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Inclusiveness Index*

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What is Inclusive Development?

Introducing the Multidimensional Inclusiveness Index

Christoph Dörffel*, and Sebastian Schuhmann**

Abstract:

Despite successes in mitigating global poverty, there is a growing objection against addressing development policies in many countries fed by the feeling of growing inequalities. Thus, development should be more “inclusive”. The purpose of this paper is to address two major shortcomings of previous literature: First, a lacking agreement about what constitutes inclusiveness. Although the concept overall is not unambiguous, we show it needs to be human-centered at its core. Second: A suitable measurement for development. Prominent previous approaches like the Human Development Index (HDI) and Inclusive Development Index (IDI) have major conceptual drawbacks and lacking data availability. We create the Multidimensional Inclusiveness Index (MDI) that we deem conceptually more appropriate and that is available for a 50% larger sample than the HDI. The MDI is calculated in three versions for up to 171 countries for the years 1960-2018. For the aggregation of the two subindices that constitute the MDI - one on development equity and one on absolute development achievements - we avoid value judgements by applying principal component analysis. Subsequently, we chose a geometric aggregation method to calculate the MDI. We show that the MDI captures regional development patterns and that major events such as regime changes or genocides are reflected in country trends. Despite correlations resulting from the similarities in the data included, the larger set of information included in the MDI provide new insight when compared to the HDI, GDP or IDI data; its data availability is much larger compared to the HDI and IDI. The distinction into achievements and equity subindices delivers important information to disentangle countries' performance in both dimensions. In the 2018 MDI ranking, top ranks are dominated by European countries, many Sub-Saharan African countries can be found on lower ranks. Over time, the global averages for all three MDI versions are increasing. This positive trend is largely driven by improvements in the achievements dimension. Equity consideration deserve a stronger emphasis in development concepts. However, last years' trend in the equity dimension are optimistic.

Keywords: index, multidimensional, inclusiveness, inclusive development

JEL-Classification: O15, C43, P48

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1 Introduction

Probably the most widely accepted global policy framework for thinking about the issue of inclusive development is the United Nations concept of Sustainable Development Goals (SDGs). These provide a detailed set of frameworks, goals and indicators for galvanizing global action in support of development that delivers more sustainable and more inclusive¹ outcomes. However, they range widely, from planetary sustainability (i.e., the environment) to poverty reduction. Specific policy choices remain rather unspecified.

One important merit is that they brought a large number of development objectives that had not received this attention before onto the political agenda. The SDGs suggest to apprehend development on a broader, more inclusive scale. Other than just income-related variables must be targeted. There has been agreement that income has no intrinsic value for human well-being. It is rather an intermediate means to promote other factors that are relevant for well-being. That is why development strategies focused on economic growth can be too myopic to encompass all areas of human life when income growth is generated at cost of other factors that needed for well-being. While economists have been concerned with development for centuries, broader development concepts and human-centered approaches of well-being are relatively new.

To measure more inclusive human development, the most acknowledged analytical framework is the Human Development Index (HDI) which comprises the dimensions of income, schooling and health. Another, more recent approach is the Inclusive Development Index (IDI). Both indices have been used by empirical studies, e.g. by Georgescu and Herman (2019) to analyze the determinants of productive employment in the European Union. They find that high levels of inclusivity and sustainability (measured by the HDI and IDI) can be explained by higher labor productivity, an efficient sectoral structure of employment and better social safety nets for workers. The same two indices have also been used by Prada and Sánchez-Fernández (2019) to investigate the relationship between wealth and development when using different development indicators. They highlight that the selecting and weighting method of indicators for wealth within a composite indicator is extremely important for the ranking the indicator will produce. Furthermore, the IDI has been used by Draper et al. (2018) to analyze differences in inclusive development between G20 and non-G20 countries. They find evidence that G20 countries succeed better to improve peoples' inclusiveness than non-G20 countries. Furthermore, the HDI has been used in empirical studies by Seth and Villar (2017) to analyze the nexus between human development, inequality and poverty. They stress the importance of inequality and additional dimensions of poverty to conceive patterns of human development.

While both indices analyze important aspects of inclusive development, they still have shortcomings. The HDI does not fully capture the broadness of the concept of inclusive development since it is based on only three dimensions. It fails to specifically address the inequality dimension (as noted e.g. by Sagar and Najam (1998)) and, as McGillivray (1991) argues, suffers from redundancies because its subdimensions are highly correlated with each other². This can be problematic as they both deliver little additional information with respect to each other and can cause biases because single information are weighted too heavily. The IDI on the other hand, tries to resolve these issues by increasing the number of variables and by explicitly including indicators for environmental quality and

¹ A definition and discussion of the term inclusiveness will be provided in the Section 2.1

² Surely, there are countries where the correlation is less distinct. One can think the health and income dimensions in Cuba or South Africa.

inequality (World Economic Forum, 2017). However, the IDI's limitation is data availability which prevents analysis in panel settings.

We try to resolve this by taking a middle ground. The Multidimensional Inclusiveness Index (MDI)³ extends the dimensions compared to the HDI but is also available for a large set of countries and a longer time frame than the IDI. We include a larger set of data on environmental, productivity and demographic development and inequality. Our MDI data set covers 171 countries and a time frame of 1960-2018. Similarly to Anand et al. (2013) who distinguish between income growth and income inequality, we disentangle the development achievement and equity dimension. Therefore, we evaluate their impact on inclusive development distinctly. Methods used by Dreher (2006) and Gygli et al. (2019) for creating the KOF Globalization Index and Gwartney and Lawson (2001), the Economic Freedom Index as well as (Nardo et al., 2005) guided us in the creation of the MDI. Because many of the variables included to measure inclusive development are highly correlated, we use the statistical principle component analysis (PCA) method to avoid biases in the aggregation process of the overall index.

Due to its aggregated nature and larger set of variables, the MDI does not allow specific policy advice. We are careful to make any claims in this regard. However, it allows researchers to empirically assess the factors that influence inclusive development and its main subdimensions, development achievements and equity. A first attempt is made by Dörffel et al. (2020) who look at the main drivers of inclusive development. Additionally, researchers can assess the impact of inclusive development on other, e.g. growth or political outcomes.

In chapter 2, we provide a discussion of inclusive development as this motivates the set-up for the MDI. Furthermore, we provide a brief discussion of the HDI and IDI as two previous attempts to measure development in a broader scale. In section 3, we introduce the MDI and explain the construction of its three versions in detail. An overview over the index data and several illustrations highlighting the usefulness of the MDI will be presented in chapter 4. Chapter 5 gives a brief suggestion for potential fields of application for the index before chapter 6 concludes.

2 Measuring Inclusive Development

2.1 Defining Inclusive Development

The concepts of inclusive development still lacks a clear-cut definition. We claim that inclusive development comprises both, a fair distribution⁴ and preferable development returns. As Anand and Sen (1994) argue, development should be human-centered. The reason is that humans are both the end as well as the means of development (Anand and Sen, 2000). All development measures and policies are to serve the human and their life quality. Therefore, looking only at growth rates and gross domestic product (GDP) does not depict the whole picture of inclusive development (Nordhaus and Tobin, 2018; Stiglitz et al., 2009). The levels of income and stock of (material) do not allow inferences about a human's individual preferences and to what extent they are satisfied. Therefore, they can only be intermediate goals with instrumental value.

³ As introduced in section 3.

⁴ The definition about a fair distribution is highly normative. It cannot be the objective of an economic analysis to assess the fairness of a distributional outcomes. However, we can assess that there is a general agreement about an income distribution fulfilling certain criteria for being perceived as fair. One of these criteria is that differences in income are justified on the ground of differences in skills and effort rather than the outcome of rigid structural discrimination of certain members of society. Recently, increasing opposition can serve as an indicator of increasing discontent about decreasing fairness of distributional outcomes.

Talmage and Knopf (2017) define inclusiveness as a “community outcome that results from methods of inclusion that utilize diversity as a resource”. In this light, inclusiveness shows the scale of “inclusion of all individuals and groups, specifically individuals or groups who were previously not included or excluded” (Talmage and Knopf, 2017). This goes along with the appreciation of the diversity in personal characteristics and life plans. The term “inclusive” suggests that individuals have equal access to the social, political and economic mainstream and chances to participate to assert their preferences. This normative aspiration requires all parts of society to benefit from development and that no person will be left behind.

Thereby, inclusive development is somehow related to equality but both concepts are not the same. A society with a highly unequal distribution that impairs access and participation can hardly be perceived as inclusive. Material inequalities may be justified, however, as long as they only represent of different preferences among members of a society. These inequalities do not impact the individuals’ life fulfillment. When considering goods and means for the satisfaction of basic human needs, individual preferences are more homogenous. Especially, when it is about meeting minimum thresholds to secure human survival.⁵ Here, vast inequalities are harder to justify. On the other hand, a just distribution in a society will not necessarily ensure a high level of inclusiveness. When all individuals are equally poor, they are still constrained in pursuing their life plans.

Inclusive development has a consistent relation to sustainable development. In the “Brundtland Report” (World Commission on Environment and Development (WCED), 1988), sustainable development is defined as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.” This highlights the importance of intertemporal considerations and protecting the environment in a prospective way. As per definition of the United Nations (2005), this addresses economic, social and environmental dimensions. All three dimensions are mutually reinforcing and intertwined.

As a result of previous considerations, scholars have been driven by the attempt to introduce development approaches that address also non-monetary aspects of wellbeing. Probably, the most famous – and pioneering - example to measure inclusiveness is the HDI introduced in the United Nations Human Development Report in 1990. It is based on the popular capabilities approach, which claims that every person must be provided with the freedom and the capabilities to pursue the life they want to live (Sen, 1999, 1992). If policies, for whatever reason, marginalize or contribute to the persistence of existing marginalization of persons or groups, then there are individuals who are denied the capability to lead the life they want to. It is argued that certain variables allow people to increase their functionings (doings and beings) and that the ability to choose between alternatives has an intrinsic value for their well-being. The HDI captures basic functionings and capabilities to choose these functionings. However, neither HDI nor the capability approach explicitly state anything about the distribution and sustainability of development.

