
Human Development Index (HDI) and its family of indexes: an evolving critical review

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Abstract: The human development index (HDI) is currently used for many different purposes, from a comparative index to a decision-making instrument for public policy decisions. It is also used as a 'blaming and shaming' index in the media. For this reason, in this paper we delve into the foundations of the HDI, exploring to what extent it can be considered an alternative to the use of the gross national product (GNP) as the main measure of human development. Our focus is mainly on the HDI and its evolution and unsolved technical issues. Was the HDI successful as an alternative? Given that the established goal was to provide an alternative index to the unidimensional and income centred previous indicators, HDI represents indeed advancement, both in terms of the characterisation of the multidimensional nature of development and in terms of its refined theoretical basis. On the other hand, arguments claiming the introduction of a completely new paradigm, showing a change from the concentration on means towards the promotion of human ends, are far from being settled. The claim that HDI is a capability measure, considered the most basic human capabilities, also remains elusive.

Key-words: Human development; capability approach; human development index.

Índice de Desenvolvimento Humano (IDH) e sua família de índices: uma revisão crítica em evolução

Resumo: O índice de desenvolvimento humano (IDH) atualmente é utilizado para diversos fins - desde instrumento para fins comparativos, tomada de decisões até como instrumento para elaboração de políticas públicas. Pela mídia,

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tem sido usado inclusive para acusar e culpar. Em decorrência disso, este artigo volta-se para os fundamentos que levaram à criação do IDH como um índice alternativo aos indicadores existentes previamente, como o PIB per capita e a renda que eram usados para medir desenvolvimento. Nosso foco principal é no IDH, analisando os aspectos técnicos e também sua evolução. Dado que o IDH se propunha a ser um índice alternativo, podemos dizer que obteve sucesso? Atualmente pode-se dizer que o IDH efetivamente se constitui num avanço, principalmente quando se considera a natureza multidimensional do desenvolvimento. Por outro lado, o IDH foi construído sobre um novo paradigma, que valoriza a avaliação das realizações humanas a partir dos fins e não meios do desenvolvimento. Neste sentido, ainda não se pode tomar o IDH como uma medida adequada de capacitações humanas.

Palavras-chave: *Desenvolvimento humano; abordagem das capacitações; índice de desenvolvimento humano.*

JEL: O15;I32

Introduction

The demands for good social indicators are well-known: indicators should be reliable, consistent, sensitive to responses, measurable, user-friendly, cost-effective, policy-relevant and valid, among other requirements. The difficulty in building indicators with these properties and in aggregating and using them should not be underestimated. A paradigmatic case-study of elaborating and using human development indicators is provided by the Human Development Index (HDI). The HDI is currently used for many different purposes; from a comparative index to a decision-making instrument for public policy decisions. It is also used as a 'blaming and shaming' index in the media. For this reason, in this paper we delve into the foundations of the HDI, exploring to what extent it can be considered an alternative to the use of the gross national product (GNP) as the main measure of human development. Our focus is mainly on the HDI and its family of indicators, its evolution and unsolved technical issues.

The topic HDI is of particular concern for all those interested in the operationalisation of development ethics paradigms. In its own way, the HDI can be seen as a combination of the previous approaches such as those inspired by Utilitarianism (Economic Growth), Basic Needs (BN) and the Capability Approach (CA). In general terms, the HDI was the main instrument through which the Human Development (HD) approach became widely known. The HDI tries to measure the level of the HD and to represent human well-being at national, regional or municipal levels. By doing so, the HDI tries to provide a summary indicator of the BN and CA goals.

According to Anand and Sen (1994:2), the motivation behind the creation of the HDI was the search for an index that could be able “to focus directly on the lives that people lead – what they succeed in being and doing”. The information from the index should be able to answer the following questions about people’s lives (Anand & Sen 1994:2):

Do they have the capability to live long? Can they avoid mortality during infancy and childhood? Can they escape preventable morbidity? Do they avoid illiteracy? Are they free from hunger and undernourishment? Do they enjoy personal liberty and freedom?

The general motivation among the HDI creators was the willingness to provide an alternative index to the GNP (or GDP) and income based measures. The first difference to be noted is that the HDI is a multidimensional index that tries to portray a measure of capability achievements. Although the HDI is supposed to measure capabilities, Anand and Sen (1994:12) acknowledge that the index “has been concerned only with the enhancement of very basic capabilities of people”. In their view, concerning the lack of power to capture the differences among the industrialised and advanced countries, the HDI may be limited. Once income and literacy are very similar in terms of achievements among developed countries, the only differences are due to small variations in life expectancy. But they recognise that if the aim is to capture a slightly higher level of development, a more complex indicator is needed. In their words: “Yet once we take of the high and similar levels of achievement of basic capabilities, it becomes relevant to assess performance using more refined capabilities” (Anand & Sen 1994:13).

