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Abstract: This article recounts the intellectual history of the UNDP's Human Development Index. It begins with the early history of welfare economics and follows this field through three successive revolutions in thought culminating in the theory of human development. The first section traces this history from the origins of economic "utility" theory to Sen's human capabilities approach. The second section is a chronicle of past and present measures of social welfare used in the fields of economics and development, including national income and a variety of composite measures up to and including HDI.

Key words: human development; well-being; human development index; economic history of thought; social welfare measurement

Introduction

In 1990, the United Nations Development Program (UNDP) transformed the landscape of development theory, measurement, and policy with the publication of its first annual *Human Development Report (HDR)* and the introduction of the Human Development Index. *HDR 1990* presented the concept of “human development” as progress towards greater human well-being, and provided country-level data for a wide range of well-being indicators. The UNDP’s establishment of the *HDR* expanded both the availability of measurement and comparison tools used by governments, NGOs, and researchers, and our common understanding of development itself.

The Human Development Index, or HDI, embodies Amartya Sen’s “capabilities” approach to understanding human well-being, which emphasizes the importance of ends (like a decent standard of living) over means (like income per capita) (Sen 1985). Key capabilities are instrumentalized in HDI by the inclusion of proxies for three important ends of development: access to health, education, and goods. Empowered by these, and other, capabilities, individuals can achieve their desired state of being.

HDI has been the centerpiece of the *HDRs* for 17 years, and the latest edition, *HDR 2006*, includes HDI rankings for 177 countries. In HDI, component indices for life expectancy, literacy, school enrollment, and income are combined together into a single index that can be used to compare the level of human well-being among countries or to monitor one country’s progress over time. HDI provides an alternative to the still common practice of evaluating a country’s progress in development based on per capita national income.

What follows is the story of the development of the HDI, beginning with the early intellectual history of welfare economics and following this field through three successive revolutions in thought culminating in the theory of human development. In the first section, I trace this history from the origins of economic “utility” theory to Sen’s human capabilities approach. The second section is a chronicle of past and present measures of social welfare used in the fields of economics and development, including national income and a variety of composite measures up to and including HDI. Since HDI’s first introduction in 1990, many scholars have offered critiques of its underlying data and its method of calculation. In many cases, the UNDP has responded by improving HDI based on these critiques. In the third, and final, section of this chapter I summarize these critiques and the UNDP’s adjustments to HDI over time.

Human Well-Being: A History of Thought

In neo-classical economics “utility” is a term that has come to mean an individual’s mental state of satisfaction, with the proviso that levels of satisfaction or utility cannot be compared across individuals. It is a concept that is simultaneously too broad and too narrow. Almost anything can be seen to have and give utility, albeit with diminishing returns. While its reach is broad, the usefulness of the “utility” concept as deployed in neo-classical thought suffers from some severe limitations. In the absence of inter-personal comparability, the utility of individuals cannot be aggregated in order to consider social welfare, nor can it be compared in order to consider distribution.

While a theory of well-being that can address neither aggregate welfare nor inequality seems of little practical or conceptual use, this modern definition of utility has nonetheless been the dominant measure of human welfare used in mainstream economic theory since the 1930s. As measurement has become increasingly central to the field of economics, the accepted metric for social or aggregate welfare has been defined implicitly (and sometimes explicitly) in terms of money, or, more specifically, as national income per capita (ironically, a practice that violates neo-classical utility theory, as will be explored below). Yet modern theorists including Martha Nussbaum, John Rawls, and Amartya Sen have opened our eyes to a world of concepts of social welfare unbound by the rules of neo-classical economics. The history of thought leading up to Sen's capabilities approach to human welfare is the topic of this section.

The origins of welfare economics

The Western thought that provides the basis for most modern economists' understanding of human well-being can be traced back as far as Aristotle, who viewed well-being as something generated by our actions and not our belongings:

Another belief which harmonizes with our account is that the happy man lives well and does well; for we have practically defined happiness as a sort of good life and good action. The characteristics that are looked for in happiness seem also, all of them, to belong to what we have defined happiness as being. For some identify happiness with virtue, some with practical wisdom, others with a kind of philosophic wisdom, others with these, or one of these, accompanied by pleasure or not without pleasure; while others include also external prosperity. (Aristotle, 350 B.C.E.)

Dominant European concepts of well-being changed over time from this Aristolean idea to the medieval metric of heavenly rewards and punishments determining our earthly well-being, to Calvinist predetermination, and finally to the scientific aestheticism of the Renaissance, which lasted until the dawn of Utilitarian philosophy in the 18th century (Segal 1991).

Jeremy Bentham's (1789: Ch.1) *Introduction to the Principles of Morals* was not the first, but is the best remembered discussion of the philosophy of Utilitarianism, in which human behavior is described as motivated by pleasure and pain – their net satisfaction being “utility.” Society's well-being was the sum of these utilities, such that an ethical course of action was that which led to “the greatest happiness for the greatest number.” This formulation of social welfare was meant to be both egalitarian and individualistic: each person's utility was counted equally and each person got to determine what was his or her own level of satisfaction (Ackerman 1997a). In theory, utility could be summed across individuals to determine “social welfare,” but utilitarianism did not offer any practical way to actually measure either individual or societal well-being. Bentham also posited what would eventually come to be known as the diminishing marginal utility of goods, and, by extension, income or wealth: the idea being that each new unit of anything adds to your utility a little bit less than the last one.

Amartya Sen (2000a) points to a fierce opposition to pluralism of ideas as a defining characteristic of Utilitarianism. Utilitarians insisted on the importance of having a single measure of human well-being, as opposed to different and non-commensurable elements. In contrast, in *The Standard of Living*, Sen (1987b: 1) defends a pluralistic understanding of well-being:

There are many fundamentally different ways of seeing the quality of living, and quite a few of them have some immediate plausibility. You could be well off, without being well. You could be well, without being able to lead the life you wanted. You could have got the life you wanted, without being happy. You could be happy, without having much freedom. You could have a good deal of freedom, without achieving much. We can go on.

Sen (2000a) views Benthamite utilitarianism as a rhetorical tactic that successfully cleared the intellectual arena of any serious opponents to utility. If there could be only one measure of well-being, then the struggle to have that measure be net satisfaction was not a very difficult one.

Utilitarianism receded in the early 19th century, until its revival by John Stuart Mill's *Utilitarianism* (1861). Mill's vision of utilitarianism differed in some respects from that of Bentham and other early proponents. He allowed for a hierarchy of different qualities or types of pleasure, recognized the importance of social influences on individual attitudes, and acknowledged that individuals are not always the best judges of their own interests (Ackerman 1997a).

The Marginalist Revolution

The most direct antecedents of today's neo-classical economists were called the Material or Marginalist Welfare School; these theorists preserved the basic precepts of Utilitarianism, but used new mathematical tools to make their arguments. At the center of their economic theory were two related ideas. First, that the goal of individuals was to maximize utility, and, second, a formalization of Bentham's idea that utility was concave, or diminishing on the margin. Versions of these ideas were published independently by Willam Stanley Jevons, Carl Menger, Leon Walras, and Alfred Marshall starting in the 1870s (Ackerman 1997a; Cooter and Rappoport 1984). Of the marginalists, Marshall (1890, Book 3, Chapter 3) is the best known for promoting the idea of "satiabile wants":

There is an endless variety of wants, but there is a limit to each separate want. This familiar and fundamental tendency of human nature may be stated in the law of satiable wants or of diminishing utility thus: The total utility of a thing to anyone (that is, the total pleasure or other benefit it yields him) increases with every increase in his stock of it, but not as fast as his stock increases. If his stock of it increases at a uniform rate the benefit derived from it increases at a diminishing rate. In other words, the additional benefit which a person derives from a given increase of his stock of a thing, diminishes with every increase in the stock that he already has.

By the 1890s the marginalists dominated British economic thought. This school of thought, perhaps envious of the new mathematical models developed in the field of physics in the 1860s, is responsible for increasing the mathematical complexity of economic analysis. Its members also changed the focus of economics, away from the centrality of economic growth emphasized by Adam Smith (and by future 20th century macroeconomists) and the distribution among classes emphasized by David Ricardo and Karl Marx, and towards the analysis of constrained maximization or allocation problems that necessitated the assumption of fixed resources (Ackerman 1997a).¹ Interestingly, interpersonal comparisons were assumed to be impossible by proponents of the Marginalist Welfare School, but these comparisons were conducted nonetheless between large groups, like the rich and the poor (Cooter and Rappoport 1984).

Following the work of Arthur Cecil Pigou, the marginalists restricted their analysis to the necessities of life, using money as a “measuring stick.” Focusing on the most material aspects of welfare led to the insight that additional income was more useful to the poor than the rich. Pigou and Marshall, in particular, were explicitly in favor of income redistribution because it would lead to more material wants being satisfied. Vilfredo Pareto – who was against redistribution – clarified the by now murky waters of utility by pointing out that there were really two concepts of utility, not one. Usefulness was one form of utility. Ophelimity, or subjective desire, was the other. The Marginalist Welfare School was concerned only with the material wants of the former (Cooter and Rappoport 1984; Ackerman 1997b).