As of the early 2000s, most of the discussions on inclusive development have remained more narrowly addressing mainly economic growth dimensions, as the pro-poor growth approach suggests. They emphasized the importance to induce growth that will benefit the poorer parts of society (Ravallion and Chen, 2003). Hence, pro-poor growth seeks to mitigate income poverty. While absolute pro-poor growth calls for the highest growth rates for the poorest members in society, the relative definition of pro-poor growth deems positive growth rates for the poorest members of society as legitimate even if richer segments benefit relatively more. With decreasing world poverty, global inclusiveness is on the rise. Lakner and Milanovic (2013) show that in the 20 years from 1988-2008 income growth had

⁵ Examples for these goods are accommodation, food required for basic nutrition, basic education like reading skills, clothes, access to basic medical care etc.

been the highest in the lower and middle components of the global income distribution and below average in the “richer world”. Chen and Ravallion (2013, 2010) point out that this improvement was mostly driven by the astonishing catch-up processes in India and China. In the period from 1981-2005, the percentage of people living on \$1.25 or less per day declined from about 60% to about 40% in South Asia, in East Asia from almost 80% to under 20%, while in Africa it remained at around 50%.

Klasen (2010) suggests an approach that looks at all people, also those above the poverty line. His approach, however, puts an emphasis on the distributional outcomes of growth. While for long the outcome dimensions of growth have been of main interest, Klasen (2010) turns the focus to the growth process itself, i.e. the extent to which large groups of the society parts are able to access and participate in the economic mainstream.

Even inclusive growth comprehends solely income dimensions. To capture inclusiveness on a broader scale, non-income dimensions must be acknowledged. This brings about the discussions on inclusive development. Rauniyar and Kanbur (2010) trace the evolution from growth to inclusive development in two steps: First, by anticipating within-society inequalities and, second, by including non-income dimensions like social participation and environmental protection. “Inclusive development emphasizes the social and environmental aspects of sustainable development” (Gupta et al., 2015). The African Development Bank highlights that inclusive growth comes through poverty reduction enabled by economic, social, spatial and political inclusion (African Development Bank Group, 2013). According to the World Bank, any growth strategy can only be successful when benefiting equity, equality of opportunities and social protection (World Bank and Commission on Growth and Development, 2008). The Asian Development Bank puts a decided emphasis on the empowerment of those that have been marginalized on the grounds of gender, ethnicity or race (Asian Development Bank, 2014). Yet, social dimensions have dominated but a more profound acknowledgment of ecological dimensions seems required as the poorer members of society are more opposed to environmental systems (Fairhead et al., 2012).

Most definitions remain indistinct and difficult to operationalize. Some authors claim that inclusiveness is an elusive concept and that full inclusiveness can never be achieved (Teichman, 2017). He sees it as an illusory benchmark that serves as a benchmark to align policy frameworks. As the societies develop and face new challenges, the concepts for inclusive development need to be adjusted accordingly. This is an “adaptive learning process, which responds to change and new risks of exclusion and marginalization” (Gupta et al., 2015). Given the current dissatisfaction with development concepts⁶, claims for more inclusive development have persisted. One such claim is premised on what the “Inclusive Growth and Development Report” (World Economic Forum, 2017) characterizes as “secular stagnation”, particularly of Western societies. In the authors’ view, there are three drivers of this stagnation: (i) rising within-country inequality; (ii) structural fiscal challenges due to long-term demographic changes and simultaneously growing debt issues in many western countries; and (iii) (expected) employment disruptions and income distribution shocks due to information-fueled technological disruptions.

Addressing these problems is crucial as “people do not isolate the different aspects of their lives. Instead, they have an overall sense of well-being” (United Nations, 1990). Therefore, we need an index that takes a holistic perspective and draws a comprehensive picture of human development.

In our view, inclusive development comprises both aspects of process-inherent participatory empowerment as well as outcome-related attainments. In the past decades, there has been much

⁶ Culminating in populist movements in many parts of the world accompanied by anti-globalization and anti-trade sentiments.

progress with respect to development outcomes, especially economic growth. Nevertheless, distributional concerns have become a pressing problem in many countries. Generally, the focus of policy debates has lately shifted towards the promotion of equal access to assets that are required for wealth creation (Ngepah, 2017). Assigning single variables to either the process or outcome dimension can be somewhat vague and ambiguous. This makes it a difficult task to disentangle both dimensions. The distinction between a distributional dimension and one of absolute development achievements is more feasible.

We suggest this definition: Inclusive development is societal progress (development) that incorporates participatory empowerment of citizen and promotes well-being related outcomes in accordance with sustainability of societal foundations (institutions and environment).

2.2 Previous propositions the measurement of inclusive development

As suggested in the previous section, inclusive development is multidimensional and complex. The discussions of its measurement are ongoing. Our aim is to create a development index that allows the comparison of countries with heterogeneous characteristics. Constructing a composite index is difficult as it must adequately consider the structural differences between countries, especially high and low income countries.⁷ Also, the sophistication of certain variables constitutes a bottleneck manifested by limited data availability especially for less developed countries like small island developing states (Blancard and Hoarau, 2013). Yet, the literature provides indices that were developed for specific country groups, e.g. by Blancard and Hoarau (2013). We still lack a convincing index for inclusive development on the global scale.

This section provides a discussion of two earlier attempts of development indices, namely the HDI and the IDI by the World Economic Forum (WEF). The HDI was the early attempt of a comprehensive index for comparison of development across countries addressing non-income aspects. It is calculated from three indices, one for income, health and education each ranging on a unit-free [0, 1] scale. The choice of variables and computation method for the indices and HDI itself has been extensively motivated by the authors and also criticized by others (see Kelley, 1991, McGillivray, 1991 and Sagar and Najam 1998). This has led to several adjustments since the HDI establishment. For example, the first version of the HDI in the 1990 Human Development Report was designed as a measure of economic shortfalls as compared to the best performing country. Only in the subsequent years the set-up of the index was changed to measure the development achievements. Until 2009, the HDI used an arithmetic aggregation method with equal weights for all three indices. Since 2010, an equally weighted geometric aggregation mean has been applied.⁸

From the beginning, p.c. gross national income (GNI) has been included as income variable into the HDI. Also here, income is perceived as an intermediary target and “proxy measure for the choices people have in putting their capabilities to use” (United Nations, 1990) that were not sufficiently depicted by the other two variables. To address the assumedly decreasing marginal utility of income, the HDI uses the natural logarithm of p.c. GNI. The HDI health variable is the average expectation of life in years. Currently, the education variable is the expectation of average years of schooling. Until 2008, the education indicator was calculated from the share of population with basic literacy skills and the share of gross enrollment. In 2009, this was replaced by an education index comprising the average years of schooling for a 25 year old person and expected years of schooling for newborns.

⁷ As defined by the World Bank.

⁸ The different sensitivity of the HDI scores with regard to a compensability of low scores in subindices by high scores in other subindices is subject to normative judgements and causes differences in the country scores.

The choice and adjustment of all variables included indicates that the HDI was originally developed to measure achievements in the satisfaction of basic human capabilities. For the calculation of the indices, the authors selected (lower and) upper boundaries. All data beyond those boundaries were curtailed. Therefore, countries could not attain better scores for value above these thresholds. It is clear that the scores of a country are determined by the choice of the boundaries and that this choice is arbitrary. The dilemma of the HDI is that it fails to address the heterogeneous nature of capabilities and demands for subjective well-being in various categories of countries. People in high income countries may have more refined needs so other capabilities matter more than they do in low income countries. To make the comparison of countries based on the HDI more convincing, it may be useful to think about new categories or the assignment of new variables. This seems necessary as basic capabilities have been increasingly served in large parts of the developing world over the past decades.⁹ Even, when choosing other variables for the three incumbent categories, the HDI does not capture distributional aspects¹⁰ and environmental sustainability. Applying Rauniyar and Kanbur's (2010) logic, the HDI can only be regarded as a development index but does not qualify as a comprehensive inclusiveness measurement.

A second approach was delivered by the WEF. The IDI¹¹ captures intra-society concerns on a comparative basis presenting cross-sectional data as well as data on five-year changes. In searching for solutions to what are profound structural problems, the WEF claims that a reassessment of national performance may be needed which should be based a new development concept that addresses a larger set of objectives.

This leads to their elaboration of an “Inclusive Growth and Development Framework” comprising institutional, structural and fiscal aspects.¹² This framework underpins the development of the IDI which consists of 12 variables which are grouped into three domains:

1. Growth and Development
 - GDP p.c. (per capita)
 - Labor productivity
 - Healthy life expectancy
 - Employment
2. Inclusion
 - Net income Gini
 - Poverty rate¹³
 - Wealth Gini
 - Median income

⁹ Mainly with the exemption of African states.

¹⁰ Since 1991, an Inequality Adjusted Human Development Index (IHDI) has been published by the United Nations Development Programme as addition to the HDI. However, there has been an interpolation of missing data and changing methods used for the calculation.

¹¹ As an amendment of the WEF's Inclusive Growth and Development Report 2015 (Samans et al., 2015), the current IDI was first established in the WEF's The Inclusive Growth and Development Report 2017 (World Economic Forum, 2017).

¹² The seven pillars mentioned comprise: education and skills, basic services and infrastructure, corruption and rents, financial intermediation of real economy investment, asset building and entrepreneurship, employment and labor compensation, and fiscal transfers.

¹³ The Poverty rate has different definitions for “advanced” and “emerging” economies (relative and absolute poverty).

3. Intergenerational Equity and Sustainability

- Adjusted net savings¹⁴
- Carbon intensity of GDP
- Public debt
- Dependency ratio (non-working age/working age population).

The IDI summarizes these National Key Performance Indicators. All quantitative data indicators are converted to a 1-to-7 scale using a linear min-max transformation (worst to best). Thereby, it is possible to aggregate the data from the indicator up to the index level. For outliers, a benchmark is applied to reduce the bias on the arithmetic mean of the whole sample. That is how the order of, and the relative distance between, country scores is preserved to allow for unbiased comparison. Thereby, the IDI provides a useful contribution and extends the perspective beyond those domains previously covered in the HDI. The IDI framework is more comprehensive with regard to inclusiveness and comprises a larger number of variables. This enables better assessment of inclusive development outcomes across different institutional setting (see Draper et al., 2018).