However, what is being measured as High Human Development in developing countries, for instance, can be rather different from the same index in developed countries or regions. Hence, in this paper, without ignoring these general limitation of the HDI, our focus are: To analyse the HDI’s evolution since its creation, looking at the contributions and criticisms put forward; To investigate the correlation between high HDI and people’s real capabilities and/or opportunities and; To examine under which conditions the HDI can reflect human development and the necessity to build a set of related indicators.

The paper is divided into six parts. Following this introduction, the second part presents the main characteristics of the HDI, since its origins, emphasising its evolution. In the third part, the construction of the HDI is scrutinised and the main /critiques to the index are discussed. Part four examines the most important reactions to the critiques (mostly from UNDP). In the fifth part, the technical modifications in the HDI are

investigated. Finally, the paper concludes with an overall assessment of the HDI as a measure of human development.

1. The Human Development Approach

The first part of this section refers to the origins and the evolution of the Human Development Approach. It is important to keep that approach in mind because the indicator is nothing else (or at least should not be) than a representation of its highlighted categories. Subsequently, the last part discusses the creation of the HDI (as a representation of human development) and its measurement problems. The origin of the HD concept goes back to more than thirty years ago. However, considerable progress has been achieved in the last decade, especially when it comes to elaborating its concepts. The high point of this debate comes after the 1990s, when the United Nation Development Program (UNDP) published the *Human Development Reports* (HDRs) and the *Human Development Index* (HDIs).

The Human Development Approach emerged as an attempt to put people back in the centre of the discussions and actions related to economic and social policies. The HD paradigm is defined as a process that covers all aspects of development – whether economic, international trade, budget deficit, fiscal policy, savings, investments in basic technology, social services or safety nets for the poor. Ul Haq (1999) emphasized such idea saying that no aspect of the development model falls outside the human development scope. But, according to him, the main advantage is the widening of people's choices and the enrichment of their lives.

The arguments present at the HDR (1990:9-10) are that the core ideas of the HD refer to human well-being as central to the goal of development and that human beings constitute the major economic resource. Sen has emphasised that human development is a process to improve people's capability to do or to be what they consider valuable. In other words it means to improve people's positive freedoms Sen (1985, 1987, 1992, 1997, 1999). As Stewart (1996) argues, the HD definition draws on elements from Basic Needs (BN) and from the Capability Approach (CA), intending to focus on people as a priority in themselves. The attempt is to promote all aspects of their lives, from their basic physiological needs until psychological necessities, feelings, freedom and autonomy of choice.

The concept of Human Development can be seen as a natural follow-up from previous critiques to economic growth as a measure of social well-being. However, it is more than that. This conception brings intrinsically

a deep concept of human life, which is closely related to poverty and well-being discussions. Human Development provides a wider concept of the meaning of 'good life'. In this sense, human development is a concern for all human beings, not limited to those who are under economic deprivation. This is neither a new nor an original idea, but a result from long previous discussions (Ul Haq 1999, Streeten 1994, Desai 1991).

The first ideas about human development were born from issues related to the sustainability of economic development and the existing doubts about economic growth sufficiency. These references are dated from the end of the II World War. During the sixties, doubts about the desirability of growth were added to the sufficiency problem. At this time the poverty issue started to emerge, and high economic growth rates were not helping to reduce poverty. In the following years, the early seventies, environmental problems were added to previous discussions on human development (Desai 1991).

The economic effects of the 1970s' oil shocks moved this debate from the middle to the end of the seventies. In the eighties, themes concerning poverty, income distribution and environment received again a central place in academic and policy-making discussions. During the eighties, many problems emerged as an outcome of economic growth, in particular, the much damage done to the environment and the more concentrated income, with its resulting social problems. Doubts were raised about the efficiency of economic growth as an appropriate instrument for quality-of-life (Desai 1991).

An investigation about the roots of the idea of human development paradigm would identify two main strands. One would come from studies about economic inequality, social choice and poverty (informed by the BN and CA frameworks). The second would come from the search for an independent non-economic indicator/measure of development, which was highlighted by the Physical Quality of Life Index (PQLI) proposed in 1979 by Morris. These two roots, from where the human development concept was born, suggest that the concept can be interpreted as going back to earlier discussions about human welfare and to later thoughts about capabilities. As put forward by Desai (1991:534), "the [HD] concept relates to the guaranteeing of sufficient resources, so basic capabilities are assured and examines the use people make of these capabilities".

