ECON 256: Poverty, Growth & Inequality

Jack Rossbach

Measuring Poverty

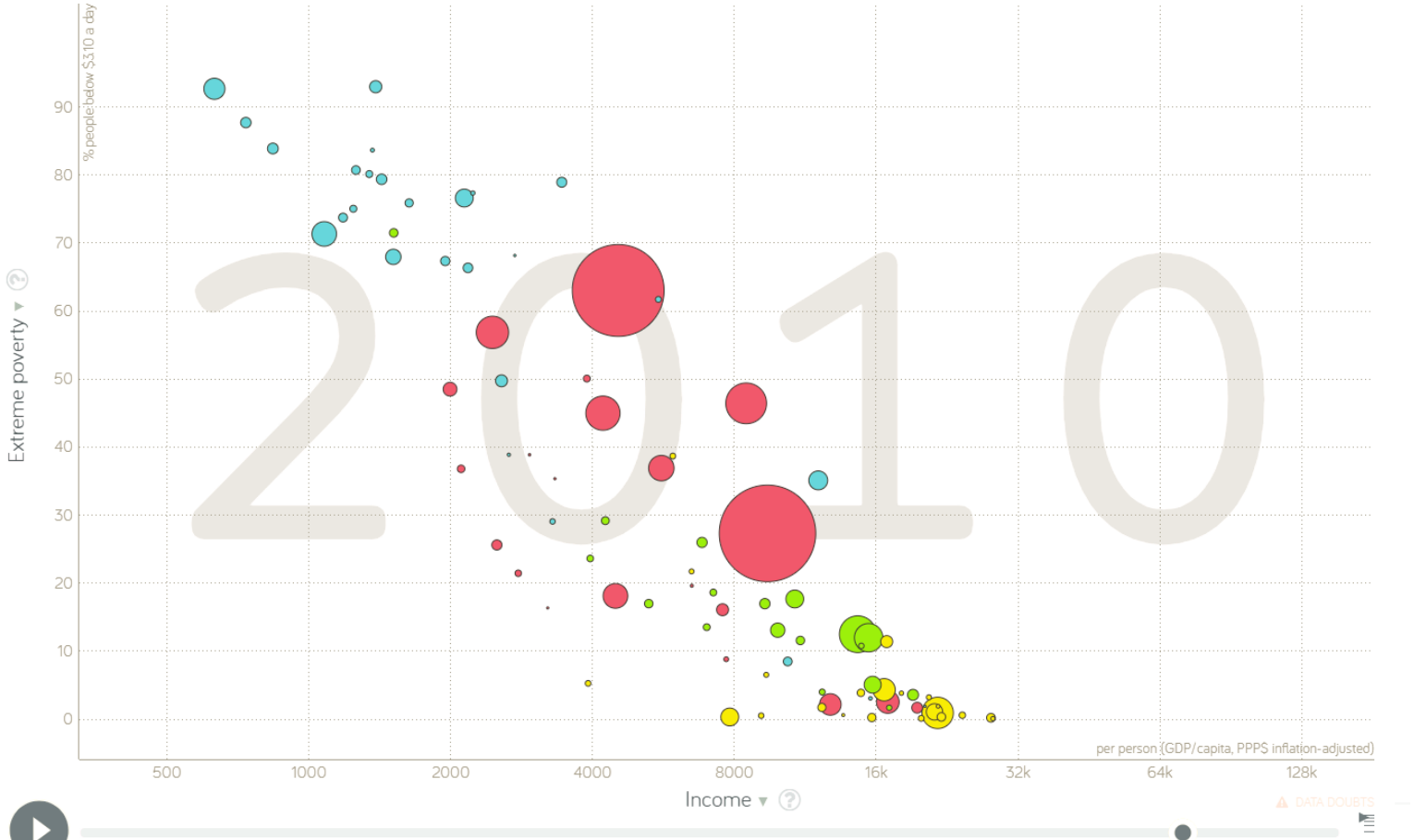
Many different definitions for Poverty

- Cannot afford 2,000 calories per day
- Do not have basic needs met: clean water, health care, shelter, clothes, education
- Spend more than a certain fraction of income on rent, food, or clothing
- Subjective opinion of local community members on who is considered poor