However, the WEF IDI has certain weaknesses that confine the validity and persuasiveness. Those weaknesses are related to the construction set-up as well as the choice of variables included. First, it is not comprehensible how the lower and upper boundaries are defined. This complicates the interpretation of the differences in the country scores in the single variables. Neither is it transparent whether all National Key Performance Indicators are weighted equally in the aggregation of the single variables. Second, despite the large number of sub-indicators, the IDI fails to consider all aspects relevant for inclusive development. Contrary to the HDI, it does not include a measure for education. Therefore, it cannot fully capture cognitive capacities that are important for human capital, social interaction and the development, denomination and preservation of individual preferences. The data on median income and income Gini as well as GDP p.c. and labor productivity are highly correlated.¹⁵ Including both variables in each case translates into too heavy weighting of single information and a bias in the overall index (Nardo et al., 2005). The IDI includes two variables on savings (debt and savings) which comprise similar information. An (assumed) equal weighting leads to a bias here, again. Due to its aggregation method, one cannot distinguish between the contributions of the three subdimensions, especially the development and equity dimensions, which prevents a detailed analysis about the performance of countries in these dimensions. Third and most importantly, the data availability of the IDI does not allow rigorous empirical usage and the analysis of development trends. It offers cross-section data for 2017 and 2018 plus respective five-year trends. This time frame is too short to conduct profound analysis of long-term development.

The HDI and IDI are to our knowledge the most prominent attempts to develop an index on inclusive development. However, there has been a list of other authors offering alternative approaches that have not been widely accepted in the literature though. McKinley (2010) constructs an inclusive growth index, including variables on human capabilities such as education and health as well as and employment and inequality measures. Covering the dimensions of education and health seems reasonably entrenched since the establishment of the HDI. Anand et al. (2013) deliver another approach that is not widely acknowledged, important to our work though. They define inclusive growth as the product of growth rates and equity. Thereby, they are able to disentangle the development and

¹⁴ Adjusted net savings are defined as “net national savings plus expenditure on education and minus depletion of energy, minerals, and forests, and damage by particulate emissions. Carbon damage has been excluded from the calculation” (World Economic Forum, 2018).

¹⁵ The Pearson correlation coefficients of the variables concerned are 0.60 and 0.90 respectively.

inclusiveness (distributional) outcomes. Their cross-country analysis covers 143 countries for the time period between 1980 and 2010. This allows to reveal long-term dynamics which is not possible with the IDI. The patterns differ largely across countries, with countries like India having higher economic growth but increasing income inequality while countries like Kenya show lower economic growth rates but more equal income distribution. We claim that both dimensions matter for social mobility and inclusive growth. Therefore, it is important to address both with appropriate policy choices. However, as suggested by the Kuznet's curve, there might be a potential trade-off between economic growth and equality. That is why it is useful to disentangle both dimensions to have a clear picture about the development patterns and net effects in a country.

3 The Multidimensional Inclusiveness Index

Given the shortcomings of earlier development indices and the growing relevance of the matter, there is an urgent need for a convincing index. We attempt to fill this gap by developing the MDI to capture development on a comprehensive scale and for a longer timeframe. The construction and all aspects with regard to country coverage and timeframe will be explained in detail in this section. Our approach embraces the selection of the IDI indicators but is conceptually affiliated to earlier works that differentiate explicitly between absolute achievements and equity. One example is Kakwani's and Son's (2008) paper on an alternative growth rate including the income distribution, the second is Anand et al. (2013).

3.1 Subindices and selection of variables

We broaden the perspective from inclusive growth to inclusive development. As described above, this urges us to consider a large number of aspects and factors that matter for fulfilling individual life goals. Therefore, we face a trade-off between being parsimonious, i.e. keeping the construction and interpretation of results simple, and including a bigger amount of indicators increasing the richness of information but renouncing simplicity and communicability (Abson et al., 2012). This has been a fairly familiar problem as "too many indicators could produce a perplexing picture" (United Nations, 1990). Our aim is primarily the measuring and monitoring of human development. We include a variety of variables that are representative and meaningful. However, data availability is still a major constraint to the selection of variables on a balanced range.

We construct the MDI as the product of two subindices, one on development achievements and the second on development equity: $MDI = I_E * I_A$, where MDI denotes the overall aggregated Multidimensional Inclusiveness Index, I_E denotes the subindex in the equity dimension and I_A is the subindex in the achievements dimension. This specification allows to us capture the overall concept of inclusive development for which distributional outcomes as well as development achievements matter. It enables us to disentangle the distinct impact of the subindices on the overall index.¹⁶

The following two subsections describe our rationale for variable selection and a description of the data we include. Section 3.1.3 provides an explanation of the three different versions of the MDI that we commute due to data limitations.

3.1.1 The equity dimension

As discussed in section 2.1, inclusive development is related to equality. Since data on distributional outcomes are scarce, we are somewhat limited in our choices. Like most studies that address inclusive

¹⁶ We acknowledge that both subindices can interrelate as theoretically as well as empirically there are arguments about a correlation between economic growth and inequality within countries (Sagar and Najam, 1998).

growth, we first include income inequality (measured by the national income Gini) into our equity index. This is the most important variable because income has shown high correlation with life satisfaction (Deaton, 2008). Therefore, we are confident that this variable is an important proxy for how equitable well-being is distributed within a country.

As an alternative to the Gini coefficient, one could consider to look at the performance of the top and bottom 20%. Thereby, the focus would be on the most vulnerable part of society (Sagar and Najam, 1998). The Gini coefficient does not allow too much inference in this regard as the score does not show the percentile distribution and decomposition for inequalities within and between groups in the overall society (Anand, 1983). Our measures, however, consider all parts of society and are therefore more representative.

However, income alone does not tell the whole story of development. To cover additional aspects of equity, we include data on national distributions for wealth, education and health. Unlike income and wealth, the latter two have an intrinsic value for human well-being. Including these data gives genuine insight. Our elaboration is in line with the United Nations' HDI as, except of wealth, three of them (leaving out wealth) correspond to the dimensions covered in the HDI.

Comprehensive data on the distribution of development outcomes are less prevalent.¹⁷ For the income Gini, the Standardized World Income Inequality Database (SWIID) offers the most comprehensive data (Solt, 2019). The Wealth Gini has been estimated in the Credit Suisse Global Wealth Reports since 2010 (Credit Suisse, different years). We used these estimations for our analysis. Data on both education inequality and health inequality have been provided by the United Nations Development Programme (UNDP) in the Human Development Reports since 2010 (United Nations Development Programme, 2020). These inequality measures use the Atkinson Inequality Index method.¹⁸

3.1.2 The achievements dimension

To measure development achievements, we employ the WEF IDI set-up as a conceptual basis for the selection of variables in the achievement index. However, we choose to (1) resign from the structure of the three subdimensions and (2) adjust the selection of variables.

First, we include p.c. GDP. This is a proxy for income per person.¹⁹ Similar to the authors of the HDI, we claim that income is required to cover the expenses for basic human needs. This indirect measure has certain drawbacks as a conversion is very complicated given the assumed marginal return of income to well-being which could lead to insignificant marginal effects of income increases above a certain level. Second, it was argued that income will only translate into higher human well-being when it exceed a certain minimum. Below this threshold, income can only serve to satisfy basic human needs which can hardly be considered as human well-being (Sagar and Najam, 1998). Another problem of income as indicator for human well-being is that people differ with regard to their preferences and requirements to assert individual functionings. Some people have "more expensive" preferences and requirements. Therefore, the same real income can result in distinct satisfaction of needs. This is the case both within and between countries as well as across time. Acknowledging these problems (of conversion), we nevertheless conclude that monetary income matters for human well-being.

¹⁷ Many sources provide incomplete data; often the data are available for a short timeframe only.

¹⁸ In their computation, Atkinson Inequality measures contain an inequality aversion parameter which depending on choice assigns different weights to observations. This approach can be reasonable if it renders social norms shared by the population. However, it is highly normative.

¹⁹ Using GDP as an income proxy has its advantages and disadvantages, as discussed in detail e.g. in Dollar and Kraay (2002, p. 199). However, it is common in the literature. It is also common to log variables that are log-linear, of which GDP p.c. is one example.

Matching the distributional data in the equity dimension, we add the corresponding variables for development achievements in the wealth, health and education area. The selected variables here are gross domestic savings (as fraction of GDP), life expectancy at birth, and human capital.

Following (World Economic Forum, 2017), we include labor productivity and the employment ratio. Labor productivity is the output per worker and captures how technically advanced a country is, which is arguably a natural indicator for development achievements. The employment ratio indicates the fraction of the population that is formally employed. Employment is a main source of income but also serves other purposes like allowing people access to social capital or increasing subjective well-being (Winkelmann, 2009).

Since inclusiveness is related to sustainability, we include measures capturing sustainability outcomes in countries. Addressing the conventional three dimensions of sustainability, we select adjusted net savings as proxy for financial sustainability, the dependency ratio as proxy for demographic sustainability and carbon intensity of GDP (CO₂ emissions per \$ of GDP) as proxy for environmental sustainability. Since environmental sustainability is exceptionally important and an increasingly pressing issue in our times, we include natural resource depletion in percent of the GNI, i.e. how much of a nation's income is generated by depleting existing natural resources as second environmental indicator.²⁰ It carries information different from carbon intensity. Therefore, we deem it a useful addition.

The World Development Indicators (WDI) database of the World Bank offers very rich data on development. For our purposes, we used the WDI data on GDP p.c., gross domestic savings, life expectancy at birth, labor productivity, employment ratio, adjusted net savings, dependency ratio, carbon intensity of GDP and natural resource depletion. As a proxy for educational achievements, we use the human capital index from the Penn World Tables 9.1 (Feenstra et al., 2015) which approximates the average years of schooling in the population.

Our variable selection is not immune against criticism. One could think about the inclusion of additional variables, e.g. public debt or alternative measures for environmental performance like the carbon footprint as applied by (Blancard and Hoarau, 2013). All too often, data constraints impeded our efforts. While sometimes, data were not available at all, in other cases the underlying definition were uncertain and, therefore, obstructed an unbiased comparison. Other authors claim that well-being is highly subjective. Therefore, claims have arisen that a comprehensive human development index should incorporate subjective well-being indicators (Otoi et al., 2014). We are confident that our selection of variables finds an appropriate compromise between covering the range of relevant domains and keeping the index construction operationalizable.

3.1.3 MDI versions: basic, equity plus and achievements plus

Because of data limitations in both the equity and the achievements dimension, we decide for three versions of the MDI which differ with regards of variables included. Thereby, they offer different insights and serve different research interest. We call them “MDI basic”, “MDI equity plus” and “MDI achievements plus” respectively.

²⁰ Alternatives are: total greenhouse gas emissions (in kilotons) or the share of renewable energy production/consumption of total energy production/consumption. We decide against the first because the kt amount of emissions from countries is non-informative because of different country sizes. Scaling it by population size or GDP leads to a variable similar to the one that is already included (CO₂ emissions per \$ of GDP). We decide against the second, because the data provided by the International Energy Agency includes nuclear energy in the category of renewable energy. This may not be in line with the general understanding of environmental sustainability.

