

The Human Development Index and Its Methodological Refinements

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Abstract

The human development index (HDI), which portrays a simple characterisation of the development process by considering achievements in health, education and standard of living, is popularly used as the summary indicator of well being in comparative analysis of nations. However, the index as a measure has not remained free from criticisms on computational methodology and choice of indicators. Several methodological changes were undertaken in the twentieth anniversary edition of HDI in 2010. The purpose of this note is to review the revision in methods and point out what needs to be done further to improve quality of the HDI index.

Keywords

HDI, measures of well-being, weighted index, methods of aggregation

Introduction

The United Nations Development Programme has been publishing the Human Development Report (HDR) since 1990 to emphasise that people and their capabilities should be the ultimate criteria for assessing the development of a country and not the economic growth alone. The Human Development Index (HDI), conceived around the same time by combining health, education and income into a composite index, consequently came to be recognised as the most well-known aggregate measure of well-being. So far, 24 editions of the HDI have been published, with the 2014 edition titled *Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience*. The methods used to calculate the HDI and define categories of human development were revised for the

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20th anniversary edition of the HDR in 2010 and, subsequently, two major data revisions were also made in 2013 and 2014. It may be noted that despite the popularity and insights offered by the HDI in the discussions of development, the methodological content of the index has not remained free from criticisms. The revision of the methods used for the calculation of HDI can basically be seen as responses by the Human Development Report Office to address the criticisms levelled previously at the index. The purpose of this brief note is to comment on the methodological changes and assess as to what extent these revisions could modify the new set of HDIs from a simple to a more comprehensive index.

What is Human Development Index?

The United Nation Development Programme (UNDP) published the first Human Development Report (HDR) with the essential focus that people must be at the centre of all development and with the main message that it is important to study how economic growth translates or fails to translate into human development in various societies (UNDP, 1990). The Human Development Index (HDI) emphasised on the importance of ends like being literate or living a healthy and long life over indices like per capita income or standard of living. In fact, the HDI, which is based on the *capabilities* approach developed by Sen (1999) and Nussbaum (2000) basically, involves tracking of the *capabilities* available to the individuals in a society. Capability gives the combinations of functioning achievable by an individual, who may try to expand his capabilities in order to attain a given quality of education and health to improve his well-being. Thus, the HDI was introduced as an aggregate indicator to measure progress towards greater human well-being and provided country-level data for a number of dimensions. From the very beginning, the HDI tended to focus on the basic capabilities or central human functional capabilities or fundamental capabilities or general capabilities, which are a subset of all capabilities and refer to the freedom to do some basic things that are necessary for survival and escape poverty (see Alkire, 2002a, 2002b). The HDI was accordingly conceived as a multi-dimensional index of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. According to UNDP (1990), the HDI has two sides: one has to do with the formation of human capabilities such as improved health, knowledge and skills, and the other is related to the use that people make of their acquired capabilities for productive purposes of being active in cultural, social and political affairs.

Criticisms

The HDI ranking of countries provoked policy-makers to examine how each country fared in this regard and to ask why some countries and regions, such as Costa Rica, Sri Lanka or the state of Kerala in India, managed to achieve much higher levels of human development in comparison to countries with similar

income levels (Fukuda-Parr, 2003). However, the HDI as a measure of human development has not remained free from conceptual and methodological criticisms (Decanq & Lugo, 2009; Noorbakhsh, 1998; Ravallion, 2012; Srinivasan 1994). To comprehend the critiques that have been levelled against the HDI, it is necessary to have an understanding of its computational methodology.

The HDI remains a composite index that measures progress in the three basic dimensions, viz., health, knowledge and income. Under the previous HDI formula, health was measured by life expectancy at birth; education or knowledge by a combination of the adult literacy rate and school enrolment rates (for primary through university years); and income or standard of living by GDP per capita adjusted for purchasing-power parity (PPP US\$). The dimensional indices obtained from the corresponding indicators were normalised using a fixed minima and maxima. The scale-free values for each dimension are derived by using the minimum and maximum values as follows:

$$\text{Dimensional index} = (\text{Actual value} - \text{Minimum value}) / (\text{Maximum value} - \text{Minimum value})$$

The final HDI was derived in the form of an arithmetic mean using equal weights of one-third for three-dimensional indices according to the previous methodology.

Much of the criticism on the methodology of HDI, however, involved the choice of dimensions and the method of aggregating into a multi-dimensional indicator. To be specific, some critics visualise the HDI as simplistic representation of only three dimensions by excluding the other crucial ones, such as, political freedoms, human rights, social cohesion or environmental dimensions of development. The assumption of equal weighting of the three dimensions and the methodology of combining indicators by making the HDI index a simple average of separate indicators remained open to other critics.