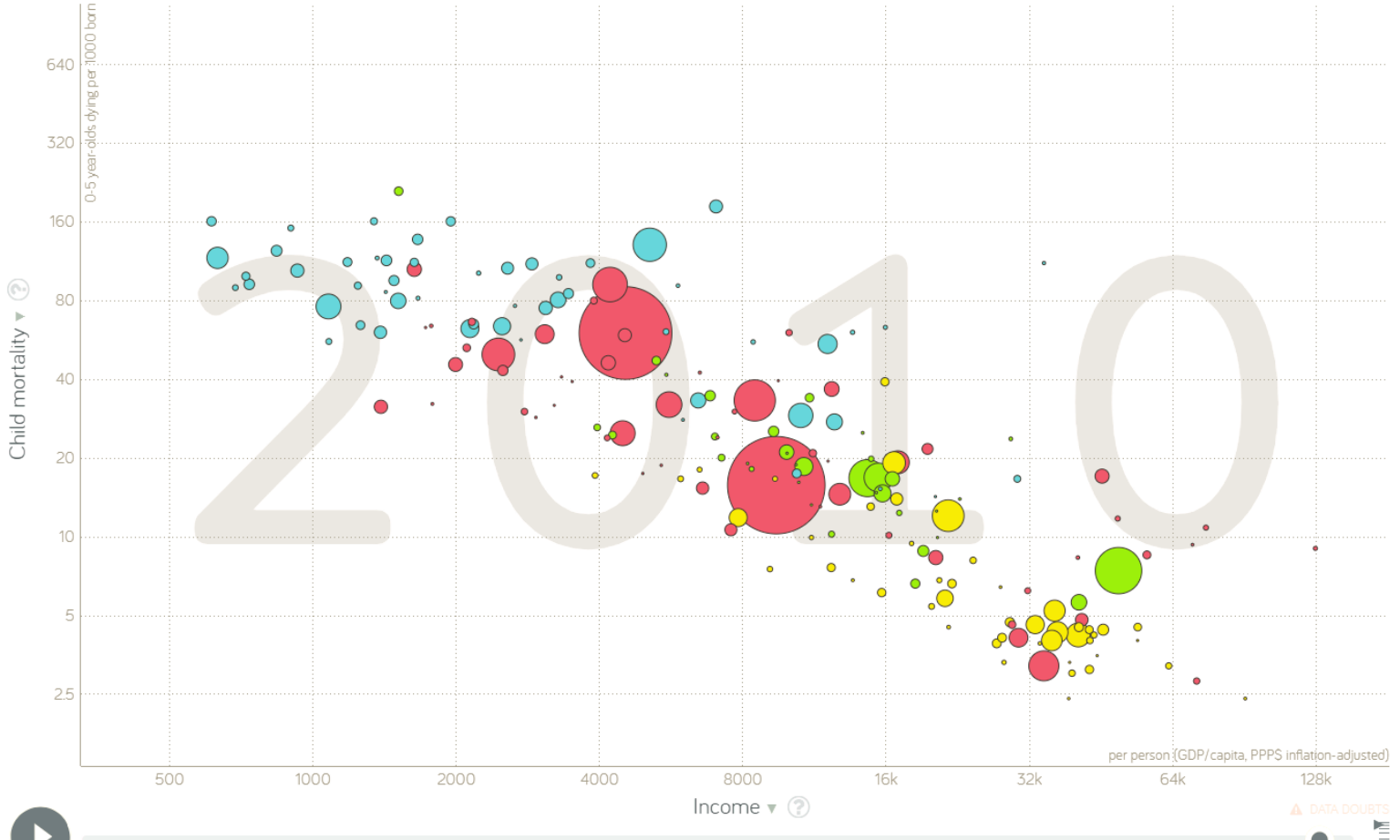
GDP per capita tends to be highly correlated with all these measures

- There can be outliers, such as the United States and health measures

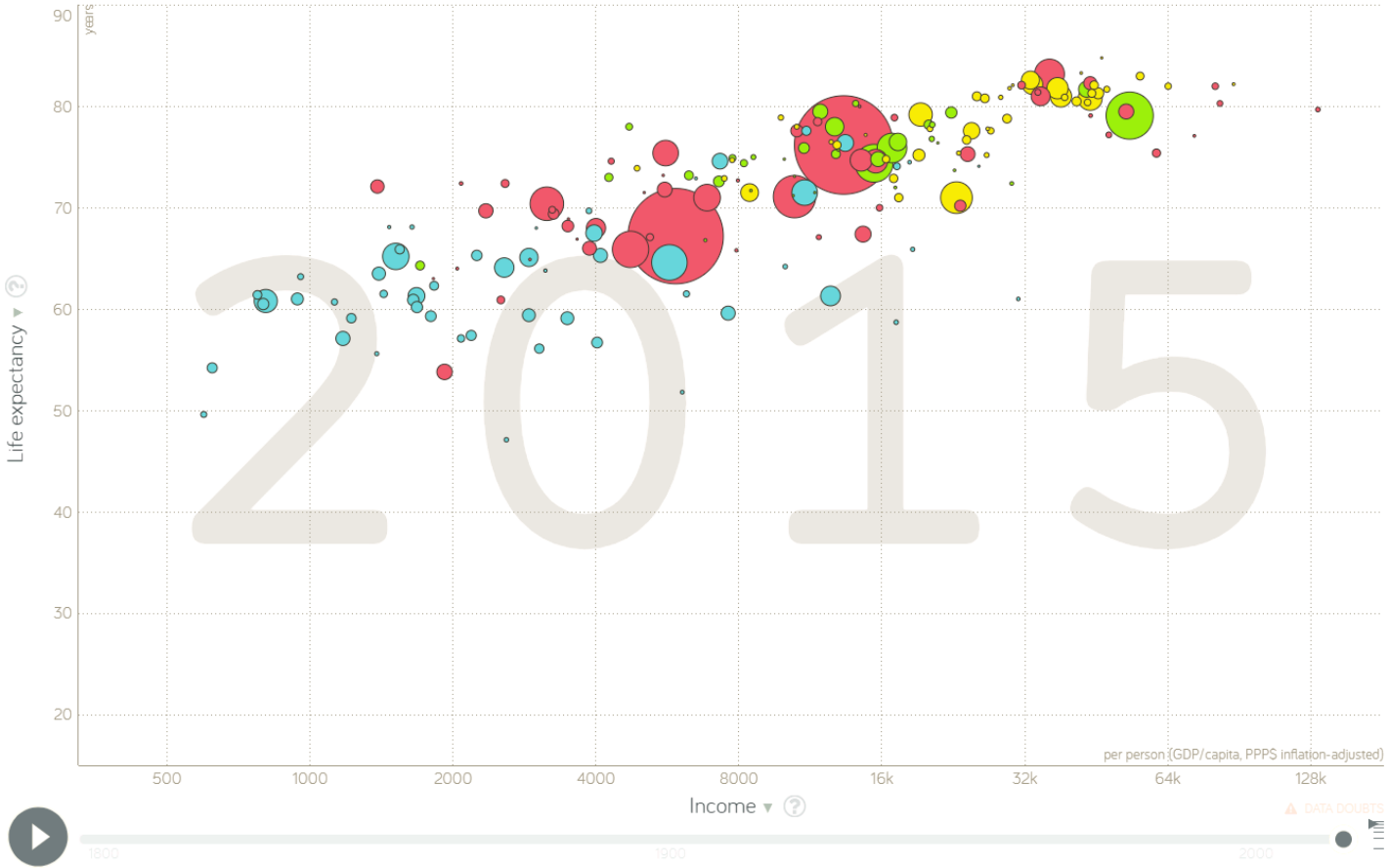
Extreme Poverty Rate ($3/day) vs GDP per Capita