The **MDI basic** has the largest sample but is therefore based on the narrowest set of variables. The set of variables contains the income Gini in the equity dimension and GDP p.c., savings, life expectancy and human capital in the achievement dimension.

$$MDI_{basic} = I_E * I_A = I_E(Gini_{Income}) * I_A \begin{pmatrix} GDP\ p.c., \\ savings/GDP, \\ life\ expectancy, \\ human\ capital \end{pmatrix}$$

The **MDI equity plus** provides an extension in the equity dimension, i.e. we include more variables to measure the equity subindex compared to the MDI basic. These variables are the wealth Gini, health inequality and education inequality. These four variables together capture the distributional aspect of the inclusiveness concept more adequately.

$$MDI_{equity\ plus} = I_{E+} * I_A = I_{E+} \begin{pmatrix} Gini_{income}, \\ Gini_{wealth}, \\ Gini_{health}, \\ Gini_{education} \end{pmatrix} * I_A \begin{pmatrix} GDP\ p.c., \\ savings/GDP, \\ life\ expectancy, \\ human\ capital \end{pmatrix}$$

The **MDI achievements plus** provides an extension in the achievements dimension, i.e. we include more variables to measure the achievement subindex compared to the MDI basic. These are labor productivity, employment ratio, adjusted net savings, dependency ratio, carbon intensity of GDP and the natural resource depletion. These six additional variables together capture the overall conceptual goal of the achievements index more adequately.

$$MDI_{achievements\ plus} = I_E * I_{A+} = I_E(Gini_{Income}) * I_{A+} \begin{pmatrix} GDP\ p.c., \\ savings/GDP, \\ life\ expectancy, \\ human\ capital, \\ labor\ productivity, \\ employment\ ratio, \\ adjusted\ net\ savings/GNI, \\ dependency\ ratio, \\ carbon\ intensity\ of\ GDP \\ nat.\ res.\ depletion/GNI \end{pmatrix}$$

3.2 Method of calculation of the Multidimensional Inclusiveness Index

The Multidimensional Inclusiveness Index is based on 14 variables, which are aggregated into two subindices. Subsequently, both subindices are aggregated into the MDI. We distinguish between the three aforementioned MDI versions. We additionally supply the two subindices in their respective extended forms, i.e. an equity index plus and an achievement index plus. Hence, we offer a total of five indices.

The MDI basic is calculated for up to 171 countries and each year in the timeframe 1960-2018.²¹ The selection of countries is based on the definitions used for the World Bank data base. The availability of the MDI equity plus and the MDI achievements plus as well as the subindices differs due to the data availability.

²¹ Because of the aggregation method (section Weighting and Aggregation), the MDI cover less countries for some years, e.g. in 1980 it covers 129 countries, in 1995 162 countries, in 2008 the maximum of 171 countries.

3.2.1 Imputation

Due to the long timeframe and large number of countries, there are missing observations for several variables. We follow Gygli et al. (2019) and impute missing observations within a series by using linear interpolation. Missing observations at the beginning or the end of a series are substituted by the timewise closest observation that is available. This means that the earliest available value is carried backward until the beginning of the series and the latest available value is carried forward until the end of the series. Missing data tends to be more prevalent in the earlier years. This implies that data coverage has improved over time.

Table 1: Data coverage (fraction of countries for which data is available)

	1960-69	1970-79	1980-89	1990-99	2000-09	2010-18
Imputed	84.9%	84.9%	84.9%	84.9%	84.9%	84.9%
No imputation	25.2%	33.1%	40.1%	57.4%	63.3%	77.0%

As shown in Table 1: Data coverage (fraction of countries for which data is available), the share of missing observations that were extrapolated is considerable, especially in earlier years. While, on average, for the 1960s only about a quarter of the total data is available, the data coverage for the 2010s is more than three quarters. With our imputation method, we can increase the data availability to 84.9% over the whole time frame. Especially for the 1960s, this is a striking improvement. We argue that the extrapolated data is better than having no data. Even if the specific value of the extrapolated data does not reflect the true data points, the scores of countries and in the variables and its consequential index rank are less fluctuating over time. Therefore, this extrapolation carries valuable information and gives an approximation of the unobserved true values even if the data are available for other time periods only. Since we extrapolate naïvely, the index for a country is simply kept constant over time. As soon as the aggregated index value for a country changes over time, this reflects real changes in the actually observed data.

The starting point of the MDI is determined by the earliest time period in the underlying cross-country data. This is mainly determined by the World Development Indicators database which starts in 1960 and the income Gini database also starting in 1960. Because of the large proportion of extrapolated data, there is not much variation in the MDI in early years. Thus, a starting point at a later point would also be conceivable.²²

3.2.2 Normalization and inverting

We normalize all variables to a [0, 1] scale where 0 represents the observation with the lowest value in the sample and 1 the observation with the highest value in the entire sample of years and countries. We are aware of the problem that index scores are sensitive to the selection of upper boundaries (Kelley, 1991). Also, assigning the observation with the highest value a score of 1 suggests that there is no space for improvement. This is a normative implication that we want to avoid. We only intend to provide a suitable framework for inter-country measurement of inclusiveness. All other observations are assigned values according to the percentiles of the distribution of each variable. We normalize over the whole sample of countries and years (panel normalization) to capture time changes within countries. This allows us to compare the progress within one countries across time (Gygli et al., 2019). Compared to normalization for each year separately, this procedure is not sensitive in case of outliers in a specific years but only those for the whole sample. A disadvantage is that this panel normalization

²² We leave it to the individual researcher to define the threshold at which the data coverage is sufficient to meaningfully use the MDI data.

procedure is sensitive to data changes, e.g. when the underlying data is updated respectively or extended in the future, which can result in changed rankings and index values over all years (Gygli et al., 2019).

For all variables in the Equity Index as well as carbon intensity of GDP and the dependency ratio in the Achievement Index, high values impact inclusive development negatively. Therefore, the values of these variables were inverted applying the same scaling. This way, the variable can be included in the same manner as all other variables, i.e. higher values are beneficiaries for inclusive development.

Although the income and wealth Gini as well as the education and health inequality measure technically have a [0, 1] scale, we normalize them into a [0, 1] scale ranging from the highest to the lowest value in the data sample. For the wealth Gini, some reported values are greater than one which is possible when households in the underlying distribution report negative net wealth. We normalize the inequality measure on health and education on a [0, 1] scale as well since they are reported as Atkinson concentration indices.

3.2.3 Weighting and Aggregation

The weighting and aggregation method matters largely for the index score. The choice of a method is highly normative. Equal weighting of all variables is a straightforward method but also means an arbitrary determination based on value judgements. The same holds for adjusted weighting methods based on expert judgement or survey results. Once the variables were each given a weight, the aggregation method is decisive for the overall index score likewise. While an arithmetic aggregation is straight-forward and simple, it implies that a bad performance in one score can easily be compensated by a good score in another variable which was criticized for being inappropriate in the context of questions on inclusiveness (Desai, 1991). We also claim that all dimensions matter for inclusiveness. Yet, a perfect substitution is not justifiable.

To minimize the normative aspects of our approach, we follow Dreher (2006) and Gwartney and Lawson (2006) and employ a statistical method that bases the weighting and aggregation choice purely on the characteristics of the data sample. The principle component analysis uses the full data sample to determine the weights by partitioning the variance of the variables in the respective subindex. Thereby, weights are determined in a way that maximizes the variation of the resulting principal components (PC). As opposed to (Dreher, 2006; Gwartney and Lawson, 2006) we do not use only one principal component for each sub-index (or sub-group of variables) but apply a stopping rule that is common in the literature and described in (Nardo et al., 2005). Specifically, we determine the number of components by the “Kaiser-criterion”, including all principal components that have an eigenvalue with a score higher than 1. Once weights are determined, the individual weighted variables are aggregated into principal components. The principal components are again weighted when aggregating them into the two subindices. The aggregation of principal components is again a weighted arithmetic mean. Weights are determined according to relative proportion of the variance of the individual PC to the total variance as is standard procedure (Nardo et al., 2005).

Table 2 shows the resulting number of PCs for the subindices of the respective MDI version and their weights for the single variables. The MDI basic gets by with one PC for each subindex. When including additional variables in the MDI equity+ and MDI achievements+ respectively, we obtain an increased amount of PCs. The percentages in brackets reflect the overall weights of the components and the percentages below that reflect show the variable weights within each PC. We see diverse weights for single variables across the MDI versions accounting for statistical characteristics in the data. Both

weights for the variables and PCs are based purely on the underlying dataset, i.e. when changing the dataset, the weights will also change.²³

Table 2: Index weights for different versions

MDI basic	Weight	MDI equity+	Weight	Weight	MDI achievements+	Weight	Weight	Weight
Achievements Index	50%	Achievements Index		50%	Achievements Index			50%
GDP p.c.	32%	GDP p.c.		32%		<i>PC1</i>	<i>PC2</i>	<i>PC3</i>
Savings	7%	Savings		7%		[69%]	[16%]	[15%]
Life Exp	28%	Life Exp		28%				
Human Capital	33%	Human Capital		33%	GDP p.c.	18%	5%	0.5%
					Savings	4%	4%	23%
					Life Expectancy	16%	0.1%	2%
					Human Capital	20%	0.01%	10%
					Labor Productivity	16%	0.4%	0.1%
					Employment Ratio	3%	30%	0.2%
					Adj. Net Savings	3%	1%	60%
					Carbon Intensity	0.1%	57%	3%
					Nat. Res. Depletion	2%	0.3%	0.4%
					Dependency Ratio	18%	2%	0.8%
Equity Index	50%	Equity Index		50%	Equity Index			50%
						<i>PC1</i>	<i>PC2</i>	
						[68%]	[32%]	
Income Equity	100%	Income Equity	28%	6%	Income Gini			100%
		Wealth Equity	0.1%	90%				
		Education Equity	34%	1%				
		Health Equity	39%	2%				

We follow Gygli et al. (2019) in the handling of missing values. An observation of a subindex is reported as missing if more than 40% of observations in the underlying variables are missing. The MDI score is only calculated if both subindexes are available for the respective country and year.

