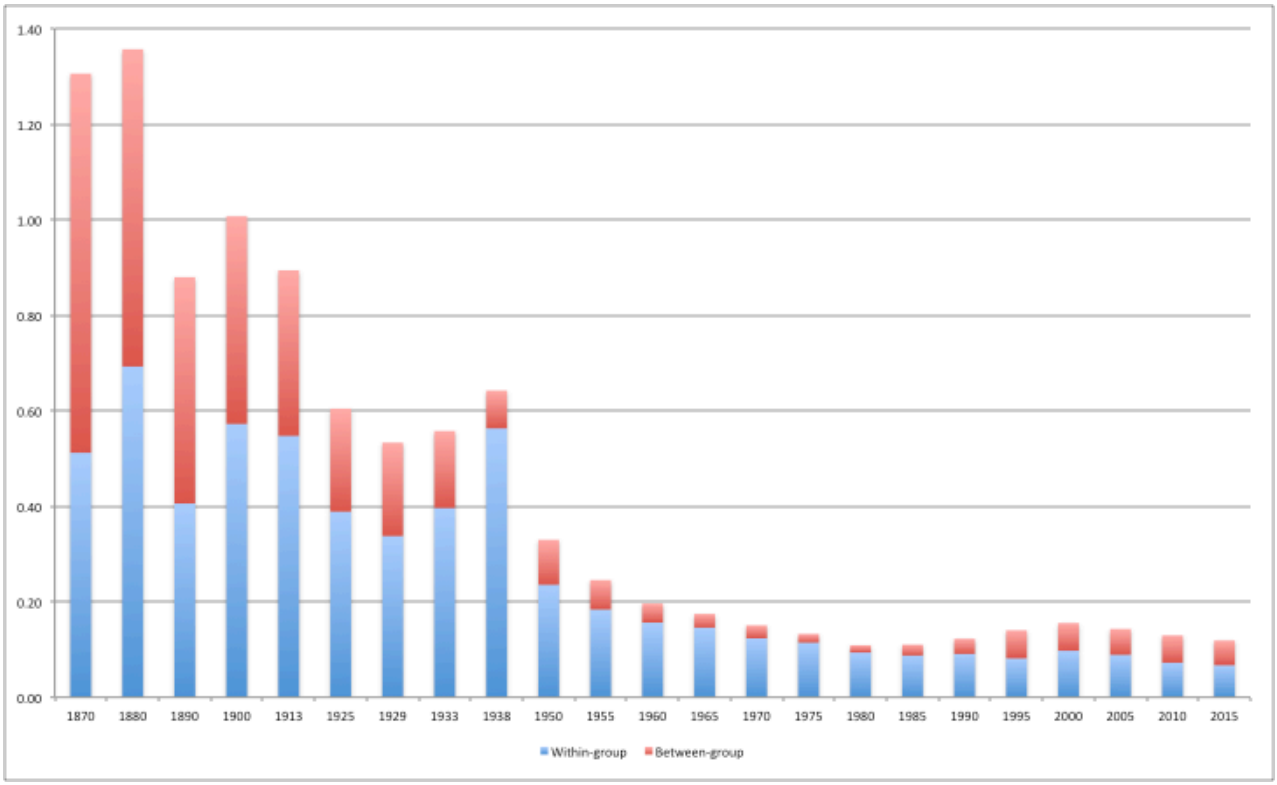

Figure 10a. Decomposing Population-weighted Inequality in Enrolment, 1870-2015 (Kakwani Index) (MLD).

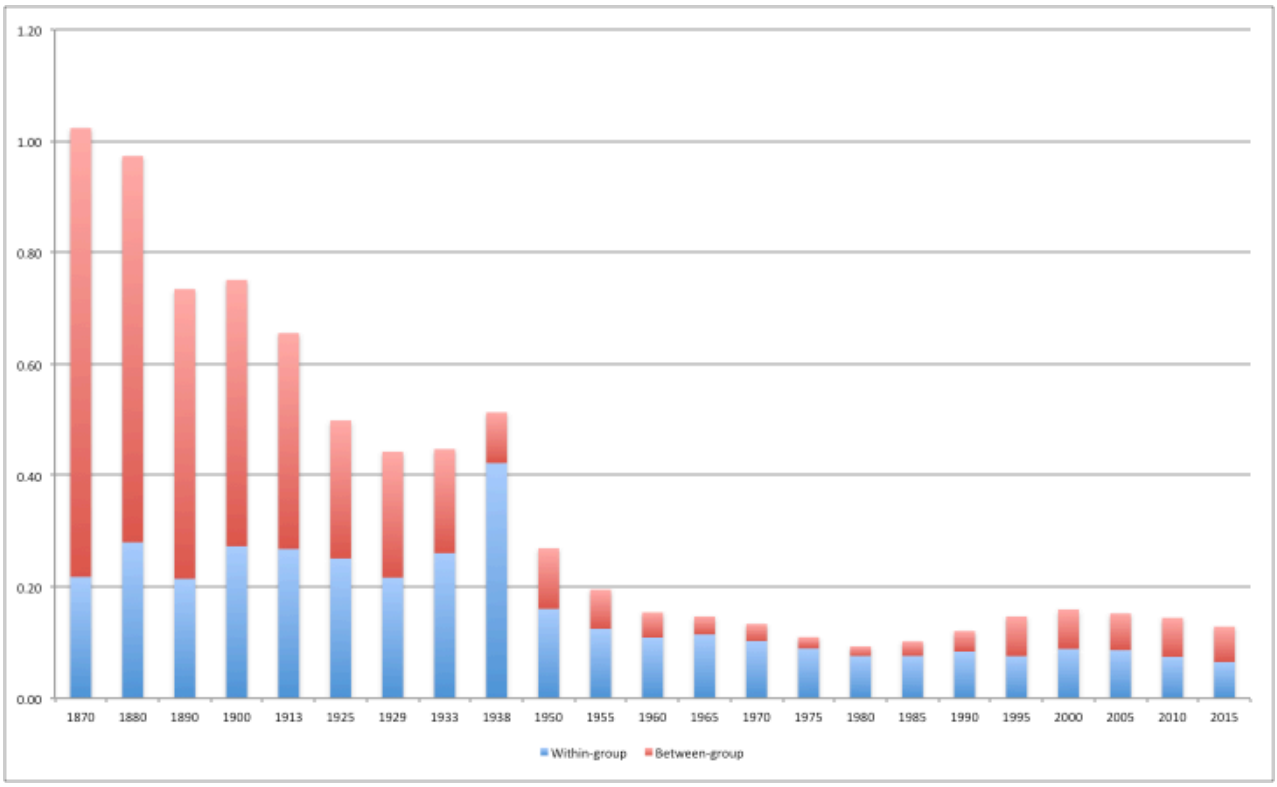

Figure 10b. Decomposing Population-weighted Inequality in Enrolment, 1870-2015 (Kakwani Index) (Theil)

