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BACKGROUND PAPER

Human Development Indices and Indicators: A Critical Evaluation

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ABSTRACT

This paper critically evaluates UNDP's current suite of human development indicators and composite indices. Despite a drastically changed landscape of development debates and associated indicators, most notably the Sustainable Development Goals (SDGs), targets and indicators, the paper argues for the continued relevance of comprehensive measures of human development. It proposes little change to the flagship Human Development Index (HDI), the Inequality-adjusted Human Development Index (IHDI) and the Multidimensional Poverty Index (MPI), but encourages more analysis of trends and determinants in these measures. It proposes revisions to gender indicators, and two new measures to track sustainability and commitment to development.

Introduction

In 1990, UNDP presented its first *Human Development Report,* including the first version of the Human Development Index (HDI). It was a very different world from the one we live in now. At the time, economic policy in general, and development policy in particular, had taken a turn towards market fundamentalism and a focus on economic efficiency. Stabilization and structural adjustment programmes were still operating in developing countries affected by the oil shocks of the 1970s, a collapse in terms of trade of their primary products and a resulting debt crisis. The emphasis was on restoring economic growth, the primary metric of development at the time. The collapse of the Eastern bloc was just underway with the presumption that market reforms would also lead to quick economic growth. One indicator of the primacy of economic growth and per capita income as the primary yardstick for development was that in the World Bank's World Development Report, countries were ordered by per capita income (using market exchange rates), a policy the World Bank maintained until 1997 (since then, countries have been listed alphabetically).

The world was very different in another way: Data on the performance of developing countries were generally scarce, limited to relatively few indicators, and public availability was low. Academic and policy researchers spent time typing in data by hand from the statistical annexes of World Bank and UN reports for their analyses. 'Flagship' reports of development agencies were relatively scarce and limited to few organizations, each eagerly awaited by a large audience of academics, policy-makers, and practitioners.

With the publication of the first *Human Development Report* in 1990, UNDP provided several key innovations. First, it offered a new narrative of development based on the human development paradigm, thereby challenging the sole focus on economic efficiency and per capita income. In contrast to earlier ad hoc challenges to the primacy of per capita income, such as the basic needs approach of the 1970s (Jolly 1976, Streeten et el. 1981), the advantage of the human development paradigm was its link to Sen's capability approach as an alternative conception of what development is all about (Sen 1998). In that approach, economic resources are just means to an end, which is better captured by describing the features of the lives people are actually able to live (called functionings) or the freedoms to achieve such functionings (called capabilities). This gave the human development paradigm a more durable and convincing underpinning. Second, and closely related to the first point, the new HDI, while itself a rather crude summary measure, provided an indicator to track progress in human development. While again there had been earlier related measures such as the Physical Quality of Life Index (Morris 1979) or the Economic Commission for Latin America and the Caribbean's measure of unsatisfied basic needs (ECLAC 2009), the HDI proved more successful and durable for three reasons. First, its link to the human development paradigm and the capability approach gave it greater theoretical grounding and intellectual coherence. Second, by being housed in a dedicated unit in an

international organization, the measure had appropriate institutional support. Third, the HDI's global relevance gave it a broader support base than measures focused 'only' on developing countries.

The third innovation was that the Human Development Report became a new series of flagship reports that continued to develop the human development paradigm, linking it to issues of inequality, gender, rights, climate change, human security and human mobility, among other topics. Alternative narratives on these topics, grounded in the human development paradigm, were developed and inserted into the international development debate.

A last innovation has now been called the development 'dashboard', a compilation of a range of indicators with a bearing on human development. Many users of the Human Development Reports, the present author included, often made use of the tables in the annex to the report for all sorts of research on human development.

Many of the battles of the 1990s that came to define the Human Development Reports have been won. Today, the entire development community accepts that development is more than increasing per capita gross domestic product (GDP). Even previously growth-and efficiency-obsessed organizations such as the Organisation for Economic Co-operation and Development are now at the forefront of promoting multidimensional 'better life' measures (OECD 2017). The World Bank and the International Monetary Fund (IMF) have happily signed on to the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), while the structural adjustment era has given way to a much broader, more human development-focused agenda of debt relief and associated poverty reduction strategy papers. The HDI has been canonized in all standard textbooks on development economics or development studies (e.g., Todaro and Smith 2015, Perkins et al. 2013, Ray 1997, etc.), and is considered the most serious and comprehensive alternative to GDP per capita. The Multidimensional Poverty Index (MPI), also developed by UNDP, is starting to be seen as a serious competitor to the World Bank's $1.90-a-day monetary poverty indicator. The MDGs can be seen as a multidimensional dashboard approach to human development, building on the Human Development Report dashboards. And the SDGs, with 232 indicators, are pushing the development dashboard into 232-dimensional space.

As a source of data, the Human Development Reports have become relatively unimportant, easily dwarfed by the ever-increasing free online availability of data, most notably the World Bank's online World Development Indicators, and the many non-state actors compiling data. No one needs the Human Development Report to learn about new development data, although many still turn to UNDP's compilation for its specific human development-focused set of indicators and, of course, data on the HDI and other composite indices as well as their component indicators.

Related to the point above, UNDP's suite of composite indices seems now remarkably reductionist. In the world of big data, floods of indicators, and SDGs with 17 goals, 169 targets and 232 indicators, the Human Development Report's tradition of limiting most composite indices to three to

five indicators seems downright quaint and excessively narrow.[1] At the other extreme, the SDG Index of the Bertelsmann Foundation (2016, 2017) comprised 63 indicators (77 for OECD countries) in 2016 and 83 indicators (99 for OECD countries) in 2017. Many other composite measures, for example in the gender field, usually have a dozen or more indicators (see Klasen and Schüler 2011).

The role of the Human Development Report as a flagship report is also much diminished. Now it competes with dozens of other flagship reports from many other developing agencies, and it is hard to present truly new insights and analysis in this crowded field. Its ability to generate outrage about, say, global inequality, or the inequities of global governance, is now drowned out by an increasingly vocal non-governmental sector that specializes in creating sensational facts such as on the state of global wealth inequality (e.g., Oxfam 2016). The irregular appearance and uneven quality of the reports, also related to funding and staffing issues, has not helped either.

Given this situation, it is right to review the existing approach to the measurement of human development, the various indices produced by the Human Development Report, as well as the other data made available. In particular, it is critical for the Human Development Report Office to position itself vis-à-vis the SDG process, including indicators and measures proposed there. Similarly, it needs to review whether the current suite of composite indicators (as well as the larger dashboard of indicators) is sufficient in tracking key aspects of human development. This paper will attempt to provide such a critical review. I will argue that UNDP's suite of composite indicators remain relevant and ought to be retained. In particular, I recommend little change to the HDI as well as the Inequality-adjusted Human Development Index (IHDI). I propose to keep the (new) Gender Development Index (GDI), resuscitate the old Gender Empowerment Measure or GEM (in slightly revised format), retain the MPI in its current (UNDP-adjusted) format, and add a new index of sustainability and one on commitment to the SDG agenda. Finally, I suggest presenting a wider human development-focused dashboard of indicators in the report (including particularly measures of rights and freedoms from other sources), and also presented in an online database (as is already the case).

Do we still need the suite of human development indices?

Given the changed circumstances discussed above, it is a legitimate question to ask whether UNDP's human development indices are still needed. In particular, there are three challenges. One is the SDGs and their implied dashboard approach to development. In contrast to the HDI, a product of the Human Development Report Office, the SDGs were developed as a consensus among the world's governments about global priorities for the next 15 years. They therefore command an unprecedented level of

[1] If one looks at the total suite of indicators included in the 'dashboard' of the Human Development Reports, they match the breadth of the SDGs, and nearly all SDGs are covered in one way or another. But ultimately, it is the composite indices that get most attention and are focused on here.

ownership and will surely play an important role in shaping the development agenda, including the agenda of UN organizations such as UNDP, for the foreseeable future. While many of the indicators used in the suite of human development indices are also SDG indicators, or closely related to them, and while many indicators monitored in UNDP's dashboard relate to the SDGs, UNDP's composite indices cannot be construed to provide a reliable guide for progress on the SDG front. They contain too few indicators, are highly selective and omit entire dimensions of the SDGs (such as indicators related to goals 9, 11, 12, 13, 14, 15, 16 and 17). Their weighting and aggregation rules do not match the intentions of the SDGs. The larger dashboard of indicators reported by UNDP is similar in breadth to the SDGs, but lacks their legitimacy.

So one could easily argue either for dropping the suite of human development indices in favour of focusing exclusively on the SDGs, or propose to rework them to become more closely linked to the SDGs. For example, one could rework the HDI to include indicators for all 17 goals, have gender measures focused on indicators in goal 5 and inequality measures focused on indicators in goal 10, etc.

A second challenge comes from many competing indices that also purport to measure development and/or progress on the SDGs. Of particular note are, on the one hand, competing indices such as the Better Life Index of the OECD and indicators focused on subjective well-being. On the other hand, there is the recent SDG Index, which purports to measure the state of SDG implementation (Bertelsmann Foundation 2016, 2017), using 63 SDG indicators (77 for OECD countries) in 2016 and 83 (99 for OECD countries) in 2017.

A third challenge comes from the ever-increasing need to be innovative in order to capture the attention of a development audience bombarded with indicators, data and analyses. In that context, the reliance on the same old measures that have been around for 25 years seems to lack innovation and may be perceived as boring.

Despite these developments and important arguments, I would argue that UNDP's suite of human development indices, most notably the HDI, but also the other measures, still has an important place in today's development landscape. There are several reasons for this assessment. First, the indices in general, and the HDI in particular, continue to be among the most well-known and accepted measures of development, and are seen as critical complements to (or alternatives to) per capita income and dollar-a-day poverty measures. This is related to their clarity and simplicity, their link to the popular capability approach, and the past success of establishing them as key measures of development, now canonized in textbooks and used by development researchers and practitioners as well as policy-makers. The HDI has an even wider reach. For example, in the climate field, it is regularly used to study the link to carbon emissions (e.g., IPCC 2014), and to set a normative benchmark for reconciling climate and development goals (e.g., van den Bergh and Botzen 2018). It would indeed be ironic if the key measure that helped broaden the debate about the ends of development was discontinued after successfully shifting the debate. To borrow from marketing language, the HDI is an established brand

that one should not abandon easily. Thus there is a strong case for annually maintaining and updating the HDI. While such an annual exercise does indeed not appear to be terribly innovative, it is important that the very large constituency using the HDI and related measures continues to be served.[2]

Second, in some dimensions, UNDP's indices have been at the forefront of development debates and continue to provide cutting-edge approaches to critical issues in development. For example, the IHDI is arguably still among the best measures to capture inequality in human development. It compares very favourably with the grab-bag of indicators now included in SDG 10, none of which capture the essence of inequality in human development particularly well. In general, the Human Development Report Office has been leading debates on inequality, with other parts of the development community (including the World Bank, the IMF and the OECD) catching up to this topic only recently. Similarly, UNDP has been leading on finding ways to capture gender inequality in human development, although, as I argue below, the measures used over the years have been problematic. Lastly, UNDP's work on multidimensional poverty continues to be at the forefront of debates on poverty, and the MPI is becoming a widely accepted 'competitor' or 'complement' to the World Bank's dollar-a-day measures, which have run into increasing problems (Klasen et al. 2016).

Third, UNDP's indices have substantial advantages compared with other approaches to measuring development. In particular, using the SDGs as a dashboard of indicators does not provide very clear guidance to levels and trends in human development. The SDGs mix outcome with process targets and indicators, critical human development outcomes are listed alongside much more peripheral issues, many targets have no widely available indicators, missing data are rampant, and the whole edifice lacks any sense of priority (Klasen 2015). Studying the dashboard of the SDGs to get a sense of where a country is in terms of levels and trends in human development is an exercise ending in frustration. Using composite measures based on the SDGs is no help either. In particular, the recently prepared SDG Index goes through a great deal of effort to develop a composite index by averaging benchmarked performance across the 17 goals. The selected list of 63 indicators is entirely data-driven, and no attempt is made to prioritize indicators within goals, or prioritize among goals so that all the problems of the SDGs (mixing means and ends, lack of priority) are present as well. In the 2017 version, the indicators and methods were changed again, allowing for no intertemporal consistency. Given the many indicators, it is very hard to understand what drives performance of an individual country, and it is striking that the country ranking closely resembles the ranking according to the HDI (Bertelsman Foundation 2016, Figure 2). Given the many problems of the opaque and overwhelmingly broad SDGs, UNDP's human development measures are exercises in clarity,

[2] To provide an analogy: National income accounting is also perceived by most to be a boring task with little innovation. But nobody would suggest getting rid of GDP as a measure of economic performance based on this lack of innovation.

transparency and conceptual soundness. Other composite indices are either limited in country coverage (e.g., the OECD's Better Life Index) or in scope (e.g., happiness measures), or both.