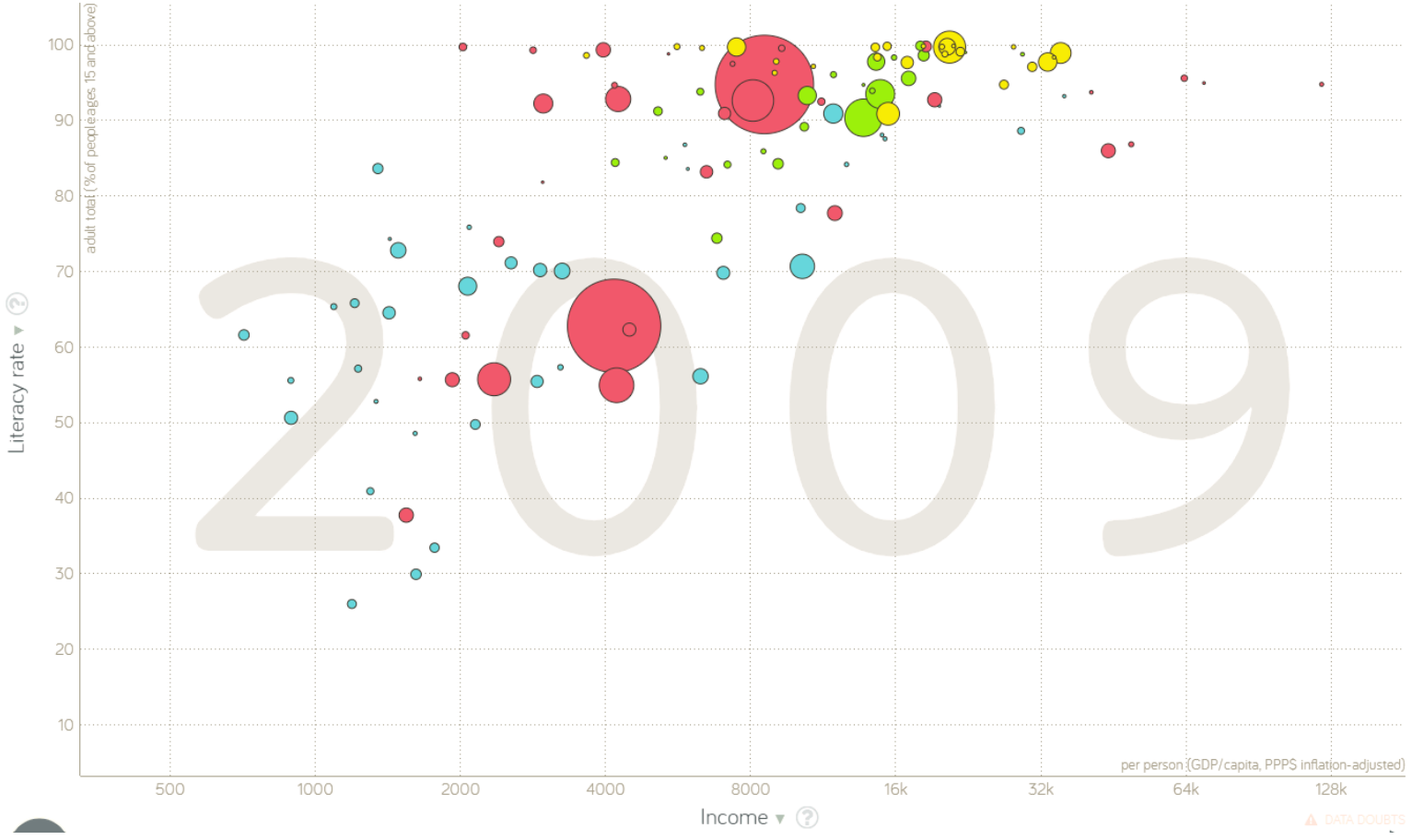
Child Mortality vs GDP per Capita



Life Expectancy vs GDP per Capita



Literacy vs GDP per Capita



Extreme Poverty Lines and Poverty Rates

Extreme poverty is most commonly measured using a $2/day Poverty Line (ranges $1-$3)