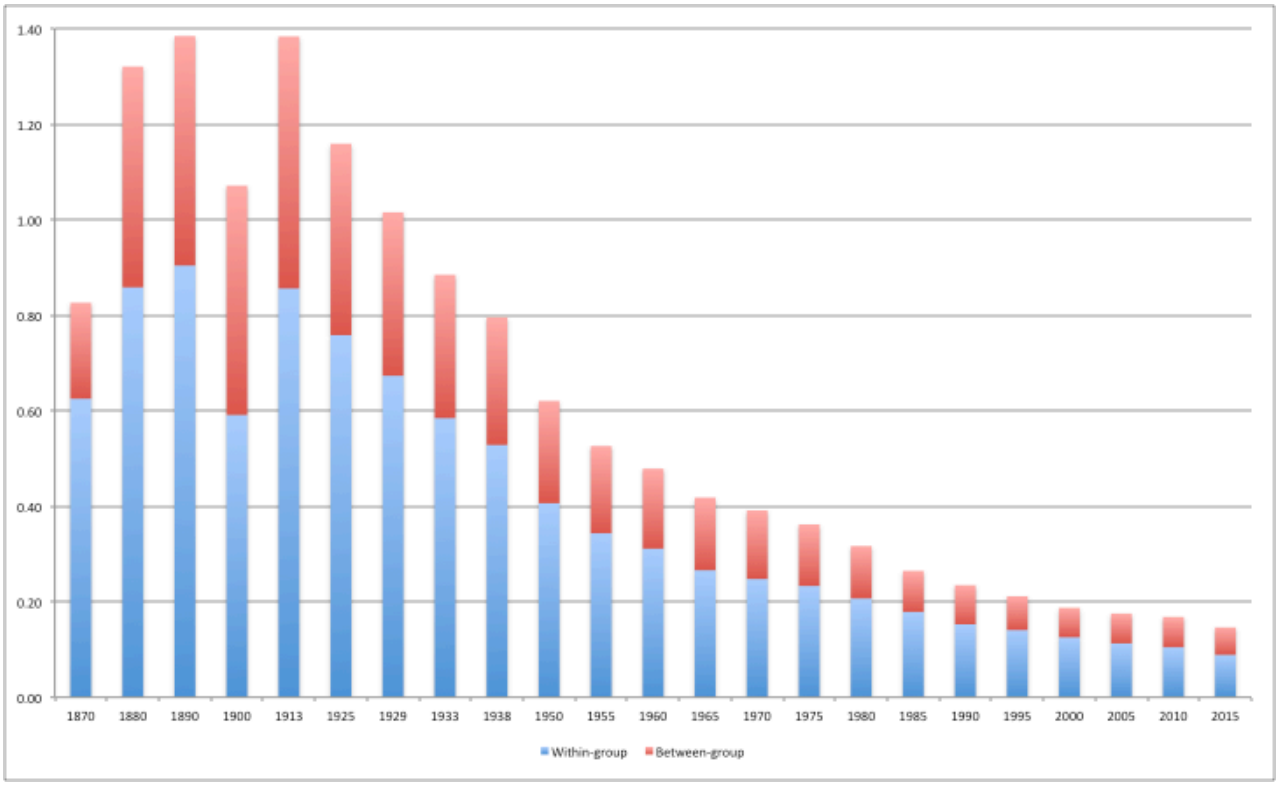

Figure 11a. Decomposing Population-weighted Inequality in Years of Schooling, 1870-2015 (Kakwani Index) (MLD)

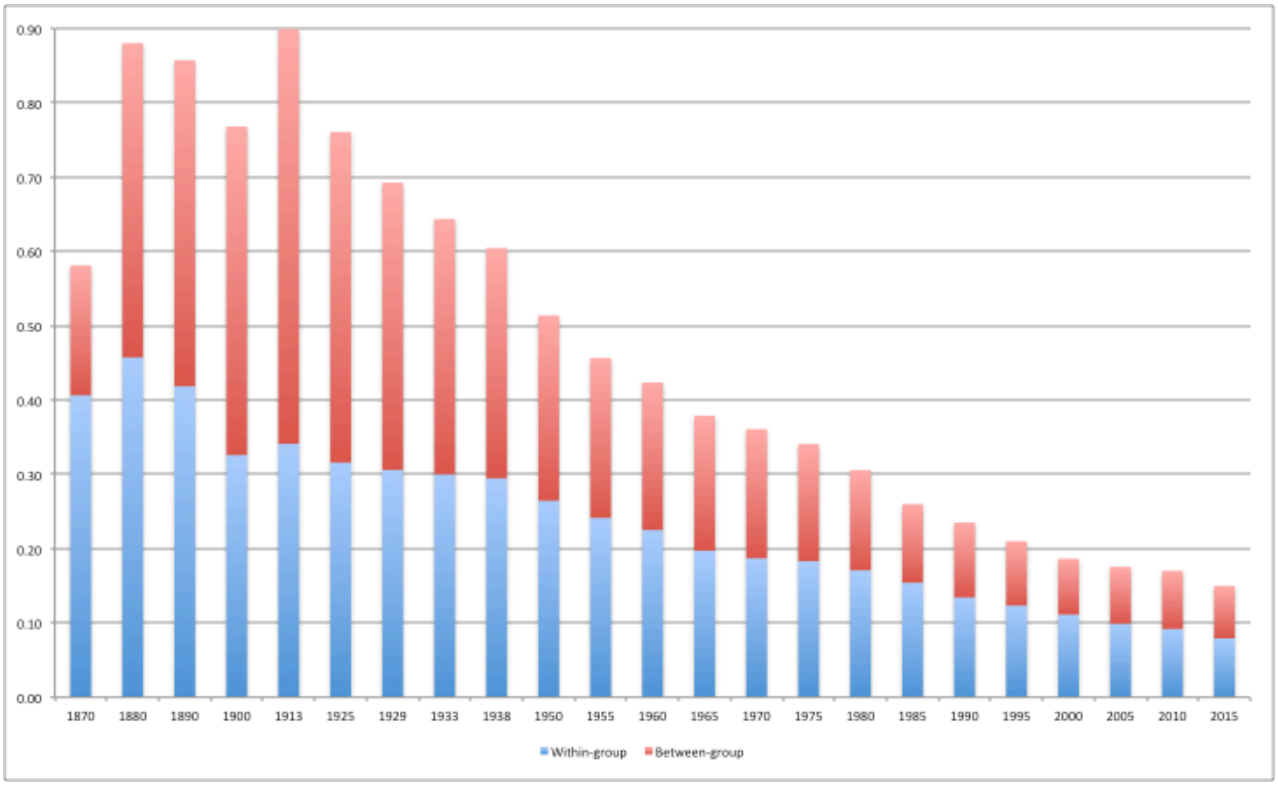

Figure 11b. Decomposing Population-weighted Inequality in Years of Schooling, 1870-2015 ((Kakwani Index) (Theil)

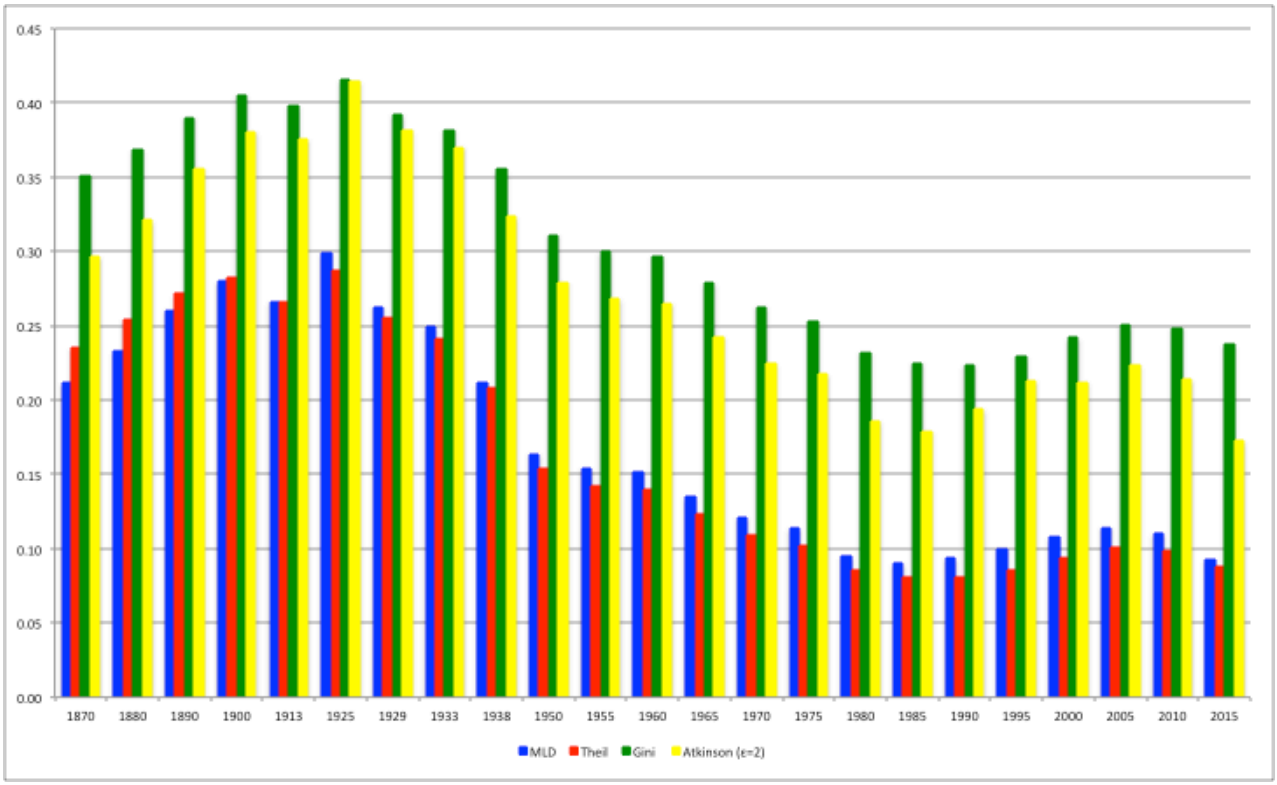

Figure 12a. Unweighted Inequality in Life Expectancy, 1870-2015 (Kakwani Index)