Current and well-known definitions of human development were formulated and shaped in the nineties. They benefited from the contributions of Mahbul Ul Haq and Amartya Sen for the United Nations Development Program. According to Ul Haq (1999), there are five ideas that are common for all societies sharing a conception of human

development. The first idea is the proposition that people must be in the centre-stage of human development. Each activity should be assessed in relation to the degree of participation allowed to people. The second one brings the idea that human development can be analysed in two ways – one referring to the formation of human capabilities and the other to the use that people might make of their acquired capabilities. The third idea tackles a careful distinction between ends of development and means - the idea is to focus on the former without forgetting the latter. The fourth idea is that thinking about human development paradigm embraces all aspects of society – not only in economic terms. Finally, the last idea is that people are both means and ends in the human development process.

Ul Haq (1999) emphasised that people must be the core of the discussions about HD, which means that all other resources need to be managed to reach human well-being. In that sense, the HD idea contrasts with the radical environmentalist view, which puts the environment before humans. According to the Human Development Approach, sustainable environment is a useful strategy to help people to improve their lives now and in the future. But sustainable development should not emphasise the environment at the expense of the human dimension. The reasons why human development provide the contents for the most important development goals to be pursued by nations can be illustrated with six reasons presented by Streeten (1994:1) First and above all, HD is an end in itself that needs no further justification; 2) HD is a means to higher productivity; 3) HD slows down human reproduction by lowering the desired family size; 4) HD is good for the physical environment; 5) HD reduces poverty and contributes to a healthy civil society, improving democratic processes and great social stability; 6) HD has political appeal, and so it may reduce civil disturbances and increase political stability.

The richness of the human development perspective can, however, be an embarrassment for those trying to operationalise the approach. For instance, it has been argued that the concept of human development is clearly wider and richer than what can be captured in any index or set of indicators Ul Haq (1999). A paradox may rise since, if on the one hand, it is desirable to explore a complex conceptual basis for HD, on the other, it might decrease the chances of seeing the approach put fully into operation. The problem is that ideas that cannot be put in practice are open to misunderstanding and improper use.

This is a fair concern because, according to Ul Haq (1999) and Alkire (2001), it was precisely what happened, for example, to the Human Needs Approach. The concept of basic needs was not centred in commodity possession, but in its operationalisation process, that being the main message that survived from the approach. The core of the BNT was

concerned with the provision of opportunities for all to have a full life, with particular emphasis on the well-being of the poor. And, yet, the approach was criticised for focusing on the promotion of economic needs. By no means this acknowledgment implies that economic growth has no role in the promotion of human development. As Sen (1983: 745) remarks, “I shall argue that the obituary may be premature, the original themes – while severely incomplete in coverage – did not point entirely in the wrong direction, and the discipline of economic development does have a central role to play in the field of economic growth in developing countries” (Sen 1983:745).

So, it could be argued that both Economic Development theory and the Basic Needs theory were pointing in the right direction, trying to promote a broader view of human life, but that the mechanisms put forward for their operationalisation as development approaches led to narrowness and misunderstanding. The Economic Development emphasis on economic growth can be historically justified within the context of the Keynesian Revolution. From this perspective, economic growth theory can be seen as a result of a time period where economic growth promotion and industrialisation were understood as the most important development challenges (Sen 1983). It is essential to keep into perspective that the main aim of Economic Development theory was to improve quality of life. The problem with that was to believe that economic growth was the only way to reach this goal.

It seems evident that the main problem with the economic development theory was to take into consideration only one dimension of human development. Surely, economic growth is one aspect of a good life, but it is not the only one. This argument is reinforced by Sen (1983:753) who points out that “the real limitations of traditional development economics, arose not from the choice of means to the end of economic growth, but in the insufficient recognition that economic growth was not more than a mean to some other objectives. The point is not the same as saying that growth does not matter.” Similarly, Ul Haq (1999) reports that the original ideas of economic theory were related to an improvement of people’s quality of life, but that later, after the Second World War, an obsession with economic growth models and national account grew from the economist’s main schools of thought. Other dimensions that were not passive of measurement were ignored.

It is for this reason that the HDI tried to rescue the multidimensionality aspect of human well-being, which was lost with the exclusive promotion of economic development. For a long time, the main measure used to differentiate between developed and underdeveloped countries was the GNP. Noorbakhsh (1998) mentions how early critiques of GNP measures first appeared at the United Nations report (UN 1954). This report

detailed arguments against the use of the GNP as the only way to measure standards of living. When using market values to assess human development, some distortions might appear. For instance, market prices attach greater value to guns than to milk.

