

# WHAT DOES THE NEW INEQUALITY HDI TELL US ABOUT EUROPE?

Adina, Moise-Titei<sup>1</sup>

## Abstract:

*Like all averages, the HDI masks inequality in the distribution of human development across the population at the country level. Starting from this hypothesis, we chose to bring to your attention the new Inequality-adjusted Human Development Index (IHDI) which was adopted in the 20th anniversary edition of Human Development Reports, in 2010. In this article we proposed to make some comparisons between the ranks of European Countries in the hierarchy of Inequality-adjusted HDI and also, we proposed to highlight the loss in values compared with traditional HDI.*

**Keywords:** human development, inequality, composite index, hierarchy

**JEL Classification:** O15

## 1. Introduction

In 1990, the United Nations Development Program (UNDP) published first annual *Human Development Report (HDR)* and introduced *the Human Development Index (HDI)*. This index provides a broader characterization of “development” than is possible by focusing on national income alone. Traditionally, the achievements in health, education and material wellbeing were associated with such variables as life expectancy at birth, a combination of literacy rate and gross enrolment rate for measuring knowledge and, for a decent standard of living, was used GDP per capita in purchasing power parity (PPP) terms in US dollars. Until the 2010 edition of the Human Development Report (HDR), the Human Development Index (HDI) was calculated like an arithmetic mean of the normalized values of those three variables.

Among other things, the HDI has been criticized for the fact that it uses the wrong variables, and that it does not reflect the human development idea accurately (Chibber and Laajaj, 2007 or Dasgupta and Weale, 1992). It has also been criticized for the arbitrariness of its weighting scheme. Using the Human Development Index (HDI), Foster, McGillivray and Seth illustrated the robustness relations for various sets of weighting vectors and demonstrated how some rankings are fully robust to changes in weights while others are quite fragile [4].

For example, Chibber and Laajaj consider it is necessary that HDI brings to light a broader set of basic dimensions of human development and they proposed to add the fourth dimension of development which measures environmental sustainability as one of the priorities. On the list of indicators are CO<sub>2</sub> emissions per capita, renewable energy, SO<sub>2</sub> emission per km<sup>2</sup> and water scarcity [1].

Many authors consider insufficient and inadequate to use only GDP or GNP per capita for measuring the well-being. In this regard, D and W proposed to include indices of political and civil liberties based on the observation that improvements in per capita national income, life expectancy at birth, and infant mortality are positively correlated with the extent of political and civil liberties enjoyed by citizens, while improvements in literacy are negatively correlated with these liberties [2].

Ranis, Stewart and Samman explored empirical correlations between 11 categories of indices that seem to encompass all the major dimensions of human development. Here, we can mention mental well-being, political freedom, inequality, work conditions, economic stability, political security etc. They find that under-five mortality rates perform

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<sup>1</sup> Associate Professor, Ovidius University of Constanta, Faculty of Economic Sciences, [adinatitei@yahoo.com](mailto:adinatitei@yahoo.com)

equally as well as the HDI, and income per capita is less representative of other dimensions of human development. [6]

With the occasion of the 20th anniversary edition of HDR, the United Nations Development Programme (UNDP) introduced several minor but still significant adjustments in the indicators and methodology used to calculate the Human Development Index.

The access to knowledge is now measured by: mean years of adult education, which is the average number of years of education received in a life-time by people aged 25 years or older and expected years of schooling for children of school-entrance age. The second represents the total number of years of schooling a child of school-entrance age can expect to receive if prevailing patterns of age-specific enrolment rates stay the same throughout the child's life.

Also, the standard of living is now measured by Gross National Income (GNI) per capita in PPP US\$, instead of Gross Domestic Product (GDP) per capita in PPP US\$. This change was necessary because GDP is a measure of economic output, and it does not reflect a country's disposable income — some profits may be repatriated abroad, some residents receive remittances from abroad, and in some cases inbound aid flows may be sizeable. GNI adjusts the GDP for these factors and it is therefore a better measure of a country's level of income.

We also mention that the new HDI is calculated after 2010 using the geometric mean, thus penalizing unequal achievements across dimensions.

## **2. The Inequality-adjusted Human Development Index (IHDI)**

The HDR has always recognised that inequality in human development deserves serious consideration, and that averages can be misleading. Joint deprivations exist where inequality in health and education coincide with inequality in income — which in turn may overlap with ethnicity and gender [3]. Since 1997, Hicks proposed a new index and offered ways to measure such inequality. He considered that in dimensions of life such as income, education, and health/longevity, inequality is significant for economic and ethical analysis. “Relative” deprivations resulting from inequalities are distinct from (though related to) “absolute” deprivations; thus alongside knowing a society's total or average endowment of particular goods like income, education, and healthcare, information can also be obtained about the distribution of those goods across the population [5].