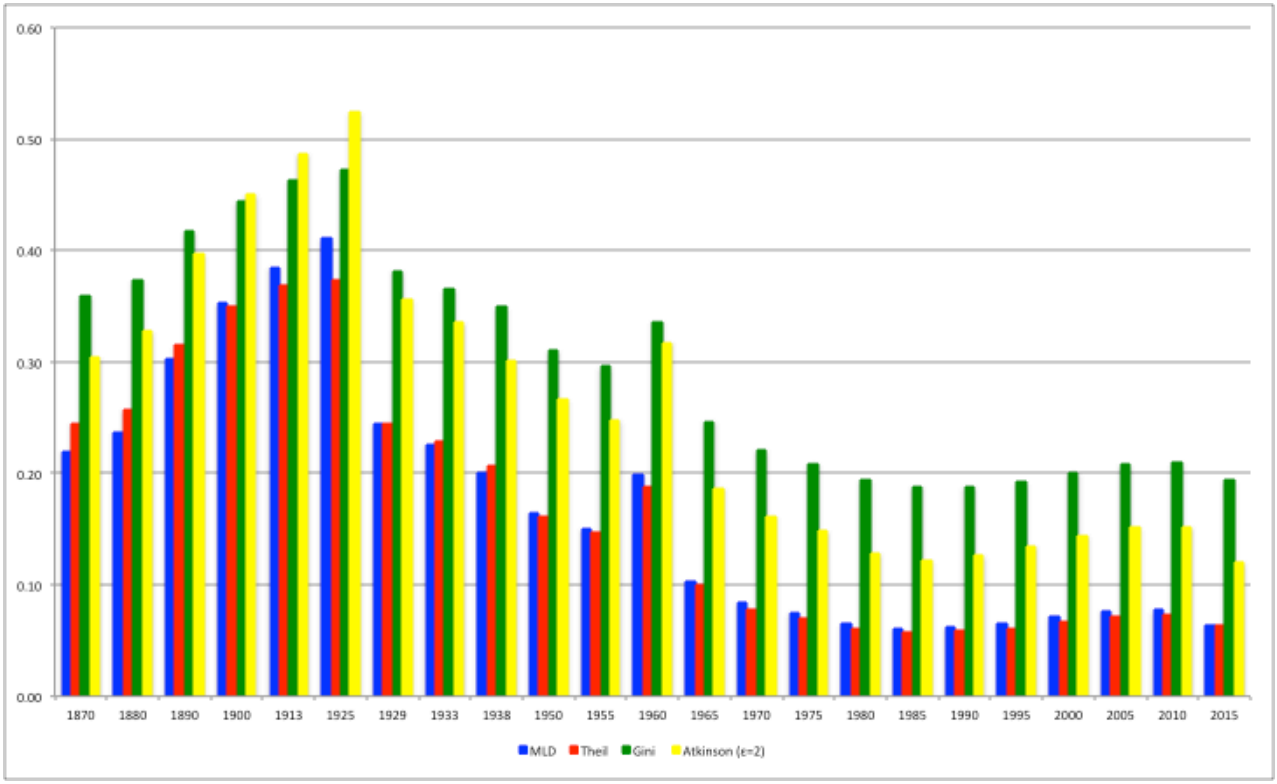

Figure 12b. Population-weighted Inequality in Life Expectancy, 1870-2015 (Kakwani Index)

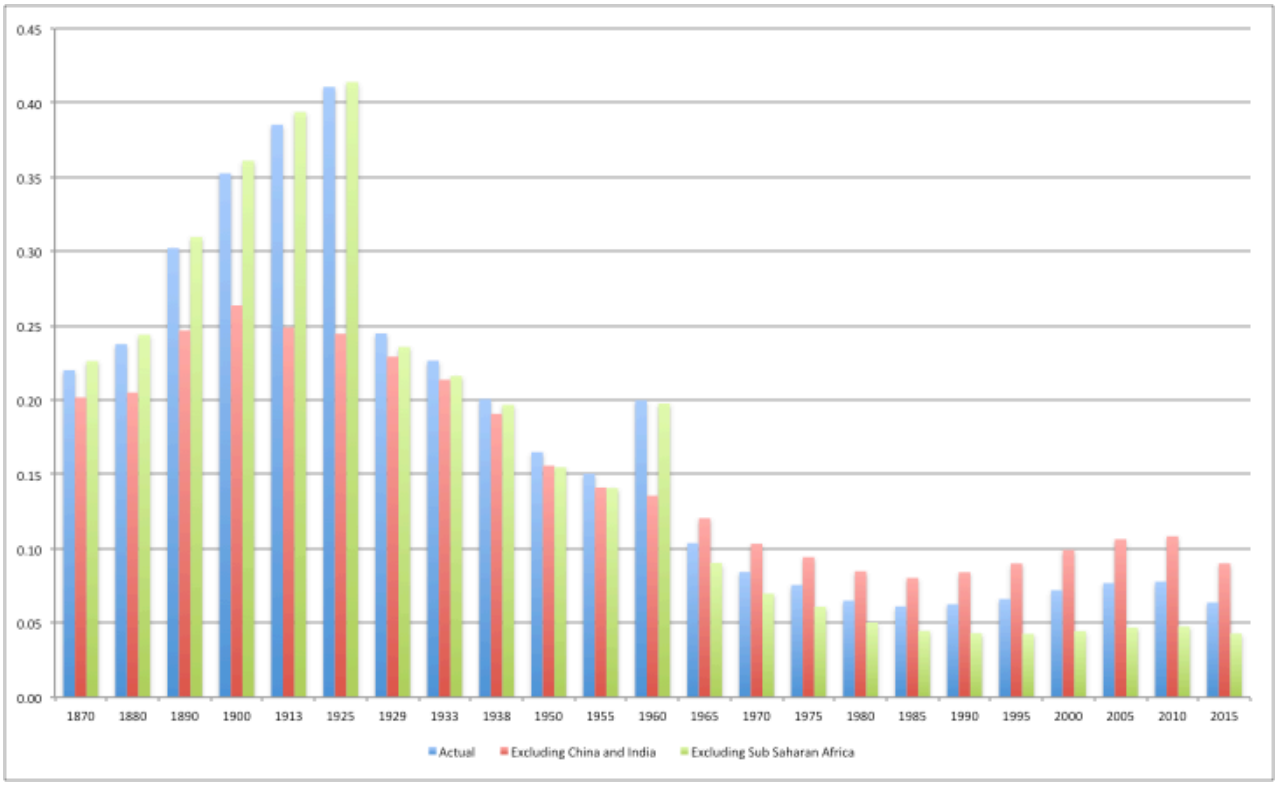

Figure 13. Population-weighted in Life Expectancy: The Contribution of China and India and Sub Saharan Africa, 1870-2015 (Kakwani Index) (MLD)