The Ordinalist Revolution

In 1932 the Marginalist Welfare School was attacked by British economist Lionel Robbins for having too narrow a focus on usefulness utility (e.g., bread) to the exclusion of ophelimity utility (e.g., opera tickets).² Unlike material necessities, ophelimity cannot be observed or compared either between individuals or on average between groups of people. Robbins called for the rejection of all interpersonal comparisons of utility arguing that cardinal measurement and interpersonal comparisons could never capture the unobservable utility or satisfaction of others, and that it, therefore, could not be demonstrated or assumed that the marginal utility of income for the poor is greater than the marginal utility of income for the rich. The success of Robbins’ rejection of cardinal measures of utility led to the so-called “Ordinalist Revolution” in economics, and the birth of neo-classical economics as we know it today (Robbins 1932; Cooter and Rappoport 1984).

The ordinalists noticed that if one were to combine the utilitarian concept of social welfare (defined as the sum of individual welfares) with another important marginalist assumption, diminishing marginal utility of income, the logical outcome is a very subversive result: Social welfare reaches its maximum when income was distributed equally across the population. Robbins (1932: 137, 141) took pains to reject this conclusion:

The Law of Diminishing Marginal Utility implies that the more one has of anything the less one values additional units thereof. Therefore, it is said, the more real income one has, the less one values additional units of income. Therefore, the marginal utility of a rich man’s income is less than the marginal utility of a poor man’s income. Therefore, if transfers are made, and these transfers do not appreciably affect productivity, total utility will be increased...[This claim] rests upon an extension of the conception of diminishing marginal utility into a field in which it is entirely illegitimate...[and] begs the great metaphysical question of the scientific comparability of different individual experiences...Hence the extension of the Law of Diminishing Marginal Utility, postulated in the propositions we are examining, is illegitimate. And the arguments based upon it therefore are lacking in scientific foundation. Recognition of this no doubt involves a substantial curtailment of the claims of much of what now assumes the status of scientific generalisation in current discussions of applied Economics. The conception of diminishing relative utility (the convexity downwards of the indifference curve) does not justify the inference that transferences from the rich to the poor will increase total satisfaction...Interesting as a development of an ethical postulate, it does not at all follow from the positive assumptions of pure theory. It is simply the accidental deposit of the historical association of English Economics with Utilitarianism: and both the utilitarian postulates from

which it derives and the analytical Economics with which it has been associated will be the better and the more convincing if this is clearly recognised.

If income were both concave in welfare and unequally distributed, you could always increase social welfare by redistributing some income from the rich to the poor. Ian Little (1955: 11-14) elaborated on Robbins critique and argued that individual satisfactions cannot be summed up, that satisfaction is never comparable among different individuals, and that the field of welfare economics up until that time had been – to its detriment – entirely normative. The utilitarian definition of social welfare was gradually replaced in welfare economics by the idea of “Pareto optimality.”

In the concept of Pareto optimality, individual welfare is still utility, but social welfare is defined by the absence or presence of Pareto optimality (a situation in which no one can be made better off without making someone else worse off). In reality, this is a somewhat empty concept of social welfare since a very wide array of distributional situations can be Pareto optimal, and the only real opportunities for “Pareto Improvements” – when someone is made better off while no one is made worse off – occur when there are unclaimed or wasted resources. In *On Ethics and Economics*, Amartya Sen (1987a: 33-34) calls this redefinition of social well-being the narrowing of welfare economics: “In the small box to which welfare economics got confined, with Pareto optimality as the only criterion of judgement, and self-seeking behaviour as the only basis of economic choice, the scope for saying something interesting in welfare economics became exceedingly small.”

In modern usage, the applied economics of social welfare has taken the form of cost/benefit analysis (CBA), a common tool for making decisions about whether a project will improve social welfare (and should therefore be carried out) or will reduce social welfare (and should not be carried out). According to CBA, if the net present value of the future stream of costs and benefits of a project is positive, we should carry out the project, but if the net present value is negative we should not carry out the project. Abstracting from the vexing question of discount rates (by which future costs and benefits are translated into present values), this means that any addition to the size of the “economic pie” is good, regardless of the distribution of costs and benefits (in that changes that improve the welfare of some while diminishing that of others somehow qualify as social welfare improvements). This decision rule runs counter to that of Pareto optimality, but it is similar to Bentham’s social welfare as the sum of all individual welfares, with the difference that what is being summed is money rather than utility. Thus in applied neo-classical welfare economics, inter-personal comparability re-enters through the back door, while the diminishing marginal utility of income drops out of sight. The practice of adding up costs and benefits, and concluding that any positive net present value is good overlooks problems of unequal distribution: who gets the benefits and who pays the costs?

Connecting CBA back to ordinalist economic theory takes a blind eye and a few, difficult to justify, conceptual leaps. The conceptual leap by which neo-classical economics bridges applied cost-benefit analysis to theoretical welfare economics is the “compensation test.” If a project results in a positive net present value, then the economic pie has gotten bigger. With a bigger pie potentially we could make everyone better off, or at least we could make some people better off while making no one worse off: This is a “potential Pareto improvement.”

The compensation test, introduced by Nicholas Kaldor and John Hicks, is a method for determining whether or not there has been a potential Pareto improvement (Cooter and Rappoport 1984; Jackson 1992). Those who receive net benefits (the winners) could in principle compensate those who bear net costs (the losers) and still be better off. When net present value is positive, if I get all of the benefits but I have to pay back everyone who suffers costs, I can pay all the losers and still have a positive benefit left for myself. Of course, this fails to bring solace to the losers unless they are compensated in practice. As Sen (2000b: 947) so devastatingly put it:

If compensations are actually paid, then of course we do not need the comparison criterion since the actual outcome already includes the paid compensations and can be judged without reference to compensation tests... On the other hand if compensations are not paid, it is not at all clear in what sense it can be said that this is a social improvement (“Don’t worry, my dear loser, we can compensate you fully, and the fact that we don’t have the slightest intention of actually paying the compensation makes no difference; it is merely a difference in distribution”). The compensation tests are either redundant or unconvincing.

Winners do not actually have to compensate losers in CBA – there just has to be the potential. But when the costs accrue to one group and the benefits accrue to another, can it be said unequivocally that a positive net benefit is an increase to society’s well-being?

CBA marries Pareto optimality to the compensation test at the micro-economic level. At the macro-economic level, Pareto optimality combined with the compensation test leads to income per capita as a measure of development. The use of income per capita as a measure of social welfare requires the same conceptual leap that CBA makes on the micro-economic level. Unless one assumes that there is a constant marginal utility of income, maximizing the sum of dollars is not the same as maximizing the sum of utility. But with a bigger dollar pie, it would be possible to distribute the additional dollars such that no one has less – a potential Pareto improvement that evades the problem posed by diminishing marginal utility of income. The practice of conflating income per capita with social welfare is, of course, subject to the same criticism that Sen levels against CBA.³

The Humanist Revolution

In *A Theory of Justice* (1971), philosopher John Rawls’ definition of individual well-being was the possession of “social primary goods” or things that rational humans need or desire – a concept similar to utility – but his method of aggregating social well-being across individuals was revolutionary. Rawls’ two principles of justice are, first, that, “Each person has an equal right to a fully adequate scheme of equal basic liberties which is compatible with a similar scheme of liberties for all.” (Sen 1992: 75) This is not unlike Oliver Wendell Holmes’ famous statement that, “The right to swing my fist ends where the other man’s nose begins.” Rawls’ second principle is that, “Social and economic inequalities are to satisfy two conditions. First, they must be attached to offices and positions open to all under conditions of fair equality of opportunity; and second, they must be to the greatest benefit of the least advantaged members of society.” (Sen 1992: 75; Rawls 1971)⁴

Rawls (1971: 152-3) went on to explain that these principles taken together form what he called the “maximin” rule for choice under uncertainty:

[T]he two principles are those a person would choose for the design of a society in which his enemy is to assign him his place. The maximin rule tells us to rank alternatives by their worst possible outcomes: we are to adopt the alternative the worst outcome of which is superior to the worst outcome of the others. The persons in the original position do not, of course, assume that their initial place in society is decided by a malevolent opponent. As I note below, they should not reason from false premises. The veil of ignorance does not violate this idea, since an absence of information is not misinformation.

A Rawlsian notion of society’s well-being, therefore, is one in which social welfare is said to be equal to the well-being of society’s least well-off member.

Amartya Sen and Martha Nussbaum are together credited with the origination of the “capabilities” approach to human well-being based on Rawlsian philosophy (Pattanaik 1994). Like Aristotle, Sen and Nussbaum focused attention on what human beings can do, instead of on what they have. Moving the discussion away from utility and towards “capabilities” allowed Sen and Nussbaum to distinguish means (like money) from ends (like well-being or freedom) (Crocker 1992, 1995).

While Rawls limited his analysis of social welfare to the “social primary goods” that rational humans need or desire, and “negative freedoms” that involve the absence of interference, Sen and Nussbaum expanded on this base to include “positive freedoms” as well, like freedom from being constrained by poverty or a lack of education (Sen 1987a; Rawls 1971; Crocker 1992, 1995).⁵ For neo-classical economists, well-being is individual utility, a mental state. For Sen and Nussbaum, both well-being and agency – or freedom – are important, and utility is not adequate as a measure of well-being (Crocker 1992, 1995). In *Inequality Reexamined*, Sen (1992: 6) makes this critique:

Welfarism in general and utilitarianism in particular see value, ultimately, only in individual utility, which is defined in terms of some mental characteristics, such as pleasure, happiness, or desire. This is a restrictive approach to taking note of individual advantage in two distinctive ways: (1) it ignores freedom and concentrates only on achievements, and (2) it ignores achievements other than those reflected in one of these mental metrics.