The discussions about how to measure economic development in the last decades resulted in a range of different socio-economic indicators. There were important advancements in data collection, and some attempts to get a complete, practical and comparable indicator were partially successful. The most well-known result was the physical quality of life index (PQLI), calculated by Morris (1979). However, even PQLI did not become world-wide accepted. It was difficult to achieve international consensus about the use of an indicator for human development, until the launch of HDI Report in 1990. The HDI, as presented in the 1990 Report, meant to provide i) an alternative measure to GNP indicators and ii) a concrete way of expressing the HD framework.

But the operationalisation of the HD paradigm, did not come without challenges, as explained by Ul Haq (1999). To develop and build HD indicators it is necessary to address at least three main difficulties: First, some researchers proposed to score economic indicators and social indicators without any compounded aggregation procedure. Policy makers rejected it as a hard procedure to digest; Secondly, several combined measures lacked a sound methodological base and were abandoned after brief trials; Finally, the elaboration of wide-scale indicators were costly and it was difficult to build an alternative to GNP measures that were financially feasible. According to Ul Haq (1999), the work on national income accounts had five decades of investment and research, and yet many aspects of these accounts were still being investigated, pointing out weaknesses. During the search for the HDI, the following six principles were used as guidelines:

1. The new index would measure the basic concept of human development to enlarge people's choices.
2. The new index would include a limited number of variables to keep it simple and manageable.
3. A composite index would be constructed rather than a plethora of separate indices.
4. The HDI would cover both social and economic choices.
5. The HDI should be kept the coverage and methodology of the HDI quite flexible – allowing gradual refinements, once better alternatives became available.

6. Lack of reliable and up-to-date data series should not be allowed to inhibit the emergence of the HDI. An index can be only as good as the data fed into it, but the creation of indicators should be seen as a long-term process.

Currently, it could be said that the conceptual discussion improved significantly and that the general public has become more aware of the human development concept. However, simple issues about how to evaluate and how to promote human development, still remain controversial and sensitive to different interpretations and interests, even if there is broad acceptance about the practical applications of the index. The development of the HDI prompted a new wave of discussions about human conditions. At the same time, the HDI has been widely criticised in different ways. Sometimes, it is considered to have the same limitations as the GNP measures, as discussed below, that were traditionally used to measure economic development. The only widely-shared agreement among researchers is that poverty and human development are multidimensional concepts and, therefore, they need to be measured accordingly.

2. The HDI properties and the criticisms to the Index

2.1 The HDI construction and its properties

In 1990 the United Nations Development Program published the Human Development Index (HDI) for the first time, as part of the Human Development Report (HDR). As mentioned, the main motivation of the UNDP research group was to build an indicator able to replace the GDP or the GNP. There was a consensus within UNDP that both the GNP and the GDP were inadequate as well-being or capability measures. The new indicator should present characteristics such as: i) being a multidimensional index, ii) focusing on the ends of people's lives instead of on survival means, iii) being simple to calculate, iv) being easy to use and to understand, v) being feasible within the available data, and vi) being able to express capabilities. According to Foster et al (2003), the following intuitive and technical properties may be attributed to HDI: It is 1) symmetric in dimensions; 2) symmetric on people; 3) replication invariant; 4) monotonic; 5) linearly homogeneous; 6) normalised and 7) continuous.

In the process of building the index, UNPD used previous UN works to shape the progress of the Human Development Index (HDI). Consensus was achieved around three basic variables: life expectancy, literacy and

GDP per capita. These three basic variables were considered representative of the most basic capabilities – those considered fundamental for people to develop as full human beings. The construction of the index, according to the 1990 HDR, was done in three steps:

1. First of all they defined a measure of deprivation in each dimension for each country. Maximum and minimum values were determined for each of the three variables using current actual values from the data set. The variables were named as following:

X1 – life expectancy (years)

X2 – literacy (%)

X3 – GDP per capita (log)

$$I_{ij} = \frac{(\max_j X_{ij} - X_{ij})}{(\max_j X_{ij} - \min_j X_{ij})}$$

The maximum and minimum values were taken from the data set and X_{ij} represented actual values for the country.

2. The second step was to define an average deprivation indicator (I_j) (UNPD 1990:109).

$$I_j = \sum_{i=1}^3 I_{ij}$$

3. Finally, the last step involved a compilation of the different dimensions:

$$(HDI_j) = (1 - I)$$

The original formulation and presentation of the HDI raised a considerable amount of interest, suggestions and criticisms from different research fields. The next section presents some of the latter and related issues. In section four we present UNDP's counterarguments and the methodological changes to the HDI.

2.2 Criticism to the basic HDI and to its family of indices

2.2.1 Main criticisms

After the publication of the first HDR in 1990, it was evident that the most conspicuous aspect, both for the Academia and media, was the proposal of a human development index. Critics reacted strongly to the idea of an indicator and also to some statistical properties shown by the index. Those can be organised into four groups, described below.