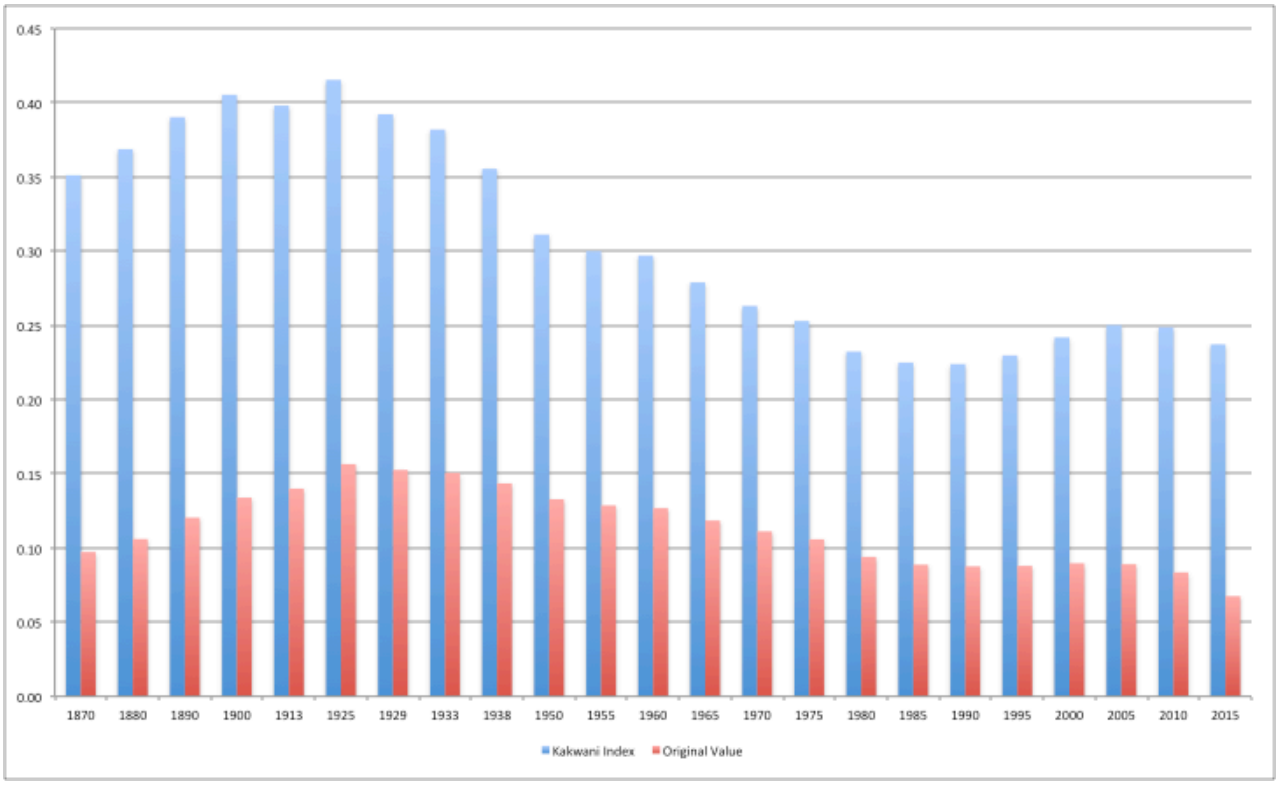

Figure 14. Population-weighted Inequality in Life Expectancy (Gini): Kakwani Index and Original Values

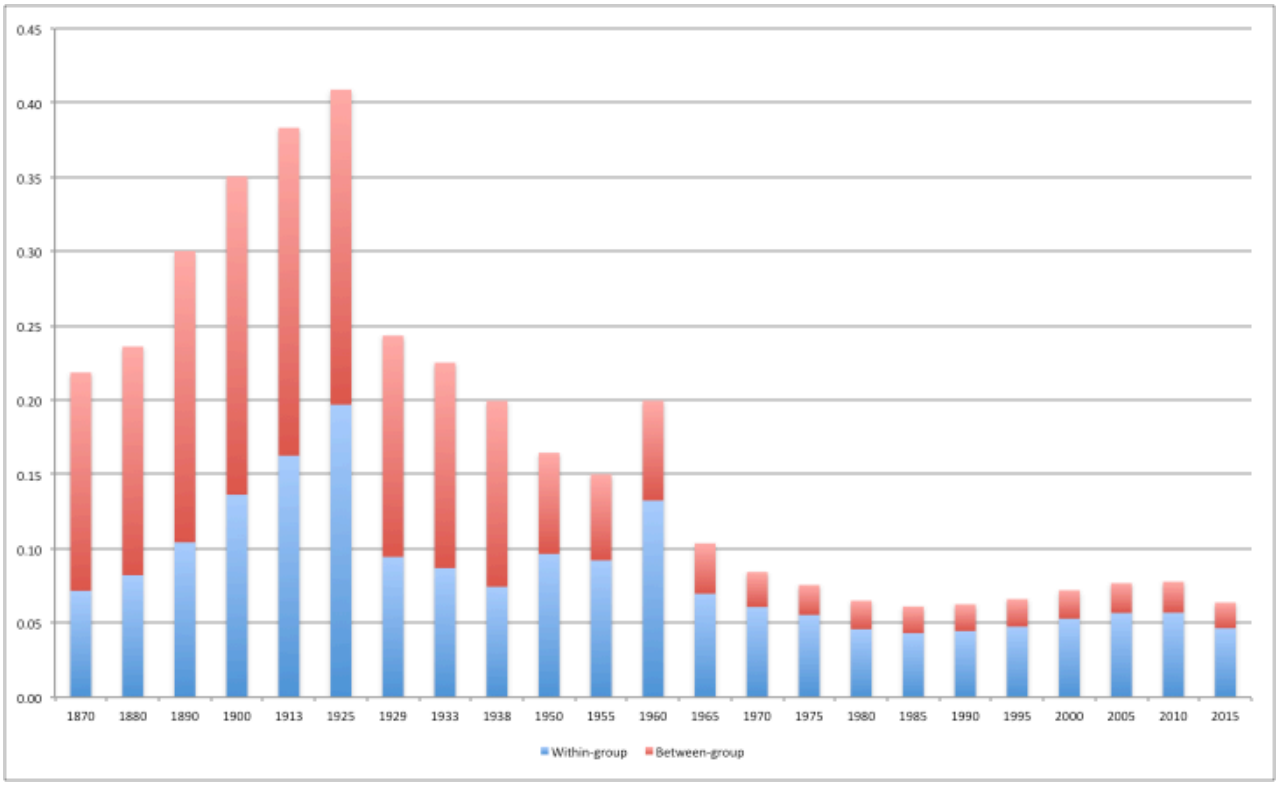

Figure 15a. Decomposing Population-weighted Inequality in Life Expectancy, 1870-2015 (Kakwani Index) (MLD)

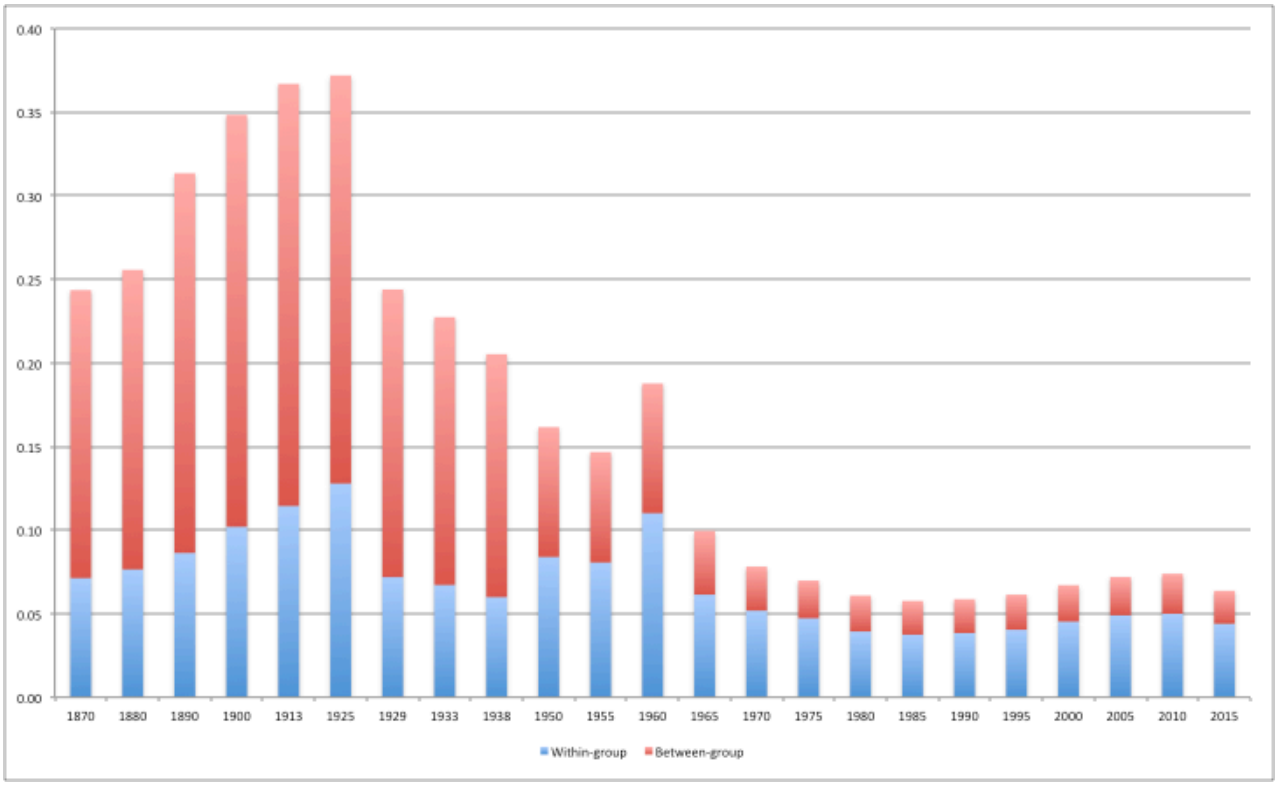

Figure 15b. Decomposing Population-weighted Inequality in Life Expectancy, 1870-2015 (Kakwani Index) (Theil)