Capabilities are the abilities to do certain things or to achieve desired states of being. They are empowerment, the power to obtain what you desire, utilize what you obtain in the way that you desire, and be who you want to be. Goods, on the other hand, are merely things that you possess. Capabilities allow you to use goods in ways that are meaningful to you. Sen uses a further term, “functionings,” to refer to the capabilities that a person actually uses or participates in. Capabilities, then, are the full set of functionings that are feasible for a given person. For example, with one capabilities set, fasting may be the only choice; with another set, fasting may be one of many choices. In addition, capabilities can have intrinsic value by adding worthwhile options or positive freedoms to one’s life (Sen 1999; Crocker 1992, 1995).

While Sen declines to list capabilities or functionings because of what he considers to be a need for a democratic process to determine such a list, Nussbaum (2000) has proposed a list of ten

capabilities: (1) life; (2) bodily health; (3) bodily integrity; (4) senses, imagination, and thought; (5) emotions; (6) practical reason; (7) affiliation; (8) other species; (9) play; and (10) control over one's environment.⁶

Nussbaum also discusses the ways in which our ability to convert a commodity into a capability depends on personal, social, and environmental conversion factors. Ingrid Robeyns (2005: 99) gives the example of access to a bicycle:

If a person is disabled, or in a bad physical condition, or has never learned to cycle, then the bicycle will be of limited help to enable the functioning of mobility...If there are no paved roads or if a government or the dominant societal culture imposes a social or legal norm that women are not allowed to cycle without being accompanied by a male family member, then it becomes much more difficult or even impossible to use the good to enable the functioning.

The capabilities approach draws on a rich history of economic and philosophical thought regarding social welfare. Sen and Nussbaum's work stands out from that of their predecessors because of inclusion of human beings' role as agents of their own well-being, and because of the centrality of human agency both as an end in itself, and as a means to other important capabilities or freedoms. Sen and Nussbaum's humanist revolution is a critique of theoretical neo-classical welfare economics, and they go beyond arguing that income per capita and CBA are inadequate measures of social welfare to refute Pareto optimality's standing as a basis of making value judgments. The UNDP's Human Development Index (HDI) is an attempt to build on the insights of the humanist revolution, in effect developing an applied measure of social welfare as a correlate to this new theoretical welfare economics. Just as income per capita and CBA were the progeny of the ordinalist revolution, HDI was born of the humanist revolution.

A History of the Measurement of Social Well-Being

In *India: Economic Development and Social Opportunity*, Jean Drèze and Amartya Sen (1995: 9) describe the origins of the field development economics shortly after World War II and note that from its beginnings this field had "an overarching preoccupation with the growth of real income per capita." The most common measure of aggregate human well-being is now – as it has been for over 50 years – national income, usually expressed as per capita gross national product (GNP) or per capita gross domestic product (GDP). Criticisms of national income as a metric for social welfare have a long history and are by no means confined to economists (see Sánchez 2000).

Measures of national income add up all of the goods and services exchanged on the market in a particular country in a given year. One of the principal architects of national income accounting was Nobel Laureate Simon Kuznets, who began work on the United States' income accounting in 1932. In 1947, a student of Kuznets, Milton Gilbert, then chief of the National Income Division of the United States' Department of Commerce, published the first description of the particular form of national income accounts called "gross national product" (Waring 1988).

GNP is the sum of all consumption, investment, and government spending by a country's nationals, whether within the national territory or not. In 1953, the United Nations published "A System of Statistical Tables" that gives clear, precise instructions for constructing national

income accounts; these tables, with some modifications, are still the standard for national income accounts today (Waring 1988). Since the 1990s, GNP has been supplanted by GDP as the most common definition of national income (Ackerman *et al.* 1997: 347). GDP measures all consumption, investment, and government spending within a country, plus exports minus imports, regardless of the citizenship of the consumers or investors.

Many authors have noted conceptual problems with using GDP or GNP per capita as a measure of human well-being.⁷ Briefly, national income accounts: 1) only register monetary exchanges; 2) equate goods with commodities that are not “goods” but “bads,” like nuclear weapons, the production of which tends to lower social welfare; 3) count both additions and cures, or “anti-bads,” like the costs of cleaning up petroleum spills; 4) treat natural resources as free and limitless; 5) place no value on leisure-time; 6) ignore freedom and human rights; and (7) ignore the distribution of income within the society (Hicks and Streeten 1979; UNDP 1990).

Growth versus development

Closely associated with the use of national income accounts to measure well-being is the conflation of economic growth (as measured by the change in GDP) with development or progress. Hicks and Streeten (1979) point out two common assumptions made by proponents of this measure: First, economic growth will automatically “trickle-down” and spread its benefits across society; second, when economic growth fails to trickle-down and instead causes income disparities, governments will step in to remedy the situation. By one or both routes, growth in per capita national income will reduce poverty. As Hicks and Streeten (1979: 567) comment, neither assumption had, at the time of their writing, proved true: “Highly concentrated and unequal growth was observed in some countries for prolonged periods, so that there was no universal tendency for growth to spread. Nor did governments always show signs of correcting gross inequalities.”

Ahluwalia and Chenery (1974: 38) state that:

It is not sufficient that we should pay more attention to distribution or to the incomes of the poor within the existing framework of policy analysis. Rather, it is necessary to reformulate the framework itself so as to incorporate an explicit analysis of the processes by which the incomes of the poor are generated and the policy instruments by which these processes can be affected.

They distinguish between GDP growth and development, and propose an index of economic performance that sorts individuals into groups by their income or asset level, and then weights the importance of each group’s economic growth before aggregating for a measure of social welfare. Ahluwalia and Chenery discuss several different potential weighting schemes, from setting the weight of the poorest group at one and all other groups at zero (which would result in a measure consistent with Rawls’ idea of social welfare), to giving each individual’s income growth an equal weight (i.e., a one percent increase counts the same for all), to weighting the groups’ importance to society’s well-being by its share of total income. They point out that this last approach is equivalent to using GDP growth as a measure of the change in social welfare.

In *Hunger and Public Action*, Jean Drèze and Amartya Sen (1989: 183, 226) address this issue by distinguishing between growth-mediated and support-led government intervention. The

growth-mediated strategy is, in some respects, a “trickle-down” policy. The idea is that greater affluence not only improves private incomes but also creates a better basis with which to pay for social services; the goal, then, is to increase GDP in order to increase the country’s tax base and potential social service provision. In contrast, support-led strategies prioritize not increasing a country’s GDP, but directly providing social services – including guarantees of income, income transfers, healthcare, and education – regardless of the level of GDP.

The strategies of growth-mediated and support-led development are contrasted to what Drèze and Sen (1989: 188) call “unaimed opulence” – an indiscriminate pursuit of economic expansion:

A particularly crude version of [unaimed opulence], which is in fact not uncommon, consists of attempting to maximize economic growth without paying any direct attention to the transformation of greater opulence into better living conditions. Unaimed opulence, in general, is a roundabout, undependable, and wasteful way of improving the living standards of the poor.

In effect, unaimed opulence is a lack of any sort of public policy to address equity; the result of this lack can be rampant economic growth coupled with widespread poverty, illiteracy, ill health, child labor, crime, and starvation (Drèze and Sen 1995: 34). According to Drèze and Sen (1989: 180-1), there is no inevitable connection between GDP and the quality of life. The effect of GDP growth on poverty and inequality is always and everywhere mediated by public action.

The *HDRs* have carried this message – that national income is insufficient to measure human well-being for a wide variety of reasons – into the 1990s and beyond:

People are the real wealth of a nation. The basic objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives. This may appear to be a simple truth. But it is often forgotten in the immediate concern with the accumulation of commodities and financial wealth. (UNDP 1990: 9)

Some authors have disagreed with the UNDP’s claim that estimates of national income have been the only measure of aggregate social welfare taken seriously since the 1950s or 1960s (UNDP 1990). For example, Srinivasan (1994: 238) states that, “In fact, income was never even the primary, let alone the sole, measure of development, not only in the minds of economists but, more importantly, among policymakers.” Srinivasan cites a variety of other measures that were in use in the 1950s. Similarly Rao (1991: 1453) calls the HDI “old wine in a new bottle,” stating that before development was supplanted by economic growth in the 1960s, there was a more comprehensive view of human well-being.

It is not, however, the existence of other measures that is in dispute, but rather the overwhelming dominance of national income as a measure of well-being. An early United Nations (1954: 12) report gives further evidence both of this dominance, and of a long tradition of criticism of national income as a measure of development:

The amount of money spent on consumption is often regarded as the measure of the level of living. The Committee did not agree with this view. Monetary expenditure to a large extent indicates personal wants and preferences. If an individual receives an increased income, and if prices, etc., remain the same, it must be assumed, according to the monetary approach, that his level of living has risen. But if he spends the additionally money on certain types of products or

activities injurious to his health, we may...come to the conclusion that his level of living has not gone up or is even lower than before. Similarly, two persons expending the same amount of money on themselves may...have quite different levels of living.