For correction, in 2010, UNDP introduced a new index, named Inequality-Adjusted Human Development Index (IHDI), which conceals disparities in human development across the population within the same country. Accordingly, it takes into account not only the average achievements of a country on health, education and income, but also how those achievements are distributed among its citizens.

The inequality in distribution of the HDI dimensions is estimated for:

- Life expectancy, which uses data from abridged life tables provided by United Nations Department of Economic and Social Affairs (UNDESA). This distribution is available across age intervals (0–1, 1–5, 5–10, ..., 85+), with the mortality rates and average age at death specified for each interval.
- Years of schooling and household income (or consumption), which use household survey data harmonized in international databases;
- The inequality in standard of living dimension, which uses disposable household income per capita, household consumption per capita or income imputed based on an asset index matching methodology.

## **3. Calculating the Inequality-Adjusted Human Development Index**

As we mentioned above, HDR for 2010 introduced the Inequality-adjusted Human Development (IHDI) for measuring the inequality in distribution of each dimension across

the population. It is based on a distribution-sensitive class of composite indices, which draws on the Atkinson (1970) family of inequality measures [7].

It is computed as a geometric mean of geometric means, calculated across the population for each dimension separately. The IHDI equals the HDI when there is no inequality across people but it is less than the HDI as inequality rises. In this sense, the IHDI is the actual level of human development (accounting for this inequality), while the HDI can be viewed as an index of “potential” human development (or the maximum level of HDI) that could be achieved if there was no inequality. The “loss” in potential human development due to inequality is given by the difference between the HDI and the IHDI and can be expressed as a percentage.

In the first step the inequality measure is  $A = 1 - g/\mu$ , where  $g$  is the geometric mean and  $\mu$  is the arithmetic mean of the distribution, following the formula:

$$A_x = 1 - \frac{\sqrt[n]{X_1 X_2 \dots X_n}}{\bar{x}} \quad (1)$$

where  $\{X_1, \dots, X_n\}$  denotes the underlying distribution in the dimensions of interest.  $A_x$  is obtained for each variable (life expectancy, mean years of schooling and disposable income or consumption per capita). If there is perfect equality in the distribution of achievement  $X$ , then  $A_x = 0$  and if there is at least some inequality in the distribution of achievement  $X$ , then  $A_x < 0$ .

In the second step each dimension-index is adjusted by the loss due to inequality, following the formula:

$$I_x^* = (1 - A_x) \cdot I_x \quad (2)$$

Finally, the IHDI is the geometric mean of the three dimension indices adjusted for inequality:

$$\begin{aligned} IHDI &= (I_{Health}^* I_{Education}^* I_{Income}^*)^{1/3} = \\ &= [(1 - A_{Health})(1 - A_{Education})(1 - A_{Income})]^{1/3} \cdot HDI \end{aligned} \quad (3)$$

The loss in the Human Development Index due to inequality is:

$$Loss_{\%} = 1 - [(1 - A_{Health})(1 - A_{Education})(1 - A_{Income})]^{1/3} \quad (4)$$

Overall loss can be also approximated with the coefficient of human inequality:

$$Coefficient\ of\ human\ inequality = \frac{A_{Health} + A_{Education} + A_{Income}}{3} \quad (5)$$

When all inequalities in dimensions are of a similar magnitude, the coefficient of human inequality and the loss in HDI differ negligibly. When inequalities differ in magnitude, the loss in HDI tends to be higher than the coefficient of human inequality [8].

#### 4. The Inequality-adjusted HDI for the European Countries

Like all averages, the HDI masks inequality in the distribution of human development across the population at the country level. Starting from this hypothesis, we choose to bring to attention the new Inequality-adjusted Human Development Index (IHDI) which was adopted in the 20th anniversary edition of the Human Development Reports, in 2010.

On the assumption that inequality makes its presence felt increasingly, even in countries with high levels of human development, we intend to draw some comparisons between the ranks of European Countries in the hierarchy of Inequality-adjusted HDI and also, we wish to highlight the loss in values compared with traditional HDI.

When there is no inequality in the HDI dimensions or no aversion to inequality, the average level of human development is reflected in the HDI. In this respect, the HDI can be viewed as an index of 'potential' human development and IHDI as an index of actual human development. The 'loss' in potential human development due to inequality is given by the difference between the HDI and the IHDI, and can be expressed as a percentage.