- If consumption for a person is less than $2/day, they are classified as impoverished
- The $2/day is adjusted for inflation and PPP. Meant to approximate the cost of 2,000 calories of food per day.
- The Poverty Rate is the proportion of the population below the poverty line

$$\text{Poverty Rate} = \frac{\text{Number of People Below Poverty Line}}{\text{Total Population}}$$

- Also called Poverty Headcount Ratio. Doesn't account for how far below the poverty line.

Average Poverty Gap

The Average Poverty Gap (APG) takes into account average distance below poverty line

$$\text{APG}\ (\%) = \text{Poverty Rate}\ (\%) \times \frac{\text{Poverty Line} - \text{Average Income of Person Below Poverty Line}}{\text{Poverty Line}}$$

Average Poverty Gap

The Average Poverty Gap (APG) takes into account average distance below poverty line

$$\text{APG}\ (\%) = \text{Poverty Rate}\ (\%) \times \frac{\text{Poverty Line} - \text{Average Income of Person Below Poverty Line}}{\text{Poverty Line}}$$

- Suppose the Poverty Rate is 60%, the Poverty Line is $2/day and Average Income of Individuals below Poverty Line is $1/day.

$$\text{APG}\ (\%) = 60 \times \frac{2-1}{2} = 30\%$$

- The average poverty gap can range from 0 to 100.

Computing Average Income for Individuals Below Poverty Line

Income distribution below poverty line (daily income)	Between 0 and 25 cents	Between 25 and 50 cents	Between 50 and 75 cents	Between 75 cents and 1 dollar	Poverty headcount ratio (in %)	Average poverty gap (in %)
Country A (millions of people)	10	10	40	40	50	17.5
Country B (millions of people)	40	40	10	10	50	32.5

Country A and country B both have 50% of the population below the poverty line. However, there is more extreme poverty in country B than in country A. The average poverty gap takes this difference into account.

$$\text{Average Income of Individuals Below Poverty Line} = \frac{\left(10 \times \left[\frac{.25 + 0}{2}\right] + 10 \times \left[\frac{.50 + .25}{2}\right] + 40 \times \left[\frac{.75 + .50}{2}\right] + 40 \times \left[\frac{1.00 + .75}{2}\right]\right)}{10 + 10 + 40 + 40} = 0.65$$

Roland: Table 2.1

Poverty Rates and Average Poverty Gaps Across Countries

	The poverty headcount ratio in 2005 (in %)	The average poverty gap in 2005 (in %)
Bangladesh	49.6	13.1
Bolivia	19.6	9.7
Cambodia	40.2	11.3
Democratic Republic of the Congo	54.1	22.8
Nigeria	65.9	29.6
Peru	8.2	2.0

The poverty headcount ratio shows the percentage of the population of the selected countries that lives below the poverty line (here, 1 dollar a day). The average poverty gap indicates what percentage of the population would have to receive a transfer equivalent to 1 dollar a day in order for poverty to be eradicated in those countries.

Source: United Nations, http://millenniumindicators.un.org/unsd/mdg/SeriesDetail.aspx?srid=580 and http://millenniumindicators.un.org/unsd/mdg/SeriesDetail.aspx?srid=584.

Roland: Table 2.2

Poverty Rates across Time and Regions

	Poverty headcount (in millions)			Poverty headcount ratio (percent)		
	1981	1993	2005	1981	1993	2005
East Asia and Pacific	1071.49	845.26	316.21	77.67	50.77	16.78
China				84.02	53.69	15.92
Europe and Central Asia	7.06	20.05	17.29	1.67	4.26	3.65
Latin America and the Caribbean	47.08	46.64	45.25	12.87	10.1	8.22
Brazil				17.1	12.97	7.76
Middle East and North Africa	13.66	9.85	10.99	7.87	4.07	3.6
South Asia	548.29	559.42	595.58	59.35	46.94	40.34
India				73.17*	58.46	50.91
Sub-Saharan Africa	212.25	317.36	388.38	53.37	56.87	50.91
Total	1899.82	1798.57	1373.69	51.87	39.19	25.19

Table 2.3 shows the number of people (in millions) living on less than $1.25 a day in different regions of the world between 1981 and 2005, the most recent year for which those measures exist. The same data are also shown as a percentage of the populations of the different regions.

Source: The World Bank, http://iresearch.worldbank.org/PovcalNet/povDuplic.html.
*1977 instead of 1981.