After emphasizing the continued need for UNDP's human development measures, this is not an argument for strictly adhering to the status quo. In order to stay relevant, it is important to first clearly position UNDP's suite of indicators with respect to other important processes, most notably the 2030 Agenda for Sustainable Development and the SDGs. The *2016 Human Development Report* does that by stressing that both share a principle of universalism and fundamental areas of focus, and have sustainability as the core principle. It also suggests that the human development approach can strengthen the conceptual base of the SDGs, and they can mutually benefit from sharing indicators and joining in advocacy (UNDP 2016). While these are useful points, one can supplement them with the following observations. First, UNDP's suite of indices has not covered sustainability issues, and the SDGs lay open this problem, which needs to be addressed (see below). Second, and more importantly, UNDP can be more assertive in the value added it can bring to the 2030 Agenda. As discussed above, the conceptual foundation of the SDGs is weak. The goals mix ends and means, many indicators are poorly conceived, data are not available or of doubtful coverage and timeliness, and there are no good ways to get an overall assessment of progress (with the recently developed SDG Index demonstrating these difficulties). UNDP's suite of indices offers the opportunity to get a much more accurate, conceptually sound, comprehensive and empirically valid assessment of human progress than attempts to track the 232 SDG indicators. Thus UNDP can position the indices as providing an overall assessment of whether the world and individual countries are moving in the direction envisioned by the 2030 Agenda.

In order to do that, UNDP will, however, need to rectify some of the key shortcomings of the indices. In particular, I would propose addressing longstanding problems with the gender indices, and developing a sustainability measure as well as a commitment to development measure to capture key aspects neglected in current indices.

Technical issues of existing indices

While there is a general case to be made for the continuation of UNDP's human development indices, it is useful to revisit the technical details of their construction. Given the voluminous literature on the subject, I will be brief, but comment on all the currently produced indices. For the sake of brevity, I will focus on the indices as they were presented or revised since the major overhaul in 2010, and not get into many earlier debates and revisions.

THE HDI

The Human Development Index is and remains the flagship of UNDP's human development indices. It is widely known, used by many actors, taught in schools and universities, and seen as the best available alternative to GDP per capita. This widespread recognition and long history require care in changing the index, and only making changes that seem clearly superior. As a result, I won't question the three components (health, education and living standards) and their equal weights. The three components clearly are important for human development, and equal weights are an easily defendable, if arbitrary, assumption (Nguefack et al. 2011). But it is important to remind readers that the income component of the index, in contrast to the other components, which measure functionings directly, is a *proxy* for functionings that tend to be widely available in markets, such as nutrition, clothing and housing. This explains why the translation of income into functionings was always presumed to be non-linear, with the type of non-linearity varying over the years (see Klugman et al. 2011a, 2011b).

The key features of the HDI changed in 2010 and retained until now were the use of the geometric mean instead of the arithmetic mean to average across subindices, the use of mean years of schooling and expected years of schooling for the education component, and the switch from GDP to gross national income (GNI). Some further changes introduced in 2010 have been taken back, which suggests that some of these changes were not carefully considered. They include variable goalposts that made intertemporal comparisons of the index difficult; the use of the geometric mean to average the two education components, which was not really justified;[3] the removal of caps on the upper goalposts for income and school life expectancy, which generated problems of income outliers and unreasonable education projections distorting the HDI; and the use of projections to 'now-cast' the HDI, which led to the need to correct values when real data appears. All of these reforms of the reform seem well taken. Of the 2010 reforms that remained, the switch to the new education indicators (away from literacy and enrolment) was a clear improvement, given the low variability and poor quality of the literacy variable, and the low reliability of enrolment rates as an indicator of educational outputs. Similarly, the switch to GNI was justified and an improvement. It was also correct to take back the four other changes mentioned above, which created confusion and comparability problems, and were poorly justified. The question of the upper bound, and the goalposts more generally, I will discuss in more detail below.

This leaves the switch to the geometric mean as the key debatable point (see Klugman et al. 2011a, 2011b; Ravallion 2010, 2011). Key advantages of the switch are the imperfect substitutability between dimensions and the independence of the ranking to the position of the upper bound.[4] The imperfect

[3] The use of the arithmetic mean seems justified here as it really is not about the balance of achievements but about the mix of past and present education policies that affect years of schooling and expected years of schooling.

[4] But it remains sensitive to the choice of the lower bound and to capping the index at some value. See discussion below.

substitutability is highly desirable. If a country does well in one dimension but terribly in another, human development is likely to be worse than in a country where dimensions are more balanced, as the human development dimensions complement each other. Of course, there are also other ways to express this imperfect substitutability. In particular, Chakravarty (2003, 2011) made such a suggestion. It still uses the arithmetic mean but 'discounts' achievements in each dimension.[5]

This leads me to the two main criticisms of the switch to the geometric mean. The first, expressed among others by Amartya Sen, is that the geometric mean is not very intuitive, simple, or transparent, thereby undercutting one of the key advantages of the HDI. This is a serious drawback. The second argument, made particularly forcefully by Ravallion (2010, 2011) emphasizes the different marginal rates of substitution between dimensions at different income levels. At one extreme, Ravallion points to Zimbabwe where, in 2010, an increase of income by 51 cents would raise the HDI by the same amount as an additional year of life expectancy, while among the richest countries, an increase of almost $9,000 would be required to achieve the same increase in the HDI as an increase of one year of life expectancy. This dramatic difference is partly related to the geometric mean, which is equivalent to a log transformation of each dimension; the additional log transformation in the income component, which heavily discounts the HDI impact of higher incomes; and, in the case of Zimbabwe, its position in 2010 close to minimum income (which has since been rectified by lowering the minimum income threshold to a more plausible figure, see Klugman et al. 2011b). Ravallion finds these different trade-offs troubling, suggests that they imply that the value of life is far too low in poor countries, and would lead to the policy conclusion to invest more in the health of rich countries where life is more valuable.

While it is the case that the differences in the trade-offs between poor and rich countries are very large, probably excessively so, they do not imply the two conclusions he draws. In a country that is very rich, additional income has hardly any human development impact, while in a poor country, it has a huge impact. So rather than interpreting these figures as 'values attached to human life', one should emphasize that they rather reflect differences in the importance of added income for human development (see also Klugman et al. 2011a, 2011b). Secondly, one cannot draw any direct policy conclusions between an allocation of funds between countries, since one knows nothing about the costs of such improvements. For example, it is very likely that increasing longevity by a year in Zimbabwe is much cheaper than increasing it in the richest countries. So if we want to maximize the global HDI, we

[5] Specifically, his proposed formula for the HDI is: $HDI = \left(\frac{1}{k}\sum_{i=1}^{k} s_i^{a}\right)^{\frac{1}{a}}$, where k is the number of dimensions, s is the subindex (using the goalpost formula currently used for them, including the log formulation for the income component, thus 'discounting' this dimension already once in this step), and $0<\alpha<1$ is a parameter that 'discounts' dimensional achievements and thus ensures only partial substitutability between dimensions. In the application in Table 1 below, I use a value of α of 0.5 for illustration purposes (the value favored by Ravallion). For the education dimension, I first average the two dimension indices and then apply the 'discounting', which is in the spirit of how the Human Development Report Office currently deals with the education dimension. 'Discounting' each education dimension first would lead to slightly different results.

would want to pour health funds (as well as funds to raise incomes and education) into the poorest countries, even if the marginal rates of substitution between health and income are much higher in rich countries.

There are, of course, other arguments that can be (and have been) made in favour of and against the geometric versus the arithmetic mean. But it is important to point out that the empirical relevance of this difference is minor. In Table 1, I show rankings using the 2016 Human Development Report data and applying the arithmetic mean, the geometric mean and the Chakravarty (2011) suggestion (using α=0.5 favoured by Ravallion). In the Chakravarty approach, the trade-off between dimensions does not depend on levels of achievements in other dimensions, which makes the trade-offs less extreme, particularly at low levels of achievement in one dimension.[6] It turns out, however, that the ranking changes very little. In the vast majority of countries, rankings do not change at all or by just one position between the arithmetic and the geometric mean. In only 8 cases (out of 188) do they change by more than three ranks (and in no country by more than five). When comparing the geometric mean and the Chakravarty approach, which also has imperfect substitutability between dimensions, the difference is even smaller. In only one case does a ranking change by more than three ranks, and in the vast majority of cases, the ranks do not change at all or only by one rank. And the Chakravarty approach and the arithmetic mean are even closer. So while the conceptual differences are substantial, the empirical differences are minute, leaving the Human Development Report Office with all options to retain the geometric mean, switch back to the arithmetic mean or use the Chakravarty approach.

Let me conclude the discussion by briefly raising the issue of goalposts. The goalposts not only set the parameters for the range of human development outcomes to be considered, but they also have an impact on implicit weights of the components of the HDI (Klugman et al. 2011a). If, for example, the goalposts for life expectancy were narrowed from 20 to 85 to, say, 40 to 85, the implicit weight of the life expectancy component would increase. With the geometric mean in particular, the lower bound is critical as well as whether one caps the index or not. Apart from these technical considerations, it is important to have conceptual clarity on the goalposts. They are meant to express the range of conceivable values that they can take. In education, the lower bound is clearly 0 as this has happened in many circumstances. In health, the lower bound is 20 years. Nowadays, no society is close to that level, but historical societies have come close to such low longevity, although a life expectancy of 20 usually reflected very unusual circumstances such as mass epidemics or wars. So one could possibly raise this bound to 25 but 20 also seems defensible. One hundred dollars in 2011 purchasing power

[6] While this approach also implies imperfect substitutability, maybe the dependence of the assessment of human development in one dimension on achievements in other dimensions (which is absent here) is an important insight. For example, one could argue that the assessment of life expectancy should depend on whether one has any income to achieve valuable functioning in that lifespan.

parity (PPP) seems very low for average incomes per capita, and also seems inconsistent with human survival. One could therefore raise that to $200. But one should consult the data and research historical experiences when setting the minimum. A second question is whether to cap the component indices at some values. Here I agree with the Human Development Report Office's reintroduction of caps, reversing a change made in 2010, to avoid biases associated with the expected years of schooling calculations and to ensure that extreme outliers such as tax havens are being dealt with. It is very unlikely that incomes above the current cap of $75,000 make any contribution to human development.

So if one moves in the confines of the current HDI, there is not a big case to change its formulation. In general, the current formulation is defensible, and many debates on changes would actually not have a large impact. This is a strong case for maintaining the current formulation. Of course, one may question these confines within which the current HDI operates. In particular, an important criticism is that the HDI leaves out important dimensions of human development. Among those regularly mentioned are freedom; political, social and human rights; and sustainability issues. Rights and freedoms are well covered by other indices and measures such as the Polity Indicators, the Freedom House Measures and the CIRI (Cingarella-Richardson) indices. Given this and the difficulty for UNDP to take a strong position on rights and freedoms (see Klugman et al. 2011a), it may be best to refer to these other measures (and report them regularly in the UNDP dashboards). Regarding sustainability, a suggestion is made below to develop a new index in this regard.