Predecessors of the HDI

Many scholars and development agencies have attempted to create a broader measure of human well-being by combining indicators that shed light on both means and ends of social progress. Obstacles to the construction of such an index have included the lack of any objective standards both for what components should and should not be included, and for the appropriate way to combine the chosen indicators (Hicks and Streeten 1979).

One of the earliest of these attempts was conducted by the United Nations Research Institute for Social Development (UNRISD). In 1966, the UNRISD published a 20-country study of a “level of living index” that had categories for physical needs (nutrition, shelter, and health); cultural needs (education, leisure, and security); and higher needs (measured as income above a threshold). The UNRISD released a second study in 1972, this time of a “Development Index” with nine economic and nine social characteristics (McGranahan 1972; Hicks and Streeten 1979). In 1973, the Organization for Economic Cooperation and Development (OECD) published a report in which six social variables were used to form a “predicted GNP per capita index” for 82 developing countries. In 1975, the United Nations Economic and Social Council ranked 140 countries by adding the ranks together for seven indicators: two social (literacy and life expectancy) and five economic (energy, the manufacturing share of GDP, the manufacturing share of exports, employment outside of agriculture, and number of telephones) (OECD/DAC 1973; UN-ECOSOC 1975; Hicks and Streeten 1979).

Beginning in 1976, the International Labor Organization began publishing its work on the “basic needs” approach to development. Basic needs included an adequate level of both consumption and essential services, like health care or primary education. The specific indicators used to measure basic needs have varied over time, although in later studies by Paul Streeten (1981) and Frances Stewart (1985) an effort was made to reduce the number of variables by establishing which had the highest levels of correlation with one another. Both studies came to the conclusion that life expectancy could stand as a proxy for all basic needs.

In 1979, M.D. Morris of the Overseas Development Council released the Physical Quality of Life Index (PQLI) with the objective of measuring whether a minimum set of human needs was being met by the world’s poorest people: “To the extent that development planners within poor countries and aid dispensers in donor countries now focus more directly on projects that emphasize distribution of benefits, they need not only new planning strategies but also additional measurement systems.” (2) The PQLI combined infant mortality, life expectancy at age one year, and basic literacy, transforming each indicator into an index by comparing the level to a fixed range of possible levels, and then taking the average of the three components. Morris (1979: 49) explained that, “The extremes that define each index affect the placing of countries on that particular index as well as on the composite index.” The PQLI also presented sub-national measures by gender and by region, where data were available.

Later attempts to construct a measure of social welfare include Camp and Speidel's (1987) *International Human Suffering Index*, which combined ten measures including income, infant mortality, nutrition, adult literacy, and personal freedom (Srinivasan 1994). Also Slottje's (1991) study of 130 countries, which appears to have been written before the release of the *HDR 1990*, drew on the capabilities approach by constructing a composite of 20 indicators, arguing that Morris' three components were insufficient to capture the quality of life.

Mahbub ul Haq and the HDI

For the first time, we have begun to acknowledge – still with a curious reluctance – that in many societies GNP can increase while human lives shrivel. – Mahbub ul Haq (1999: 4)

Drawing heavily on the capabilities approach to human welfare, Mahbub ul Haq's "human development" project of the UNDP has been to define a new conceptualization of well-being and to make available measures of well-being based on that new idea. The first *HDR* (UNDP 1990: 9) declared that the means of development have obscured its ends because of two primary factors:

First, national income figures, useful though they are for many purposes, do not reveal the composition of income or the real beneficiaries. Second, people often value achievements that do not show up at all, or not immediately, in higher measured income or growth figures: better nutrition and health services, greater access to knowledge, more secure livelihoods, better working conditions, security against crime and physical violence, satisfying leisure hours, and a sense of participating in the economic, cultural and political activities of their communities. Of course, people also want higher incomes as one of their options. But income is not the sum total of human life.

The human development process is one of enlarging people's choices. It focuses on three essential components: a long and healthy life, knowledge, and "access to resources needed for a decent standard of living" because, "If these essential choices are not available, many other opportunities remain inaccessible." (UNDP 1990) In the words of Paul Streeten (1994: 232):

Human development puts people back at center stage, after decades in which a maze of technical concepts had obscured this fundamental vision. This is not to say that technical analysis should be abandoned. Far from it. But we should never lose sight of the ultimate purpose of the exercise, to treat men and women as ends, to improve the human condition, to enlarge people's choices.

Sen, who was one of the principal consultants on *HDR 1990*, wrote that at first he did not see the point of a crude composite index like the HDI, especially against the backdrop of the wealth of information that the UNDP was planning to include in the report. Haq replied, "We need a measure of the same level of vulgarity as GNP – just one number – but a measure that is not as blind to social aspects of human lives as GNP is."⁸ Sen (2000a: 17) has since described human development as "an illuminating concept that serves to integrate a variety of concerns about the lives of people and their well-being and freedom," and affirmed that the *HDR* has served the increasing demands for pluralistic measures of development from both scholars and activists.

On the success of this mission to supplant GDP, Haq has said:

Only 30 years ago, it would have been heresy to challenge the economic growth school's tacit assumption that the purpose of development is to increase national income. Today, it is widely accepted that the real purpose of development is to enlarge choices in all fields – economic, political and cultural. Seeking increases in income is one of the many choices people make, but it is not the only one. (Haq, as quoted in Sánchez 2000: 9)

In 2005, as in 1990, the HDI is the heart of the *HDRs*. HDI is a measure of human development that combines proxies for three important human capabilities: health, education, and a decent standard of living. Health (H) is represented by life expectancy (LE), education by literacy (LIT) and school enrollment (ENR) (the literacy and school enrollment indices are combined in weighted average as the education (E) index), and standard of living by GDP per capita (Y). The value for each these components is transformed into an index using a normalization formula in which the actual value is compared to a stylized range of values across all countries:

$$(1) \text{H-Index}_i = \frac{\text{LE}_i - 25 \text{ years}}{85 \text{ years} - 25 \text{ years}}$$

$$(2) \text{LIT-Index}_i = \frac{\text{LIT}_i - 0\%}{100\% - 0\%}$$

$$(3) \text{ENR-Index}_i = \frac{\text{ENR}_i - 0\%}{100\% - 0\%}$$

$$(4) \text{E-Index}_i = 2/3(\text{LIT-Index}_i) + 1/3(\text{ENR-Index}_i)$$

$$(5) \text{Y-Index}_i = \frac{\ln(Y_i) - \ln(\$100)}{\ln(\$40,000) - \ln(\$100)}$$

The per capita GDPs used in the income index are in U.S. dollars and are purchasing power parity (PPP) adjusted to eliminate differences in national price levels. In addition, income is capped at \$40,000, and natural logarithms are calculated for the actual, minimum, and maximum values in order to account for the diminishing marginal utility of income. The practical upshot of the logarithmic transformation is this: increasing GDP per capita by \$100 in a country where the average income is only \$500 has a much greater impact on the standard of living as measured in HDI than the same \$100 increase in a country where the average income is \$5,000 or \$50,000.

In the final step for calculating HDI, the health, education, and income indices are averaged together, with each one given an equal weight:

$$(6) \text{HDI}_i = (\text{H-Index}_i + \text{E-Index}_i + \text{Y-Index}_i)/3$$

The calculations used in the HDI have changed over the years and what is described above is the most recent formula, which has remained unchanged since 1999. Figure 1 below gives a history of HDI formulations.⁹

Critiques of HDI

Sen and Haq have not been the only ones to point out that one of the primary attributes of HDI is its ability to draw attention away from GDP and towards a wider concept of human development. Some scholars have derided the HDI on precisely these grounds. For example, Castles (1998: 832) writes that the *HDR*'s "dominant position in the global market for information on the social and economic world owes little to its intrinsic qualities and much to the packaging and promotional efforts of its multinational sponsor." Streeten (1994: 235), on the other hand, takes a positive view of these same qualities, "Yet, such indexes are useful in focusing attention and simplifying the problem. They have a stronger impact on the mind and draw public attention more powerfully than a long list of many indicators combined with a qualitative discussion."

Year	Human Development Index
1990	<ul style="list-style-type: none"> • Component Index = (maximum-actual)/(maximum-minimum) • HDI = 1 - average of component indices • Ranked from worst (#1) to best (#130) • Maximum and minimum for current year • Education Index = adult literacy only • Income Index = $\log_{10}(\text{PPP GDP/capita})$; with the average poverty line for nine OECD countries as maximum
1991	<ul style="list-style-type: none"> • Ranked from best (#1) to worst (#160) • Education Index = adult literacy and mean years of school enrollment • Income Index = Atkinson formula = $y^* + 2(\text{GDP}_i - y^*)^{1/2} + 3(\text{GDP}_i - 2y^*)^{1/3} + \dots$; threshold y^* is the average poverty line for nine OECD countries
1994	<ul style="list-style-type: none"> • Component Index = (actual-min)/(max-min) • HDI = average of component indices • Fixed maximum and minimum (LE: 25/85 yrs; LIT: 0%/100%; ENR: 0%/100%; Y: \$200/\$40,000)
1995	<ul style="list-style-type: none"> • Education Index = adult literacy and combined gross school enrollment • Income minimum changed to \$100
1999	<ul style="list-style-type: none"> • Income Index = natural log(PPP GDP/capita) up to \$40,000

Source: UNDP 1990 to 2005.