Roland: Table 2.2

Poverty Lines and Poverty Rates in Developed Countries

Poverty Rates reported in developed countries tend not to use the $2/day line

- In the United States the poverty lines is defined using income (instead of consumption) and defined at the household level.
- Poverty Rate is around 12% with these poverty lines, but not comparable to extreme poverty lines.
- Income vs Consumption

Size of Family Unit	Poverty Threshold
One person	$12,082
Two people	$15,391
Three people with two related children	$19,096
Eight people with two related children	$43,230

- US Definition: Food Consumption basket doesn't take up more than 1/3 of income

Source: US Census

Measuring Inequality

Many Different ways to measure inequality

Quantile Ratios

- Rank population by income and divide it into quantiles (equal sized groups, e.g. 10 groups would be deciles). Compare average income between two individuals in different quantiles

Strength: Easy to Compute, Weakness: Doesn't take into account whole distribution

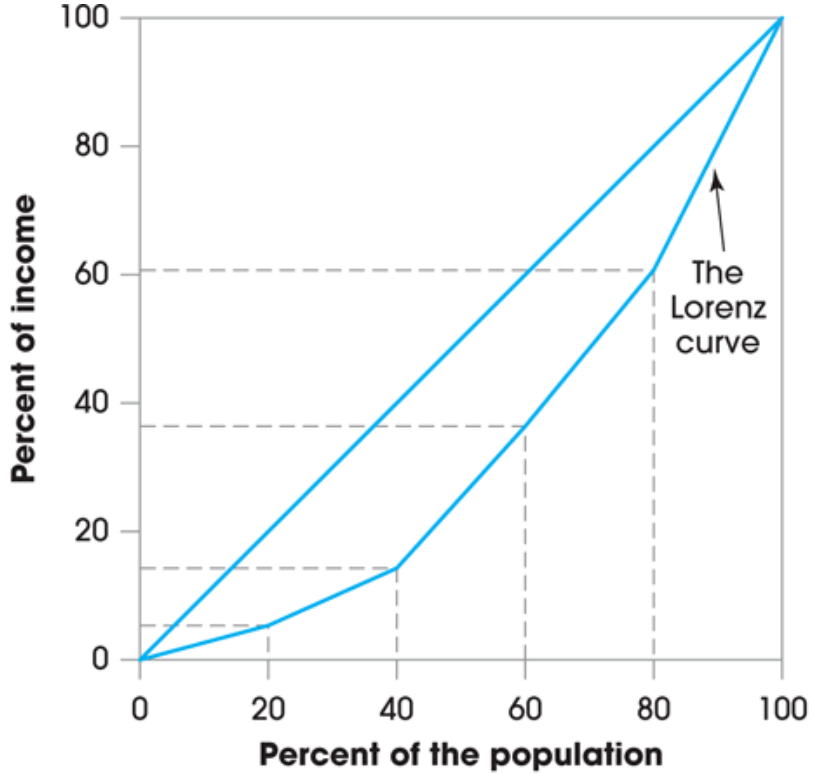
Measuring Inequality

Many Different ways to measure inequality

Lorenz Curves and Gini Coefficients

- Plot the Cumulative Share of Income held by different quantiles of the population
- Compare it to the distribution of a perfectly egalitarian society
- Compute **Gini** coefficient as ratio of area between egalitarian society and actual distribution divided by area under curve

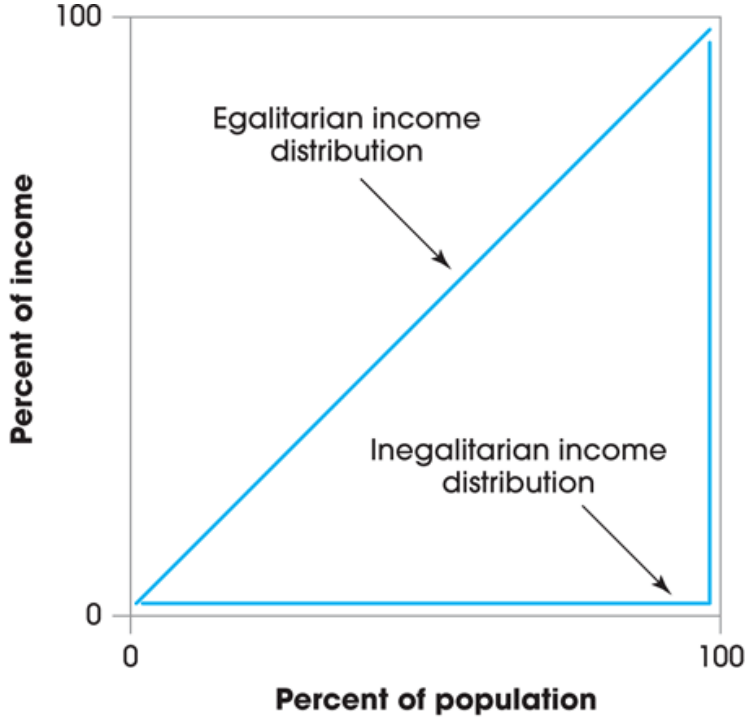
Lorenz Curve and Gini Coefficient



The Lorenz curve plots the share of income (on the vertical axis) held by the poorest quintile to the richest quintile of the population.