While weights for each variable within indices are determined by the PCA, in the last step we aggregate the equity and achievement subindices into the MDI. We apply equal weights for the multiplication, i.e. the equity and achievements index contribute 50% each to the MDI score. Clearly, here we make a value judgement but we are confident that both dimensions matter for inclusive development likewise. We decide for a geometric aggregation here because an easy compensation in an arithmetic

²³ This might cause challenges when extending the dataset in both directions. Either the weights are kept stable to allow for unbiased comparison of the impact of single variables or the weights are allowed to adjust to the data changes which will take account of changes in the data structure.

aggregation seems inadequate for our definition of inclusive development. A country needs good performances in both dimensions to obtain a high MDI score.

Afterwards, we multiply the MDI and the subindices by 100, therefore rescaling it to a [0,100] scale, making it more “digestible” for later use.

The significance of the MDI has limitations. Due to the outlined construction with pooling of variables, the MDI cannot be perfectly sensitive to specific contexts. We make no claims about the specific driver(s) of the score for each observation and emphasize that we are not able to directly derive policy conclusions to adjust development concepts. The MDI is largely centered around a variety of aspects that are relevant for humans’ daily lives, it cannot show structural differences between sexes, people of different age-groups and between rural and urban population. These differences may, however, be important for development. Nevertheless, we are confident that with the chosen procedure, the MDI is an important step forward in measuring inclusive development.

4 Overview over the Multidimensional Inclusiveness Index data

In this section, we highlight the results of the MDI calculation. We visualize the MDI and subindex scores by means of figures and tables in order to disclose the most important findings and highlight its value compared to existing indices.

Table 4 (in the Appendix) shows the MDI basic ranks of all countries for the selected years 1993 and 2018 plus the 25 year changes of the scores (absolute and percentage changes) for the 168 countries for which we have data on for both points in time. We deem this time interval long enough to capture structural changes in the development of a country.

With the most recent data from 2018, we see the top positions largely dominated by Western developed countries. With Norway ranking first, the top 10 positions are taken by Central and Northern European countries. Especially the Slovak Republic and Slovenia on second and fourth rank are surprising. The first non-European countries are Canada ranking 15th and Japan 19th. At the bottom of the ranking, we see many Sub-Saharan African countries, small island states, and Central Asian countries.

As shown in the last two columns in Table 4, the vast majority of countries managed to improve its score (at least between the two listed years). Only 10 countries, about 7% of the sample, experienced a drop of their scores between 1993 and 2018. The drops in scores are rather small in their scale with Eswatini and Cote d’Ivoire having the biggest losses with 9.8% and 7% respectively. With the low absolute score, especially Eswatini is a worrying example in this regard. The improvements in the scores are much bigger in magnitude. With Rwanda and Peru, two countries were even able to more than double the score. The most populous countries China and India both show positive developments with improvements of 12.6% and 9% respectively. However, both are not on top positions with China ranking 68nd and India 120th. The results of the MDI basic for the two listed years suggest successes in facilitating inclusive development, with forerunners leading and still improving their development and many countries lacking behind but catching up to the forerunners over time.

Figure 1 provides a graphical overview over MDI scores for the year 2018. Namibia and Norway define the lower and upper boundaries – with the lowest and higher MDI basic scores obtained, 1.75 and 75.1 respectively. The data on the map is grouped into four equally large quartiles between these values. It shows a heterogenous picture. Most of North America, Europe, Oceania and Russia display relatively high MDI scores, most countries in South America and Southeast Asia have scores in the middle quartiles and most countries in Sub-Saharan Africa and notably India have rather low scores. The Figure

reveals that the score tends to concentrate regionally. In very few cases, neighboring countries are not in adjacent quartiles, i.e. if we observe a high MDI score in one country there it is very likely that the neighboring country also score (relatively) high. This regionalization points toward a positive relation between inclusive development and democratization (Gründler und Krieger, 2018).

Figure 1: MDI basic map for 2018 in 4 quantiles (white countries reflect missing data)

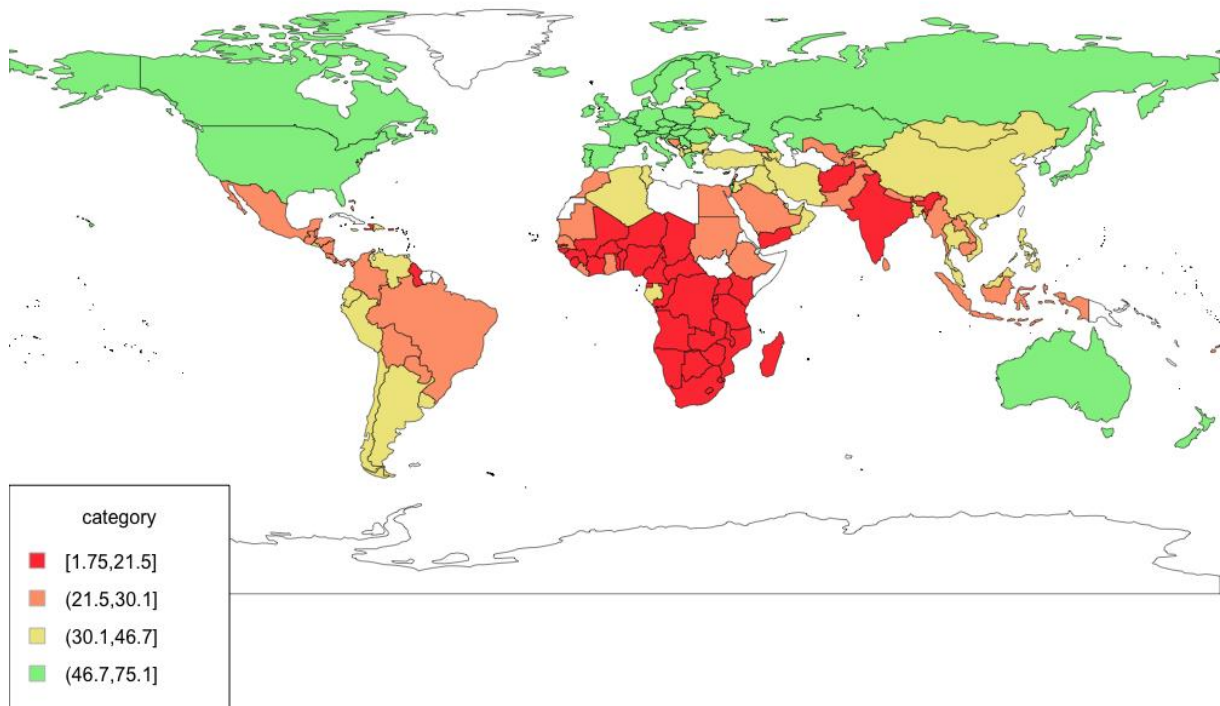
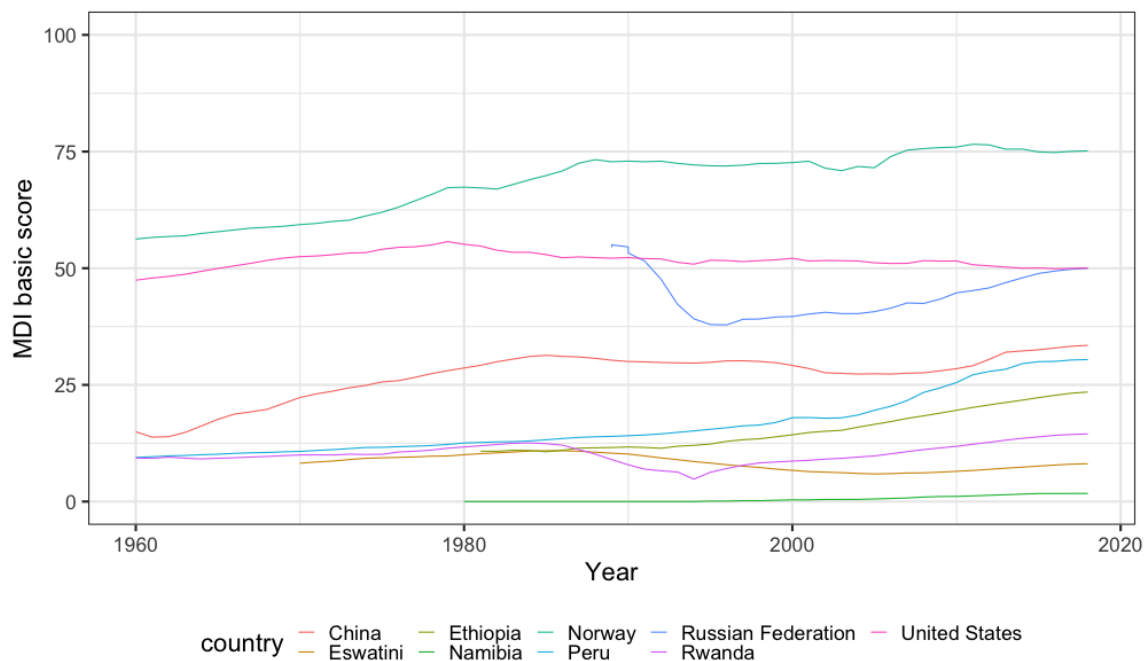


Figure 2 shows the development of MDI basic scores in nine selected countries over time. The choice of the countries is made for various reasons. First, we choose Norway, as the country with the highest MDI basic score in 2018. The Figure reveals that Norway has had high MDI scores since the late 1980s with minor fluctuations but rapidly increasing scores in earlier periods.

A comparison of the United States and Russian Federation is interesting because they score very similar in 2018 but their graphs show a very different developments over time. The US score peaked in 1979, i.e. development mostly in the post-WWII period. Russia had very high MDI scores, thanks to high income equality in the times of the Soviet Union. However, after the collapse of the Soviet Union, the societal and economic changes have led to a very large decline in the MDI score of around 15 points. Since it hit rock bottom around 1995, the situation has substantially improved again. Interestingly, China, which ranks 68 in 2018, has made no big improvements in last 30 years. After large improvements until the early 1980s, The MDI scores stagnated during the 1990s and even declined in the 2000s. The developments of the last years show improvements in inclusive development.