IHDI

The Inequality-adjusted Human Development Index, introduced by the Human Development Report Office in 2010, is an excellent addition to the suite of indices. It measures inequality in human development, long a problem of the HDI, which focuses on average performance. The approach is sensible, and data availability is very good. Three points are worth noting, however. First, it appears that not enough is made of the index, its results and what they mean in the Human Development Reports. This is a shame since the IHDI generates useful insights that can make an important contribution to the growing debates on inequality. Such a discussion in the reports could also include experimenting with different inequality aversion values (e.g., e=1.5 or 2) that are still within the range of the empirical literature on inequality aversion (Klasen 2008, Gruen and Klasen 2008). Second, as pointed out in the technical notes, the IHDI is, due to data limitations, unable to assess the joint distribution of inequality in the three dimensions. One could experiment here with ways to consider that, building on Harttgen and Klasen (2012), and see how much the joint distribution of inequality changes the picture. Third, it is important to clarify what data for inequality in the life expectancy dimension are actually used. In particular, it is measuring the distribution of actual life lengths associated with a particular life expectancy rather than differences in life expectancy for different socioeconomic groups within a country. In a country with low life expectancy, actual life lengths are strongly bimodal with many dying already in the first years of life, while the second mode is after age

50, leading to high inequality in life lengths. In a country with high life expectancy, actual life lengths are in contrast essentially unimodal with most dying between 60 and 90, leading to low inequality in life lengths. This needs to be explained and interpreted more in the reports.

MPI

The MPI, introduced in 2010, is also an excellent addition to the suite of indices. What the HDI is to GDP per capita, the MPI is to dollar-a-day measures: a multidimensional, capability-based measure to rival and complement an income-focused indicator. Of course, such a micro-based measure creates a range of challenges in terms of data availability, statistical capacity, status of the data as well as many technical issues that need to be considered. These are discussed in detail in Dotter and Klasen (2014) and will not be repeated here. Suffice it to say that the changes introduced in 2014 (to change cut-offs and deal with 'ineligible populations') are all sensible, and the transparency of making all programmes available is exemplary, even though this means that now two competing versions of the MPI exist. As with the IHDI, in the Human Development Reports, there is also not enough discussion of levels, trends and determinants of multidimensional poverty. More detailed discussions of this nature could be included in future reports.

GENDER-RELATED INDICES[7]

In contrast to UNDP's wildly successful HDI, its gender-related indices have had a rather rocky history. To this day, the Human Development Report Office has not produced a measure that has met the requirements of policy-makers, academics and development practitioners for a transparent, clear, well-measured, internationally comparable index that can be used to assess the extent of gender inequalities in human development-related dimensions. As a result, this void has been filled by many other indices outside of the UN system. But although these alternative measures have received a considerable amount of attention, they suffer from their own problems (see Klasen 2017), thereby still leaving an opportunity for the Human Development Report Office to enter the fray with gender-related measures that are simple and transparent, linked to its overall conception of human development, relevant for the 2030 Agenda and able to provide meaningful intercountry comparisons. The newly created Gender Development Index introduced in 2014—which I call NGDI to distinguish it from the older Gender-Related Development Index or OGDI that was introduced in 1995 and dropped in 2010—is an important step in the right direction.

In the *1995 Human Development Report,* UNDP introduced two measures of gender-related development. When proposing the two, the Human Development Report Office made two important decisions. The first was to separate gender-related human development from empowerment and

[7] This section builds on Klasen (2017).

relegate them to two separate measures, the OGDI and Gender Empowerment Measure (GEM), respectively. This was following the arguments proposed above that the two issues are separate and separately intrinsically valuable, a point repeatedly emphasized in Amartya Sen's work (e.g., Sen 1998). The second decision was, in the case of the OGDI, to refrain from proposing an index of gender inequality in well-being but instead propose a measure that would track overall human development and include a penalty for gender gaps in human development, that is, a *gender-sensitive* measure of human development. Anand and Sen (1995) developed the conceptual framework of the OGDI, which considered intergroup inequalities by gender in an overall assessment of well-being. The idea was to apply a 'penalty' to the HDI value if gender inequality existed in any of the three dimensions of the HDI, using the approach of Atkinson (1970) in his famous paper on the measurement of inequality. The larger the gap between men and women in achievements of life expectancy, education and earned income, the more the OGDI differed from the HDI. The gap between the HDI and OGDI therefore depended on the differences in achievements between men and women in one of the components of the HDI, and on the penalty given to this gender inequality. It could be interpreted as the HDI discounted for gender disparities in its components. Therefore, it should not be used independently of the HDI; in particular, it cannot be understood on its own as an indicator of gender gaps in well-being or the welfare losses of gender inequality. The gap between HDI and GDI (difference or ratio) can, however, be seen as the loss of human development due to gender inequality.

Early critiques by Bardhan and Klasen (1999, 2000), Dijkstra and Hanmer (2000) and Dijkstra (2002) as well as the review of the GDI in 2005-2006 brought out a number of weaknesses, which Dijkstra (2006), Klasen (2006b) and Schüler (2006), among others, summarize. On the practical side, the most important problem appeared to be that the OGDI was often misunderstood and misinterpreted as a direct measure of gender inequality (Klasen 2006a, Schüler 2006). As just shown, this assumption is incorrect, as the OGDI merely adjusts the HDI by a welfare penalty for gender inequality, and thus is a gender-inequality adjusted measure of overall human development. Moreover, many of the above-mentioned reviews saw severe conceptual and empirical problems with the earned income component, which accounted by far for the largest difference between the HDI and the GDI, and is based on earned incomes of men and women. In particular, it is implausible to accept that gender gaps in earned incomes are very good proxies for gender gaps in consumption at the household level, since resources are, at least to some extent, shared at the household level (Bardhan and Klasen 1999, Klasen 2006b). While it is likely (and has been documented, e.g., World Bank 2001) that women with low earned incomes, relative to men, might suffer from inequalities in access to resources within the household, the disparities in earned income clearly exaggerate the disparities in consumption of human development-related goods that this component is meant to measure. In the extreme, one cannot assume that a woman who earns no income at all therefore has absolutely no

access to resources for human development such as nutrition, clothing and housing.[8] As we argue below, disparities in earned income are plausibly a good indicator of gender gaps in economic empowerment and thus relevant for an empowerment measure, but not a good proxy for gender gaps in consumption.

Moreover, the empirical assumptions for deriving earned income shares relied heavily on labour force participation data and gender differentials in earnings in the non-agricultural sector. The labour force participation data are not very reliable and difficult to compare, and the earnings data are patchy (and thus often estimated) and come from sectors that represent a small fraction of the working population in many developing countries. As a result, they have a very weak empirical base and cannot really be seen as a good representation of earned incomes (Bardhan and Klasen 1999, 2000). Thus the most important difference between the HDI and the OGDI, and thus of UNDP's assessment of the welfare penalty of gender inequality, was seen as conceptually and empirically deeply problematic.[9]

A last conceptual issue relates to compensation or accumulation of disadvantages. The OGDI did not allow for any compensation in inequality across dimensions, which may be seen as a problem (see below). A serious conceptual problem associated with this approach, however, is that the procedure to adjust the HDI for gender inequality compounds penalties for gender inequality in different dimensions, even if the inequality hurts women in one dimension and men in another. Thus, a country with gaps harming women in all three dimensions is treated the same as a country where equal gaps impact women negatively in some dimensions and men in others, which seems problematic. As is shown in Klasen (2006b), this actually affected the results for many countries where women were advantaged in the life expectancy component, but disadvantaged in the education and earned income component. Since then, the problem has grown as, in addition to the larger number of countries where the female life expectancy advantage exceeds five years, there are more countries where men are now also disadvantaged in the education component. Women are disadvantaged everywhere in the earned income component (UNDP 2016).

In the *2010 Human Development Report,* UNDP decided to rework its gender-related indices and address some of the shortcomings identified in the literature. As recommended by Klasen and Schüler (2011) and others, the OGDI was dropped and the GEM discontinued. A new Gender Inequality Index (GII) was created and calculated for 137 countries. It contains three dimensions: reproductive health, empowerment and the labour market. The first averages female adolescent

[8] See Klasen (2006a and 2007) for a fuller discussion of these issues.

[9] Unfortunately, there are no obvious ways of fixing the empirical problem and estimating 'true' male and female consumption shares. This is due to the fact that income is shared at the household level, and a significant share of income is then devoted to household-specific public goods (such as housing, durable goods, etc.) whose use cannot be ascribed to individual members. See Klasen (2007) for a full discussion of these issues. This also means that claims about the shares of males and females among the income poor are not based on sound analysis.

fertility and maternal mortality, the second parliamentary representation and educational attainment, and the third just consists of labour force participation. The aggregation is first across dimensions for males and females separately, using the geometric mean. Since the indicators of reproductive health only apply to women, for males a perfect score in reproductive health is assumed and used in the aggregation of the geometric mean. In a next step, the aversion to inequality procedure (as in the OGDI and GEM) is used to calculate welfare losses associated with the inequalities between males and females; the GII measures the welfare loss of these inequalities, relative to the achievements if perfect equality had persisted.

Some points are worth noting. The GII measures the welfare loss of gender inequality considering a hybrid of well-being and empowerment outcomes, rather than gender-sensitive development or gender inequality directly. Also, the use of the geometric mean as well as of labour force participation data (rather than earned incomes) is in line with the recommendations made in some of the critiques of the OGDI and GEM. The way the GII is calculated allows for partial compensation across dimensions and avoids the problem of compounding disadvantages going in opposite directions. But, in line with the discussion above, there are also some serious shortcomings.

First, the index mixes well-being and empowerment issues, which we see as problematic. Gender gaps in well-being and gender gaps in empowerment are both important issues, but conceptually distinct as, for example, emphasized by Sen in his distinction between well-being and agency (Sen 1998). By mixing the two, one gets no sense of whether a country does well because gender gaps in well-being are low, or gender gaps in empowerment are low. Worse, this approach allows trade-offs between the two, which appears deeply problematic. Allowing more women to enter parliament can make up for large gender gaps in education or high maternal mortality.

Second, the GII mixes female achievements and female-male gaps. Any maternal mortality rates higher than 10 per 100,000 live births are considered as inequality, while in parliamentary representation, only deviations from 50 percent are inequality. Of course, part of the high maternal mortality in developing countries surely relates to past and present unequal treatment of women. But a large part of high maternal mortality empirically observed is related to poor overall health services, which affect males and females alike, but only affect women in terms of maternal mortality (see Klasen and Vollmer 2014). While such high maternal mortality constrains women, in those cases, it is not so much a gender inequality as a poverty issue. As a result, a high GII due to poverty-linked high maternal mortality will automatically imply that most poor countries are doing badly on gender, regardless of gender gaps in well-being or empowerment. Arguably one might suggest that, similarly, high adolescent fertility rates in poor countries can be as much poverty as gender inequality issues, although surely a part of high teenage fertility will be related to child marriages and low value placed on adolescent girls. Since empirically the penalty due to gender inequality implied by the GII is mostly due to high rates of maternal mortality and adolescent fertility (UNDP 2010), poor countries with low gender gaps in education or health access or low gender gaps in empowerment will still get a poor

score, and their efforts will go largely unrewarded. Rwanda is a classic case of a country where women have more than 50 percent of seats in parliament, a higher labour force participation rate than men, low adolescent fertility and comparatively small gender gaps in education, but the country only ranks 84th in the GII because of relatively high maternal mortality, which is likely to be mostly related to its high poverty rather than to large gender inequality (UNDP 2016).[10]

Third, the index does not account for deviations in the female population share from 50 percent. This is most obviously a problem for the parliamentary representation measure, but can affect values and rankings for other components as well. Doing so might then generate the problems that plagued the GEM, where it was possible for the index to exceed 1.

Fourth, the index is highly complex and involves a sequence of non-linear aggregation procedures, involving arithmetic, geometric and harmonic means in one calculation. This will make it very hard to communicate to policy-makers or to understand the drivers of the welfare loss due to gender inequality. The rather benign neglect with which the GII has been greeted since its inception demonstrates the difficulties with understanding and interpreting it.

Fifth, the alleged advantage of greater country coverage comes with a cost. Despite the fact that the Human Development Report Office does not need to make any imputations, the data on maternal mortality are mostly imputed for developing countries where the database for accurate measurement of maternal mortality is simply lacking.[11] Thus an important driver of the GII is based on imputed data.

Lastly, the welfare loss of inequality is based on a calculated measure of gender equality that itself is reported nowhere and is not discussed; in that sense, the measure is worse than the OGDI, where one knew that the OGDI with perfect equality is the HDI.

My summary assessment of the GII is that it is not an improvement at all and in fact represents a deterioration in many dimensions vis-à-vis the previous state of affairs. It mixes well-being and empowerment, levels of achievement and gender gaps, and is far too complex to be usefully communicated and interpreted.