Roland: Figure 2.1

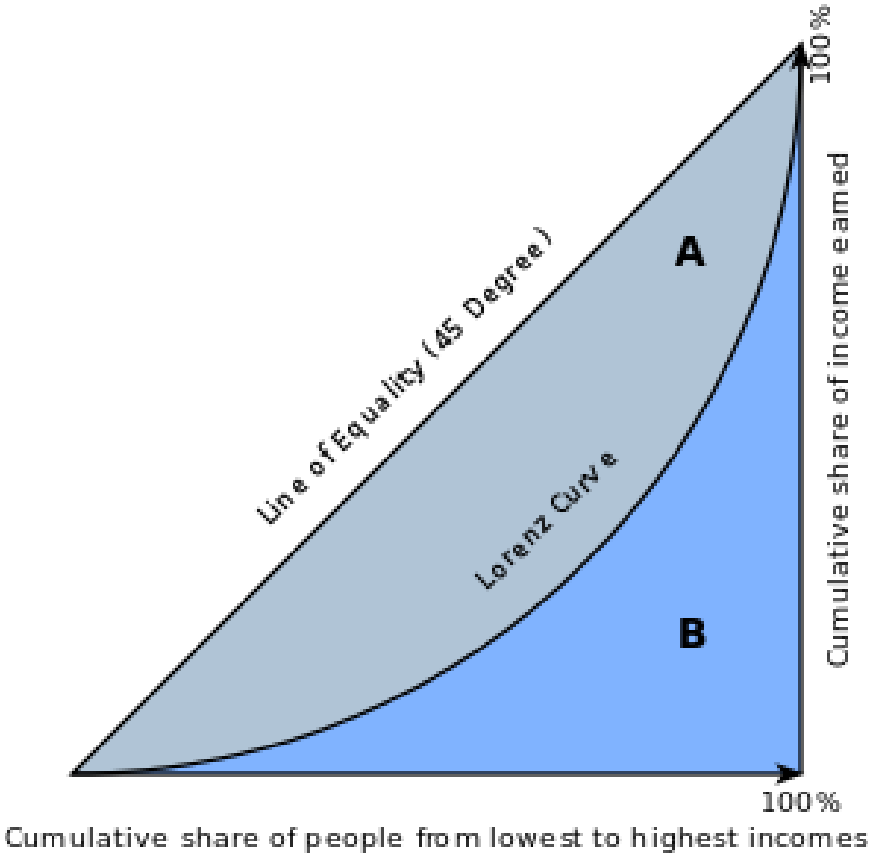
Lorenz Curve and Gini Coefficient



If everyone in a given population has the same income (fully equal income distribution), then the Lorenz curve would follow the diagonal line. If all income were held by the wealthiest 1% of that population (completely unequal income distribution), the Lorenz curve would be a flat horizontal line between 0 and 99% of income and a vertical line thereafter.

Roland: Figure 2.2

Lorenz Curve and Gini Coefficient



Equivalent Formulas for Gini

Formula 1:

$$G = \frac{A}{A + B}$$

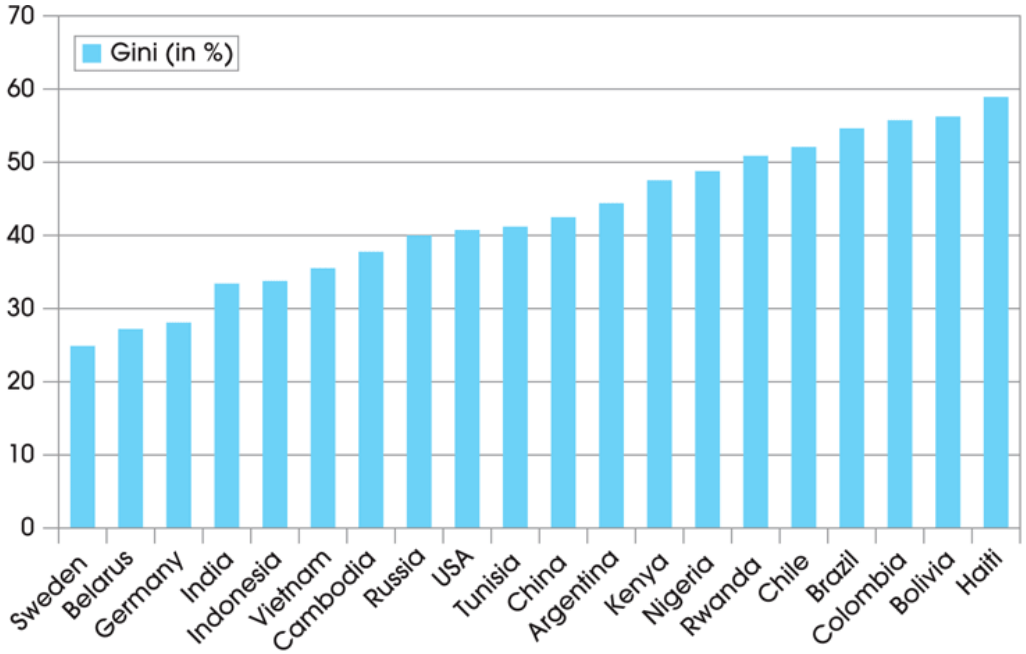
Formula 2:

$$G = 1 - 2B$$

- Gini ranges between 0 (perfectly equal) and 1 (one person has everything)
- Often expressed as % (between 0 and 100)

Graph: Wikipedia

Inequality Across Countries



Gini coefficients (in percentages) are shown for a selected group of countries. A low Gini coefficient means low income inequality and a high Gini coefficient means high income inequality.

