International Well-being Inequality in the Long Run

Leandro Prados de la Escosura
(Universidad Carlos III, Groningen, and CEPR)

GGDC 25th Anniversary Conference
Groningen, 28-30 June 2017
Main Questions

• Has inequality in well-being cumulated since globalization began?

• Do inequality trends in well-being dimensions concur?

• How much has the gap between the West and the Rest contributed to international inequality?
How to Measure Living Standards? (I)

• *Original* values for each dimension of welfare?

• *But* ... if well-being indicators have *asymptotic* limits
  => a transformation required to measure changes within *upper* and *lower* bounds

**Option:** A *linear transformation* of the *original* values

Indices for each dimension (*I*) are computed as

\[ I = \frac{x - Mo}{M - Mo}, \]

*x, observed value* of a given dimension of welfare, *Mo* and *M, maximum* and *minimum* values or goalposts

• *But* with *original* or *linearly transformed* values,
  if a social variable has *asymptotic* limits,
  *identical absolute* changes result in *different increases* depending on the *starting level*
Allowing for Quality in Health and Education

- **Life expectancy at birth (LEB), crude measure of healthy life**
  - but **health-adjusted life expectancy** only available since **mid-1990s**

- **Healthy** life expectancy increases as **LEB** expands
  - Age-specific disability is lower when **LEB** is higher: as **LEB** increases, the **quality** of life rises for each **age cohort**
  => Longer **LEB**, better **health** in childhood and youth

- **Literacy** and **Enrolment**, crude proxies for **access to knowledge**

- The **quality of education** (**cognitive skills**) **improves** as its **quantity** (**literacy and enrolment rates**) **increases**
  => More years of **education**, better **education** for **children** and **youth**
Years of Poor Health and LEB in 2002

\[ y = -0.0051x^2 + 0.7173x - 16.523 \]

\[ R^2 = 0.52 \]
How to Measure Living Standards? (II)

- Can time trends be inferred from cross-section patterns?

- A non-linear transformation of social variables (Kakwani) as an indicator reaches higher levels, its increases represent higher achievements than if the increase occurred at a lower level

  => a convex achievement function

  \[ f(x, Mo, M) = \frac{((M - Mo)^{1-\varepsilon} - (M - x)^{1-\varepsilon})}{((M - Mo)^{1-\varepsilon})} \]

  for \( 0 < \varepsilon < 1 \)

  \( x \), country values; \( M \) and \( Mo \), maximum and minimum values

- If \( \varepsilon \) takes a value of 1,

  \[ f(x, Mo, M) = \frac{\log (M-Mo) - \log (M-x))}{\log (M-Mo)} \]
Preston Curve Revised: The World 1870-2007

\[ y = 0.0289x^2 - 0.2623x + 0.4651 \]

\[ R^2 = 0.98572 \]
Inequality Measures

- Gini

- MLD = G(0) = \( \sum p_i \ln (p_i/y_i) \)

- Theil = G(1) = \( \sum y_i \ln (y_i/p_i) \)

with \( p_i \) and \( y_i \) representing country \( i \) shares in total population \([Ni]\) and social indicators \((Si)\) \([Si*Ni]\)

- Atkinson (\( \varepsilon = 2 \))
International Inequality in Real Per Capita GDP (unweighted)
International Inequality in Real Per Capita GDP (population weighted)
International Inequality in Real GDP per head: MLD
The Contribution of China & India and SSA
Decomposing International Inequality in Real Per Capita GDP: MLD (pop-weighted)
International Inequality in Literacy (unweighted)
International Inequality in Gross School Enrolment (unweighted)
International Inequality in Gross School Enrolment
(pop weighted)
Decomposing International Enrolment Inequality
MLD (population weighted)
International Inequality in Life Expectancy
(population weighted)
International Inequality in Life Expectancy MLD (pop weighted)

The Contribution of China & India and SSA
Decomposing International Life Expectancy Inequality
MLD (pop-weighted)
A Health Kuznets Curve? Gini (population-weighted)
Main Findings

- **Well-being inequality** has **declined** over time

- **Inequality trends** in **social dimensions** concur

- **Well-being dimensions** alter the view on **long run inequality** derived from **real per capita GDP**
  - Inequality in **social dimensions** declined since **1920s**
  - While **income inequality** increased until **mid-20th century**
World Inequality in HIHD* and GDP per Head MLD
(population weighted)  *excluding the income dimension
Main Findings (2)

• China and India: major influence on inequality-2 trends, different timing for income and social dimensions

• The West-Rest Gap, less relevant for international inequality?

• The diffusion of the health transition(s) drives life expectancy inequality
  - A Health Kuznets Curve?
Research Agenda

• Why inequality declined in well-being’s social dimensions but not in GDP per head?
  - Public policy?
  - Medical technology, a public good?

• Why has not been a second health transition in the Rest?
  - Inequalising new technologies?
  - Lack of public policies?