The first group accuses the HDI of not accurately representing the concept of human development by ignoring important dimensions. Dasgupta and Weale (1992) point out that the HDI is an index restricted to the socio-economic sphere of life, ignoring the political and civil spheres. To, Ram (1992), the HDI does not report inequality measures. Furthermore, inequality among countries would be underestimated, i.e. not given the appropriate attention in the indicator. Hicks (1997) added that inequalities inside countries and between genders are not considered by the index.

The second group focuses on the quality of data used for the HDI and some of its methodological aspects (Srinivasan 1994; UNDP 1993; Murray 1993). Srinivasan (1994) argues that the HDI is conceptually weak and empirically unsound, based on the claim that both components of the HDI are problematic. The GNP in developing countries suffers from incomplete coverage, measurement errors and biases. Also the conversion of international currencies into USA dollars using purchasing power parity (PPP) is problematic, according to Srinivasan (1994: 241). He also stresses the problem of missing data, arguing that life expectancy, "is not available for as many as 87 out of 117 less developed countries". Under-five mortality data, in many countries is a mathematical estimation and does not come from collected data. The same happens to the definition and measurement of literacy rates, not only because they follow different methodologies in different countries, but also because of their unavailability since 1970 in a significant number of countries.

The third group, that may be represented by Desai's (1991) suggestions, criticises HDI aggregation procedures. According to the author, better information and techniques are needed to solve issues such as the way longevity is considered; how much importance attribute to each level of education and especially how the life standard is represented by GNP or GDP per capita. He argues that the weighting of components and data quality should be improved (Desai 1991:355-356).

Finally, the last group focuses on the technical limitations of the index. They can be seen in the contributions given by Hopkins (1991), McGillivray (1991), MacGillivray & White (1993), Trabold-Nubler (1991) Dossel & Gouner (1994), Gormely (1995) and Noorbakhsh (1998), among others.

Hopkins (1991:1471) disapproves the weights used to aggregate the three dimensions, arguing that “there is no *a priori* rationale that allows one to add life expectancy to literacy. It is akin to adding bananas and oranges”. McGillivray (1991) questions the composition and the usefulness of the HDI, warning that “the HDI, generally, reveals little more than any one of the pre-existing development indicators alone reveals” (1991:1462). Such a limitation means that the HDI fails as a way to provide insights into inter-country development comparisons, as pre-existing indicators did. McGillivray (1991) also considers that the HDI as a development indicator has a problem of redundancy. The point is that, if there is a significant and positive correlation between the HDI and any other of its components, we might find additional insights into an investigation of inter-country development levels. “Intuitively, a necessary, although not sufficient, property of a good composite indicator is that its components are themselves insignificantly correlated” (McGillivray 1991:1462). This does not seem to be the case of the HDI.

Dasgupta and Weale (1992) raised problems related to the cardinal treatment of an ordinal index, criticising the HDI for ignoring successful ordinal correlations between ordinal GDP and social variables. Trabold-Nubler (1991) noted the shortcomings in using the Atkinson formula for scaling income in the HDI. Luchters and Menskhoff (1996) showed that there were problems with the application of a composite formula that aims to transform GDP values into human development values.

2.2.2 A brief overview of the HDI contributions

A fair assessment of the HDI should not only acknowledge its limitations but also its main contributions and progress in relation to previous indicators. For instance, Luchters and Menkhoff (1996) have observed how the HDI contributed to a better modelling of the income dimension by referring to it in terms of marginal returns to income and how it constitutes an important step in putting forward a multidimensional indicator, exploring the use of longevity and knowledge as human indicators. Indeed, even with its limitations, it seems that the index can be considered more consistent and wider than previous measures of GNP per capita.

Streeten (1994, 1995) makes a case for the HDI providing results that put some light into the inadequacies of previous indicators. According to him, the information provided by the HDI is more complete and helpful to public policy decision-making (even considering that the HDI is an aggregated measure). On similar lines, Desai (1993) emphasises that the HDI captures better distributional aspects of income, once it works more efficiently than simple GDP averages. UL HAQ (1998) stresses that the HDI's main contribution is its multidimensional characterisation of human development. He recognises the wider nature of the HD concept, but argues that, anyway, the HDI can capture many crucial aspects of human life that were not captured before by income measures. Dasgupta and Weale (1992) acquiesce the methodological improvement brought in by the HDI, acknowledging that the HDI represents a good package of indices at a very aggregate level.

In summary, it can be argued that, despite criticisms, the HDI has been praised for its capacity to reflect the human condition in a more appropriate way than previous economic measures. The complexities that are involved in the formulation of the Human Development concept are also an open door to criticism in its measurement process.