Figure 2: MDI basic score for selected countries



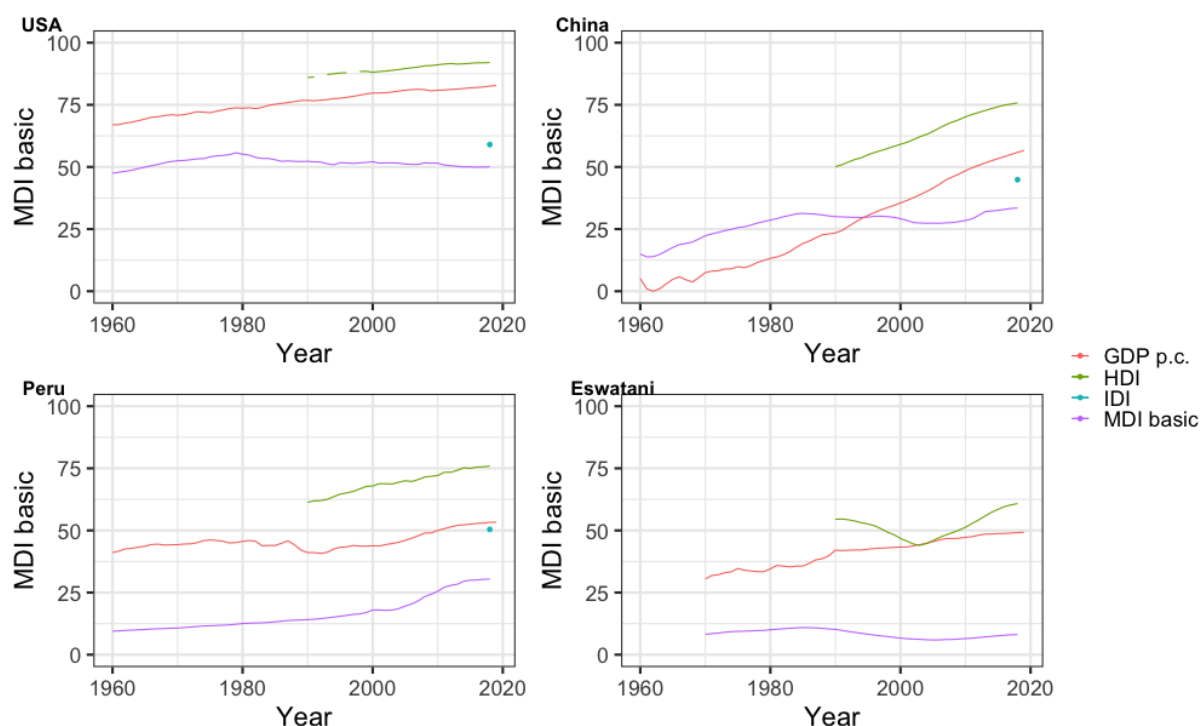
Peru, which ranks 77th in Table 4, is the country with the second largest gain of 105% during the last 25 years. From the beginning of the MDI data, Peru has made steady progress. The gains are especially large since 2000. Ethiopia also almost doubled its score in the last 25 years from 11.9 to 23.5, reflecting a 98% increase (starting from a low baseline). Rwanda, which ranks 140 in Table 4, is also a remarkable case because it has almost the same MDI score it had in the mid-1980s. The political turbulences culminating in the genocide in 1994 had a clearly visible impact of the MDI scores dropping down to a value of 6 but climbing back to about 15 reflecting the largest increase in our sample between 1993 and 2018 (of 129%).

Eswatini ranks 152 and has experienced the largest decrease since 1993. Namibia, last in our 2018 ranking, shows very little improve in its MDI score.

In Figure 3, we compare the development of the MDI basic score of four countries covered in Figure 2 to their development with regards to HDI, GDP p.c. and IDI scores. In case of the USA in the upper right, the comparison of MDI basic scores to the GDP and HDI shows that increases in GDP does not necessarily translate into improvements in inclusive development. Similarly, the panel with China illustrates that there is a close connection to the increase in GDP p.c. and the increase in the HDI but that the MDI does not necessarily follow the same trend, reflecting other developments in the underlying data. For China, GDP p.c. and HDI increase were huge in the last 30 years but it improved very little in inclusive development. In both cases, this may be ascribed to increasing inequalities within the society. The panel of Peru in the lower left corner shows a larger MDI increase in the last 20 years than increases in GDP p.c. or HDI. Again, the HDI trend seem to be closely related the trendline in GDP p.c. Lastly, Eswatini in the lower right corner illustrates that the MDI follows a different trend than GDP or HDI data. Eswatinis GDP p.c. increases steadily during the last 30 years, while the MDI decreased by about 10%. The HDI data show a large drop around the year 2005 when Eswatini introduced a constitution with more democratic rights and regular elections, following a century-lasting reign of two kings and civil rights protests. In the three panels, where IDI data is available, the IDI ranks countries somewhere in between GDP and MDI. However, due to missing time-series data, we cannot compare the trends over time.

Figure 3 illustrates two important aspects. First, the MDI delivers different information than the HDI and GDP because their behavior differs significantly. This is because the MDI uses additional information in its equity subindex and weights it against the achievements index (which is closer to trends in GDP or the HDI). Second, having a larger sample than the HDI and, especially, the IDI is advantageous in revealing long-term development patterns. In fact, the MDI has a net sample size of 8145 observations which is 50% larger than the sample of the HDI which comes with 5399 observations and about 40 times larger than the IDI sample.²⁴

Figure 3: Comparison of MDI to HDI, IDI and GDP developments for selected countries



The differences in the performance of the MDI basic, HDI, IDI and GDP p.c. are shown in Table 3, where we calculate the respective correlation coefficients for the year 2018 (i.e. we ignore time-series correlation here). The Pearson correlation coefficient looks at the distances between countries in the data while the Spearman correlation coefficient compares the ranks of countries. Table 3 reveals that correlations are significantly different from zero for the overall sample and most subsamples and for both methods used. The correlation of the MDI for all countries is less pronounced with HDI and GDP, largest with IDI. Correlations are much smaller and sometimes not significantly different from zero for non-OECD countries, LDCs, and lower income countries.

Although most correlation coefficients are relatively large and significant with the other indices, the previous analysis shows that MDI provides different information. Part of the correlation of the MDI basic with the comparison indices might be the result of GDP being included as a variable in our index, and the HDI and IDI likewise. This conceptual relation is reflected in the MDI. One major reason why the MDI behaves differently than the GDP p.c. or HDI data is that we combine achievements data (as does the HDI and GDP) with equity data. To illustrate this, we show Figure 4-6 where we look at the subindices separately and compare them.

²⁴ The MDI sample spans the years 1960-2018 and up to 171 years while the HDI data spans between the years 1990-2018 for up to 204 years. The IDI is only available for the years 2017 and 2018 for 103 countries each.

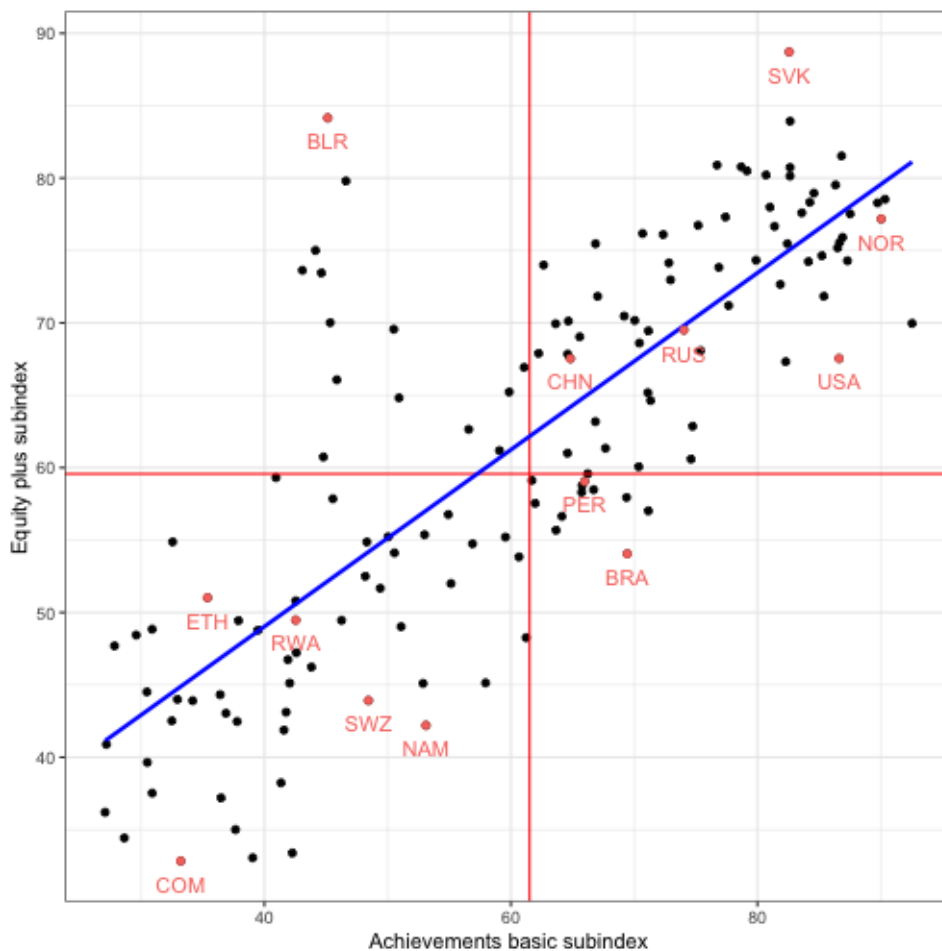
Table 3: Correlations between the MDI basic, HDI, IDI and GDP p.c. for different country groupings

	OECD countries (n=36)	non-OECD countries (n=141)	LDCs (n=42)	non-LDCs (n=135)	LICs (n=24)	MICs (n=98)	HICs (n=55)	All countries (n=175)
Pearson corr. coeff.								
MDI basic & HDI	0.82*	0.73*	0.45*	0.82*	0.22	0.68*	0.75*	0.83*
MDI basic & IDI***	0.76*	0.68*	0.73*	0.82*	0.54	0.55*	0.71*	0.86*
MDI basic & log GDP p.c.	0.74*	0.59*	0.26	0.71*	0.25	0.42*	0.55*	0.78*
Spearman rank-corr. coeff.								
MDI basic & HDI	0.65*	0.76*	0.40**	0.82*	0.24	0.69*	0.69*	0.87*
MDI basic & IDI***	0.80*	0.72*	0.61**	0.82*	0.33	0.55*	0.78*	0.87*
MDI basic & log GDP p.c.	0.65*	0.60*	0.27	0.70*	0.08	0.44*	0.55*	0.78*

Notes: * p-val < 0.01, ** p-val < 0.05, ***respective samples for the IDI are smaller.