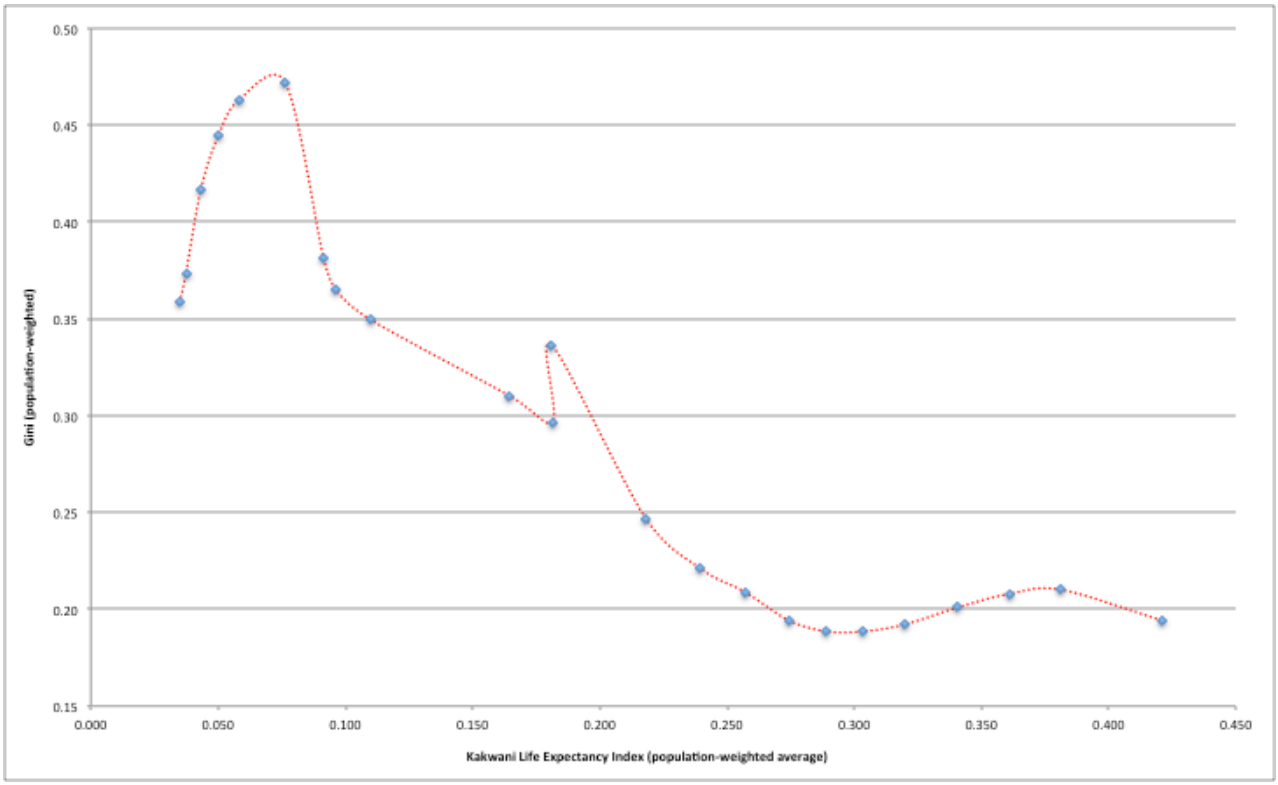

Figure 16a. Life expectancy: Population-weighted Inequality (Gini) versus Level (Kakwani indices)

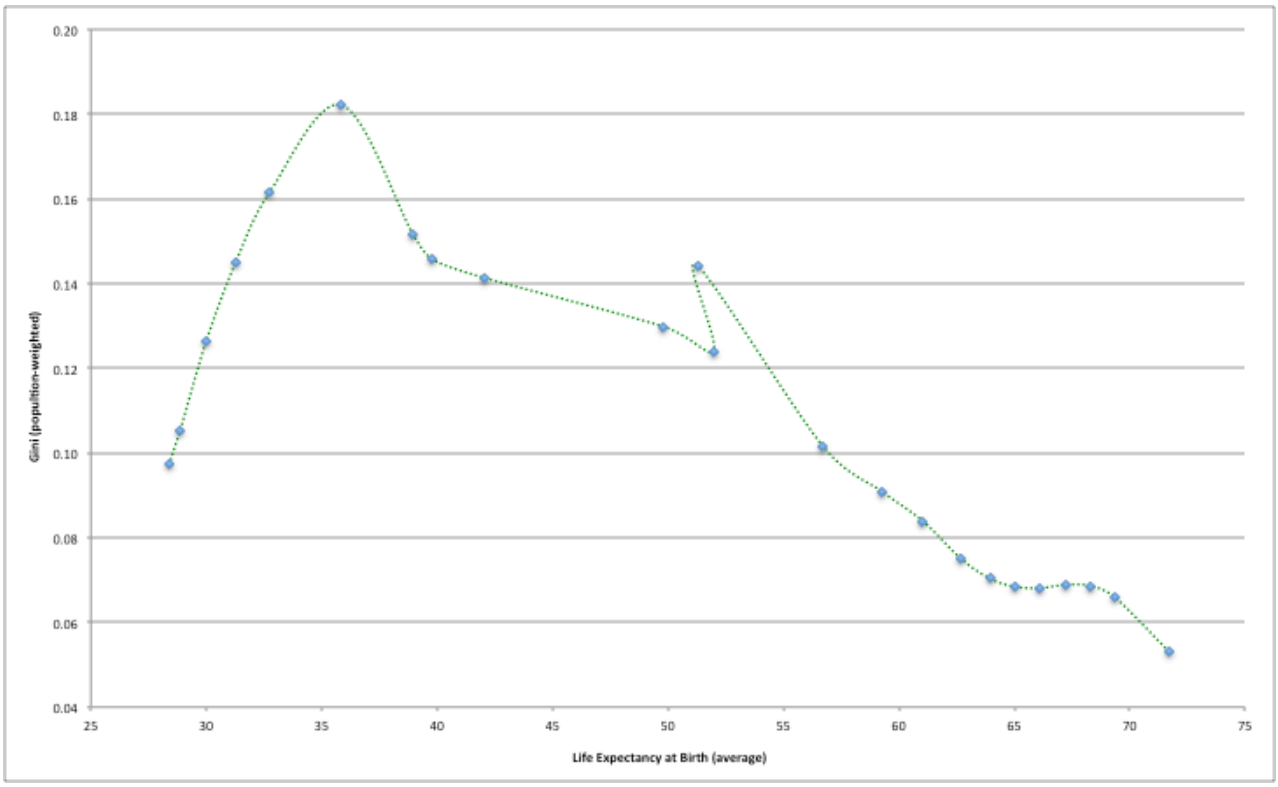

Figure 16b Life Expectancy Population-weighted Inequality (Gini) versus Level (original values)