I do not really see an easy way to reform this index, as the problems are rather fundamental. If one were to try to reform it, there are three directions in which one could go. One would be to separate well-being and empowerment concerns, focus the GII on well-being and create another index on

[10] Of course, there are reasons to be skeptical of Rwanda's achievements on the gender front. In particular, one might argue that high female representation in Parliament does not signify high female political empowerment given the autocratic nature of the country's political system and the low say for Parliament. But this scepticism relates mainly to parliamentary representation, not maternal mortality.

[11] See, for example, Klasen and Vollmer (2014) for a discussion of this issue.

empowerment. If one were to do that, it would be preferable to focus the well-being on indicators that are closely related to the HDI, i.e., life expectancy, schooling and earnings (or labour force participation due to the problems associated with earned incomes). A second approach would be to simplify the complex calculations. Here one might want to move from an indicator measuring the welfare loss of inequality to a gender gap measure. A third would be to use different indicators. In particular, the maternal mortality and the adolescent fertility indicators are problematic as they do not represent gaps. Replacing them with life expectancy might be the best way forward. But any of these changes would be so fundamental that it might be hard to say that it still is the same measure, presented in a reformed way. So a more fundamental approach might be warranted.

Instead of moving in the direction of the GII, Klasen (2006b) and Klasen and Schüler (2011) proposed ways to reform UNDP's two gender-related indices in the following way. First, they proposed, following the discussion above, to keep the distinction between well-being and empowerment measures as two distinct issues that can and should be analysed separately. Regarding the OGDI, they proposed two general approaches. One was to produce a male and female HDI that would immediately make the gender gaps in human development visible. As discussed below, this approach was taken up in the *2014 Human Development Report* where the NGDI was introduced; it is simply the ratio of a female human development index to a male human development index. One problem with that approach is, however, that it would still be reliant on the problematic assumption that differences in earned incomes equal differences in access to consumption. Therefore, the main proposal by Klasen and Schüler (2011) regarding the GDI was to make it a direct gender inequality measure called the Gender Gap Measure (GGM), which is simply the geometric mean of the female-male ratios of life expectancy, education and labour force participation rates. In other words, the GGM is defined as:

$$GGM = \left(\frac{LE_f}{LE_M} \times \frac{ED_F}{ED_M} \times \frac{LF_F}{LF_M}\right)^{\frac{1}{3}}$$

where LE, ED and LF are the life expectancy index adjusted for an assumed five-year female longevity advantage,[12] the education index and the labour force participation rates of women and men, respectively.[13] This would allow for full compensation of advantages and disadvantages across dimensions. While allowing for some compensation is surely desirable, one may of course see full compensation critically. One partial approach to address this is to cap the ratios (see below).[14] The

[12] The life expectancy index is calculated for males: (LEm-22.5)/60, and for females: (LEf-27.5)/60. For education it is simply the weighted average of literacy and enrolment rates.

[13] See Permanyer (2010) for a closely related indicator, called GRS1.

[14] See Klasen and Schüler (2011) and Klasen (2017) for a full discussion of compensation. In line with the discussion on the HDI, partial compensation might possibly be the best approach.

advantage of the GGM compared to the competing gender inequality measures discussed above would be its close relationship to overall human development, its simplicity and ease of interpretation, and its focus on well-being.

Table 2 shows the results for the OGDI (drawn from the 2006 report and thus based on the year 2004),[15] the female and male HDI, the ratio of the female-to-male HDI (which now is very similar to the NGDI in the *2014 Human Development Report*)[16] as well as two versions of the GGM, one without capping the components at 1 and the other one capping them at 1, which thereby reduces the amount of compensation possible. For each of those options, associated rankings are produced.[17]

As is well known, the Scandinavian countries top the list in the OGDI, while the bottom 30 countries are from sub-Saharan Africa. When analysing the male and female HDI, we see significant differences between them. This is particularly the case in countries lower down the list, where the female HDI is up to 35 percent smaller than the male HDI. Overall, the female HDI is about 8 percent lower than the male HDI, with rather small gaps in industrialized countries.[18]

Compared to the OGDI, some rankings do change when the female HDI is examined separately. Among the countries gaining in rank when the female HDI is considered are Luxembourg, Finland, France, many transition countries, and a few countries in sub-Saharan Africa (including Lesotho, Rwanda and Zimbabwe). Among those losing positions are Bangladesh, Ireland, Japan, the Netherlands, Pakistan, Switzerland and many Middle Eastern countries. These rank changes appear quite plausible, given what is known about gender gaps in human development in the different regions.

Maybe more instructive than the ranking of the female HDI is the ratio of the female-to-male HDI, now the NGDI since 2014 (Table 2, column 5) and the ranking of the ratio of the female-to-male HDI (Table 2, column 7). In contrast to the OGDI and the female HDI, which measure gender-sensitive overall human development or female human development, respectively, the NGDI, calculated as the female-to-male HDI ratio, can be interpreted as a measure of the gender gap in human development. Also note that with this ratio, advantages in one dimension can compensate for disadvantages in another. For example, higher female than male education in a country can boost the female HDI and make up for low earned incomes of women that would otherwise decrease the female HDI. In fact, as a result of this, the ratio of the female to male HDI can exceed 1; this happens in countries where the

[15] The table is for illustration purposes. Using later years will likely lead to the same findings.

[16] As the information in Table 2 is based on the old formulation of the HDI (including, for example, enrolment and literacy rates, and using an arithmetic mean for creating the index), it is not directly comparable to the GDI created by UNDP in the *2014 Human Development Report*.

[17] As the indicators included in the GDI, GEM and GGM change relatively slowly over time, the rankings shown here would hardly change if more recent or somewhat older data were used.

[18] These gaps are much larger than those between the HDI and the GDI, which are only about 1 percent on average. See Klasen (2006b) for a discussion.

gender gaps favouring women in longevity and education outweigh the gender gap favouring men in earned income. Lastly, the ratio directly measures the gaps in human development and not the welfare penalty attached to those gaps. We suggest that these are all desirable features of the NGDI.

Given the differences, it is therefore no surprise that the rankings change dramatically. Several countries have a ratio above 1. Among them, the Russian Federation gets the first spot, followed by Latvia, Lithuania, Estonia and Belarus. Scandinavian and other industrialized countries occupy the next 20 to 30 ranks, but all fall significantly in rank. Ireland stands out as the biggest drop off in terms of rank: It loses 40 positions relative to the female HDI, and 46 relative to the OGDI (due largely to its low performance in female earned income). The reasons for the particularly high ratios in transition countries are related to comparatively low gaps in earned incomes, hardly any gaps (or even gaps favouring women) in education, and a large survival advantage for women relative to men. The last point suggests more male disadvantage than female advantage, and therefore a value of the female to male HDI above 1 should not necessarily be seen as desirable, while a ratio very close to 1 should be seen as best. As shown in Table 2, the top 50 countries have ratios quite close to 1, suggesting relatively small gender gaps or similar gaps going in different directions. The fact that it is difficult to distinguish between these two issues (small gaps versus gaps going in different directions) is a weakness of this measure as well as of the GGM (see discussion below). By studying the ratio of the different components (e.g., the ratio of the female to male life expectancy component), one can, however, readily see whether the good performance is due to small gaps or ratios above 1 in a component compensating for ratios below 1 in another.

In Table 3, I calculate UNDP's GII as well as the GGM using data for 2010; I show both the uncapped as well as the capped version (where each ratio is capped at 1) for reasons suggested above. The GGM differs from the formulation of Klasen and Schüler (2011) and Table 2 in that it uses total years of schooling (with 14 years as the maximum) and school life expectancy (with 20 as the maximum and capped beyond that) instead of adult literacy and enrolment rates. I also slightly modify the goalposts for life expectancy (from 32.5 to 82.5 for males and 37.5 to 87.5 for females) to reflect the range of observed data better. The use of school life expectancy reduces the comparison to just 104 countries from 138 countries for which the GII was available; now, however, school life expectancy data are available for 180 countries, so that is no longer a constraint.

The rankings are dramatically different between these two measures. While in the GII, the top ranked countries are Scandinavian countries, followed by the Republic of Korea and other European nations, with African and Asian countries populating the bottom of the ranks, in the GGM, transition countries top the list, followed by Scandinavian and other European countries. Particularly noteworthy are individual rank changes. The Republic of Korea changes from a rank of 7 in the GII to a rank of 61 in the GGM, Russia rises from a GII rank of 41 to a GGM rank of 1, and quite a number of African countries perform much better under the GGM (e.g., the United Republic of Tanzania moves up from 98 to 53, Rwanda from 66 to 33, Namibia from 74 to 46, etc.). In contrast, Middle Eastern countries

generally move down quite a lot in the GGM (e.g., Tunisia from 35 to 94, Turkey from 56 to 98, Morocco from 64 to 99, etc.). What is driving these drastic differences in rankings? Two issues are particularly important. First, in the GII, poor countries have basically no chance of achieving a high ranking as their all-important maternal mortality rates and adolescent fertility rates are high. I have argued above that this is a problem of the index as this poor performance is often not mainly an issue of gender inequality but of poor overall economic and health conditions. In the GGM, quite a few poor countries do reasonably well if they are able to ensure low gender gaps in education, health and economic participation.

Second, the GGM allows for full compensation between disadvantages across dimensions. As seen in the middle columns of Table 3, which shows the female-male ratios of life expectancy, education and labour force participation, the reason the transition countries are topping the list in the GGM is that women enjoy a life expectancy advantage that is substantially larger than the presumed five years. In addition, they enjoy more education than their male counterparts, and the gaps in labour force participation are rather small. As a result, the GGM is actually above 1, suggesting that, on average, women's well-being, as measured by these indicators, is higher than that of males. Of course, one can express it the other way around as well. Men in transition countries suffer from very low life expectancy, compared to females, do worse in education, and only have a slight advantage in labour market participation. This is not to say, of course, that women in transition countries are in general treated better than men, but that in these key aspects of human development, they appear to be favoured.

This issue is addressed in the capped version of the GGM, which is shown in the last two columns of Table 3. Now the transition countries no longer do quite as well, but they remain among the top performers; Moldova now is the top performer. Scandinavian countries occupy higher spots due to their greater balance in gender gaps across dimensions. Further down, the rankings hardly change. Using the capped version or presenting both might be the best way to address the problem of compensation between dimensions.

To summarize the discussion so far, it appears the GII is not an ideal measure for several reasons. It mixes well-being and empowerment, achievements and gaps, and is very complicated. The measurement choices matter as the NGDI and the GGM show. The NGDI is, however, a welcome addition to measuring gender gaps in human development. It has a nice intuitive link to the HDI, leads to interesting results and is generally easy to interpret. Its use of earned income remains a problem, however.

So far, I have focused on gender-related well-being measures and argued for the NGDI and/or the GGM. What about empowerment? The old GEM, created in 1995 and discontinued in 2010, had a range of problems. It used income levels rather than shares to measure empowerment, it allowed for accumulation of disadvantages across dimensions, and it was available for only a few countries (see

Klasen 2006b for details). Regarding empowerment, Klasen and Schüler (2011) proposed a revision of the GEM to deal with the problematic use of income levels (and use income shares instead), and also turn the GEM into a straightforward gender inequality indicator consisting of a geometric mean of ratios. The revised equation is:

$$GEM3 = \left(\frac{PR_f}{PR_M} \times \frac{EP_F}{EP_M} \times \frac{IS_F}{IS_M}\right)^{\frac{1}{3}}$$

where PR, EP and IS refer to parliamentary representation, economic participation in leadership positions and income shares, respectively.[19] The measure would again be a gender gap measure, this time focusing on empowerment. By focusing on relative achievements in economic and political participation, it is now more clearly a measure of relative empowerment. But of course, it also has some drawbacks. To the extent that, for example, female participation in the labour force is driven by the distress of poor women forced to work in difficult and hazardous jobs, it is not so clear that this invariably an indicator of empowerment.[20] Moreover, female participation in national parliaments may not reflect broader political empowerment (see Klasen 2006b for a discussion).

