A note on Gini index of Liberia in World Development Indicators 2009

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Abstract

Either the Gini index or the distribution of income or consumption of Liberia is inappropriate in the World Development Indicators (WDI) 2009. In the present exercise, we have computed Gini coefficients for 135 countries to show that Liberia deviates widely from the usual pattern. We have then estimated the relationship between the computed Gini coefficients of 134 countries (except Liberia) and those of the WDI 2009 using OLS method to predict the appropriate value of Liberia as it should be in the WDI 2009. The Gini index of Liberia should be 37.9 instead of 52.6. However, if the distribution is inappropriate, it needs exact replacement or we have to follow our intuition to replace it by a suitable pattern as in case of Lesotho or Nicaragua or Chile etc. The Bank may include such an exercise in the curricula while computing Gini index as a precautionary measure.

Keywords : Distribution of income or consumption, Gini coefficient, Kendall and Stuart, Liberia, World Development Indicators 2009

JEL classification: D630

1. Introduction

Probably the World Bank exercises the highest level of curricula while computing Gini coefficient to reveal true inequality of the world with robustness and accuracy. Such information on economic inequality in the form of Gini index and distribution of income or consumption are published in World Development Indicators (WDI) every year. However, if we look at the table 2.9 of the WDI 2009 (World Bank 2009: 72-75), we find something unusual with Liberia[*]. By looking at the distribution of income or consumption and the Gini index of Liberia, we realise that either the former (the distribution) is inappropriate or the latter (Gini index) is heavily inflated. If the distribution is inappropriate, it needs exact replacement or we have to follow our intuition to replace it by a suitable pattern as in case of Lesotho or Nicaragua or Chile etc. However, we may surely check whether the Gini index of Liberia is inflated for that particular distribution of income or consumption following a simple method described in the next section.

2. Method

Although there are various working formulae of computing Gini coefficient, we may take the one given by Kendall and Stuart (1963) as following:

$$G = (1/2n^2\mu)\sum_{i=1}^{n}\sum_{j=1}^{n}\left|y_i - y_j\right|, \qquad \ldots \qquad \ldots \qquad \ldots \qquad \text{(i)}$$

where, y_i is the income of person i, y_j is the income of person j, μ is the average level of income, i = 1, 2, 3, …, n, j = 1, 2, 3, …, n and $y_1 \geq y_2 \geq \ldots \geq y_n$. In the above equation, Gini coefficient (G) is one-half the average value of absolute differences between all pairs of incomes divided by the mean income.

[*] Table M of Human Development Report 2009 (UNDP 2009: 195-198) also shows similar information.

It is to be noted that we are working with distribution of income or consumption instead of absolute income levels and in our case n = 5, as we have five different groups / quintiles, where $y_1 \leq y_2 \leq \ldots \leq y_n$.

It is also to be remembered that as the World Bank exercises the highest level of curricula, n (number of cases) may be too large for them. In our case n = 5. As Gini coefficient is influenced by the granularity of the measurements, the above formula will surely yield lower index value for a country as compared to that of the World Bank one. In order to have an appropriate index value for Liberia, we may compute Gini coefficient of other countries as well (following the above formula), check the relationship between the computed Gini coefficient values and those of the table 2.9 of WDI and fit a curve to predict the index values of the latter, particularly the index of Liberia.

3. Application

We have computed Gini coefficients of 135 countries as per availability of data in WDI 2009 (list of countries is shown in the appendix) and plotted the values against those of WDI 2009 in figure 1 (as shown in the appendix). The figure clearly shows a linear relationship between the two as well as an wide deviation of Liberia from this particular pattern.

As we observe a linear pattern and as Liberia diverts widely from this, we drop Liberia from our analysis and fit a curve following OLS method for 134 countries treating the Gini index (WDI 2009) as dependent variable as following:

$$Gini(WDI\,2009) = -2.23 + 1.15 * Gini(Kendall\,and\,Stuart). \quad \ldots \ \ldots \ \text{(ii)}.$$