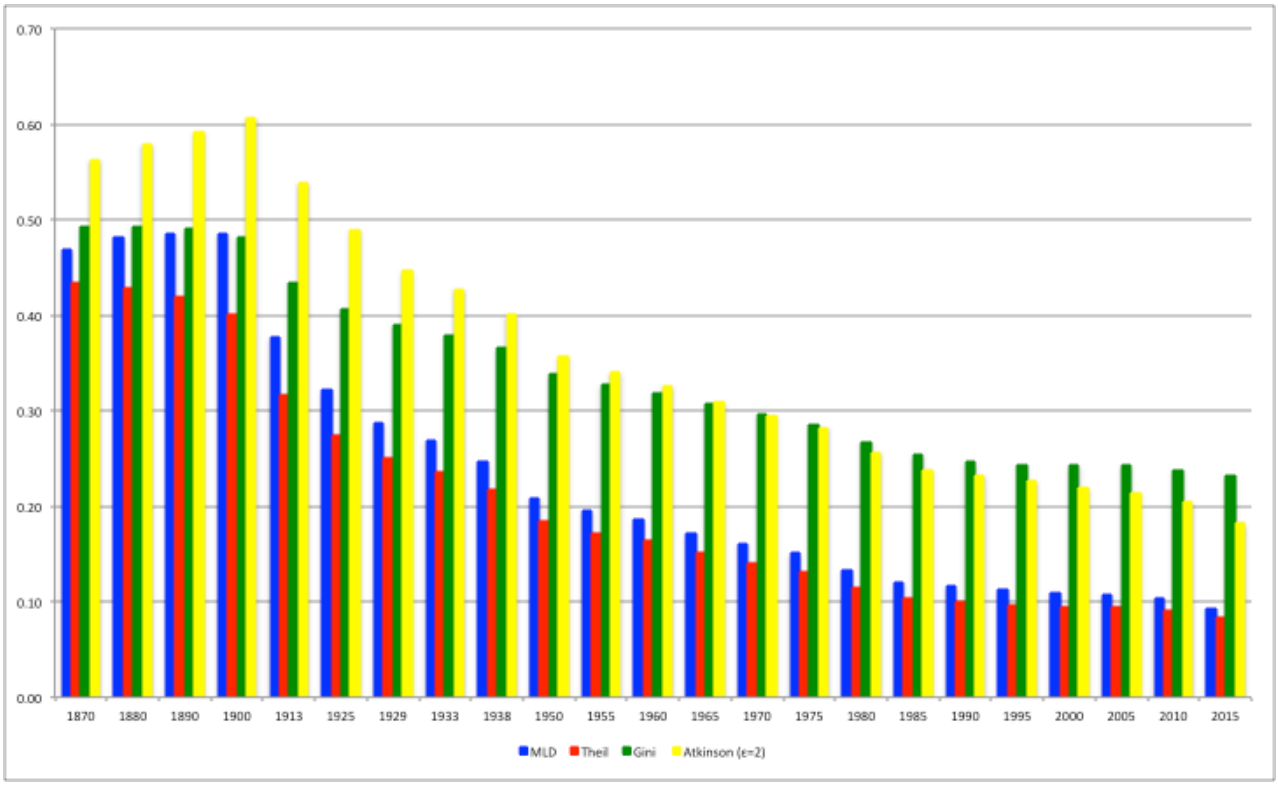

Figure 17a. Unweighted Inequality in Human Development 1870-2015

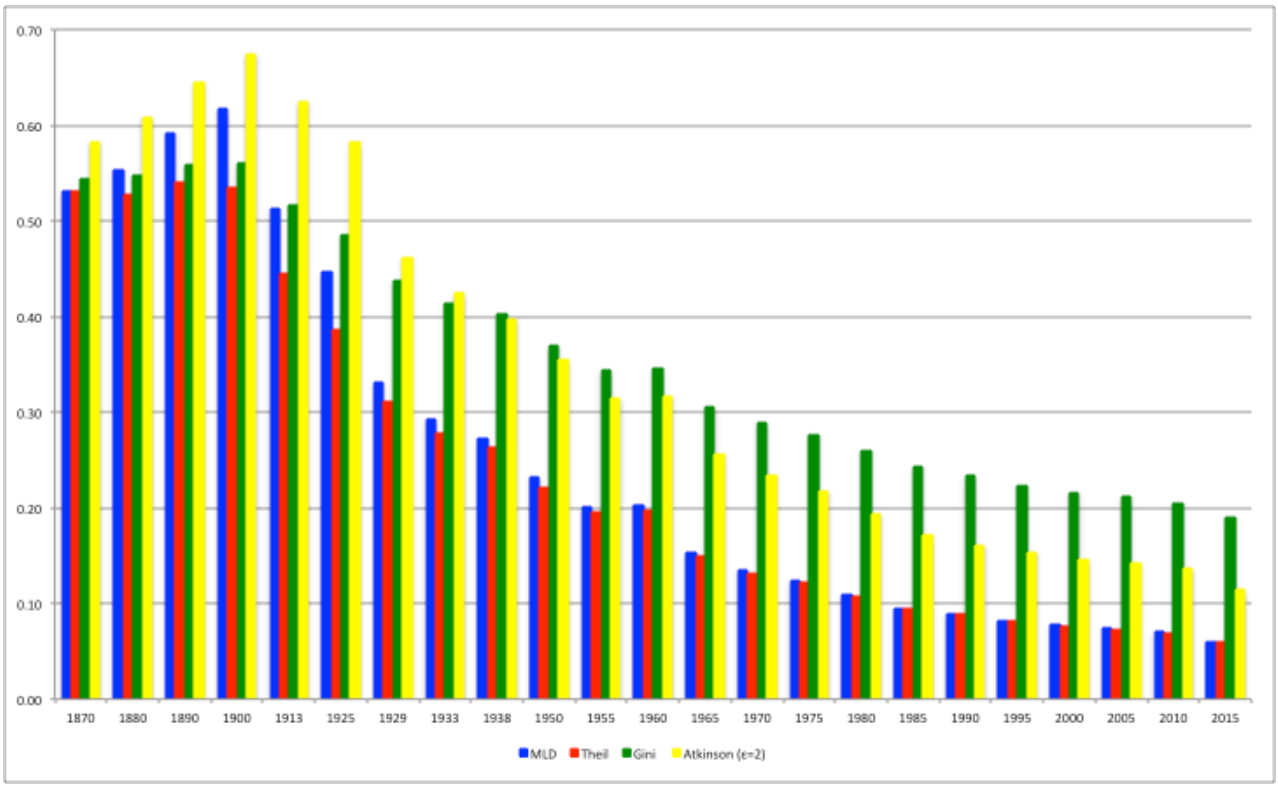

Figure 17b. Population-weighted Inequality in Human Development, 1870-2015

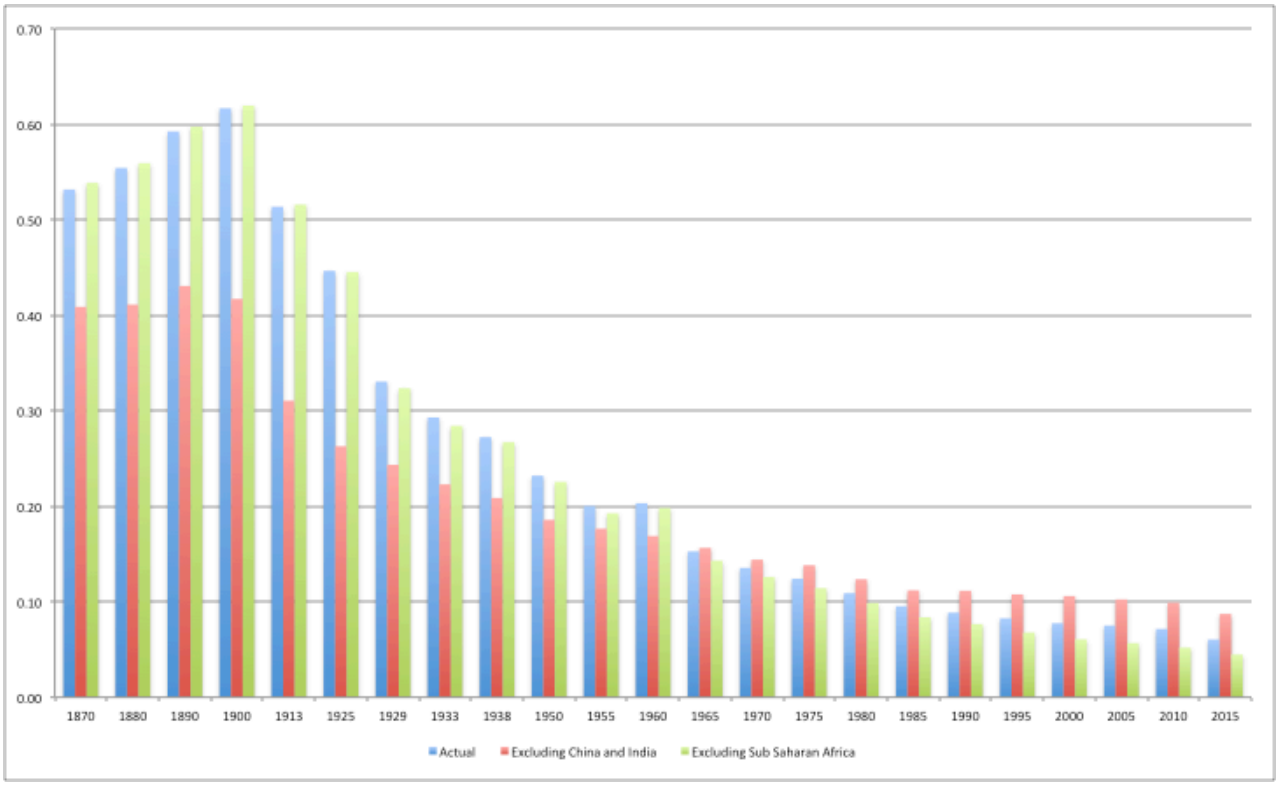

Figure 18. Population-weighted Inequality in Human Development: The Contribution of China and India and Sub Saharan Africa, 1870-2015 (MLD)