A complication arises in that the reported underlying data for these indicators are the share of women in parliament and economic leadership, and with high incomes. These shares are, as discussed in Klasen (2006b), also dependent on the population shares of men and women. For example, in a country where women make up 55 percent of the population, equality should mean 55 percent of parliamentary representation (and not 50 percent). To account for this in the case of parliamentary representation, for example, the first component of GEM3 is calculated as follows:

$$\frac{PR_f}{PR_m} = \frac{\frac{FSPA}{FSPOP}}{\frac{MSPA}{MSPOP}}$$

where FSPA, FSPOP, MSPA and MSPOP are the female share of members of parliament, the female population share, the male share of members of parliament and the male population share. We make equivalent calculations for the other two components.

[19] One may wonder why the proposed GEM continues to use the problematic income shares rather than shares in labour force participation as proposed for the GGM. The reason is that, as already suggested in Bardhan and Klasen (1999), the income component in the GEM is (conceptually) less problematic than in the GDI. While it is highly implausible that women with zero earned income have no access to food, shelter, clothing and other valuable functionings (as the GDI implies), it is plausible that women with no earned income have little or no control over economic resources and are thus disempowered in this way (see World Bank 2001).

[20] See Klasen and Pieters (2015) for the example of India, where part of female participation in the labour force, particularly among less educated women, is distress driven.

Table 4 shows the results for GEM as calculated by UNDP, and our two revised versions of the GEM (GEM2 and GEM3), together with associated rankings. GEM2 uses income shares but retains all other features of UNDP's GEM, while GEM3 follows the formula presented above. One weakness of the GEM is unfortunately also apparent for all three formulations. It is available only for 75 countries, thus fewer than half of the countries in the world. It would be worth exploring, however, whether now data are available for more countries, in which case, a revised GEM would indeed be a useful indicator. A quick search revealed that the International Labour Organization has data for about 110 countries, but sometimes the observations are several years old. This is an important area for further investigation.

When comparing the GEM2 (with income shares rather than levels; Table 4, columns 3 and 4) to UNDP's GEM (Table 4, columns 1 and 2), a number of important differences appear. While the two are generally closely correlated, and there are relatively few changes at the very top and the very bottom of the ranking, significant changes do occur. Four countries lose more than 20 ranks (Ireland, Italy, Japan and the United States of America), while two countries gain more than 20 ranks (Moldova and the United Republic of Tanzania). The single largest improvement in ranking is the United Republic of Tanzania, which jumps from a rank of 37 to a rank of 8. Ireland, Italy, Japan and the United States of America fall in the ranks due to very low parliamentary representation, which is no longer papered over by high income levels (as in UNDP's GEM). Conversely, relatively poor countries where women are broadly represented in politics and the economy and have relatively high earning shares see an improvement in ranking. In UNDP's GEM, these achievements are not visible due to the low income levels for men and women in these countries, showing that this undesirable feature really makes a difference.

When considering the GEM3 (the geometric mean of ratios of empowerment achievements) in columns 5 and 6 of Table 4, the results are much more similar to GEM2 (with income shares) than to GEM. Again, there are not many changes at the bottom of the list. Saudi Arabia and the United Arab Emirates have a GEM3 of 0 due to the absence of any female representation in parliament, but the impact on their very poor ranking is minor. At the top, Greece, Ireland, Italy, Japan and the United States of America again drop the most in rank, largely due to low parliamentary representation and somewhat smaller disadvantages in the other dimensions. Also, the United Republic of Tanzania again has one of the biggest increases in rank but is joined by Moldova and the Philippines. The latter two now fare much better as the female advantage in representation among professional and technical workers can compensate for disadvantages in other dimensions.

To sum up, the results here suggest that both ways to correct for the problems of the GEM seem to lead to relatively similar results. Since GEM3 is easier to interpret, it may be best to use as the central indicator of gender-related empowerment. The main argument against this is that this way of framing the index allows for fully compensating for gender gaps in different dimensions, which some might see as problematic.

It was argued in Klasen and Schüler (2011) and in Klasen (2017) that with the NGDI, the GGM and GEM3, UNDP would have addressed the most serious weaknesses of its existing suite of measures, continued to distinguish between well-being and empowerment dimensions, retained its close linkage to its conception of human development, and created simple and easily interpretable measures of gender inequality in well-being and empowerment. This is still the argument, although one might say that the use of the NGDI possibly obviates the need for the GGM, although it continues to suffer from some flaws that we discussed above.

New measures

So far, we have made suggestions about retaining and/or reforming the existing suite of human development indices. But as suggested above, there are real gaps. In particular, a glaring gap is the lack of measures that deal with sustainability, i.e., the preservation of the earth's and the economy's resource base to not only meet current but also future human needs. Of course, this issue can be tackled through a dashboard of indicators as it currently is being presented. But just having a dashboard for this dimension while headlining composite indices for human development, gender, inequality and poverty would leave the impression that sustainability issues are of lesser importance. Also, advocacy, naming and shaming is much harder based on a dashboard. Thus I would propose to generate a new composite index.

In the spirit of UNDP's use of three components for most indices, I would propose the following sustainability index. To reflect current environmental problems, I would focus on the most important ones in terms of their impact on morbidity and mortality, which are unclean water and inadequate sanitation (World Bank 1992). As indicators, I would use a composite of the share of the population that has access to clean water and adequate sanitation facilities (simple average of the percentages). An important problem to address is that water access may be present but unsustainable, leading to sinking water tables. One could address this either by adding a third component to this sub-index, such as net annual freshwater withdrawal per capita, or just flag this as an important issue that is tracked in a dashboard of indicators.

To reflect the overall sustainability of the economy of a country, I would use the adjusted savings rate, which is defined as net national savings plus education expenditure and minus energy depletion, mineral depletion, net forest depletion and particulate emissions damage (all as a percentage of

GNI).[21] One could either just use the percentage (which can be negative), or create an index using fixed upper or lower bounds.

The third indicator would measure contributions to arguably the most dangerous global problem, anthropogenic climate change. The indicator would be net greenhouse gas emissions per capita (gross emissions minus sinks that arise through reforestation), and if they are positive (as they would be in nearly all cases) they would enter as a negative number. Here an index would need to be created using reasonable fixed upper and lower bounds. One could average the three indices using an arithmetic or geometric mean; a geometric mean would imply imperfect substitution, which would be reasonable in this case given the different aspects captured by the three dimensions. Note that this index would be unusual in that it can take on negative values if the net emissions dwarf the other two components.

A second gap is the lack of a measure on the contribution countries are making to further global development. Here, industrialized and emerging economies carry particular responsibilities, and thus this index should probably be limited to them. A good starting point to consider is the Commitment to Development Measure produced by the Center for Global Development (CGD) for 27 rich countries. It considers seven domains, including trade, aid, technology, environment, security, migration, finance and technology. I would propose to shorten the measure to just focus on three issues: aid, trade and migration, arguably the three most important ways countries contribute to global development. In terms of coverage, I would broaden it to include all OECD countries, oil-rich Arab countries as well as Brazil, China, India, the Russian Federation and Singapore, which all have aid programmes, and trade and migration policies that have important impacts on poor countries. The first indicator would be aid as a share of GDP (normalized using fixed goalposts), the second could be an index of openness to trade from developing countries (normalized qualitative index), and the third would be an index of openness to migration from developing countries (normalized qualitative measure); the last two are available for OECD countries in the CGD measure. Maybe such an index could be prepared in partnership with the CGD (drawing on their data) or be derived from it and supplemented with other information (e.g., AIDDATA on aid flows from non-OECD donors, the United Nations Conference on Trade and Development and the World Trade Organization on trade access, etc.).

Clearly, these are suggestions that would need to be carefully analysed to assess their viability, data access, timeliness and other issues. But I would suggest that these are two areas where UNDP could round out its suite of critical human development indices.

As argued already above, other gaps are measures of rights and freedoms. But given existing measures as well as UNDP's difficulty in judging member countries' freedoms, I propose that the

[21] Often, the global damage caused by carbon dioxide emissions is included in adjusted net savings. Since this is treated separately in the third dimension, I would propose to leave it out here. The data are readily available with and without damage from these emissions.

Human Development Report regularly report on rights and freedoms using existing databases from Polity, Freedom House and CIRI in its dashboard in the back of the report.

In this discussion, I have not drawn explicitly on the SDGs when discussing the new measures. Clearly, both proposed indices are related to the SDGs, the first one to SDGs 6, 12 and 13, and the second one to SDG 17. But, as argued, above, it is a strength of UNDP's indices to present an independent, comprehensive view of human development that is not directly derived from the SDGs, but related to its overarching intention.

Conclusions

In this short paper, I have covered a lot of ground. This implies that I was only able to touch on selected issues. Let me briefly summarize my main recommendations. I would propose that the Human Development Report Office retain its suite of human development indices, and position them as overarching outcome indices that can comprehensively assess the progress of people in the world (better than the SDG matrix or any index based on it). To do that, I propose no changes to the HDI (although one could play with the aggregation rule), no change but more analysis and interpretation of the IHDI and the MPI, a revised GEM alongside the NGDI and/or the proposed GGM (both instead of the GII), and two new composite indices on sustainability and commitment to global development. With these I believe the Human Development Report Office will remain relevant and an important player in monitoring and advocating for human development-oriented global and national policies.

Table 1. HDI Aggregation Using Geometric Mean, Arithmetic Mean or Chakravarty Proposal

	HDI rank	Rank arithmetic mean	Rank Chakravarty	Difference geometric-arithmetic	Difference geometric-Chakra
Afghanistan	169	171	171	-2	-2
Albania	75	75	76	0	-1
Algeria	83	83	83	0	0
Andorra	32	31	32	1	0
Angola	150	151	151	-1	-1
Antigua and Barbuda	62	61	62	1	0
Argentina	46	46	46	0	0
Armenia	84	84	84	0	0
Australia	3	3	3	0	0
Austria	24	24	24	0	0
Azerbaijan	78	78	78	0	0
Bahamas	58	57	58	1	0
Bahrain	47	47	47	0	0
Bangladesh	140	137	139	3	1
Barbados	54	55	55	-1	-1
Belarus	52	54	53	-2	-1
Belgium	22	22	22	0	0
Belize	103	105	103	-2	0
Benin	167	170	168	-3	-1
Bhutan	132	132	132	0	0
Bolivia (Plurinational State of)	118	118	118	0	0
Bosnia and Herzegovina	81	81	81	0	0
Botswana	108	109	109	-1	-1
Brazil	79	79	79	0	0
Brunei Darussalam	31	29	29	2	2
Bulgaria	57	58	57	-1	0
Burkina Faso	185	183	184	2	1
Burundi	184	185	185	-1	-1
Cabo Verde	122	123	123	-1	-1
Cambodia	143	143	143	0	0
Cameroon	153	158	158	-5	-5
Canada	10	10	10	0	0
Central African Republic	188	188	188	0	0
Chad	186	186	186	0	0
Chile	38	37	38	1	0
China	90	90	90	0	0
Colombia	95	96	96	-1	-1
Comoros	160	162	161	-2	-1
Congo	136	138	136	-2	0

	HDI rank	Rank arithmetic mean	Rank Chakravarty	Difference geometric-arithmetic	Difference geometric-Chakra
Congo (Democratic Republic of the)	176	176	176	0	0
Costa Rica	66	65	66	1	0
Côte d'Ivoire	171	172	172	-1	-1
Croatia	45	45	45	0	0
Cuba	68	66	67	2	1
Cyprus	34	35	35	-1	-1
Czech Republic	28	28	28	0	0
Denmark	6	6	6	0	0
Djibouti	172	168	169	4	3
Dominica	96	94	95	2	1
Dominican Republic	99	100	99	-1	0
Ecuador	89	87	88	2	1
Egypt	112	111	111	1	1
El Salvador	117	116	116	1	1
Equatorial Guinea	135	134	135	1	0
Eritrea	179	177	178	2	1
Estonia	30	33	31	-3	-1
Ethiopia	174	173	173	1	1
Fiji	91	92	91	-1	0
Finland	23	23	23	0	0
France	21	21	21	0	0
Gabon	109	108	108	1	1
Gambia	173	174	174	-1	-1
Georgia	70	70	70	0	0
Germany	4	5	5	-1	-1
Ghana	141	142	141	-1	0
Greece	29	30	30	-1	-1
Grenada	80	80	80	0	0
Guatemala	126	125	125	1	1
Guinea	183	181	181	2	2
Guinea-Bissau	178	180	179	-2	-1
Guyana	128	128	128	0	0
Haiti	164	163	163	1	1
Honduras	130	130	130	0	0
Hong Kong, China (SAR)	12	11	12	1	0
Hungary	43	43	43	0	0
Iceland	9	9	9	0	0
India	131	131	131	0	0
Indonesia	113	114	113	-1	0
Iran (Islamic Republic of)	69	69	69	0	0