The goodness of fit statistics of the above exercise are shown in table 1 in the appendix. Now, if we put the computed Gini coefficient value of Liberia (which came to be 34.96) in equation (ii), we have the following:

$$Gini(WDI\,2009)_{Liberia} = -2.23 + 1.15 * 34.96$$

$$= 37.94.$$

4. Conclusion

We feel that either the Gini index or the distribution of income or consumption of Liberia is inappropriate in the World Development Indicators (WDI) 2009. In the present exercise we have computed Gini coefficients for 135 countries to show that Liberia deviates widely from the usual pattern. We have then estimated the relationship between the computed Gini coefficients of 134 countries (except Liberia) and those of WDI 2009 using OLS method to predict the appropriate value of Liberia as it should be in WDI 2009. Although the Gini index of Liberia is 52.7 according to WDI 2009, it should be around 37.94. However, if the distribution is inappropriate, it needs exact replacement or we have to follow our intuition to replace it by a suitable pattern as in case of Lesotho or Nicaragua or Chile etc. The Bank may include such an exercise in the curricula while computing Gini index as a precautionary measure.

5. Reference

Kendall, M. G. and A. Stuart. (1963): *The Advanced Theory of Statistics, Vol. 1, Distribution Theory,2nd edition* (London: Griffin).

UNDP (2009): *Human Development Report 2009,* (Oxford: Oxford University Press).

World Bank. (2009): *World Development Indicators 2009* (Washington D. C.: The World Bank).

Annexure

I. List of 135 countries (as per availability of data in WDI 2009)

Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Congo Dem Rep., Congo Rep., Costa Rica, Côted'Ivoire, Croatia, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt Arab Rep., El Salvador, Estonia, Ethiopia, Finland, France, Gabon, Gambia The, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Hong Kong China, Hungary, India, Indonesia, Iran, Islamic Rep., Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Rep., Kyrgyz Rep., Lao PDR, Latvia, Lesotho, Liberia, Lithuania, Macedonia, FYR, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands The, New Zealand, Nicaragua, Niger, Nigeria, Norway, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Rwanda, Senegal, Serbia, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, RB, Vietnam, Yemen, Rep., Zambia, Zimbabwe.

II. Scatter-plot: Gini index (WDI 2009) Vs. computed Gini coefficient (Kendall and Stuart) in the present context for 135 countries

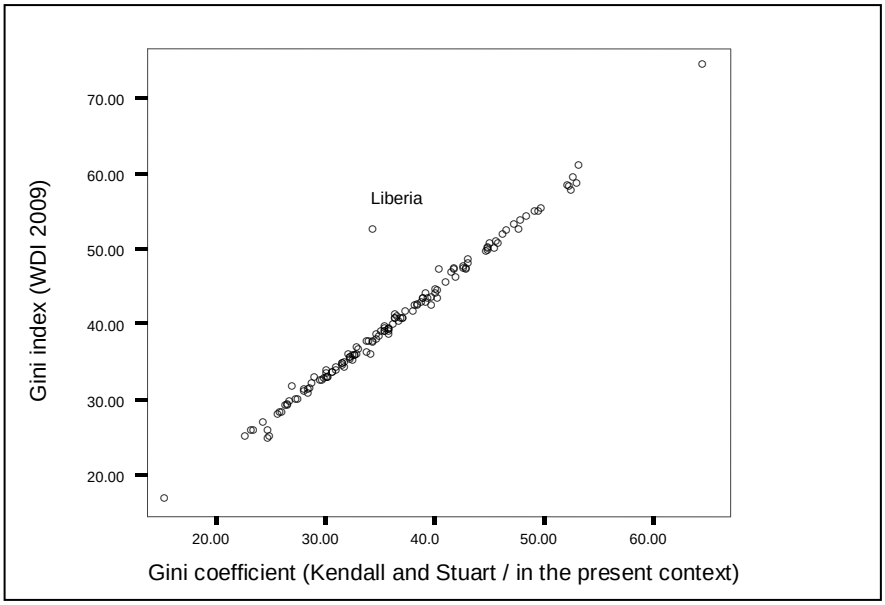

Figure 1. Scatter plot of Gini coefficients: WDI measure Vs. the present measure

III. The goodness of fit statistics of OLS estimate

Table 1. Model summary

Statistic	Value	Standard error	F or t*	Sig.
Adjusted R Square	0.995	0.637	27665.125	0.000
Constant	-2.230	0.261	-8.551	0.000
Gini (Kendall and Stuart)	1.150	0.007	166.331	0.000

n=134

* F for adjusted R square, t for the constant and the coefficient