

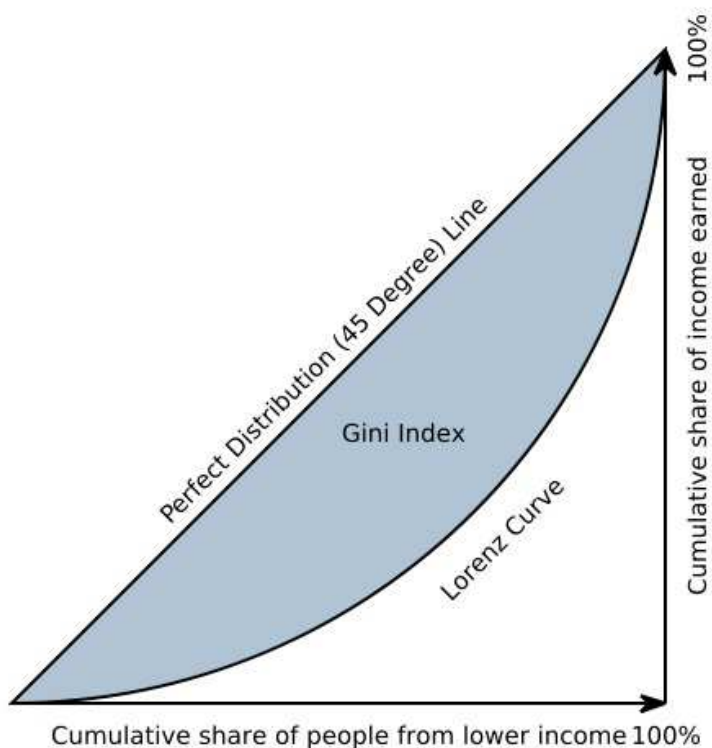
Gini Indexes and Lorenz Curves

The **Gini coefficient** is a measure of statistical dispersion most prominently used as a measure of inequality of income distribution or inequality of wealth distribution. It is defined as a ratio with values between 0 and 1:

A low Gini coefficient indicates more equal income or wealth distribution, while a high Gini coefficient indicates more unequal distribution. 0 corresponds to perfect equality (everyone having exactly the same income) and 1 corresponds to perfect inequality (where one person has all the income, while everyone else has zero income).

Worldwide, Gini coefficients range from approximately 0.249 in Japan to 0.707 in Namibia.

The **Gini index** is the Gini coefficient expressed as a percentage, thus Japan's Gini index is 24.9% (Mathematically, this is equal to the Gini coefficient of 0.249, but the percentage sign is often omitted in the Gini index.)



How to calculate a Gini Index

To calculate the Gini Index we need to find the area between the Lorenz curve and absolute equality (which is the line $f(x)=x$). Economists multiply this area by 2 to give a Gini index between 0 and 1, making the Gini index easier to interpret. Thus the formula for finding a Gini

index given a Lorenz curve of $L(x)$ is: $2 \cdot \int_0^1 [x - L(x)] dx$

Example: The Lorenz curve for the United States in 1990 can be modeled by:

$L(x) = 2.03x^4 - 3.15x^3 + 2.22x^2 - 0.1x$ Compute the Gini Index

Example: In 1988 the Lorenz curve was $L(x) = 1.93x^4 - 2.96x^3 + 2.12x^2 - 0.09x$, calculate the Gini Index

Example: Suppose a study indicates the distribution of income for professional baseball players is given by the Lorenz curve: $L_1(x) = \frac{2}{3}x^3 + \frac{1}{3}x$, while for professional football players the Lorenz curve is: $L_2(x) = \frac{5}{6}x^2 + \frac{1}{6}x$ and for professional basketball players the Lorenz curve is:

$L_3(x) = \frac{3}{5}x^4 + \frac{2}{5}x$. Find the Gini index for each sport and determine which has the most equitable income distribution and which has the least equitable.