Figure Error! No text of specified style in document..1: History of Changes to the HDI

Over the years many economists and other scholars have critiqued the HDI for this among many other reasons. Srinivasan (1994: 241) sums up the viewpoints of several of his colleagues writing:

[T]he HDI is conceptually weak and empirically unsound, involving serious problems of noncomparability over time and space, measurement errors, and biases. Meaningful inferences about the process of development and performance as well as policy implications could hardly be drawn from variations in HDI.

Srinivasan goes on to criticize the *HDRs*, in general, as being ill-informed and unsound.

This section summarizes the literature critiquing the HDI, changes in the HDI formula proposed by its critics, and the UNDP's responses to these critiques. The critiques and proposed alternatives fall into five main categories: poor data, incorrect choice of indicators, various problems with the HDI's formula in general, incorrect specification of income in particular, and redundancy.

Poor data

One category of critiques of the HDI addresses what some suggest is a poor quality of data, particularly in terms of the thoroughness of data collection and the frequency of measurement errors. Srinivasan (1994) and Ogwang (1994) point out that the census data used to calculate the HDI are unreliable because of the infrequency of census data collection, the possibility of inaccurate reporting, and a lack of complete coverage within countries. Srinivasan (1994) and Aturupane et al. (1994) each discuss a variety of concerns with measurement errors, including differing definitions – especially of literacy – from country to country, and the absence of a measure of school quality or length of school year in the school enrollment index. The UNDP has strived to improve the *HDR*'s data over the last 15 years, although more improvement is, of course, still possible. *HDR 1996* (UNDP 1996: 133) states that, “A major goal of the Report is to encourage national governments, international bodies and policy-makers to participate in improving statistical indicators of human development.”

Wrong indicators

A second set of critiques concerns the selection of components included in the composite HDI. This critique takes two, closely related, forms: first, that important indicators are missing from the HDI, and second, that those indicators included in the HDI are the wrong ones. The latter critique will be discussed below in the section regarding overall misspecification of the index. The former critique – that variables important to explaining human well-being have been left out – refers to indicators related to four main areas: the extent of civil and political liberties; distribution of income, access to health care, and access to educational opportunities; environmental impacts on well-being and access to natural resources; and further educational measures to include both stocks and flows.¹⁰

While the UNDP has not added any new indices to the three original components, it has responded to the first three of these concerns by focusing an edition of the *HDR* on each topic: *HDR 1991* contains a Human Freedom Index; *HDR 1992* focuses on inequality and includes an Income-Inequality-Adjusted HDI; and *HDR 1998* addresses over-consumption and sustainability. The UNDP also responded to critiques regarding the HDI's original education index, which was based solely on adult literacy. This measure was changed, first by adding mean school years in *HDR 1991* to give a greater weight to current educational policies, and then by replacing mean school years with combined gross enrollment in *HDR 1995* because of difficulty obtaining data for mean school years for all countries.

Wrong specification

It has also been suggested that the formula used to calculate the HDI is arbitrary, unjustifiable, and incorrect.¹¹ The HDI's components are combined using a simple, unweighted mean – a

method which has been likened to “adding apples and oranges.” (Hopkins 1991: 1471) Sager and Najam (1998: 251) write that “the scheme of arithmetic averaging of the dimensions runs counter to the notion of their being essential and, therefore, non-substitutable.”

One key critique of the HDI’s specification regards relative deprivation, or “moving goal posts.”¹² From 1990 to 1993 the HDI had minimum and maximum values for all three components based on variable criteria, like the actual minimum and maximum in the current year, or an average threshold value, as with income. Calculating the component indices using minimum and maximum values that change each year both makes it difficult to compare between years and, as noted by Kelley (1991: 319), “assumes that little or no progress in human development can be made by the developed countries.” In 1994, the UNDP began using fixed goal posts to calculate HDI: 25 and 85 years for life expectancy, 0 and 100 percent for adult literacy, 0 and 15 years for mean school years, and \$200 and \$40,000 for GDP per capita. When combined gross enrollment replaced mean school years in *HDR 1995*, it was assigned “goals posts” of 0 and 100 percent. Also in *HDR 1995*, the lower bound for GDP per capita was changed to \$100. These same fixed goals posts, as assigned in 1994 and updated in 1995, are still used today.

The second major critique leveled at the formulation of the HDI regards the equal weights assigned to the three components. Biswas and Caliendo (2001) call this weighting procedure “unsettling” and remark that “to the extent that one component index has a different variance than another equal weights seem unsatisfactory. Greater variability in one component index relative to another represents information that is unused or ignored in simple averaging.” In *HDR 1991* (UNDP 1991: 88), the UNDP justifies its weighting procedure by explaining that the three indices are equally important, and, “All three of the HDI components thus deserve equal weight.” Many critics have found this explanation lacking. Chowdhury (1991: 126), for example, writes that:¹³

It may be pointed out that there is an interesting paradox here. If a composite index is sensitive to weights, then one must be able to offer a solid defense of one’s chosen weights if the index is to be taken seriously. On the other hand, if the index is relatively robust, this would imply that the components are correlated, so that aggregation is pointless – any component would carry pretty much the same information.

Streeten (1994), on the other hand, defends use of a simple average stating that it is a good tool for focusing on decreasing gaps between countries, and that there is a political appeal to a simple method.¹⁴

Some scholars have focused on the relative weight of income as compared to life expectancy and education.¹⁵ According to Kelley (1991: 319), “[I]t might be argued that the capacity to choose among many dimensions of human development accorded by expanded income in particular merits giving a relatively higher weight to this indicator.”

It is also important to note that the choice of the range of all three indicators affects the weight of the respective variable in the composite index (Kelley 1991).¹⁶ In order to avoid a bias resulting from the choice of endpoints, Panigrahi and Sivramkrishna (2002) suggest standardizing each indicator before combining them.¹⁷ The problem of implicit weights concealed by the explicit

equal weights is discussed more fully in the section below on misspecification of the income indicator.¹⁸

Other possible weighting schemes include, according to Slottje (1991), establishing weights by: a social welfare function, a priori assumptions, regression coefficients, principal-components analysis (PCA), and the Borda method.¹⁹ The PCA method, which uses the variance of linear combinations of the components to determine potential weights, has been tested by several researchers. In the Borda method, ranks for the three components are added together and the sums are then re-ranked, with these new ranks becoming the composite index's values.²⁰ Other methods not on Slottje's list include using a geometric mean (UNDP 1991); using D² statistics to calculate a composite index based on the standardized actual values and the standardized targeted values of the three components (Mazumdar 2003); and multiplying the three indices, so that HDI will be more sensitive to low values in any one index (Sager and Najam 1998). In addition, Paul (1996) offers a Modified-HDI that raises each index to a given power before taking the arithmetic mean, so that the higher the power, the greater difference between countries' index values.

Noorkbakhsh (1998b) compares several different methods of arriving at a composite index using the HDI data, including the arithmetic mean, PCA, and Borda methods, and finds that the ranks for all methods are very similar, which provides a justification for the current HDI specification. Similarly, Biswas and Caliendo (2001) use the PCA method to arrive at nearly equal weights for the three components – Life Expectancy Index 34 percent, Education Index 34 percent; GDP Index 32 percent – and conclude that:

Despite the simplistic methodology, it appears that the HDI is a good method of combining the component indexes and should be viewed, perhaps, with less skepticism...[L]ittle is lost in the simplistic method, and much is gained in terms of straightforwardness. Indeed, while the strength of the HDI appears to lie in its easy comprehension, the weights used therein are consistent with multivariate techniques that generate weights optimally.

HDR 1993 also reports the results of PCA studies and concludes that these support equal weighting.

Wrong measure of income per capita

The fourth type of critique is about specification of the income component of HDI. The original measure was the shortfall of the base 10 logarithm of GDP compared to a maximum and minimum income value:

$$(7) \text{ GDP-Index}_i^{1990} = \frac{\log_{10} (\$4861) - \log_{10} (\text{GDP}_i)}{\log_{10} (\$4861) - \log_{10} (\$220)}$$

where HDI was equal to one minus the average of the three indices, and the maximum and minimum values were chosen to equal the mean of the official poverty lines in nine OECD countries,²¹ \$4861, and the GDP per capita of the country with the lowest average income, Zaire with \$220, respectively (UNDP 1990).

HDR 1990 (UNDP 1990: 12) explained the use of logarithms in calculating the GDP Index in this way:

A further consideration is that the indicator should reflect the diminishing returns to transforming income into human capabilities. In other words, people do not need excessive financial resources to ensure a decent living. This aspect was taken into account by using the logarithm of real GDP per capita for the income indicator.

More recently Haq (1999: 49) also addressed the importance of adjusting income for diminishing returns:

The HDI method thus emphasized sufficiency rather than satiety. It does not treat income as a means but reinterprets it in terms of the ends it serves. That is why, for example, the high income of the industrial countries is de-emphasized in the HDI and an overwhelming weight is given to the social progress they have achieved with this income.

