2020 SOCIAL PROGRESS INDEX

Methodology Summary

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Acknowledgements

Constructing the Social Progress Index is a significant research effort which involves months of desk research, data collection, cleaning, transformations and calculations. This would not be possible without the leadership of Michael Green and Luke Greeves, alongside the Board of Directors, and support from all our colleagues. In particular, this year's index would not have been possible without the invaluable research assistance of Rory Rolt, and Tawab Safi. We also want to thank Tamar Epner and Amy Wares for laying strong and well documented foundations for the Index which enabled us to pick up the baton. Our gratitude also goes to Brent Nagel and Alex Stetter for their editorial support and ensuring a very smooth communications and design process.

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2020 Social Progress Index Methodology Report

Introduction

The Social Progress Index is a well-established measure, published since 2013, that is meant to catalyze improvement and drive action by presenting social outcome data in a useful and reliable way. Composed of multiple dimensions, the Social Progress Index can be used to benchmark success and provide a holistic, transparent, outcome-based measure of a country's wellbeing that is independent of economic indicators. Policymakers, businesses, and countries' citizens alike can use it to compare their country against others on different facets of social progress, allowing the identification of specific areas of strength or weakness.

The 2020 Social Progress Index ranks 163 countries on social progress. We combine 50 social and environmental outcome indicators to calculate an overall score for these countries, based on tiered levels of scoring that include measures in health, safety, education, technology, rights, and more. We also consider the data of 30 additional countries, calculating component and dimension scores when enough data are available. In all, the Social Progress Index measures at least some aspects of social progress across more than 99.85% of the world's population.

This report describes the methodology used to calculate the Social Progress Index. We start by describing the principles that establish the conceptual architecture of the index and provide an overview of the index framework. We then detail the steps taken to select data and calculate the index. Finally, we discuss the methodology behind assessing countries' strengths and weaknesses, relative to their economic prosperity. We conclude the report with limitations of year-to-year comparisons and information on future directions.

Social Progress Principles

We define 'social progress' as *the capacity of a society to meet the basic human needs of its citizens, establish the building blocks that allow citizens and communities to enhance and sustain the quality of their lives, and create the conditions for all individuals to reach their full potential.* This definition, established in consultation with a group of academic and policy experts, drives the framework of the Social Progress Index. It alludes to three broad elements of social progress, which we refer to as dimensions: Basic Human Needs, Foundations of Wellbeing, and Opportunity. Under each dimension are four components whose underlying concepts relate and are guided by questions we seek to answer with available data (see Figure 1.) Each component is further defined by a set of outcome indicators that respond to the conceptual questions posed.

Figure 1 / Social Progress Index Component-Level Framework

Together, these interrelated elements combine to produce a given level of social progress. The Social Progress Index methodology allows measurement of each component and each dimension, yielding an overall score and ranking.

Our approach builds on a long line of work constructing country indexes to measure and assess various facets of economic and social performance. However, the Social Progress Index is distinct in its core methodological choices:

- A focus on non-economic dimensions of national performance
- A measurement approach based on outcome indicators, rather than input measures
- A holistic framework consisting of three broad dimensions of social progress, each of which is the sum of four equally weighted components

- Calculation of each component as the weighted sum of a series of measures, with the weights determined through principal component analysis

The Social Progress Index is explicitly focused on non-economic aspects of national performance. Unlike most other national measurement efforts, we treat social progress as distinct though associated with more traditional economic measures such as GDP per capita. In contrast, other indices such as the Human Development Index or OECD Better Life Index combine economic and social indicators. Our objective is to utilize a clear yet rigorous methodology that isolates the non-economic dimensions of social performance.

The Social Progress Index aims to be as outcome-based as possible. Both input and outcome-based indexes can help countries benchmark their progress, but in very different ways. Input indexes measure a country's policy choices or investments believed (or known) to lead to an important outcome, while outcome indexes directly measure the outcomes of these decisions or investments. Input indexes also require a degree of consensus about how inputs lead to outcomes, as well as a process to calibrate the relative importance of different input factors against outcome measures. In the field of social progress, this would mean a clear consensus and understanding of which inputs lead to better social outcomes—a field of research that is still growing and to which the Social Progress Index continues to contribute.