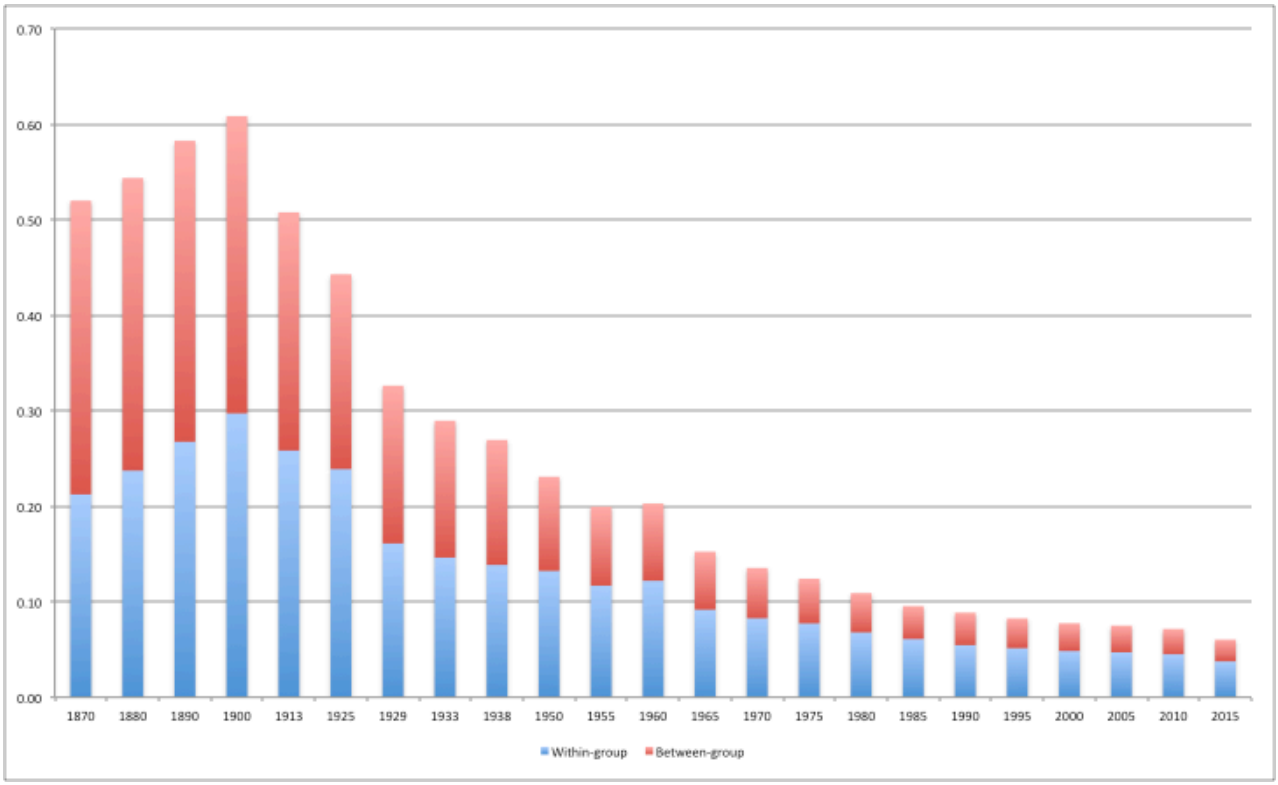

Figure 19a. Decomposing Population-weighted Inequality in Human Development, 1870-2015 (MLD)

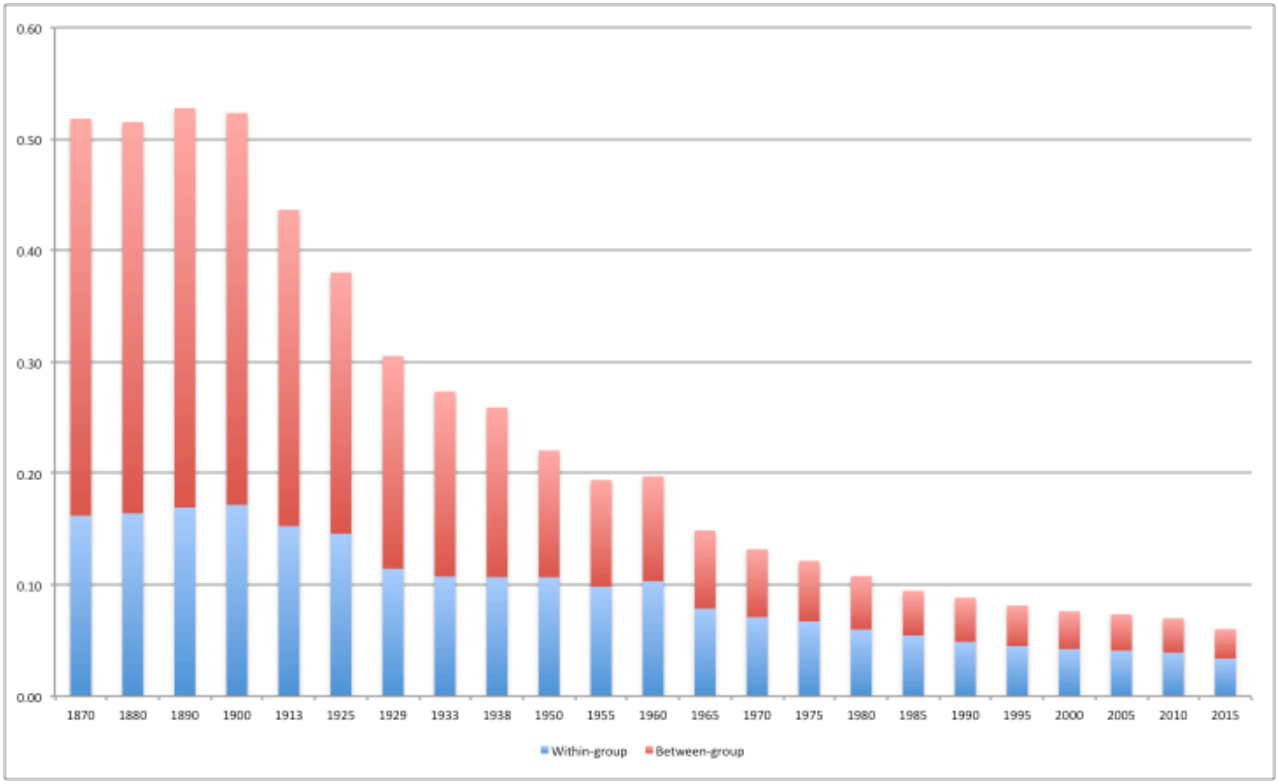

Figure 19b. Decomposing Population-weighted Inequality in Human Development, 1870-2015 (Theil)