Income is treated differently from the other variables because of the long-accepted practice in the field of economics of assuming that increases in income, and the goods and services that can be purchased with increased income, have a diminishing marginal effect on human well-being. Some critics of the HDI have raised the question of why life expectancy and literacy are not transformed to take their diminishing returns into account.²² Noorbakhsh (1998a: 519) make this case in regards to the returns to literacy:

It may be argued that the principle of diminishing returns also applies to educational attainments. To put it in a positive context, under similar conditions the early “units” of educational attainments to a country should be of much higher value than the last ones. In the context of policy-making in a country with 30% adult literacy, improvements in literacy are of far greater urgency than the same for a country with 90% adult literacy. On the other hand, it may be also argued that the value of the returns to increasing levels of educational attainment can be influenced in both directions, decreasing or increasing, by other factors such as the level of industrialization, capital accumulation and productivity.

Hicks and Streeten (1979: 571) addressed these concerns noting that for other social indicators, “skewness at the upper end is more limited than it is for income per head... There is practically no limit to how much income a man can receive, but the maximum life span is limited.” They also point out that some social indicators, like life expectancy, capture the costs of both national affluence – for example, heart disease – and destitution.

The original specification for income in the HDI was critiqued both on the grounds of its income cap, and for the use of logs, for example, by Rao (1991: 1455): “Since people do not compare ‘logs’ of incomes, it is better to simply use the absolute levels.”²³ In 1991, the UNDP changed to a new specification of income using what is referred to as a modified Atkinson concave transformation:

$$(8) f(Y) = \frac{1}{1 - \epsilon} * Y^{1 - \epsilon}$$

where ε is extent of diminishing marginal returns to income, set for particular ranges of income such that: for 0 to y^* , $\varepsilon = 0$; for y^* to $2y^*$, $\varepsilon = \frac{1}{2}$; for $2y^*$ to $3y^*$, $\varepsilon = \frac{2}{3}$, etc., where y^* was the average poverty line for nine OECD countries (UNDP 1991). In general,

$$(9) \text{ Y Index}_i^{1991} = y^* + 2(\text{GDP}_i - y^*)^{\frac{1}{2}} + 3(\text{GDP}_i - 2y^*)^{\frac{1}{3}} + \dots$$

This formula creates a concave step function to represent the diminishing marginal utility of income. The formula for HDI's income component remained unchanged until 1994, when a new method of arriving at the Atkinson-formula thresholds was introduced, along with the explanation that:

It was always questionable, however, whether the poverty level of industrial countries was an appropriate income target for developing countries. So, for the 1994 HDI, the threshold value has been taken to be the current average global value of real GDP per capita in PPP\$. Once a country gets beyond the world average, any further increases in per capita income are considered to make a sharply diminishing marginal contribution to human development. The HDI emphasizes sufficiency rather than satiety. On the new basis of real GDP per capita, the threshold is \$5,120. (UNDP 1994: 91)

The Atkinson specification of income in the HDI was a popular target for critics, who condemned it for its discontinuity and recommended a more uniform transformation over the whole range of income.²⁴ The rejection of a cap on the un-discounted income is explained by Sager and Najam (1998: 253-4) in this way:²⁵

The overall application of the GDP adjustment artificially depresses the relative affluence for wealthy nations so that the gap between the rich and poor countries seems much narrower than it actually is. The result is that the standard-of-living index presents a falsely equitable picture of a world which in fact is more inequitable than ever...As long as it is below that threshold the focus is on ensuring survival and not on adding to human development.

Ravallion (1997) offers a deconstruction of the Atkinson method and critiques it in terms of its "implicit trade-offs," that is, the terms under which countries can do well and poorly on differing indicators and end up with the same HDI score. He gives the example that \$99 was equal to one year of life for countries with GDP per capita below the income threshold; at two-times the threshold, this value was \$7,482; at three-times the threshold, \$31,631; and at four-times the threshold, \$65,038. Like Sager and Najam, Ravallion (1997: 633) sees these trade-offs as having an ethical content:

In terms of both absolute dollar values and the rate of GDP growth needed to make up for lower longevity, the construction of the HDI assumes that life is far less valuable in poor countries than in rich ones; indeed, it would be nearly impossible for a rich country to make up for even one year less of life on average through economic growth, but relatively easy for a poor country.

HDR 1993 (UNDP 1993: 110) includes a discussion of the problem of implicit weights in which the UNDP cautions against this sort of interpretation:

It would be tempting to interpret the relative coefficients as trade-offs, but a note of caution should be introduced. Superficially, it would be easy to say that one extra year of life expectancy is "worth" \$150 of income, but these are not choices open to an optimizing economic agent.

Take a poor country with per capita income as high as \$1,500...An extra year of life expectancy (above a median value of about 50 years) would be the same as 10% growth in real per capita income. Neither of these two outcomes is likely in the short run, nor are they independent of each other in the real world. Thus, it would be wrong to interpret the coefficients as reflecting a “menu of policy choices.”

In 1999, the UNDP switched to the current income specification in the HDI, with its continuous natural logarithm transformation²⁶ and high cap of \$40,000.²⁷ *HDR 1999* (UNDP 1999: 159) lists three advantages of this new formula: the discounting is less severe; all levels of income are discounted uniformly; and middle-income countries receive recognition for increases in income that, under the Atkinson formula, would have been very heavily discounted.

Redundancy

The final category of critiques of HDI is redundancy. Various authors have suggested that the indicators in the HDI are highly correlated and that the HDI offers no new information beyond that readily available in GDP per capita.²⁸ Kelley (1991: 322), for example, begins by agreeing with *HDR 1990* on the essential differences between HDI to GNP per capita and (see Figure 2, which reproduces a graph of the HDI versus GDP per capita from *HDR 1990* updated with 2003 data from *HDR 2005*), but then plots HDI against log income per capita (see Figure 3, which reproduces Kelley’s graph with updated data), and concludes that, “The notable disparity between HDI and GNP/N, as highlighted in the *HDR*, vanishes. Indeed, log GNP/N appears to represent a reasonable approximation to the HDI.”²⁹

In presenting this critique, Kelley uses the same strange graphing technique employed by the UNDP as shown in Figure 2: countries are put in order of their HDI and GNP per capita values, respectively, and then lines are drawn through all of the points for each measure thus ordered. This is to say that a vertical line drawn at any position in Figures 2 or 3 will touch on two points (one in each line) representing two different countries! The idea that conformity in the

shape of one line to the other represents close correlation is simply incorrect.³⁰ This graphing technique is central to Kelley’s conclusion that HDI is redundant.

In contrast, Figure 4 plots HDI against GDP per capita using HDI ranks to order both sets of data (so that a vertical line passes through two points that each represent the same country), and Figure 5 uses the same procedure to graph HDI and log GDP per capita. The difference – comparing Figures 2 and 4, and 3 and 5, respectively – is remarkable. A final technically correct, although less dramatic, way to graph the relationship between HDI and GDP per capita is as a scatterplot (see Figures 6 and 7). In Figure 6, countries with income per capita greater than \$10,000 seem to display a positive correlation between HDI and income per capita. As GDP per capita increases, so does HDI, and vice versa. Figure 7 shows a similar relationship between HDI and log GDP per capita throughout the income range, but the wide field of plotted points is not consistent with the idea that all of the information in HDI could be expressed with GDP per

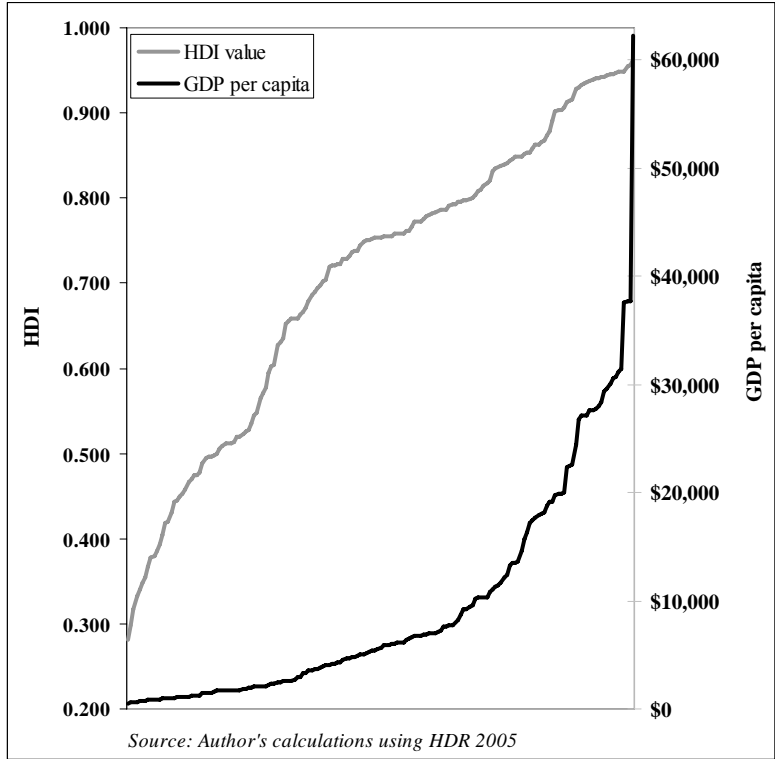


Figure Error! No text of specified style in document..2: Ranking of HDI versus GDP per capita (2003)