	HDI rank	Rank arithmetic mean	Rank Chakravarty	Difference geometric-arithmetic	Difference geometric-Chakra
Iraq	121	122	121	-1	0
Ireland	8	8	8	0	0
Israel	19	20	20	-1	-1
Italy	26	26	26	0	0
Jamaica	94	95	94	-1	0
Japan	17	17	17	0	0
Jordan	86	88	86	-2	0
Kazakhstan	56	56	56	0	0
Kenya	146	147	147	-1	-1
Kiribati	137	136	137	1	0
Korea (Republic of)	18	19	18	-1	0
Kuwait	51	48	48	3	3
Kyrgyzstan	120	119	119	1	1
Lao People's Democratic Republic	138	139	138	-1	0
Latvia	44	44	44	0	0
Lebanon	76	72	75	4	1
Lesotho	161	166	164	-5	-3
Liberia	177	178	177	-1	0
Libya	102	102	102	0	0
Liechtenstein	15	14	15	1	0
Lithuania	37	40	37	-3	0
Luxembourg	20	18	19	2	1
Madagascar	158	155	156	3	2
Malawi	170	169	170	1	0
Malaysia	59	59	59	0	0
Maldives	105	103	105	2	0
Mali	175	175	175	0	0
Malta	33	34	34	-1	-1
Mauritania	157	154	154	3	3
Mauritius	64	64	64	0	0
Mexico	77	77	77	0	0
Micronesia (Federated States of)	127	126	127	1	0
Moldova (Republic of)	107	106	107	1	0
Mongolia	92	93	93	-1	-1
Montenegro	48	49	49	-1	-1
Morocco	123	121	122	2	1
Mozambique	181	182	182	-1	-1
Myanmar	145	145	145	0	0
Namibia	125	127	126	-2	-1
Nepal	144	144	144	0	0

	HDI rank	Rank arithmetic mean	Rank Chakravarty	Difference geometric-arithmetic	Difference geometric-Chakra
Netherlands	7	7	7	0	0
New Zealand	13	13	13	0	0
Nicaragua	124	124	124	0	0
Niger	187	187	187	0	0
Nigeria	152	153	152	-1	0
Norway	1	1	1	0	0
Oman	53	51	52	2	1
Pakistan	147	146	146	1	1
Palau	61	62	61	-1	0
Palestine, State of	114	115	115	-1	-1
Panama	60	60	60	0	0
Papua New Guinea	154	156	155	-2	-1
Paraguay	110	110	110	0	0
Peru	88	89	89	-1	-1
Philippines	116	117	117	-1	-1
Poland	36	36	36	0	0
Portugal	41	41	41	0	0
Qatar	35	32	33	3	2
Romania	50	52	51	-2	-1
Russian Federation	49	50	50	-1	-1
Rwanda	159	161	160	-2	-1
Saint Kitts and Nevis	74	73	74	1	0
Saint Lucia	93	91	92	2	1
Saint Vincent and the Grenadines	100	101	101	-1	-1
Samoa	104	104	104	0	0
Sao Tome and Principe	142	140	142	2	0
Saudi Arabia	39	38	39	1	0
Senegal	162	159	159	3	3
Serbia	67	68	68	-1	-1
Seychelles	63	63	63	0	0
Sierra Leone	180	184	183	-4	-3
Singapore	5	4	4	1	1
Slovakia	40	42	40	-2	0
Slovenia	25	25	25	0	0
Solomon Islands	156	152	153	4	3
South Africa	119	120	120	-1	-1
South Sudan	182	179	180	3	2
Spain	27	27	27	0	0
Sri Lanka	73	74	72	-1	1
Sudan	165	160	162	5	3

	HDI rank	Rank arithmetic mean	Rank Chakravarty	Difference geometric-arithmetic	Difference geometric-Chakra
Suriname	97	98	98	-1	-1
Swaziland	148	149	149	-1	-1
Sweden	14	15	14	-1	0
Switzerland	2	2	2	0	0
Syrian Arab Republic	149	148	148	1	1
Tajikistan	129	129	129	0	0
Tanzania (United Republic of)	151	150	150	1	1
Thailand	87	86	87	1	0
The former Yugoslav Republic of Macedonia	82	82	82	0	0
Timor-Leste	133	133	133	0	0
Togo	166	167	166	-1	0
Tonga	101	99	100	2	1
Trinidad and Tobago	65	67	65	-2	0
Tunisia	98	97	97	1	1
Turkey	71	71	71	0	0
Turkmenistan	111	112	112	-1	-1
Uganda	163	165	165	-2	-2
Ukraine	85	85	85	0	0
United Arab Emirates	42	39	42	3	0
United Kingdom	16	16	16	0	0
United States	11	12	11	-1	0
Uruguay	55	53	54	2	1
Uzbekistan	106	107	106	-1	0
Vanuatu	134	135	134	-1	0
Venezuela (Bolivarian Republic of)	72	76	73	-4	-1
Viet Nam	115	113	114	2	1
Yemen	168	164	167	4	1
Zambia	139	141	140	-2	-1
Zimbabwe	155	157	157	-2	-2

Source: Human Development Report Office database for the *2016 Human Development Report.*

Table 2. UNDP's GDI, a Male and Female HDI, and two versions of a Gender Gap Index (2004)

	(1) UNDP's GDI	(2) GDI rank	(3) Female HDI	(4) Male HDI	(5) Ratio female-to-male HDI	(6) Female HDI rank	(7) Female/male HDI rank	(8) GGM	(9) GGM Rank	(10) GGM (Capped)	(11) GGM Rank (Capped)
Norway	0.962	1	0.957	0.968	0.988	1	17	0.963	14	0.958	3
Iceland	0.958	2	0.950	0.967	0.983	3	28	0.959	17	0.950	7
Australia	0.956	3	0.947	0.966	0.980	5	35	0.931	37	0.931	23
Ireland	0.951	4	0.936	0.970	0.965	10	50	0.905	51	0.901	51
Sweden	0.949	5	0.947	0.952	0.995	4	11	0.967	10	0.958	4
Luxembourg	0.949	6	0.953	0.944	1.010	2	8	0.893	56	0.884	58
Canada	0.947	7	0.938	0.958	0.980	8	33	0.951	19	0.945	13
United States	0.946	8	0.939	0.955	0.984	7	27	0.951	18	0.940	18
Netherlands	0.945	9	0.933	0.958	0.975	12	39	0.920	47	0.918	36
Switzerland	0.944	10	0.930	0.960	0.969	14	43	0.930	39	0.927	29
Finland	0.943	11	0.940	0.948	0.992	6	14	0.970	9	0.957	5
Belgium	0.943	12	0.935	0.951	0.983	11	29	0.912	49	0.902	49
Japan	0.942	13	0.926	0.962	0.963	16	53	0.881	61	0.870	67
France	0.940	14	0.937	0.945	0.991	9	15	0.946	24	0.930	25
Denmark	0.940	15	0.932	0.949	0.983	13	30	0.950	23	0.947	10
United Kingdom	0.938	16	0.929	0.948	0.980	15	34	0.936	35	0.929	26
Austria	0.937	17	0.920	0.959	0.959	20	56	0.920	45	0.914	42
Italy	0.934	18	0.921	0.951	0.968	19	46	0.863	68	0.852	76
Spain	0.933	19	0.926	0.944	0.980	17	32	0.891	54	0.872	66
New Zealand	0.932	20	0.924	0.942	0.981	18	31	0.943	31	0.938	19
Germany	0.928	21	0.916	0.943	0.971	21	42	0.923	44	0.918	35
Israel	0.925	22	0.910	0.940	0.968	22	44	0.946	30	0.946	11
Greece	0.917	23	0.905	0.932	0.971	24	41	0.879	63	0.873	64
Slovenia	0.908	24	0.906	0.911	0.994	23	12	0.958	15	0.934	21
Korea, Rep. of	0.905	25	0.885	0.929	0.953	26	61	0.885	60	0.873	65
Macau	0.902	26	0.875	0.934	0.936	28	71	0.900	59	0.900	53
Portugal	0.902	27	0.896	0.909	0.986	25	22	0.947	20	0.930	24
Cyprus	0.900	28	0.883	0.920	0.960	27	55	0.907	52	0.907	46

	(1) UNDP's GDI	(2) GDI rank	(3) Female HDI	(4) Male HDI	(5) Ratio female-to-male HDI	(6) Female HDI rank	(7) Female/male HDI rank	(8) GGM	(9) GGM Rank	(10) GGM (Capped)	(11) GGM Rank (Capped)
Czech Republic	0.881	29	0.868	0.897	0.967	32	47	0.927	38	0.918	38
Malta	0.869	30	0.852	0.889	0.958	36	58	0.785	95	0.780	104
Hungary	0.867	31	0.868	0.868	0.999	31	9	0.933	33	0.907	47
Kuwait	0.864	32	0.834	0.889	0.938	40	67	0.792	93	0.789	103
Argentina	0.859	33	0.855	0.866	0.987	35	18	0.915	43	0.890	56
Poland	0.859	34	0.858	0.862	0.996	33	10	0.953	16	0.925	32
Estonia	0.856	35	0.868	0.846	1.027	30	4	0.997	5	0.953	6
Lithuania	0.856	36	0.869	0.845	1.028	29	3	0.998	6	0.988	1
Slovakia	0.853	37	0.849	0.860	0.987	37	19	0.940	27	0.920	34
Chile	0.850	38	0.829	0.878	0.944	41	64	0.807	88	0.802	95
Bahrain	0.849	39	0.808	0.886	0.912	44	79	0.660	122	0.660	137
Uruguay	0.847	40	0.846	0.852	0.994	38	13	0.932	34	0.903	48
Croatia	0.844	41	0.838	0.851	0.985	39	24	0.921	42	0.909	45
Latvia	0.843	42	0.857	0.831	1.031	34	2	0.982	7	0.927	28
Costa Rica	0.831	43	0.812	0.853	0.952	42	62	0.818	86	0.815	86
United Arab Emirates	0.829	44	0.798	0.852	0.937	48	70	0.711	102	0.683	133
Bulgaria	0.814	45	0.807	0.824	0.979	45	36	0.940	32	0.929	27
Mexico	0.812	46	0.786	0.844	0.931	51	76	0.793	96	0.793	99
Tonga	0.809	47	0.785	0.837	0.938	53	69	0.846	80	0.844	79
Panama	0.806	48	0.794	0.821	0.967	49	48	0.863	69	0.858	73
Trinidad and Tobago	0.805	49	0.788	0.825	0.954	50	59	0.858	72	0.852	75
Romania	0.804	50	0.799	0.811	0.985	47	25	0.947	22	0.932	22
Russian Federation	0.795	51	0.811	0.783	1.036	43	1	1.015	2	0.940	17
Malaysia	0.795	52	0.765	0.831	0.919	62	78	0.819	87	0.819	85
Belarus	0.793	53	0.802	0.786	1.021	46	5	1.002	3	0.948	9
Mauritius	0.792	54	0.765	0.825	0.928	60	77	0.805	92	0.795	98
Macedonia, TFYR	0.791	55	0.769	0.817	0.941	58	65	0.854	78	0.854	74
Brazil	0.789	56	0.786	0.795	0.988	52	16	0.920	40	0.896	54
Colombia	0.787	57	0.778	0.799	0.973	56	40	0.925	41	0.916	40
Oman	0.785	58	0.717	0.854	0.839	72	106	0.589	139	0.589	144