3. UNDP's response

The HDI, as we know it today, has been through deep revisions that resulted from acceptance of some of the major criticisms. HDRs' technical notes are a rich source of information about the evolution of the HDI and the consequent attempts to address the criticisms. They discuss the rationale for the changes and their implications to the development of the final index. Yet, it is interesting to note that the UN started changing the HDI, even before the academic comments.

In the first HDR, the main expressed concern was related to the presentation of an index that would be able to replace the early measures. The discussion was about the evolution and statistical properties of development measures aiming to contextualise the main contribution of the HDI. There was a clear emphasis on the conceptualisation of poverty and its measurement, exploring the main differences and importance of the absolute versus the relative approaches to measure poverty and deprivation. The HDI was first understood and put forward as a deprivation measure and the suggested discussion on poverty was very informative and relevant at that stage. In the 1990 HDR, UNDP acknowledged the problem related to data availability and consistency. More specifically, they referred to the problems of: 1) inadequate data; 2) incomplete country coverage; 3) lack of reliability and timelines in

data sets. UNDP argued that in the absence of better-quality data, HDI ranks and international comparisons could at least provide an incentive for country improvements in their data collection procedures.

Hopkins (1991) criticism of the unweighted nature of the HDI components did not go without being addressed by UNDP. It put forward two arguments in defence of the HDI. The first was a normative argument saying that the three HDI's components have in fact equal intrinsic value. Due to that "all three of the HDI components thus deserve equal weigh" (HDR 1991:88). The second argument presented empirical results, from simulations, showing that the applications of methods such as the "Borda rule" and the "geometric mean" result in similar ranks as those provided by the original HDI. The significance of the ranks similarities was tested by the Spearman rank correlation coefficient and it showed positive at a high significance level.

The income dimension was more criticised than the other two, and it demanded more work from the UNDP team. Different HDIs were simulated and gave alternative treatments to the income aspect. In the 1990 HDR the log of the GDP was used and it was put a cap at the poverty level³. To show the robustness of the used methodology, alternative indexes were calculated using simulation based on: dropping the log and keeping the cap; removing the log and the cap; and keeping the log and removing the cap. According to the correlation coefficient obtained, the differences between the alternative methodologies were not significant, and these figures were used as part of the main argument in defence of the HDI methodology.

This argument tested for consistency but not for an identification of the marginal returns to income once the levels of income above the poverty line got zero weight. In face of that, UNDP adopted an alternative methodology based on Atkinson's formula (as it will be shown below).

In the 1991 HDR, UNDP called attention to the progress made in measuring the HDI. The trouble with these methodological changes was that a country's HDI could not be intertemporally compared. Changes in methodology involve the introduction of different technical properties and procedures. The utility of the index was then only for inter-country comparisons over the same period of time. For example, an improvement in an HDI component could be hidden within an overall decline of a HDI for a specific country over time. Such a possibility is a result of the "relativist" methodology used to define the deprivation

³ The official income poverty line was obtained from a group of 9 industrial countries, adjusted by purchasing power parities. The nine countries were Australia, Canada, the Federal Republic of Germany, the Netherlands, Norway, Sweden, Switzerland, the UK and the US (HDR 1990)

value for each HDI dimension. Once the maximum and minimum values were defined in relation to the data set and could change over the time, the relative position of each country would be dependent on the others countries' progress.

A solution to make the HDI comparable over time was proposed by UNDP, where fixed values for maximum and minimum standards were introduced, leaving the countries' actual values in each dimension as the only source of variation. As they put it, "The way to tackle this problem, without changing the logic of the HDI, is to say that the minimum and maximum should be defined, not for each point in time, but over a period of time" (HDR 1991:96). Such a change was better presented in the 1994 HDR.

In addition to the simulation related to aggregation procedures, the 1993 HDR presented an illustrative example of the possibility of obtaining new HDI within each country, if better datasets became available. This consideration emphasized the possibilities of disaggregating the data and likely benefits from an extension of the same methodology to human development dimensions such as gender, region, age, and race.

Evaluations by Dasgupta and Wale (1992), Ram (1992) and Hicks (1997) on the limitations of the HDI in capturing the concept of human development, were addressed by UNDP, that suggested that "the concept of human development is broader than any measure of human development. Thus although the HDI is a constantly evolving measure, it will never perfectly capture human development in its full sense" (HDR 1993:104).

The 1993 HDR presents differences between several development perspectives, such as the HD, the standard welfare economics, basic need theory and social indicators. The report also introduced an extensive explanation and justification of the choice of the three HDI dimensions. The promotion of capabilities was accredited as one of the main aims behind the HDI. As they put it (HDR 1993:105),

The three dimensions of the HDI relate to one or many capabilities that they are expected to capture. Thus, longevity captures the capability of leading a long and healthy life. Educational attainments capture the capability of acquiring knowledge, communicating and participating in the life of the community. Access to resources needed for a decent standard of living captures the capability of leading a healthy life, guaranteeing physical and social mobility, communicating and participating in the life of the community (including consumption).