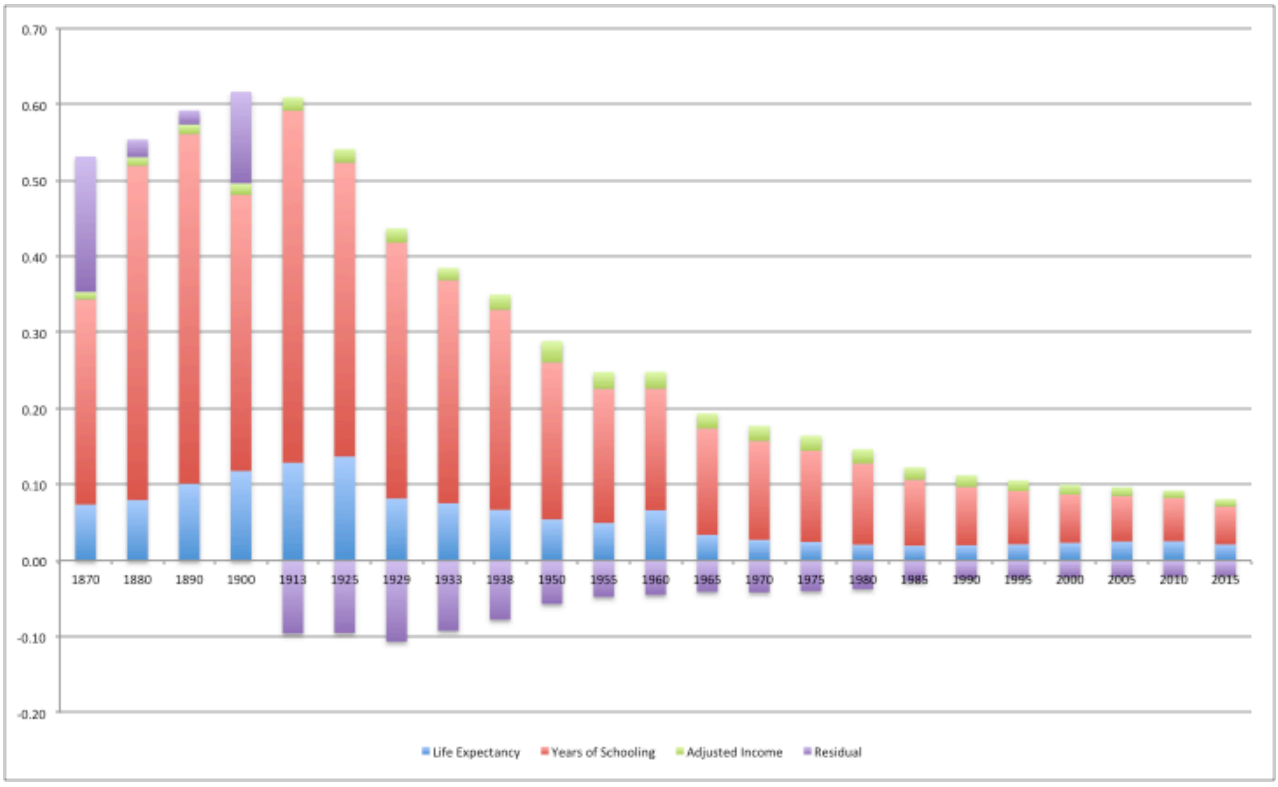

Figure 20a. Dimensions' Contributions to Human Development Inequality (population-weighted): MLD

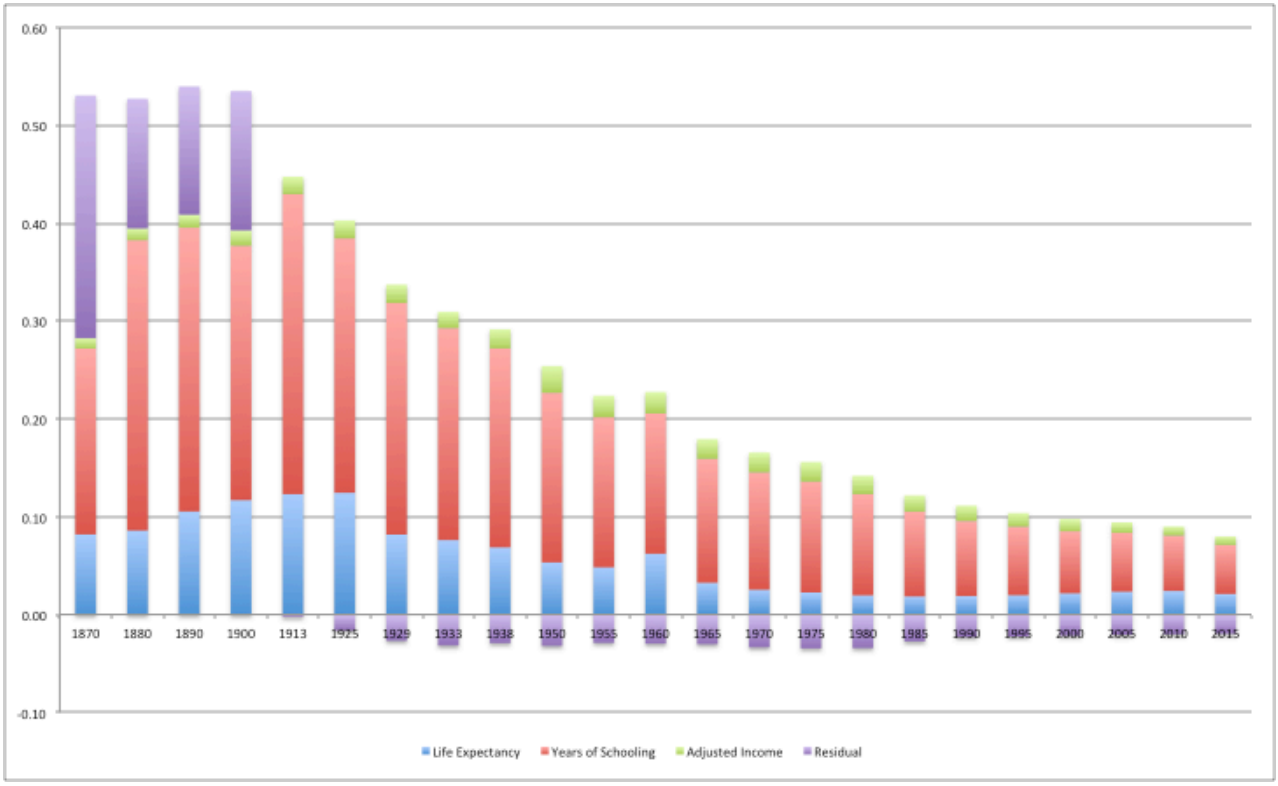

Figure 20b. Dimensions' Contributions to Human Development Inequality (population-weighted): Theil

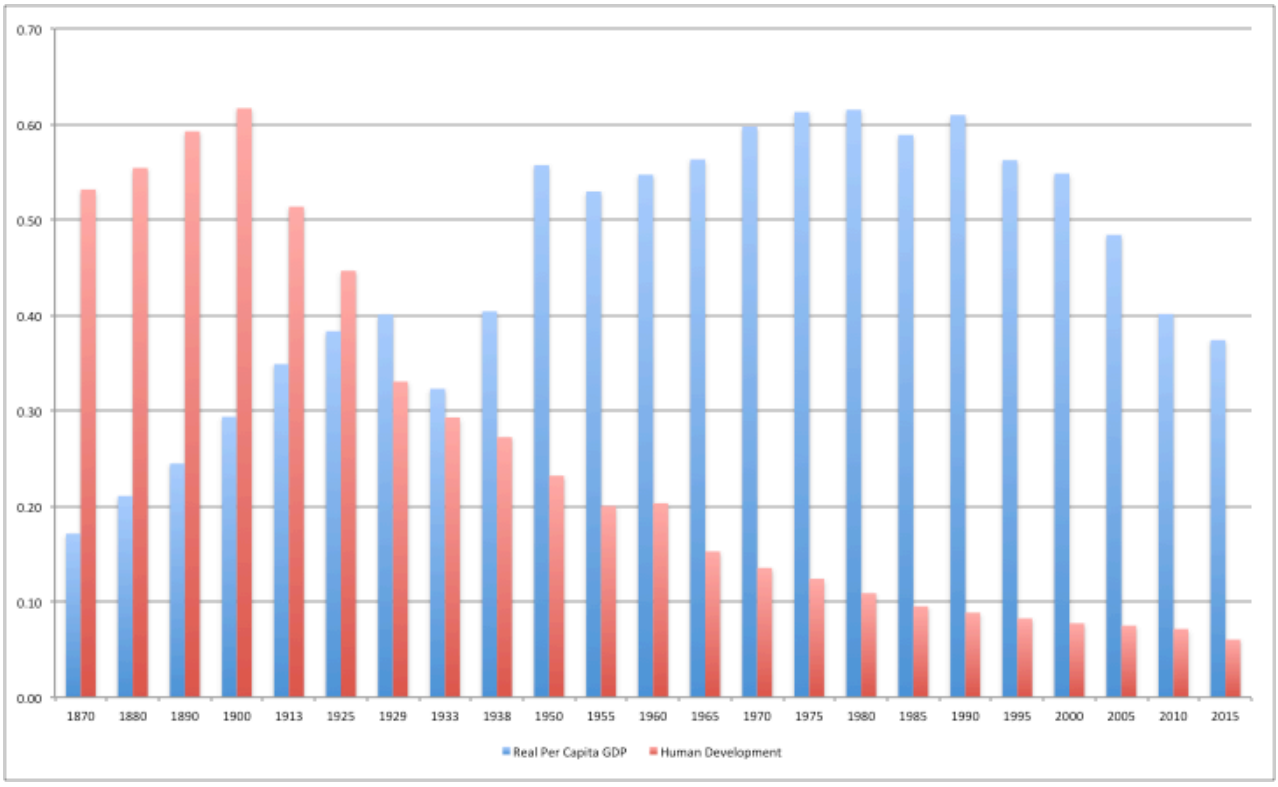

Figure 21. Population-weighted Inequality in Human Development and Real Per Capita GDP, 1870-2015 (MLD)

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