Methodological Revisions

The 2010 HDI introduced some changes with regard to the indicators, data base, change in maximum value used for normalisation and the aggregation method. The HDI is now the geometric mean of normalised indices for each of the three dimensions. The health dimension is still assessed by life expectancy at birth and is calculated using a minimum value of 20 years and maximum value of 85 years, with the data provided by the UN Population Division. The education component of the HDI is measured by mean of years of schooling for adults aged 25 years and expected years of schooling for children of school entering age. The mean years of schooling is estimated by the United Nations Educational, Scientific and Cultural Organization (UNESCO), Institute for Statistics, based on educational attainment data from various census and surveys. The expected years of schooling are based on enrolment by age at all levels of education, capped at 18 years, and are produced by the UNESCO Institute for Statistics. These two indicators, after normalisation using a minimum value of zero and maximum aspirational values

of 15 and 18 years, respectively, are combined into an education index using arithmetic mean. The standard of living dimension is measured by gross national income (GNI) per capita data provided by the World Bank and the International Monetary Fund, with a minimum income value of \$100 (PPP) and the maximum of \$75,000 (PPP). For a few countries, mean years of schooling is estimated from nationally representative household surveys and for a few countries GNI was obtained from the UN Statistical Division's database on System of National Accounts. A logarithmic conversion of income was used to reflect the diminishing importance of income with increasing GNI. It may be observed that the modifications in methodology also include the use of fixed maxima for normalisation of dimensional indices instead of using the observed maxima. Thus, it is fixed at 85 for life expectancy, 15 years for mean years of schooling, 18 years for expected years of schooling and \$75,000 for GNI per capita. The other methodological change accounted for the way the education indicators are aggregated, viz., the previous approach of aggregating expected years of schooling and mean years of schooling using geometric mean was discarded in favour of using the arithmetic mean to provide equal treatment to both indicators. The scores for the three HDI dimensional indices are finally aggregated using geometric mean to arrive at the HDI as follows:

$$HDI = (I_{Health} \times I_{Education} \times I_{Income})^{1/3}$$

Assessment

Since its inception, the HDI has been able to catch the attention of academic as well as policy-making circles, and has actually been able to shift the focus of development economics from economic growth to people-centred policies (Haq, 1995). Thus, the HDI as an index has no doubt remained popular, but has often come under attacks due to its simplistic methodology. It is often argued that much of the quality and reliability of any aggregate indicators of development depends on the coverage of its dimensional aspects as well as on the statistical method of aggregating the dimensions (Morse, 1999). As a measure, the HDI was conceived around considering only three basic aspects of human development, and the new HDI continues to assign equal weight to the three dimensions on the normative judgement that all three dimensions are equally important. It may be noted that the use of only three dimensions and the assumption of equal weighting have remained as the most major criticisms levelled against the HDI index in the early years. The need to improve the quality of an aggregate index of societal progress like the HDI has also been the focus of the Stiglitz-Sen-Fitoussi Commission Report, which identified at least eight dimensions of well-being, viz., material living standards (income, consumption and wealth), health, education, personal activities, political voice and governance, social connections and relationships, environmental sustainability and economic/physical security (Stiglitz et al., 2010). It is therefore vital that the coverage of HDI necessarily includes the missing dimensions that are central for the quality of human life.

The new HDI is now based on the geometric averaging but it still assigns equal weight to all three-dimensional indices on the normative judgement that all three dimensions are equally important. The geometric mean typically reduces the level of substitutability among dimensions so that any poor performance in one dimension is not compensated by high achievement in another. Although it is argued that the HDI is *robust* to different weighting schemes, it is desirable that the determination of weighting scheme required for deriving the composite HDI is determined on the basis of some statistical analysis, for instance, the principal component analysis. This is necessary, since the use of equal weights among dimensions—as is done in HDI—may encounter potential methodological problems of *redundancy* in case two or more dimensions are correlated.

The Human Development Report Office (HDRO) acknowledges that the combined effects of methodological change, change in indicators and data revision could bear an impact on the HDI values and ranking of countries. There are few papers from the independent sources as well as from the HDRO that examined and illustrated the impacts on the HDI rank as a result of modifications in its methodology (HDRO, 2011; Herrero et al., 2012; Klugman et al., 2011; Zambrano, 2011). In a recent paper Morse (2014) argued that changes in HDI methodology led to increased turbulence in country ranking, and significant differences were observed for some countries in their shifts in HDI ranking, particularly Romania, Jamaica, Botswana, Iran and Belize.

Summing Up

A keen observer of HDI could raise the question: whether the methodological revisions have made the index more comprehensive than before? The answer would disappointingly be *no*, because it is apparent that the methodological changes undertaken by the HDRO could just about set right the previous criticisms on its methods of construction. We therefore expect that any future methodological revisions would address the two pertinent issues: one, to include the missing dimensions; and two, switching over to the statistical determination of dimensional weights in the HDI. If not, we would soon require constructing an alternative well-being index replacing the HDI on the ground that it is too simplistic as an index that only reflects average achievements in human development.

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