Dasgupta's (1990) points to the lack of the freedom aspect in the HDI. Acknowledging the importance of freedom, the UN presented the Human

freedom index (HFI) in the HDR 1991. The referred HFI, worked only to show the insufficiency of data and the need for improvements, once the proposed data were missing for the majority of the countries. About the HDI measurement errors, it must be noted that the HDR recognised the importance of quality information, calling attention to the interpretation of the HDI under conditions of poor data quality. "But while this remains a distant prospect, there is clearly a need for caution in taking the HDI values (or any similar estimates) as firm guides in decision-making. At the same time, more resource can profitably be used in improving statistics" (HDR 1993:108). McGillivray and White (1993) presented several simulations showing that the HDI is robust to measurement errors.

More importantly than the limitations imposed by the presence of measurement errors, is the difficulty in making intertemporal HDI comparisons. UNDP has taken this assessment into account, arguing that (HDR 1993:108)

If the maximum and minimum values were to change over time, this might lead to an anomaly in which a country's actual life expectancy could go up while its score goes down. This may happen because the minimum has gone up or the range has widened over time, or both. Thus, "moving the goalposts" makes comparing the HDI over time more difficult.

Recently in almost all the UN publications they call our attention to dangers in indulging into year-to-year comparisons. Trying to solve this problem, the UN presents a HDI trend, where the countries' HDI was built using same methodology for selected years from 1975 to 2002. When seen within a historical perspective, the HDI has proved to be a flexible index that has evolved, incorporating a series of changes and criticisms raised by the academic community. Indeed, UNPD started to process modifications from the second year of the HDI launch.

4. Technical modifications in the HDI and its family of indexes

4.1 HDI technical modifications

In 1991, the second HDR put forward the first round of modifications in the HDI. The change occurred in all three dimensions of the index. The health dimension moved from flexible posts (max and min values) to fixed posts of a maximum and minimum of 78,4 and 41,8 years respectively. The knowledge dimension started to be considered attributing a 1/3 weight to years of schooling, and the remaining to the

literacy rate. In the income dimension, the log was changed to the Atkinson's formula. The argument was that the 1990 methodology, attributing zero weight to income above the poverty line, was too harsh. The inclusion of the Atkinson's formula aimed to compute the decreasing returns of income utility to well-being. Atkinson's formula was used in a way which allows different weights to different levels of income⁴. During the two following years (1992 and 1993), the HDI methodology remained the same.

The second round of revisions occurred in 1994 and again it contemplated the three dimensions of the index. In the health dimension the maximum and minimum values were fixed in 85 and 25 years respectively. The fixed values aimed to allow intertemporal comparisons. The knowledge dimension also incorporated fixed posts, with a fixed maximum and minimum: 100% and 0% rate for literacy and 15 and zero for years of schooling, respectively. With this change maximum and minimum values stopped to be derived from the data set. The maximum and minimum posts for the income dimension used in 1994 were PPP\$ 40.000 and \$ 200. A new threshold value was taken to be the global average real GDP per capita of PPP\$ 5.120. This methodological change addressed the criticism related to the use of a poverty line based on a small sample of industrialised countries.

The third round of changes took place in 1995 and it reached two of the index dimensions – education and income. Years of schooling in the education dimension were replaced by a combination of enrolment ratios in primary, secondary and tertiary education (%). The weights remained the same – 2/3 for adult literacy rate and 1/3 for the enrolment ratio. For the income dimension the minimum was changed from \$ 200 to \$ 100. This change was due to the launch of the GDI and the GEM indexes

⁴ $W = y$ for $y \leq y^*$

$W = y^* + 2(y-y^*)^{1/2}$ for $y^* \leq y < 2y^*$

$W = y^* + 2(y^{1/2} - y^{*1/2}) + 3(y - 2y^*)^{1/3}$ for $2y^* < y < 3y^*$

Where

W = the transformed income variable

y = the actual income level

y* = the poverty line for the country

The fractional weight assigned to income above the poverty line was derived from the general formula:

$$W(y) = \frac{1}{1-\varepsilon} \times y^{1-\varepsilon}$$

If $\varepsilon = 0$ income has its full weight (no diminishing returns)

If ε gets closer to 1, W(y) becomes log y. The assumption is that $\varepsilon = 0$ for $y < y^*$ and $\varepsilon = \frac{1}{2}$ for $y > y^*$.

- the lower income earned by women in development countries demanded this reduction.