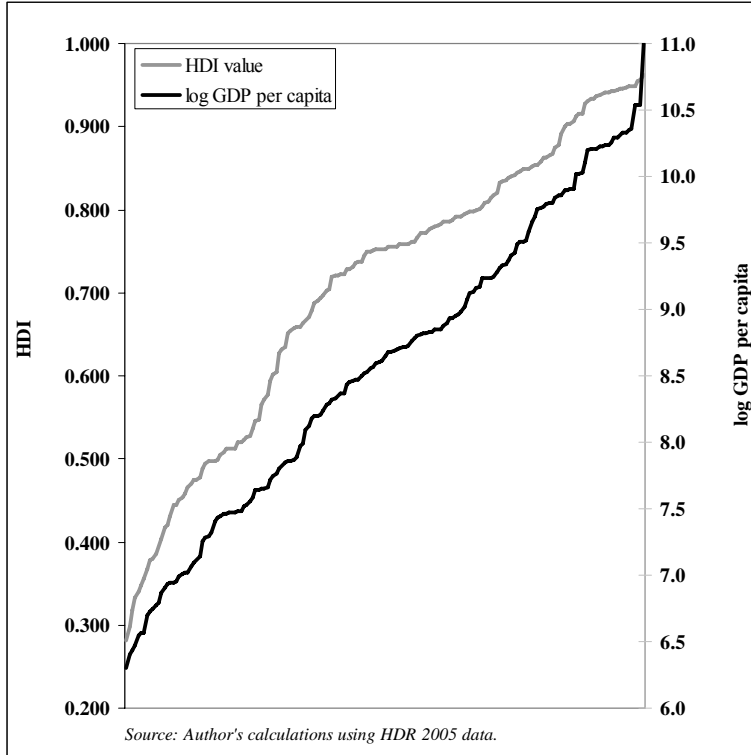


Figure Error! No text of specified style in document.3: Ranking of HDI versus log GDP per capita (2003)

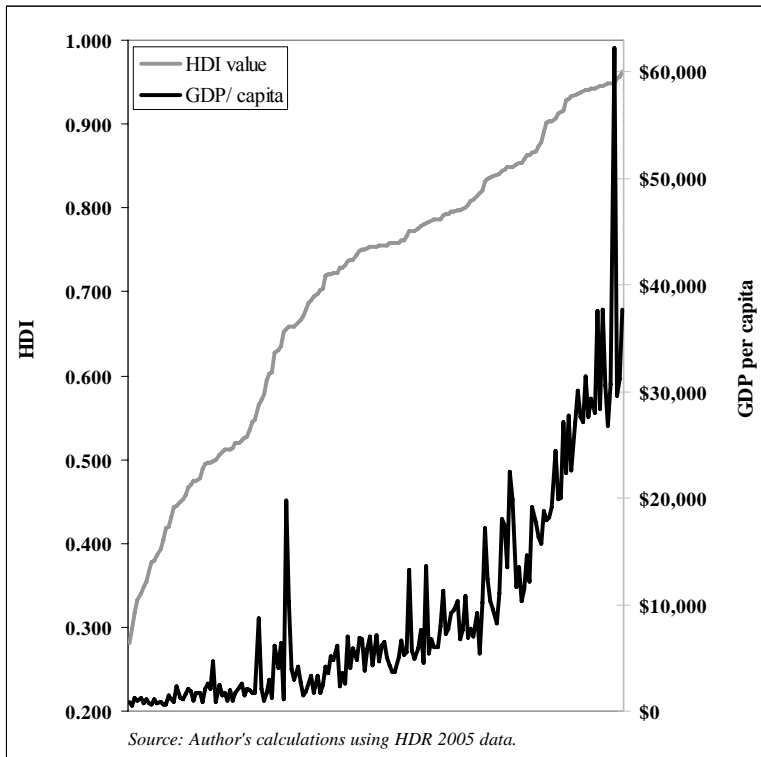


Figure Error! No text of specified style in document.4: HDI versus GDP per capita, by HDI rank (2003)

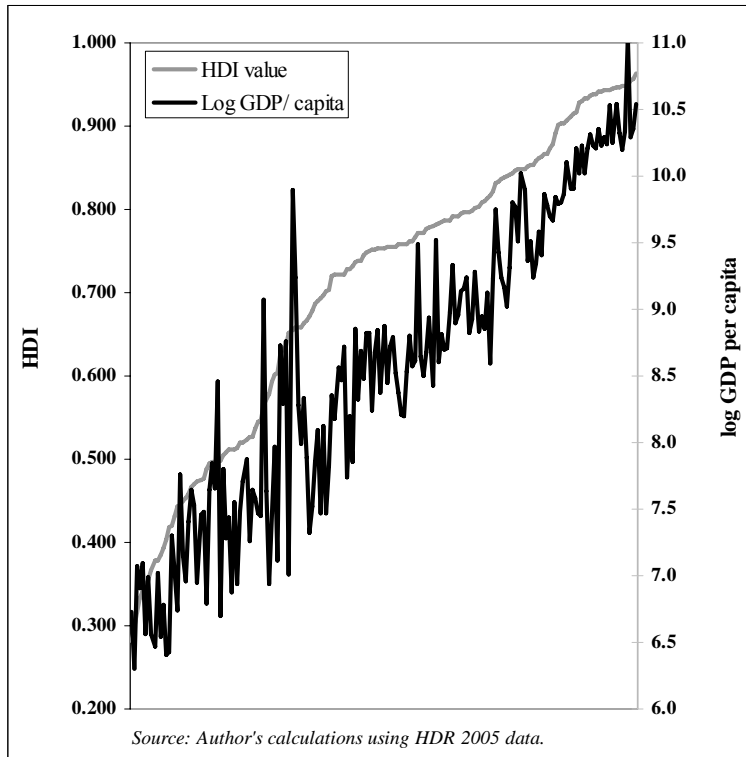


Figure Error! No text of specified style in document..5: HDI versus log GDP per capita, by HDI rank (2003)

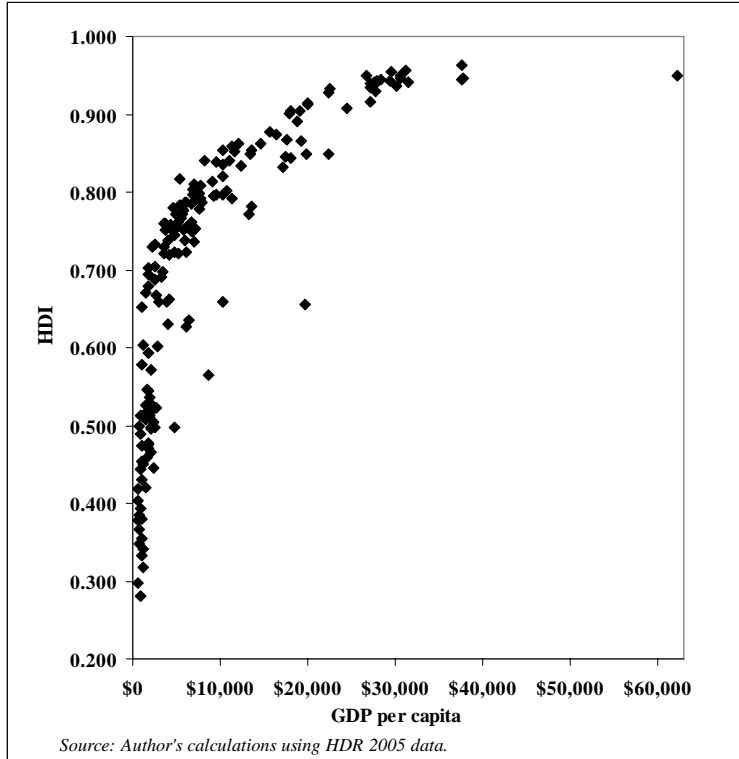


Figure Error! No text of specified style in document..6: HDI versus GDP per capita (2003)

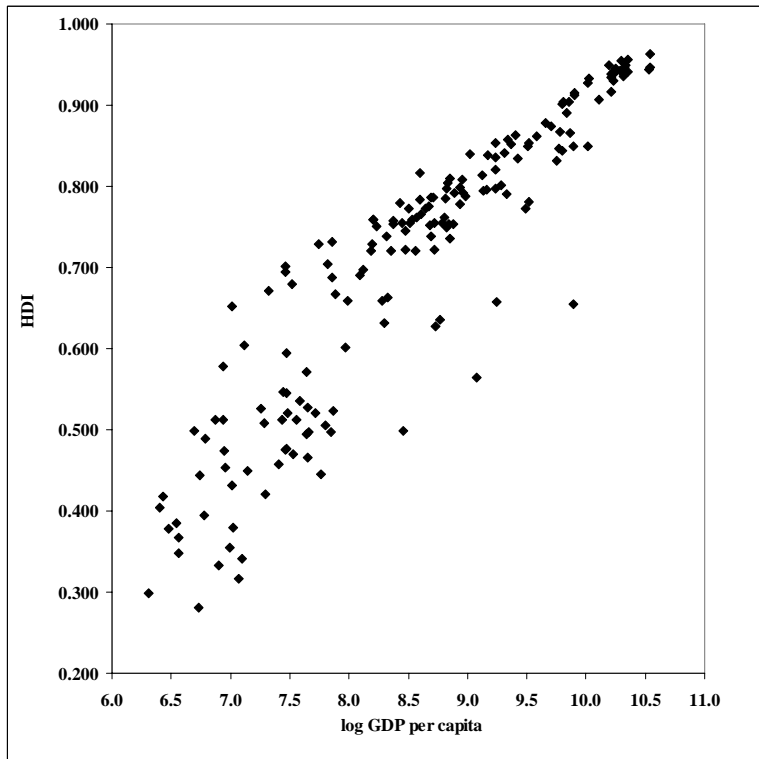


Figure Error! No text of specified style in document..7: HDI versus log GDP per capita (2003)

capita or log GDP per capita. HDI provides additional, more nuanced information about human well-being.