	(1) UNDP's GDI	(2) GDI rank	(3) Female HDI	(4) Male HDI	(5) Ratio female-to-male HDI	(6) Female HDI rank	(7) Female/male HDI rank	(8) GGM	(9) GGM Rank	(10) GGM (Capped)	(11) GGM Rank (Capped)
Thailand	0.781	59	0.770	0.795	0.968	57	45	0.943	29	0.927	30
Albania	0.780	60	0.765	0.799	0.958	61	57	0.896	57	0.891	55
Venezuela	0.780	61	0.767	0.797	0.962	59	54	0.888	58	0.880	60
Kazakhstan	0.772	62	0.780	0.767	1.017	54	6	1.023	1	0.965	2
Ukraine	0.771	63	0.778	0.770	1.011	55	7	0.997	4	0.936	20
Samoa (Western)	0.770	64	0.752	0.794	0.947	64	63	0.810	85	0.798	96
China	0.765	65	0.739	0.793	0.932	66	74	0.915	50	0.915	41
Armenia	0.765	66	0.761	0.771	0.987	63	20	0.962	12	0.944	15
Philippines	0.761	67	0.748	0.775	0.965	65	49	0.871	67	0.865	71
Peru	0.759	68	0.726	0.798	0.910	69	81	0.874	70	0.873	61
Sri Lanka	0.749	69	0.725	0.777	0.933	70	73	0.765	101	0.763	106
Jordan	0.747	70	0.701	0.800	0.877	74	91	0.674	123	0.674	134
Dominican Republic	0.745	71	0.734	0.761	0.964	67	52	0.846	71	0.823	83
Turkey	0.745	72	0.696	0.804	0.865	76	97	0.671	129	0.671	135
Saudi Arabia	0.744	73	0.675	0.827	0.816	83	112	0.552	142	0.552	148
Tunisia	0.744	74	0.695	0.806	0.862	77	98	0.685	125	0.685	131
Iran, Islamic Rep. of	0.736	75	0.690	0.788	0.876	78	92	0.753	111	0.753	111
Azerbaijan	0.733	76	0.727	0.742	0.979	68	37	0.962	13	0.944	14
El Salvador	0.725	77	0.702	0.753	0.932	73	75	0.853	77	0.847	78
Jamaica	0.721	78	0.718	0.728	0.986	71	21	0.936	28	0.902	50
Cape Verde	0.714	79	0.678	0.764	0.887	82	88	0.749	108	0.742	116
Algeria	0.713	80	0.660	0.778	0.847	86	102	0.703	126	0.703	124
Viet Nam	0.708	81	0.686	0.732	0.938	80	68	0.949	26	0.949	8
Indonesia	0.704	82	0.673	0.741	0.907	84	83	0.820	91	0.820	84
Syrian Arab Republic	0.702	83	0.657	0.759	0.866	89	96	0.723	118	0.723	120
Kyrgyzstan	0.701	84	0.698	0.708	0.986	75	23	0.943	21	0.916	39
Uzbekistan	0.694	85	0.683	0.708	0.965	81	51	0.933	36	0.922	33
Moldova, Rep. of	0.692	86	0.688	0.698	0.985	79	26	0.963	11	0.943	16
Bolivia	0.687	87	0.655	0.725	0.904	90	85	0.873	73	0.873	63
Mongolia	0.685	88	0.672	0.704	0.954	85	60	0.880	62	0.870	70

	(1) UNDP's GDI	(2) GDI rank	(3) Female HDI	(4) Male HDI	(5) Ratio female-to-male HDI	(6) Female HDI rank	(7) Female/male HDI rank	(8) GGM	(9) GGM Rank	(10) GGM (Capped)	(11) GGM Rank (Capped)
Nicaragua	0.684	89	0.658	0.721	0.912	87	80	0.751	104	0.749	112
Honduras	0.676	90	0.658	0.700	0.940	88	66	0.844	79	0.836	80
Guatemala	0.659	91	0.624	0.708	0.882	92	90	0.731	110	0.718	122
Tajikistan	0.648	92	0.629	0.672	0.936	91	72	0.902	55	0.900	52
South Africa	0.646	93	0.617	0.681	0.905	93	84	0.806	97	0.806	93
Equatorial Guinea	0.639	94	0.588	0.700	0.841	95	104	0.727	127	0.727	119
Namibia	0.622	95	0.595	0.654	0.909	94	82	0.852	83	0.852	77
Morocco	0.615	96	0.555	0.702	0.792	96	116	0.612	143	0.612	142
India	0.591	97	0.530	0.671	0.790	98	117	0.659	137	0.659	138
Cambodia	0.578	98	0.553	0.614	0.901	97	86	0.941	25	0.918	37
Botswana	0.555	99	0.524	0.602	0.870	99	93	0.749	113	0.743	115
Comoros	0.550	100	0.513	0.596	0.862	100	99	0.808	100	0.808	92
Lao People's Dem. Rep.	0.545	101	0.501	0.600	0.835	101	107	0.798	105	0.798	97
Ghana	0.528	102	0.489	0.573	0.853	102	101	0.870	75	0.870	68
Bangladesh	0.524	103	0.479	0.579	0.826	106	111	0.760	115	0.760	107
Papua New Guinea	0.521	104	0.485	0.559	0.868	103	94	0.887	66	0.887	57
Congo	0.519	105	0.483	0.565	0.855	105	100	0.814	98	0.814	88
Pakistan	0.513	106	0.443	0.612	0.724	113	131	0.592	147	0.592	143
Nepal	0.513	107	0.457	0.592	0.772	109	121	0.728	128	0.728	118
Madagascar	0.507	108	0.479	0.540	0.887	107	89	0.911	53	0.911	44
Uganda	0.498	109	0.458	0.545	0.839	108	105	0.861	81	0.861	72
Cameroon	0.497	110	0.447	0.561	0.797	112	115	0.753	120	0.753	110
Sudan	0.492	111	0.437	0.574	0.761	116	126	0.620	141	0.620	140
Kenya	0.487	112	0.456	0.526	0.867	110	95	0.806	103	0.806	94
Lesotho	0.486	113	0.485	0.497	0.976	104	38	0.852	74	0.810	91
Zimbabwe	0.483	114	0.448	0.531	0.843	111	103	0.748	119	0.748	113
Swaziland	0.479	115	0.439	0.544	0.806	115	113	0.576	148	0.576	145
Mauritania	0.478	116	0.439	0.527	0.833	114	108	0.789	106	0.789	102
Togo	0.476	117	0.421	0.562	0.749	118	128	0.694	132	0.694	128
Yemen	0.462	118	0.392	0.588	0.666	121	136	0.573	149	0.573	146

	(1) UNDP's GDI	(2) GDI rank	(3) Female HDI	(4) Male HDI	(5) Ratio female-to-male HDI	(6) Female HDI rank	(7) Female/male HDI rank	(8) GGM	(9) GGM Rank	(10) GGM (Capped)	(11) GGM Rank (Capped)
Senegal	0.451	119	0.408	0.511	0.798	119	114	0.756	117	0.756	108
Rwanda	0.449	120	0.424	0.477	0.889	117	87	0.926	46	0.926	31
Nigeria	0.443	121	0.393	0.510	0.770	120	123	0.705	131	0.705	123
Guinea	0.434	122	0.387	0.503	0.771	123	122	0.747	116	0.747	114
Angola	0.431	123	0.387	0.493	0.784	124	120	0.790	107	0.790	101
Tanzania, U. Rep. of	0.426	124	0.390	0.469	0.832	122	109	0.870	76	0.870	69
Benin	0.412	125	0.358	0.493	0.727	125	130	0.684	138	0.684	132
Côte d'Ivoire	0.401	126	0.340	0.489	0.695	130	133	0.617	146	0.617	141
Zambia	0.396	127	0.350	0.458	0.764	127	125	0.718	130	0.718	121
Malawi	0.394	128	0.352	0.448	0.787	126	118	0.813	99	0.813	89
Mozambique	0.387	129	0.344	0.454	0.757	129	127	0.812	94	0.791	100
Burundi	0.380	130	0.348	0.421	0.826	128	110	0.883	65	0.873	62
Congo, Dem. Rep. of the	0.378	131	0.329	0.449	0.732	131	129	0.739	124	0.739	117
Chad	0.350	132	0.308	0.432	0.714	132	132	0.669	134	0.669	136
Central African Republic	0.336	133	0.287	0.418	0.687	135	134	0.701	133	0.701	125
Burkina Faso	0.335	134	0.300	0.383	0.785	133	119	0.767	112	0.767	105
Mali	0.329	135	0.293	0.381	0.769	134	124	0.756	114	0.756	109
Sierra Leone	0.317	136	0.268	0.396	0.677	136	135	0.687	136	0.687	129
Niger	0.292	137	0.244	0.373	0.655	137	137	0.633	144	0.633	139
Barbados	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.968	8	0.945	12
Myanmar	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.918	48	0.912	43
Yugoslavia	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.881	64	0.881	59
Cuba	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.835	82	0.835	81
Maldives	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.826	90	0.825	82
Brunei Darussalam	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.814	89	0.814	87
Suriname	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.820	84	0.810	90
Liberia	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.698	135	0.698	126
Libyan Arab Jamahiriya	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.695	121	0.695	127
Qatar	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.695	109	0.685	130
Iraq	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.570	145	0.570	147

	(1) UNDP's GDI	(2) GDI rank	(3) Female HDI	(4) Male HDI	(5) Ratio female-to-male HDI	(6) Female HDI rank	(7) Female/male HDI rank	(8) GGM	(9) GGM Rank	(10) GGM (Capped)	(11) GGM Rank (Capped)
Occupied Palestinian Territory	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.522	140	0.522	149
Afghanistan	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.493	150	0.493	150
Average	0.707		0.683	0.740	0.906			0.831		0.822	

Table 3. Levels and Rank of GII and GGM (2010)

Country	GII	GII rank	GGM	GGM rank	Ratio life expectancy	Ratio education index	Ratio labour force participation rate	Capped GGM	Rank
Russian Fed.	0.326	41	1.046	1	1.236	1.028	0.900	0.966	8
Lithuania	0.188	26	1.044	2	1.190	1.045	0.915	0.971	6
Kazakhstan	0.331	42	1.041	3	1.207	1.018	0.919	0.972	5
Latvia	0.204	30	1.028	4	1.146	1.057	0.896	0.964	9
Ukraine	0.333	44	1.019	5	1.213	1.016	0.858	0.950	18
Barbados	0.372	52	1.017	6	1.035	1.129	0.901	0.966	7
Moldova	0.287	38	1.015	7	1.076	1.011	0.960	0.987	1
Mongolia	0.409	59	1.009	8	1.092	1.069	0.881	0.958	13
Finland	0.075	6	1.008	9	1.034	1.041	0.951	0.983	2
Sweden	0.047	2	0.995	10	0.980	1.065	0.943	0.974	4
Slovenia	0.160	21	0.989	11	1.044	1.035	0.895	0.964	10
Norway	0.073	5	0.989	12	0.989	1.045	0.936	0.974	3
Iceland	0.103	9	0.988	13	0.969	1.096	0.909	0.959	12
Bulgaria	0.241	34	0.973	14	1.053	1.018	0.859	0.951	17
Poland	0.191	28	0.973	15	1.091	1.053	0.801	0.929	32
Armenia	0.343	46	0.970	16	1.038	1.049	0.839	0.943	21
France	0.094	8	0.969	17	1.036	0.999	0.879	0.957	14
United States	0.297	39	0.966	18	1.003	1.053	0.852	0.948	19
Slovakia	0.194	29	0.964	19	1.072	1.044	0.801	0.929	33
Israel	0.145	19	0.963	20	0.990	1.036	0.872	0.952	15
Denmark	0.052	4	0.962	21	0.990	0.980	0.916	0.962	11
Uruguay	0.364	50	0.960	22	1.050	1.107	0.761	0.913	41
Australia	0.137	16	0.957	23	0.990	1.051	0.842	0.941	24
Portugal	0.137	18	0.956	24	1.028	0.982	0.867	0.948	20
Hungary	0.218	32	0.956	25	1.076	1.008	0.806	0.931	30
United Kingdom	0.215	31	0.955	26	0.983	1.053	0.842	0.939	26
Viet Nam	0.297	40	0.952	27	0.974	0.962	0.921	0.952	16
Croatia	0.170	23	0.951	28	1.051	0.996	0.821	0.935	28
New Zealand	0.190	27	0.949	29	0.979	1.023	0.853	0.942	23
Jamaica	0.452	70	0.948	30	1.006	1.068	0.793	0.926	34
Thailand	0.357	48	0.947	31	1.047	0.977	0.832	0.933	29
Belgium	0.107	12	0.946	32	1.013	1.009	0.829	0.939	25
Rwanda	0.446	66	0.942	33	0.884	0.925	1.023	0.942	22
Romania	0.339	45	0.941	34	1.061	1.005	0.782	0.921	37
Netherlands	0.046	1	0.938	35	0.979	0.981	0.859	0.938	27
Brazil	0.455	71	0.936	36	1.054	1.037	0.751	0.909	43
Czech Rep.	0.137	17	0.936	37	1.031	1.017	0.782	0.921	36
Kyrgyzstan	0.374	53	0.936	38	1.104	1.023	0.727	0.899	51
Switzerland	0.050	3	0.930	39	0.993	0.929	0.872	0.930	31
Spain	0.110	14	0.930	40	1.027	1.012	0.774	0.918	39
Argentina	0.375	54	0.930	41	1.064	1.080	0.699	0.887	53
China	0.183	25	0.924	42	0.960	0.934	0.879	0.924	35
Ireland	0.175	24	0.924	43	0.994	1.019	0.778	0.918	40
Austria	0.103	10	0.923	44	1.007	0.926	0.843	0.921	38
Luxembourg	0.168	22	0.910	45	1.004	0.956	0.786	0.909	42
Namibia	0.468	74	0.910	46	0.865	1.036	0.841	0.899	50
Cyprus	0.118	15	0.905	47	0.985	0.915	0.822	0.905	44