Source: The World Bank, World Development Indicators, http://data.worldbank.org/indicator/SI.POV.GINI.

Roland: Figure 2.4

Measures of Inequality Across Countries

	Gini index (percentage)	90th/10th percentile ratio
Sub-Saharan Africa	46	6.63
Middle East and North Africa	37	5.12
Latin America and Caribbean	50	14.42
South Asia	33	4.12
East Asia and Pacific	39	4.92
Eastern Europe and Central Asia	31	4.17
High-income OECD	31	4.09

Regional averages for the Gini coefficient and the ratio of the 90th to the 10th percentile of the population are shown here. Inequality is the highest in Latin America.

Source: The World Bank, World Bank data base, http://siteresources.worldbank.org/DATASTATISTICS/Resources/table2_7.pdf.

Roland: Figure 2.4

Measures of Inequality Across Countries

	Gini index (percentage)	90th/10th percentile ratio
Sub-Saharan Africa	46	6.63
Middle East and North Africa	37	5.12
Latin America and Caribbean	50	14.42
South Asia	33	4.12
East Asia and Pacific	39	4.92
Eastern Europe and Central Asia	31	4.17
High-income OECD	31	4.09

Regional averages for the Gini coefficient and the ratio of the 90th to the 10th percentile of the population are shown here. Inequality is the highest in Latin America.

Source: The World Bank, World Bank data base, http://siteresources.worldbank.org/DATASTATISTICS/Resources/table2_7.pdf.

Roland: Figure 2.4

Inequality over Time

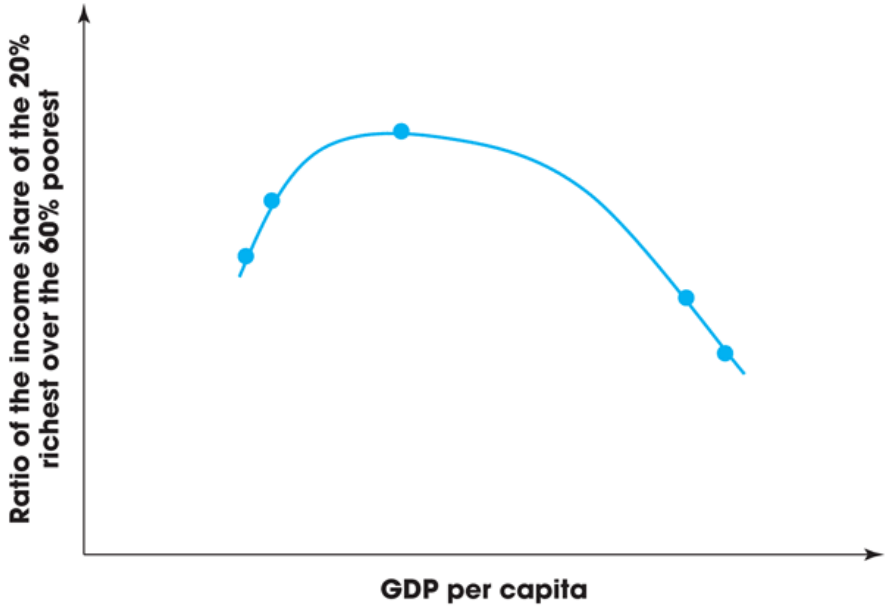
Since around 1980's inequality within countries has been increasing

- However, inequality across countries has been decreasing

There are claims there may be a Kuznet's curve for inequality

- When countries start to develop, inequality increases
- Eventually, as development continues, inequality reverses and begins to fall

