

**DATA SCIENCE**

# LORENZ CURVE

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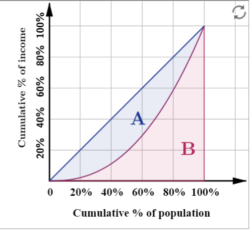
SUBJECT : DATA VIZUALIZATION

## Lorenz Curve Definition :

The Lorenz curve, named after American economist Max O. Lorenz, is a graphical representation of an [**economic inequality**](https://www.wallstreetmojo.com/economic-inequality/) model. The curve takes the population percentile on the X-axis and cumulative wealth on the Y-axis. Complementing this graph would be a diagonal line at a 45⁰ angle from the origin (meeting point of the X and Y axis), indicating the population’s perfect income or wealth distribution.

Below this straight diagonal line would be this actual distribution Lorenz curve. The area enclosed between the line and this curve is the precise measurement of inequality. The area between the two lines expressed as a ratio to the area under the straight line represents the inequality. It is called the **[Gini coefficient](https://www.wallstreetmojo.com/gini-coefficient/)**

* The Lorenz curve is a graphical representation of the economic inequality model. It is named after American economist Max O. Lorenz.
* The Lorenz curve considers the population percentile on the X-axis and the cumulative wealth on the Y-axis.
* The Lorenz curve and the Gini coefficient are the two indicators for determining economic inequality. It does not consider the income variation over an individual’s lifecycle during measuring inequality.
* The Lorenz curve can display the government policy’s effectiveness in serving redistributing income. One can also use it while considering particular measures to create economy weaker sections.



The curve (B) is a graph showing the proportion of overall income or wealth assumed by the bottom x% of the people, although this is not rigorously true for a finite population. It is often used to represent income distribution, where it shows for the bottom x% of households, what percentage, represented by a straight line – A, (y%) of the total income they have. The percentage of households is plotted on the x-axis, the percentage of income on the y-axis. It can also be used to show the distribution of assets. In such use, many economists consider it to be a measure of social inequality.

The Lorenz curve is the graphical method of studying dispersion. Gini coefficient, also known as the Gini index, can be computed as follows. Let us assume in the graph area that A1 represents the Lorenz curve and the line, and **A2**is the line below the curve. So,

Gini coefficient = A1/ (A1+ A2)

The Gini coefficient lies between 0 and 1, 0 being the instance where there is perfect equality and 1 being the instance where there is perfect inequality. Therefore, the higher the area enclosed between the two lines represents higher economic inequality.

We can say that there are two indicators for measuring [**income inequality**](https://www.wallstreetmojo.com/income-inequality/):

* The Lorenz curve is the visual indicator
* The Gini coefficient is a mathematical indicator

### Limitations :

* It might not always be rigorously true for a finite population level.
* The equality measure shown may be misleading.
* When two Lorenz curves are being compared and intersected, it is impossible to ascertain which distribution represented by the curves displays more inequality.
* The Lorenz curve ignores income variation over an individual’s lifecycle while determining inequality.

### Uses of the Lorenz Curve

* One can use it to show the effectiveness of a government policy in helping redistribute income. The impact of a particular policy introduced can be demonstrated with the help of the Lorenz curve, how the curve has moved closer to the perfect equality line post-implementation of that policy.
* It is one of the simplest representations of inequality.
* It is most useful in comparing the variability of two or more distributions.
* It shows the distribution of wealth of a country among different percentages of the population with the help of a graph that helps many businesses establish their target bases.
* It helps in business modeling.
* One can use it majorly while taking specific measures to develop the weaker sections of the economy.

# Pros

* Visually depicts inequality across a population in a manner easy to understand and analyze
* Is used to help calculate the Gini coefficient, a primary mathematical mean of calculating inequality
* May assist governments in making public policy changes or impacting tax bracket ranges based on income
* Maintains anonymity of surveyed individuals
* May be compiled to show how the curve has changed over time

# Cons

* Sample data may not appropriately reflect the overall population, therefore displaying an incorrect Lorenz curve
* May require extensive data collection to adequately fill in the entire curve
* May require estimation or preparer inference as to the curve to draw
* May mislead analysts due to the varying shapes and sizes of the Gini coefficient area; different areas may be equal in size yet vary in appearance

### Conclusion

the Lorenz curve provides an innate and complete understanding of the income distribution. Moreover, it provides the basis for inequality measurements through the Gini index.

The curve defines the relationship between the cumulative portions of income as received by the cumulative population when the income-earning population is arranged in ascending order.

The extent to which the curve bulges downward below the straight diagonal line called the line of equality indicates the degree of inequality of distribution. It implies the curve will always be bowed downwards until there exists inequality in the economy.

Though considered the simplest among other disparities measures, the graph can be misleading and might not always produce accurate results.