Country	GII	GII rank	GGM	GGM rank	Ratio life expectancy	Ratio education index	Ratio labour force participation rate	Capped GGM	Rank
Peru	0.394	57	0.905	48	1.006	0.932	0.790	0.903	46
Ghana	0.523	86	0.904	49	0.899	0.827	0.995	0.904	45
Venezuela	0.452	69	0.904	50	1.024	1.104	0.653	0.868	60
Lao PDR	0.478	77	0.903	51	0.933	0.781	1.010	0.903	47
Japan	0.107	13	0.901	52	1.041	0.965	0.729	0.889	52
Tanzania	0.603	98	0.900	53	0.867	0.863	0.975	0.900	48
Tajikistan	0.355	47	0.899	54	1.049	0.936	0.741	0.885	55
Cambodia	0.448	68	0.899	55	0.919	0.896	0.884	0.899	49
Burundi	0.439	65	0.887	56	0.862	0.781	1.036	0.887	54
Greece	0.148	20	0.883	57	0.999	0.984	0.701	0.883	56
Italy	0.104	11	0.882	58	1.008	0.982	0.693	0.879	58
Bolivia	0.460	72	0.881	59	0.982	0.900	0.773	0.881	57
Philippines	0.431	61	0.878	60	1.051	1.035	0.623	0.854	63
Korea, Rep.	0.089	7	0.875	61	1.039	0.894	0.721	0.864	61
Kenya	0.566	95	0.875	62	0.878	0.873	0.873	0.875	59
Guyana	0.506	83	0.874	63	1.039	1.117	0.576	0.832	71
Lesotho	0.545	92	0.874	64	0.587	1.245	0.914	0.813	75
El Salvador	0.472	76	0.869	65	1.129	0.934	0.622	0.834	69
Cuba	0.332	43	0.864	66	0.977	1.048	0.631	0.851	64
Panama	0.498	81	0.863	67	1.005	1.057	0.605	0.846	66
Paraguay	0.468	75	0.863	68	0.978	1.000	0.657	0.863	62
Chile	0.364	51	0.853	69	1.026	0.990	0.610	0.845	67
Botswana	0.493	79	0.849	70	0.680	0.980	0.918	0.849	65
Malawi	0.542	90	0.839	71	0.765	0.804	0.960	0.839	68
Costa Rica	0.362	49	0.839	72	0.997	1.022	0.580	0.833	70
Colombia	0.479	78	0.837	73	1.063	1.015	0.543	0.816	74
Malaysia	0.275	36	0.822	74	0.985	0.991	0.569	0.822	72
Belize	0.497	80	0.817	75	0.950	0.980	0.585	0.817	73
Qatar	0.543	91	0.814	76	0.878	1.159	0.530	0.775	85
Mexico	0.438	63	0.808	77	0.997	0.968	0.547	0.808	76
Indonesia	0.448	67	0.802	78	0.952	0.878	0.618	0.802	77
Honduras	0.502	82	0.799	79	0.992	1.001	0.513	0.798	78
Sri Lanka	0.408	58	0.796	80	1.032	1.019	0.479	0.783	83
Guatemala	0.517	84	0.795	81	1.060	0.853	0.556	0.780	84
Malta	0.222	33	0.792	82	0.995	0.939	0.532	0.792	79
Mauritania	0.530	89	0.792	83	0.935	0.723	0.735	0.792	80
Mozambique	0.528	88	0.791	84	0.820	0.610	0.990	0.791	81
Senegal	0.525	87	0.787	85	0.886	0.757	0.726	0.787	82
Swaziland	0.559	94	0.780	86	0.638	1.023	0.728	0.775	86
Benin	0.546	93	0.765	87	0.944	0.551	0.862	0.765	87
Cameroon	0.601	97	0.759	88	0.832	0.801	0.657	0.759	88
Togo	0.466	73	0.728	89	0.913	0.564	0.748	0.728	89
Algeria	0.377	55	0.721	90	0.948	0.859	0.460	0.721	90
Bahrain	0.283	37	0.711	91	0.913	1.016	0.387	0.707	92
Iran (Is. Rep.)	0.433	62	0.709	92	0.966	0.830	0.445	0.709	91
Congo (DR)	0.631	100	0.698	93	0.868	0.592	0.661	0.698	93
Tunisia	0.259	35	0.685	94	0.982	0.876	0.373	0.685	94
Mali	0.646	102	0.673	95	0.837	0.660	0.553	0.673	95
Turkey	0.379	56	0.663	96	0.989	0.819	0.361	0.663	96

Country	GII	GII rank	GGM	GGM rank	Ratio life expectancy	Ratio education index	Ratio labour force participation rate	Capped GGM	Rank
India	0.567	96	0.659	97	0.938	0.723	0.422	0.659	97
Jordan	0.431	60	0.650	98	0.944	0.924	0.315	0.650	98
Morocco	0.439	64	0.622	99	0.987	0.711	0.343	0.622	99
Saudi Arabia	0.644	101	0.610	100	0.932	0.915	0.267	0.610	100
Niger	0.666	103	0.578	101	0.808	0.556	0.430	0.578	101
Pakistan	0.523	85	0.529	102	0.901	0.655	0.251	0.529	102
Yemen	0.687	104	0.485	103	0.936	0.450	0.271	0.485	103
Afghanistan	0.609	99	0.467	104	0.700	0.374	0.389	0.467	104

Source: Own elaboration based on the Human Development Report Office database.

Table 4. Three Versions of the GEM (2004)

	(1) UNDP's GEM	(2) Rank	(3) GEM2 (income shares)	(4) Rank	(5) GEM3 (ratios)	(6) Rank	(7) Sum rank GEM GDI	(8) Sum rank GGM GEM3
Norway	0.932	1	0.781	2	0.682	2	2	5
Sweden	0.883	2	0.805	1	0.784	1	7	5
Iceland	0.866	3	0.761	7	0.666	4	5	11
Denmark	0.861	4	0.764	6	0.664	5	19	15
Belgium	0.855	5	0.769	5	0.605	9	17	58
Finland	0.853	6	0.773	3	0.672	3	17	8
Netherlands	0.844	7	0.751	11	0.588	12	16	48
Australia	0.833	8	0.750	12	0.620	7	11	30
Germany	0.816	9	0.753	9	0.562	15	30	50
Austria	0.815	10	0.729	15	0.492	25	27	67
Canada	0.810	11	0.721	16	0.565	14	18	27
United States	0.808	12	0.653	33	0.463	31	20	49
New Zealand	0.797	13	0.770	4	0.635	6	33	25
Switzerland	0.797	14	0.696	19	0.475	28	24	57
Spain	0.776	15	0.740	14	0.519	21	34	87
United Kingdom	0.755	16	0.670	26	0.449	33	32	59
Ireland	0.753	17	0.613	44	0.391	45	21	96
Singapore	0.707	18	0.647	37	0.413	38	No GDI	No GGM
Argentina	0.697	19	0.749	13	0.599	10	52	66
Portugal	0.681	20	0.686	24	0.474	29	47	53
Costa Rica	0.675	21	0.751	10	0.541	20	64	106
Trinidad & Tobago	0.660	22	0.718	18	0.510	23	71	98
Israel	0.656	23	0.622	42	0.431	36	45	47
Italy	0.653	24	0.596	49	0.351	55	42	131
Lithuania	0.635	25	0.693	20	0.598	11	61	12
Namibia	0.623	26	0.721	17	0.555	17	121	94
Latvia	0.621	27	0.691	22	0.544	19	69	47
Czech Republic	0.615	28	0.622	43	0.396	42	57	80
Greece	0.614	29	0.598	46	0.372	49	52	113
Poland	0.610	30	0.666	28	0.507	24	64	56
Estonia	0.608	31	0.655	31	0.513	22	66	28
Slovenia	0.603	32	0.597	47	0.397	41	56	62
Croatia	0.602	33	0.666	29	0.479	27	74	72
Slovakia	0.599	34	0.643	38	0.471	30	71	64
Mexico	0.597	35	0.668	27	0.398	40	81	139
Tanzania	0.597	36	0.755	8	0.606	8	160	77
Bulgaria	0.595	37	0.692	21	0.549	18	82	45
Cyprus	0.584	38	0.564	58	0.352	54	66	100
Peru	0.580	39	0.679	25	0.443	34	107	95
Panama	0.568	40	0.666	30	0.462	32	88	105
Hungary	0.560	41	0.587	50	0.401	39	72	86
Japan	0.557	42	0.493	67	0.286	65	55	132
Macedonia, TFYR	0.554	43	0.653	34	0.441	35	98	109
Moldova, Rep. of	0.544	44	0.690	23	0.574	13	130	29
Philippines	0.533	45	0.654	32	0.555	16	112	87
Venezuela	0.532	46	0.637	39	0.482	26	107	86

	(1) UNDP's GEM	(2) Rank	(3) GEM2 (income shares)	(4) Rank	(5) GEM3 (ratios)	(6) Rank	(7) Sum rank GEM GDI	(8) Sum rank GGM GEM3
Honduras	0.530	47	0.652	35	0.391	44	137	124
El Salvador	0.529	48	0.636	40	0.376	48	125	126
Ecuador	0.524	49	0.647	36	0.424	37	No GDI	No GGM
Uruguay	0.513	50	0.596	48	0.368	50	90	98
Colombia	0.506	51	0.607	45	0.377	47	108	87
Chile	0.506	52	0.569	55	0.336	58	90	153
Korea, Rep. of	0.502	53	0.499	66	0.292	64	78	129
Botswana	0.501	54	0.568	56	0.319	60	153	175
Malaysia	0.500	55	0.563	59	0.303	62	107	147
Bolivia	0.499	56	0.633	41	0.389	46	143	109
Belize	0.495	57	0.585	52	0.348	56	No GDI	No GGM
Malta	0.493	58	0.502	65	0.267	67	88	171
Romania	0.492	59	0.585	51	0.395	43	109	65
Thailand	0.486	60	0.581	53	0.367	51	119	81
Brazil	0.486	61	0.579	54	0.353	53	117	107
Russian Federation	0.482	62	0.565	57	0.364	52	113	69
Ukraine	0.455	63	0.562	60	0.319	59	126	79
Georgia	0.407	64	0.524	61	0.314	61	No GDI	No GGM
Mongolia	0.388	65	0.522	62	0.347	57	153	127
Pakistan	0.377	66	0.479	69	0.248	68	172	211
Bangladesh	0.374	67	0.504	64	0.267	66	170	173
Cambodia	0.373	68	0.517	63	0.300	63	166	100
Sri Lanka	0.372	69	0.479	68	0.235	69	138	175
United Arab Emirates	0.353	70	0.308	73	0.000	74	114	207
Iran, Islamic Rep. of	0.326	71	0.409	70	0.177	70	146	181
Turkey	0.289	72	0.368	71	0.163	71	144	206
Egypt	0.262	73	0.344	72	0.135	72	No GDI	No GGM
Saudi Arabia	0.242	74	0.262	74	0.000	75	147	223
Yemen	0.128	75	0.241	75	0.064	73	193	219

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