Kuznet's Curve

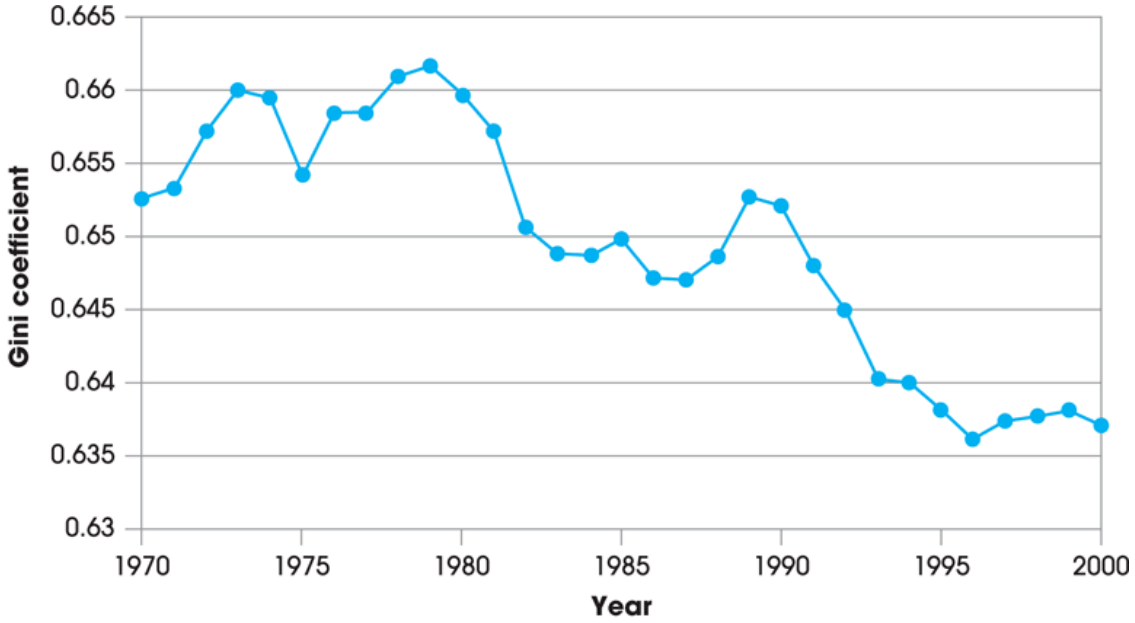


Kuznets mapped GDP per capita on the horizontal axis and a measure of inequality for which data were available for a few countries: the ratio of the income share of the 20% richest over the 60% poorest. He found that inequality first increases with economic development and then decreases, forming an inverted U-curve.

Source: Simon Kuznets, "Economic Growth and Income Inequality," *American Economic Review*, 45, no. 1 (1955): 1–28. Printed with permission of American Economics Association.

Roland: Figure 2.4

World Gini over Time

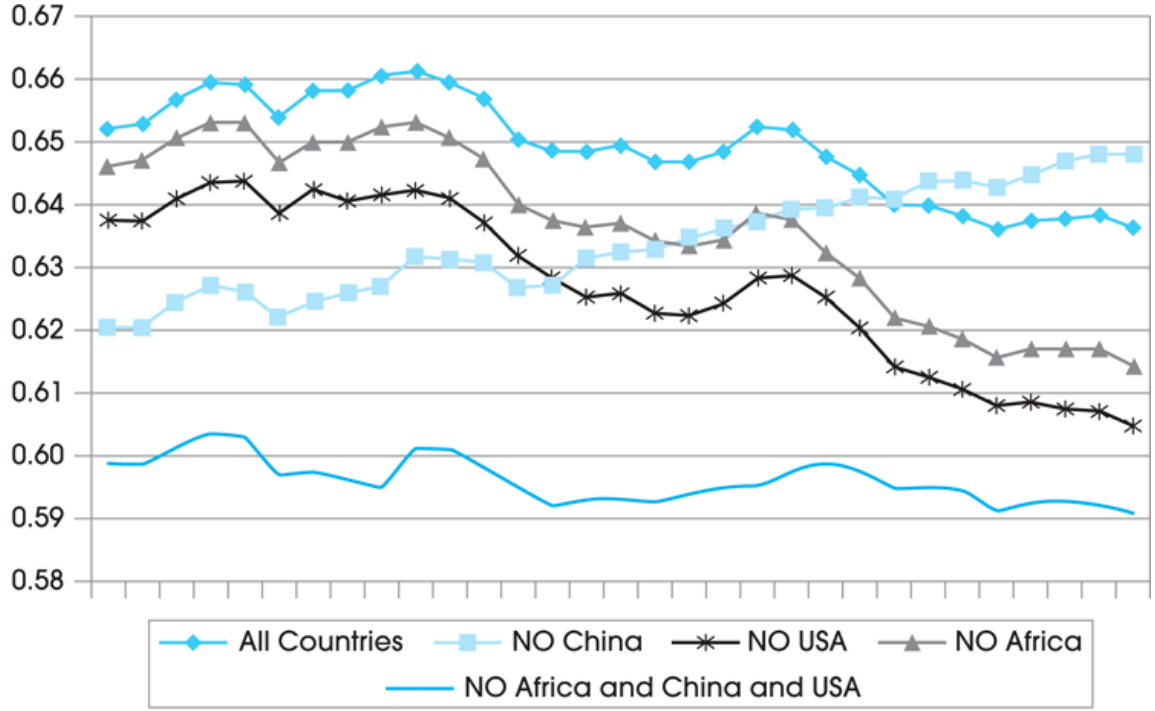


According to Sala-i-Martin, inequality in the world's income distribution has decreased since 1970. The main reason for this trend is the strong growth in China and India, where incomes have been catching up with those of richer countries.

Source: Xavier Sala-i-Martin, "The World Distribution of Income: Falling Poverty and . . . Convergence, Period," *Quarterly Journal of Economics* 121, no. 2 (2006): 385.

Roland: Figure 2.4

Country Gini Coefficients over Time



Excluding China, income inequality worldwide has increased over time. Excluding Africa, China, and the United States, it has remained stable.

Source: Sala-i-Martin, "The World Distribution of Income," 387.

Roland: Figure 2.4