• Will the diffusion of the second health transition reduce life expectancy inequality in the 21st century?
A Multidimensional Approach to Wellbeing

- Human Development: *enlarging people’s choices*

- Achievements in *longevity, knowledge,* and *living standard*

  provide individuals with *freedom to choose*

=> *human development*, a measure of *positive freedom*
An Aggregate Well-being Measure: Historical Index of Human Development

- Social dimensions, transformed with a \textit{convex} achievement function

- \textit{Yet ... income diminishing returns} => \textit{concave transformation} \((\log \ GDP \ per \ head, \ a \ surrogate)\)

- All combined with a \textit{geometric average} \(HIHD = L^{1/3} \ E^{1/3} \ UNY^{1/3}\)

  to reduce its \textit{substitutability}

  => only if \textit{all} dimensions \textit{improve}, \(HIHD\) improves
International Inequality in Human Development
(unweighted)
International Inequality in Human Development MLD
The Contribution of China & India and SSA (population weighted)
Decomposing Human Development Inequality MLD (pop-weighted)
World Inequality in HIHD* and GDP per Head MLD (population weighted) *excluding the income dimension
Main Findings

- Well-being inequality has declined over time
- Inequality trends in social dimensions concur
- Well-being dimensions alter the view on long run inequality derived from real per capita GDP
  - Inequality in social dimensions declined after WWI while income inequality increased
- China and India: major influence on inequality-2 trends
- The diffusion of the health transition(s) drives life expectancy inequality
  - A Health Kuznets Curve?
Research Agenda

- Why inequality declined in social dimensions and HD, but not in GDP per head?
  - Public policy?
  - Medical technology, a public good?

- Why has not been a second health transition in the Rest?
  - Inequalising new technologies?
  - Lack of public policies?
  - Health and education, high income elastic goods?

- Will the diffusion of the second health transition reduce life expectancy (and HD) inequality?
Cognitive Skills and Enrolment (normalized) 1960-90

\[ y = 0.8355x^2 + 0.15x + 0.1147 \]
\[ R^2 = 0.495 \]
International Inequality in Literacy (pop weighted)
International Inequality in Literacy: MLD (pop weighted)
The Contribution of China & India and SSA
Decomposing International Literacy Inequality MLD (pop-weighted)
Years of Poor Health and LEB in 2002

![Graph showing the relationship between Years of Poor Health and Life Expectancy at Birth in 2002. The graph includes a quadratic regression line with the equation: y = -0.0051x^2 + 0.7173x - 16.523. The R^2 value is 0.52.](image-url)
Cognitive Skills and Enrolment (normalized) 1960-90

\[ y = 0.8355x^2 + 0.15x + 0.1147 \]

\[ R^2 = 0.495 \]
Preston Curve: The World 1870-2007  Deaton’s Revision

The graph shows the relationship between Real Per Capita GDP (Geary-Khamis $1990) and Life Expectancy at Birth (years). The equation of the regression line is given by:

\[ y = -3.2188x^2 + 72.46x - 319.51 \]

with a coefficient of determination \( R^2 = 0.96816 \).
Decomposing International Inequality in Real Per Capita GDP: Theil (pop-weighted)
Decomposing International Life Expectancy Inequality

Theil (pop-weighted)
Decomposing International Literacy Inequality
(Theil (pop-weighted))
Decomposing International Enrolment Inequality
Theil (population weighted)
Decomposing Human Development Inequality

Theil (pop-weighted)
International Inequality in HIHD and GDP per Head

MLD (unweighted)
International Inequality in HIHD and GDP per Head

MLD (population weighted)
A Health Kuznets Curve? Theil (population-weighted)
Global Income Inequality: Theil (van Zanden et al., 2013)
World Inequality in HIHD* (unweighted)

* excluding the income dimension
World Inequality in HIHD* (population unweighted)

* excluding the income dimension
World Inequality in HIHD*: MLD (pop weighted)

*excluding the income dimension

Contribution of China & India and SSA
Decomposing World HIHD* Inequality: MLD
* excluding the income dimension (pop-weighted)
Decomposing World HIHD* Inequality: Theil
* excluding the income dimension (pop-weighted)
World Inequality in HIHD* and GDP per Head MLD (unweighted) *excluding the income dimension
World Inequality in HIHD* and GDP per Head MLD (population weighted) *excluding the income dimension
Life Expectancy in the World (1870-2007)

non-linear [Kakwani] versus linear [UNDP ‘hybrid’ and ‘old’] indices
Comparing Trends in HIHD and Per Capita GDP
Drivers of World HIHD Growth (%)

Historical Index of Human Development growth rate (%) and its breakdown by dimensions

Main periods:
- 1870-2007
- 1970-2007
- 1950-1970
- 1913-1950
- 1870-1913

Legend:
- Life Expectancy
- Education
- Adjusted Income
Drivers of Catching-up to OECD in the Rest (%)

- 1870-2007
  - Life Expectancy: 0.2
  - Education: 0.4
  - Adjusted Income: 0.2

- 1970-2007
  - Life Expectancy: 0.3
  - Education: 0.3
  - Adjusted Income: 0.2

- 1950-1970
  - Life Expectancy: 0.5
  - Education: 0.6
  - Adjusted Income: 0.1

- 1913-1950
  - Life Expectancy: 0.4
  - Education: 0.7
  - Adjusted Income: 0.2

- 1870-1913
  - Life Expectancy: 0.2
  - Education: 0.2
  - Adjusted Income: 0.2

Growth rate differential between the Rest and OECD (%) and its breakdown by dimensions.