**Table 1 – The Value for HDI, IHDI and % loss in 2013, for EU Countries**

| Country               | HDI for 2013 | IHDI for 2013 | Percentage loss | Difference from HDI rank |
|-----------------------|--------------|---------------|-----------------|--------------------------|
| <i>Netherlands</i>    | 0,915        | 0,854         | 6,7             | 1                        |
| <i>Germany</i>        | 0,911        | 0,846         | 7,1             | 1                        |
| <i>Denmark</i>        | 0,900        | 0,838         | 6,9             | 0                        |
| <i>Ireland</i>        | 0,899        | 0,832         | 7,5             | -1                       |
| <i>Sweden</i>         | 0,898        | 0,840         | 6,5             | 3                        |
| <i>United Kingdom</i> | 0,892        | 0,812         | 8,9             | -4                       |
| <i>France</i>         | 0,884        | 0,804         | 9,0             | -2                       |
| <i>Austria</i>        | 0,881        | 0,818         | 7,2             | 4                        |
| <i>Belgium</i>        | 0,881        | 0,806         | 8,5             | 0                        |
| <i>Luxembourg</i>     | 0,881        | 0,814         | 7,6             | 3                        |
| <i>Finland</i>        | 0,879        | 0,830         | 5,5             | 9                        |
| <i>Slovenia</i>       | 0,874        | 0,824         | 5,8             | 9                        |
| <i>Italy</i>          | 0,872        | 0,768         | 11,9            | -1                       |
| <i>Spain</i>          | 0,869        | 0,775         | 10,9            | 1                        |
| <i>Czech Republic</i> | 0,861        | 0,813         | 5,6             | 9                        |
| <i>Greece</i>         | 0,853        | 0,762         | 10,6            | 0                        |
| <i>Cyprus</i>         | 0,845        | 0,752         | 11,0            | -3                       |
| <i>Estonia</i>        | 0,840        | 0,767         | 8,7             | 3                        |
| <i>Lithuania</i>      | 0,834        | 0,746         | 10,6            | -3                       |
| <i>Poland</i>         | 0,834        | 0,751         | 9,9             | -2                       |
| <i>Slovakia</i>       | 0,830        | 0,778         | 6,3             | 9                        |
| <i>Malta</i>          | 0,829        | 0,760         | 8,3             | 5                        |
| <i>Portugal</i>       | 0,822        | 0,739         | 10,1            | 0                        |
| <i>Hungary</i>        | 0,818        | 0,757         | 7,4             | 7                        |
| <i>Croatia</i>        | 0,812        | 0,721         | 11,2            | -2                       |
| <i>Latvia</i>         | 0,810        | 0,725         | 10,6            | 0                        |
| <i>Romania</i>        | 0,785        | 0,702         | 10,5            | 4                        |
| <i>Bulgaria</i>       | 0,777        | 0,692         | 11,0            | 5                        |

Source: Human Development Report 2014

As you see in Table 1, for some EU Countries the loss was minor and for the others the loss was consistent. The loss percentages fewer than 7% are for 7 countries, like Finland, Slovenia and Czech Republic; the loss percentages between 7% and 10 % are for 11 countries, like Germany or France, and values above 10% are for 10 countries. The last group includes the countries with the highest inequality; we mention here countries like Romania and Bulgaria, but also Italy or Spain. This percentage loss determines a new hierarchy. For example Finland and Slovenia growth nine positions, since the United Kingdom loses four positions and Cyprus and Lithuania lose three positions.

Even if Romania recorded a loss of 10.5%, it won 4 seats in the hierarchy. So for Bulgaria, this won five places in the hierarchy, even if a loss of 11%.

## 5. Conclusions

The new version of the Human Development Index, introduced in the 2010 edition of the HDR, brings changes. The main one is the switch from the original additive aggregation function (the arithmetic mean of the three components) to a multiplicative

function (their geometric mean). The prevailing reason given for this change was to allow for imperfect substitutability between the HDI's three components.

As a supplement, in 2010, The Human Development Report introduced IHDI. As shown, this one captures the losses in human development due to inequality in health, education and income. But, unfortunately, the inequalities can be reinforced. In the end unequal societies, democratic or not, are societies where power is more concentrated in the hands of elites, so it is not surprising that economic and political institutions work in their favour. Therefore, we can state that an inequitable development is not human development.

Generally countries in the low human development group also tend to have higher inequality and thus larger losses in human development due to inequality, while countries in the very high group experience the least inequality in human development.

In addition, the Human Development Index, also focuses almost exclusively on national performance and ranking, but does not pay much attention to development from a global perspective.

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