In the application of the Atkinson's formula, the poverty line (seen as the world average income) started to be used as the minimal income value for all countries with an income level below the poverty line. The argument for this use was based on the idea that the world average income represents a good proxy for the minimal level of income that any country should have.

New rounds of changes, that could be called 'the fourth to the sixth round of modifications', took place during the period 1996 to 1998. Annual updates were introduced to the minimum of the income dimension used in the Atkinson's formula application. A seventh round took place in 1999, when the income dimension went again through an important change. The Atkinson's formula was no longer used and the logarithm of the GDP per capita was re-introduced. The maximum (PPP \$ 44.000) and minimum (\$ 100) values remained the same. The main argument for this replacement was that (HDR 1999:159):

The main problem with this formula is that it discounts the income above the threshold level very heavily, penalising the countries in which income exceeds the threshold level. It reduces the \$34.000 (PPP\$) between the threshold and maximum level of income to a mere \$321 (PPP\$). In many cases income loses its relevance as a proxy for all dimensions of human development other than a long and healthy life and knowledge.

From this year on, until 2004, the adjusted income began to be calculated according to the following formula:

$$W(y) = \frac{\log y - \log y_{\min}}{\log y_{\max} - \log y_{\min}}$$

According to UNDP, the advantages of this new methodology lies in the fact that all income levels are submitted to the same treatment and there is no heavy penalty for the high income level countries. Consequently, there is no need for using poverty lines. Currently, the calculation of the HDI follow the two steps. First, the assessment of average achievements

for each dimension⁵ and, second, the HDI calculation, averaging as follows:

$$\text{HDI} = 1/3 (\text{life expectancy index}) + 1/3 (\text{Knowledge index}) + 1/3 (\text{GDP index})$$

5. Final considerations

The evolution of the HDI showed a remarkable resilience of this index, keeping its original ideas, dimensions and aggregation procedures, at the same time that it showed great flexibility in incorporating sensible criticism and methodological advancements (as illustrated by the HDI related indexes). It is worth mentioning that much remains unaccounted and that even after all the technical modifications implemented by UNDP, the HDI has not proved able to reply to the majority of the criticisms that it has received. Trivial and basic problems related to low-quality and lagged data are still not solved. Aggregation procedures and other statistical issues were simply justified but not effectively addressed. For example, education represents 1/3 of the index weight. Higher education has the same weight as fundamental education. It is almost frivolous to question if higher education has the same intrinsic value as fundamental education. It is also possible to ask why income, that represents all standard of living aspects, goes through a diminishing returns to scale in the HDI and why the same does not apply to education? Could higher education be considered a basic capability?

So, was the HDI successful? Given that the established goal was to provide an alternative index to the one-dimensional and income-centred previous indicators, HDI represents indeed advancement, both in terms of the characterisation of the multidimensional nature of development as in terms of its refined theoretical basis. On the other hand, arguments claiming the introduction of a completely new paradigm, showing a change from the concentration on means towards the promotion of

5 1.1 The 'long and healthy life' dimension (life expectancy index) is measured by life expectancy
Life expectancy index = Actual value for life expectancy in country j – minimum fixed value (25 years)/Maximum fixed value (85 years) – minimum fixed value (25 years).

1.2 Knowledge (X₂) is measured by literacy rates (weight 2/3), and by primary, secondary and tertiary gross enrolment rates (weight 1/3).

Adult literacy index = Actual value for the country – minimum (0%) / Maximum value (100%) – minimum value (0%)

Gross enrolment rate = Actual value for the country – minimum (0%) / Maximum value (100%) – Minimum value (0%)

Education Index = 2/3 (adult literacy index) + 1/3 (gross enrolment index)

1.3 The Living standard dimension. It is measured by the log of the average GDP per capita (PPP US).
GDP index = log of actual value for the country – log of minimum income (\$100) / log of maximum income (\$40.000) – log of minimum income (\$100)

human ends, are far from being settled. The claim that HDI is a capability measure, considered the most basic human capabilities, also remains elusive. Nonetheless, the HDI assesses achievements such as education, life expectancy, and income, not freedoms. However, it is important to remark that all HDI dimensions are essential for the development of human capabilities.

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Submissão: 03 de outubro de 2006
Primeira resposta: 09 de janeiro de 2007
Aceite: 11 de maio de 2007

Apêndice – Lista de Siglas

- BN – Basic Need
CA – Capability Approach
GDP – Gross Domestic Product
GNP – Gross National Product
HD – Human Development
HDI – Human Development Index
HDR – Human Development Report
HFI – Human Freedom Index
HN – Human Needs
PPP – Purchasing Power Parity
UN – United Nation
UNDP – United Nations Development Program