Conclusions

The UNDP has been exceptionally receptive to criticism regarding poor data, incorrect choice of indicators, and poor specification of HDI overall and of HDI's income component in particular. On some points, HDI has been changed significantly in response to its critics: changes to the education and income indices, for example. On other points, improved arguments have been incorporated justifying the existing HDI formula. With regards to the final category of critiques, redundancy, the UNDP has disagreed with its critics and has maintained HDI as the central focus of all 15 *HDRs*. At the same time, the UNDP has lived up to the promise made in early *HDRs*, that, "The HDI should be seen as evolving and improving rather than as something cast in stone. It is also an exercise in which as many of its users as possible should actively participate." (UNDP 1993: 104)

HDI has played two key roles in the field of applied development economics: 1) as a tool to popularize human development as a new understanding of well-being, and 2) as an alternative to GDP per capita as a way to measure levels of development for comparison across both countries and time. The importance of these dual roles cannot be over emphasized. HDI, as reported in the *HDRs* along with its companion indicators, makes it possible for policy-makers and development professionals world-wide to gauge both moments and trends in the progress of human development and to tailor public action to suit current and future social and economic conditions. Still, in praising HDI, it is important to recall that its strength originates, at least in part, from not being a static measure, and instead being allowed to improve over time. Further revisions can continue to refine HDI in the future, to correct technical problems as they come to light, and to permit HDI to evolve towards the best possible measure of human capabilities and human development.

As an example of a possible important revision to HDI it may be recalled that, while the UNDP's path-breaking work in bringing quantitative measures of human development to scholars, development professionals, policy-makers, and the general public has changed the field of international development for the better, its original vision of human development included distribution of capabilities across each nation. If the UNDP (1990: 12) ignored distribution in the original operationalization of HDI, it did so only for a lack of data: "The case is strong for making distributional corrections in one form or another." For some aspects of distribution – notably gender-based inequality and income inequality – these data now exist. For other aspects, the data have yet to be developed, but to the extent that demand drives supply in measurement tools, to let the absence of such data be an excuse for excluding measures of inequality would be unfortunate.

The existence of inequality in well-being can be addressed either by changes to HDI or by the addition of new inequality-related companion measures to the *HDRs*. These types of revisions have excellent potential as future steps in the continued improvement of human development measurement.

Endnotes

¹ An exception would be Marshall's short-term and long-term (Ackerman 1997a).

² Bread and opera tickets were the examples used by Robbins. It was also Robbins who first defined economics as the relationship between ends and scarce means (Cooter and Rappoport 1984).

³ In addition, the macro-level application of the "potential Pareto improvement" criterion rests on the restrictive assumption that the prices by which the components of national income are aggregated would not be affected by redistribution. Yet we know, for example, that redistribution from rich to poor would diminish demand for luxuries and increase demand for necessities, potentially altering their relative prices and thus the "size" of the national income pie.

⁴ Rawls' two principles of justice are quoted here from Sen (1992), where they are updated from Rawls (1971) based on Rawls subsequent speeches, writings, and correspondence.

⁵ Sen writes that "[O]f course, it is clear that emphasizing *positive* freedom (i.e. a person being actually able to do this or be that), and the duty to help others in that respect as well, could strengthen the relevance of ethical considerations in the determination of actual behaviour. Moral acceptance of rights (especially rights that are valued and supported, and not just respected in the form of constraints) may call for systematic departures from self-interested behaviour. Even a partial and limited move in that direction in actual conduct can shake the behavioural foundations of standard economic theory."(1987a: 57)

⁶ For further discussion see, Robeyns (2005) and Crocker (1992, 1995).

⁷ See Kuznets (1947), Nordhaus and Tobin (1973), Hicks and Streeten (1979), Morris (1979), Ram (1982), Daly and Cobb (1989), UNDP (1990), Slottje (1991), Haq (1999), and Sen (2000a).

⁸ As quoted in UNDP 1999: 23.

⁹ For a discussion of changes in the HDI from 1990 to 2000 see Bhatnagar (2001).

¹⁰ On civil and political liberties, see Hopkins 1991, Dasgupta 1993, Atkinson et al. 1997, and Dar 2004; on inequality, see Chowdhury 1991, Hicks 1997, and Chatterjee 2005; on the environment, see Paul 1996, Atkinson et al. 1997, Sager and Najam 1998, and Dar 2004; and on educational measures, see Kelley 1991.

¹¹ See Chowdhury 1991, Hopkins 1991, Kelley 1991, Ogwang 1994, and Sager and Najam 1998.

¹² See Kelley 1991, Rao 1991, Tabold-Nübler 1991, Dasgupta 1993, McGillivray and White 1993, Aturupane et al. 1994, Doessel and Gounder 1994, UNDP 1994, Paul 1996, Noorbakhsh 1998a; see also, Sen 1981.

¹³ See also, Rao 1991.

¹⁴ See also, Hopkins 1991.

¹⁵ See Kelley 1991, and Atkinson et al. 1997.

¹⁶ If, for example, the maximum value in calculating the H Index were set at ten years above the actual maximum, but the maximum used in the LIT Index were set to the actual maximum, then the highest H Index value would be much lower than the highest LIT Index value (assuming that they have roughly equal means and standard deviation). See also, Hicks and Streeten 1979.

¹⁷ See also, Noorbakhsh 1998a and 1998b.

¹⁸ See also, Ravallion 1997, Sager and Najam 1998, and Panigrahi and Sivramkrishna 2002.

¹⁹ See also UNDP 1991; Slottje 1991; Dasgupta and Weale 1992; Dasgupta 1993; Atkinson, et al. 1997; Noorbakhsh 1998b; Panigrahi and Sivramkrishna 2002.

²⁰ See UNDP 1993, Noorbakhsh 1998b, Palazzi and Lauri 1998, Biswas and Caliendo 2001, and Cahill 2002.

²¹ Australia, Canada, Germany, Netherlands, Norway, Sweden, Switzerland, United Kingdom, and United States.

²² See Kelley 1991, Acharya and Wall 1994, Srinivasan 1994, Paul 1996, and Noorbakhsh 1998a.

²³ See Kelley 1991, Rao 1991, and McGillivray and White 1993.

²⁴ See McGillivray and White 1993, Ravallion 1997, Sager and Najam 1998, Bardhan and Klasen 1999, and Lüchters and Menkhoff 2000. Exceptions to this are Trabold-Nübler (1991) and Bhatnagar (2001); they both critique the Atkinson-type formula not for its discontinuity, but for its failure to conform strictly to diminishing returns. Bhatnagar recommends a different step function for utility that would exhibit diminishing returns more accurately (2001; 2002).

²⁵ See also Gormely (1995).

²⁶ Natural logs represent a change from the *HDR 1990* use of base 10 logs to discount income, but the base of the log in this formula is actually irrelevant: any base will return the same resultant GDP Index. Acharya and Wall (1994) proposed an alternative HDI that includes discounting income by natural logs, and they incorrectly justify this by claiming that the transformation using natural logs is less severe than that of base 10 logs. While it is true that natural logs provide a less severe discounting method than base 10 logs, this difference is erased when the GDP Index (using either the 1990 or the 1999 formula) is used. Dividing the log of X by the log of Y will always result in Z, regardless of the base of the logs. This is the “change of base formula” in reverse: $\log_a x = \log_b x / \log_b a$.

²⁷ \$40,000 did not effectively act as a cap on income until 2001, when Luxembourg became the first country to have a GDP per capita greater than the cap – \$42,769. To date, Luxembourg is the only country to which this cap is or has been applied in HDI.

²⁸ See Chowdhury 1991, Kelley 1991, McGillivray 1991, Dasgupta 1993, McGillivray and White 1993, Ogwang 1994, Srinivasan 1994, and Islam 1995; see also, Hicks and Streeten 1979. For a technical discussion of arbitrariness and robustness in multi-dimensional poverty measures in general, see Qizilbash 2004.

²⁹ Both Kelley's critique and the original Figure 1.2 from *HDR 1990*, used GNP per capita, not GDP per capita. HDI has been calculated using GDP throughout its history. One data adjustment has been made from the UNDP data for 2003: *HDR 2005* includes HDI values for Libya and Myanmar but omits these countries per capita GDPs; the missing values were replaced with GDP per capita from *HDR 2004*.

³⁰ McGillivray and White make a similar critique of this type analysis as it is used in *HDR 1990*.

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