The MDI set-up with the equity and achievements subindices allowing to disentangle a country's performance in several development dimensions. Figure 4 shows all available scores of the I_{E+} and I_A subindices for the year 2018. This describes the two subindices underlying the $MDI_{equity+}$ version. We choose to show the results of this version because it is richer in information on equity outcomes. For comparison purposes, we highlighted the nine countries included in Figure 2. Overall, the performance of countries is quite heterogeneous. The red lines show the sample average in the index for the selected year. As a clear tendency, as suggested by the blue linear fitting line, it can be seen that there is a positive correlation between the scores in the two subindices. Countries that perform well in the I_A subindex are able to score high also in the I_{E+} subindex. However, there are countries whose performance in the two subindices differs largely. Belarus, for instance, scores high in the I_{E+} but low in the I_A subindex. That means that development achievements in Belarusian society are below the global average but they are relatively equally distributed. A contrary picture applies to Brazil. The countries obtained a higher score in the achievement index but obviously the merits are spread comparatively unequally within the population. As argued in Section 2.1. both countries cannot be perceived as truly inclusive because of deficiencies in one of subindices. In fact, while Belarus ranks 2nd in the equity subindex, its position in the $MDI_{equity+}$ is 114. Brazil ranks on 54st position in the achievements subindex but only lands on the 109th position in the $MDI_{equity+}$. The highest $MDI_{equity+}$ score is obtained by the Slovak Republic, the lowest by the Comoros.

Figure 4: Scores in achievements index basic and equity index plus for 2018



Concerning the question of countries' performance over time, Figure 5 and 6 show the developments of the global averages of the three MDI versions and the underlying subindices. Figure 5 addresses the short-term period – 2010 -2018 – for which the data availability is improved with regards to our equity indicators. Figure 6 displays the developments over the longer time period from 1970-2018. Both figures show a clearly positive trend for all three MDI versions, with the MDI equity plus having the best performance in the recent years. Following the positive progression of the 1970s and 1980s, the MDI basic and MDI achievements plus as shown in Figure 6 experience a kink in the early 1990s which is mostly driven by the undesirable development of the global income equity. The (inverted) global income Gini displays a worrying picture over the whole time frame, i.e. the income distribution has become more unjust since 1970 with strongest drop taking place in the early 1990s which might be connected with the collapse of the Soviet Union and the economic restructuring in the former member states in Eastern Europe and Central Asia. We also see slight changes in trends of the achievements subindices following the 2008 global financial crisis. In the last years, there has been slight improvements of global income equity. Nevertheless, there has been the continuing perception in many countries that the income distribution persists to be highly “unfair”. When including the other inequality measures on the distribution of wealth, health and education which are available from the year 2010, we see that the latest upward trends are even more substantial. Figure 5 and Figure 6 after 1995 also reveal that, on average, the performance in the achievement subindex is better than in the equity subindex.

Figure 5: Development of short-term global averages all MDI versions and subindices (2010-18)

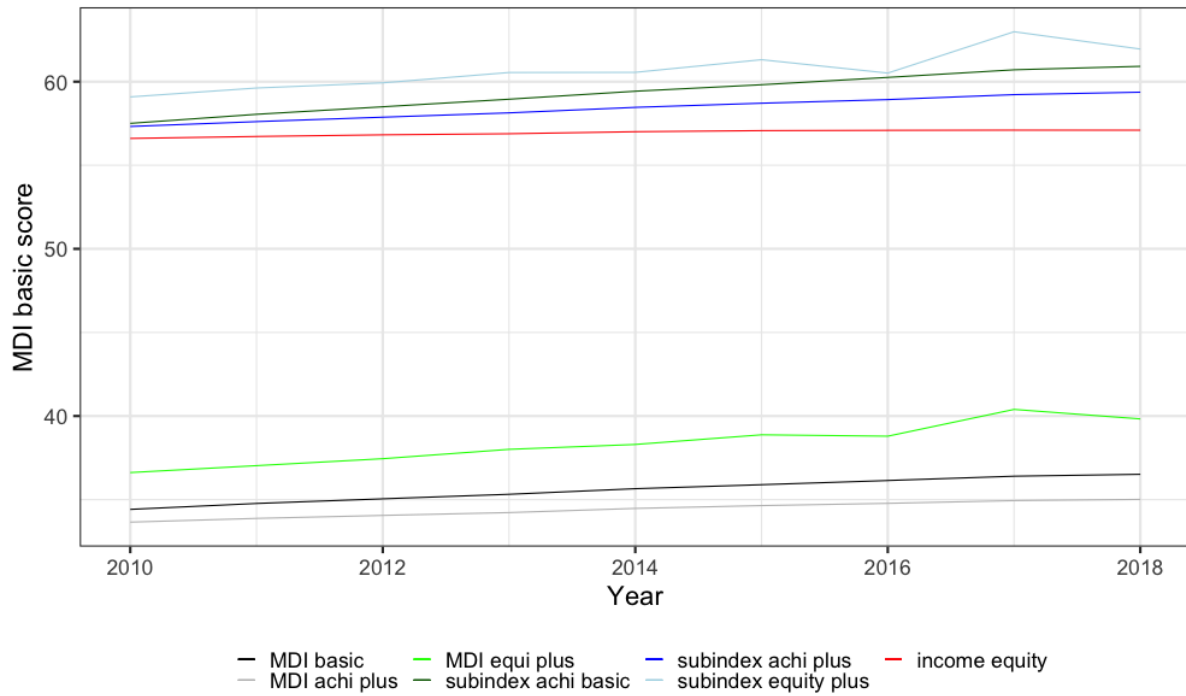
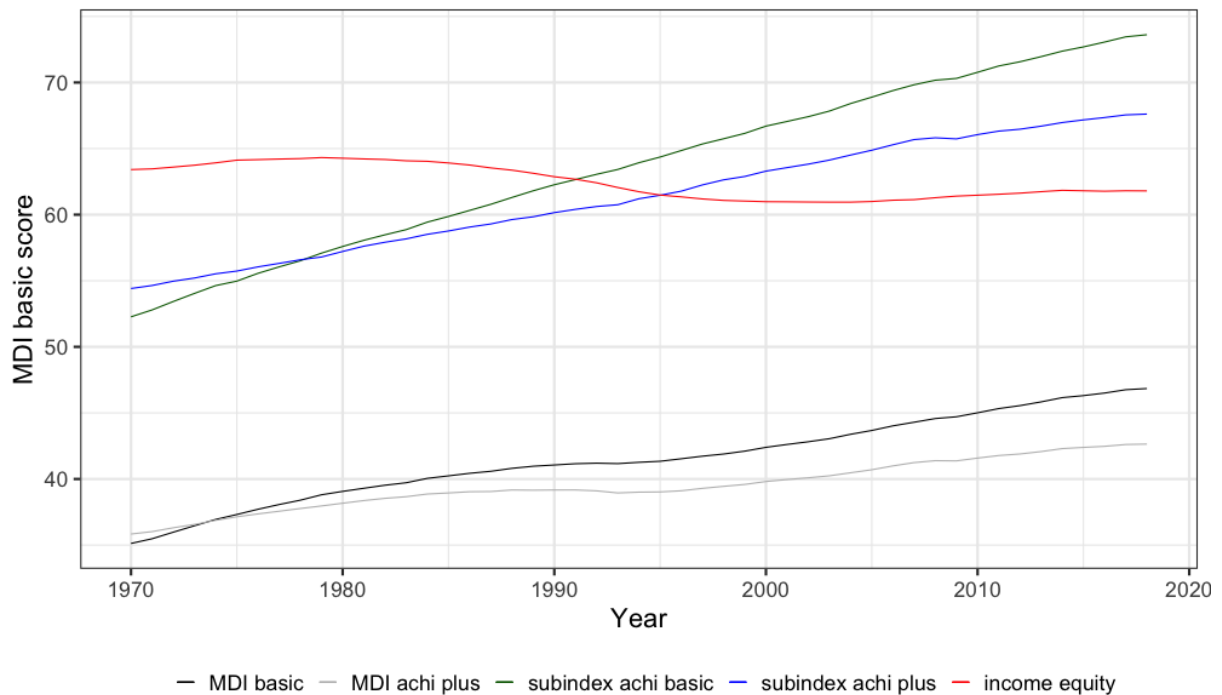


Figure 6: Development of long-term global averages of the MDI basic and achievements+ and their subindices (1970-2018)



5 Conclusion

Despite substantial success in global poverty reduction leading to income gains in many countries, there has been ongoing discontent with regards to development outcomes. Environmental problems and inequalities might be among the most pressing issues of our times. For a better evaluation of development processes, we propose a comprehensive development index that is human-centered and that captures all aspects relevant for individual human development. We are confident that the MDI – in its three versions - is an important addition to the existing indices, such as the HDI and IDI. It allows a comparison of inclusive development outcomes for a large number of countries and a long timeframe. The MDI is based on 14 single indicators that are grouped into two subindices – one on development achievement and one on development equity. The distinction between the subindices allows to disentangle the effects with regards to the respective domain(s). Both subindices are weighted equally as both matter for inclusive development. In order to prevent normative judgements in the aggregation of the subindices weights, we apply PCA to determine the weights of the single variables.

Due to similarities in the variables that are included, the MDI, to a certain degree, shows correlations with other development measurement, namely the HDI and IDI. However, we show that the MDI, processes a larger set of information and reveals differences in the performance when compared to the other measurements. These differences and a data availability vastly increased by 50% compared to the HDI make the MDI a valuable addition.

We see mainly European and other Western industrialized countries on the top positions, many Sub-Saharan African countries on the last positions of the ranking. Over the whole time period (1960-2018), the global averages for all MDI version have been increasing. This progress can mainly be related to successes in the achievements dimensions. This means that many people in the world have a higher living standard than a generation ago. The global average with regards to the income equity is lower today than it was in the year 1970. While on average the world has become more prosperous, the welfare gains seem to be distribution more unequally. However, last years' trends create a more comforting impression. In addition, we show that inclusive development follows similar regionalized patterns as democratization. This could be a first avenue for future research. We also see in MDI country trends that big societal and economic changes (e.g. the end of the Soviet Union or the Rwandan genocide) are very pronounced in the data.

The three version of the MDI and the subindices can serve as a starting point for future debates and empirical analysis of human development on a comprehensive scale. Careful investigation can identify structural development patterns and those factors that determine the MDI scores.

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List of Abbreviations

G20	-	group of Twenty
GDP	-	gross domestic product
GNI	-	gross national income
HDI	-	Human Development Index
IDI	-	Inclusive Development Index
IHDI	-	Inequality Adjusted Human Development Index
MDI	-	Multidimensional Inclusiveness Index
PC	-	principle component
PCA	-	principle component analysis
SDGs	-	Sustainable Development Goals
SWIID	-	Standardized World Income Inequality Database
UNDP	-	United Nations Development Programme
WCED	-	World Commission on Environment and Development
WDI	-	World Development Indicators
WEF	-	World Economic Forum

Appendix

Table 4: Ratings of Multidimensional Inclusive Development

Rank	Country	MDI basic score	MDI basic score	Δ 1993-2018 (abs.)	Δ 1993-2018 (%)
		2018	1993		
1	Norway	75.2	72.5	2.7	3.7%
2	Slovak Republic	71.3	66.2	5.1	7.7%
3	Denmark	70.7	70.0	0.8	1.1%
4	Slovenia	70.7	63.6	7.1	11.1%
5	Iceland	70.3	58.0	12.4	21.3%
6	Czech Republic	70.3	66.5	3.8	5.7%
7	Sweden	70.3	69.4	0.9	1.2%
8	Finland	70.3	68.0	2.3	3.3%
9	Switzerland	69.3	63.0	6.3	10.0%
10	Netherlands	68.1	63.5	4.6	7.2%
11	Luxembourg	67.9	65.4	2.6	3.9%
12	Belgium	67.9	63.3	4.5	7.1%
13	Austria	66.2	61.6	4.6	7.5%
14	Germany	65.8	66.9	-1.0	-1.5%
15	Canada	64.5	61.2	3.3	5.3%
16	Malta	63.8	53.5	10.3	19.3%
17	Ireland	63.0	49.4	13.6	27.4%
18	France	61.5	57.0	4.4	7.8%
19	Japan	60.8	61.2	-0.4	-0.6%
20	Croatia	60.7			
21	Hungary	60.6	52.4	8.2	15.7%
22	Australia	59.9	61.3	-1.4	-2.3%
23	United Kingdom	59.6	51.8	7.8	15.0%
24	Poland	59.6	51.2	8.3	16.2%
25	Korea, Rep.	58.9	52.8	6.1	11.6%
26	Kazakhstan	58.5	45.2	13.3	29.5%
27	Estonia	56.4	44.5	11.8	26.6%
28	New Zealand	56.4	54.3	2.1	3.8%
29	Cyprus	56.3	50.2	6.1	12.2%
30	Israel	56.1	53.8	2.4	4.4%
31	Italy	53.8	49.2	4.6	9.3%
32	Ukraine	53.1	47.6	5.5	11.5%
33	Greece	52.9	45.1	7.8	17.2%
34	Singapore	52.7	38.2	14.5	37.9%
35	Spain	52.3	49.5	2.8	5.7%
36	United States	50.0	51.3	-1.2	-2.4%
	Russian				
37	Federation	50.0	42.3	7.7	18.3%
38	Romania	49.2	52.5	-3.3	-6.3%
39	Serbia	48.6			
40	Lithuania	47.6			
41	Portugal	47.2	40.5	6.7	16.5%
42	Latvia	46.7			
43	Moldova	46.1			
44	Bulgaria	46.0	44.6	1.4	3.2%
45	Qatar	44.4			
46	Kuwait	44.3	42.2	2.1	5.1%
47	Uruguay	43.2	34.1	9.1	26.7%
	Hong Kong SAR,				
48	China	42.8	39.0	3.8	9.9%
49	Kyrgyz Republic	42.7	33.7	9.0	26.6%
50	Mongolia	42.1	32.8	9.3	28.3%
51	Argentina	41.8	30.4	11.4	37.5%
	United Arab				
52	Emirates	41.2	37.3	3.8	10.3%
53	Iraq	40.9	33.0	7.9	24.0%
54	Armenia	39.8	33.2	6.7	20.1%

55	Belarus	39.7	33.4	6.3	18.9%
56	Vietnam	38.6	27.2	11.4	41.8%
57	Albania	38.4	30.6	7.8	25.5%
58	Algeria	38.4	28.0	10.4	37.2%
59	Jordan	38.4	29.2	9.2	31.5%
60	Malaysia	37.7	26.7	11.0	41.0%
61	Mauritius	37.6	31.9	5.7	17.8%
62	Thailand	36.1	23.5	12.6	53.6%
63	Turkey	35.8	24.2	11.7	48.2%
64	Montenegro	35.7			
65	Tunisia	34.9	24.0	10.8	45.1%
66	Gabon	34.0	27.1	6.9	25.6%
67	Chile	33.5	24.4	9.1	37.4%
68	China	33.5	29.7	3.8	12.6%
69	Oman	33.1	30.4	2.7	8.8%
70	Azerbaijan	32.9	24.9	7.9	31.8%
71	Ecuador	32.4	20.1	12.3	61.4%
72	Jamaica	32.0	30.4	1.6	5.4%
73	El Salvador	31.8	18.1	13.7	75.9%
74	Philippines	31.8	26.1	5.7	21.8%
75	Bangladesh	31.1	22.4	8.6	38.5%
	Dominican				
76	Republic	30.7	20.8	9.9	47.7%
77	Peru	30.4	14.8	15.6	105.3%
78	Bolivia	30.1	16.3	13.7	84.2%
	North				
79	Macedonia	30.0	29.2	0.8	2.6%
80	Mexico	29.5	22.9	6.6	28.9%
81	Myanmar	29.2	18.0	11.2	62.0%
82	Barbados	29.0	28.5	0.5	1.8%
83	Panama	28.9	18.9	10.0	52.9%
84	Cambodia	28.4	17.9	10.5	58.5%
85	Costa Rica	28.2	30.1	-2.0	-6.5%
86	Pakistan	28.2	22.7	5.4	23.9%
87	Lebanon	28.1	23.7	4.4	18.5%
88	Brazil	27.9	14.3	13.6	95.2%
89	Morocco	27.7	21.1	6.6	31.3%
90	Uzbekistan	27.4	23.1	4.3	18.6%
91	Paraguay	27.3	20.0	7.3	36.8%
92	Egypt, Arab Rep.	27.0	23.2	3.8	16.4%
93	Colombia	26.6	16.6	10.0	60.1%
94	Mauritania	25.6	18.8	6.8	36.2%
95	Nicaragua	25.5	14.1	11.4	80.8%
96	Belize	25.3	18.8	6.5	34.5%
	Bosnia and				
97	Herzegovina	25.3			
98	Seychelles	25.1	23.0	2.1	9.1%
	Brunei				
99	Darussalam	25.0	23.3	1.6	6.9%
100	Bahrain	24.8	23.8	1.0	4.4%
101	Sudan	24.5	17.8	6.7	37.7%
102	Nepal	24.4	15.6	8.8	56.4%
103	Ghana	24.3	21.0	3.3	15.5%
104	Guatemala	24.3	13.9	10.4	75.1%
105	Georgia	23.8	22.2	1.6	7.4%
106	Sri Lanka	23.6	24.6	-1.0	-4.2%
107	Ethiopia	23.5	11.9	11.6	97.9%
108	Bahamas, The	23.4	22.2	1.2	5.4%
109	Indonesia	23.1	22.2	0.9	4.1%
110	Saudi Arabia	22.9	19.6	3.3	17.0%
111	Timor-Leste	22.3			
112	Liberia	22.1			
113	Bhutan	21.6			
114	Senegal	21.5	15.3	6.2	40.5%

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115	Honduras	21.5	16.2	5.3	32.6%
116	Uganda	21.3	12.3	9.1	73.9%
117	Afghanistan	21.2			
118	Zimbabwe	20.2	15.0	5.2	34.6%
119	Kenya	20.1	13.7	6.3	46.0%
120	India	19.7	18.1	1.6	9.0%
121	Kiribati	19.5	18.5	1.0	5.6%
122	Nigeria	19.5	13.9	5.6	40.5%
123	Congo, Rep.	18.7	16.4	2.2	13.4%
124	Cameroon	18.2	15.5	2.8	17.8%
125	Niger	18.1	11.8	6.3	53.0%
126	Mali	17.8	11.6	6.2	53.7%
127	Madagascar	17.5	13.3	4.2	31.1%
128	Togo	17.4	14.8	2.6	17.8%
129	Benin	17.2	14.0	3.2	22.9%
130	Guyana	17.0	15.2	1.8	11.9%
131	Puerto Rico	16.9	17.0	-0.1	-0.6%
132	Guinea	16.9	11.5	5.4	47.0%
133	Gambia, The	16.8	12.3	4.6	37.3%
134	Malawi	16.8	8.4	8.4	99.5%
135	Burkina Faso	16.4	8.9	7.5	83.8%
136	Sierra Leone	16.0	8.6	7.4	85.9%
137	Congo, Dem. Rep.	15.8	12.6	3.3	25.9%
138	Burundi	15.8	11.8	4.0	34.4%
139	Angola	14.8	10.0	4.8	48.0%
140	Rwanda	14.5	6.3	8.2	129.0%
141	Cabo Verde	14.2			
142	Equatorial Guinea	13.7			
143	Chad	13.2	10.6	2.6	24.6%
144	Guinea-Bissau	12.4	11.7	0.8	6.5%
145	Mozambique	12.0	8.1	3.9	47.6%
146	Cote d'Ivoire	11.7	12.6	-0.9	-7.0%
147	Zambia	11.7	9.4	2.3	24.4%
148	Botswana	11.4	9.1	2.3	25.2%
149	Lesotho	10.8	9.6	1.2	12.1%
150	Haiti	10.5	8.9	1.6	18.4%
151	South Africa	8.4	8.0	0.4	5.2%
152	Eswatini	8.1	9.0	-0.9	-9.8%
153	Central African Republic	8.0	7.0	1.0	14.9%
154	Comoros	8.0	6.9	1.1	16.6%
155	Namibia	1.7	0.0	1.7	
156	Fiji		24.1		
157	Lao PDR		20.3		
158	Papua New Guinea		11.2		
159	Solomon Islands				
160	Syrian Arab Republic		22.6		
161	Tajikistan		29.1		
162	Turkmenistan		27.1		
163	Tonga		23.4		
164	Trinidad and Tobago		28.5		
165	Tanzania		13.4		
166	Venezuela, RB		29.4		
167	Vanuatu		19.6		
168	Yemen, Rep.		16.1		

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