When there are multiple output measures or a lack of consensus on all the inputs that matter, or when data related to inputs are highly incomplete, an outcome-oriented index may be more appropriate (Fleurbaey and Blanchet, 2013). Following this logic, we designed the Social Progress Index as an outcome index. The Social Progress Index has been designed to aggregate and synthesize multiple outcome measures in a conceptually consistent and transparent way that will also be useful for decision-makers benchmarking progress. The Social Progress Imperative continues to explore the role of input measures and policies in determining a country's performance.

Dimensions of Social Progress

At the topmost level of the framework, we synthesize three distinct though related questions that, taken together offer insight into the level of social progress:

1) Does a country provide for its people's most essential needs?
2) Are the building blocks in place for individuals and communities to enhance and sustain wellbeing?
3) Is there opportunity for all individuals to reach their full potential?

Each of these questions describes a dimension of social progress, respectively: Basic Human Needs, Foundations of Wellbeing and Opportunity. The first dimension, Basic Human Needs, assesses a population's capacity to survive with adequate nourishment and basic medical care, clean water, sanitation, adequate shelter, and personal safety. These needs are still not met in many developing countries and are often incomplete in some more prosperous countries.

Basic needs have been the predominant focus of research in development economics, but the second dimension of social progress, Foundations of Wellbeing, deserves equal attention. It highlights the extent to which a country's residents can gain a basic education, obtain information and communicate freely, benefit from a modern healthcare system, and live in a healthy environment conducive to a long life. Nearly all countries struggle with at least one of these aspects.

Finally, any discussion of social progress must also include whether a country's population have the freedom and opportunity to make their own choices and pursue higher education. Personal rights, personal freedom and choice, inclusiveness, and access to advanced education all contribute to the level of opportunity within a given society. This dimension of the Social Progress Index is perhaps the most controversial and most difficult to measure. Nonetheless, it is important to highlight that societies, high-income or low-income, developed or developing, still struggle to meet the moral imperative to guarantee the equality of opportunity for all citizens.

The multi-dimensional construction of the Social Progress Index should not be interpreted as a step-by-step movement toward progress from one dimension to the next. Rather, the three dimensions are interrelated and, in fact, statistically correlated. While we distinguish between these three aspects of social progress, many issues they encompass interact with one another to drive more meaningful change.

Components of Social Progress

Under each dimension are four components. Components, like dimensions, are categories of outcomes, rather than specific outcomes themselves. Each component highlights a separate aspect of the overall set of outcomes that make up a dimension, building on both academic and policy literature. For example, the Opportunity dimension includes the components Personal Rights, Personal Freedom and Choice, Inclusiveness, and Access to Advanced Education. Each of these components describes a related, but distinct aspect of what it means for a society to guarantee opportunity among its population. The Personal Rights and Access to Advanced Education components describe the extent to which individuals can pursue their own objectives to the best of their ability. Personal Freedom and Choice and Inclusiveness, on the other hand, describe the extent of limits on individuals. Together, the four components offer a conceptually coherent way of capturing how societies can empower (or limit) an individual's autonomy, freedom, and ability to progress.

The twelve components represent what we believe to be the most complete set of outcome categories given our current understanding of social progress from diverse literature and given the current availability of data. The Social Progress Imperative Advisory Board provided input into selecting the dimensions and the elaboration of the components within each dimension, along with an iterative review of relevant literature.

The framework was established in 2013, and we continue to ensure its relevance each year of publication. We consult extensively with experts across disciplines on the twelve-component structure of the Social Progress Index on an ongoing basis, ensuring it continues to capture the principal aspects of human wellbeing and that the issues measured are comprehensive and apply to all societies, regardless of their country's level of economic development, political stature, or geography.

Indicator Selection

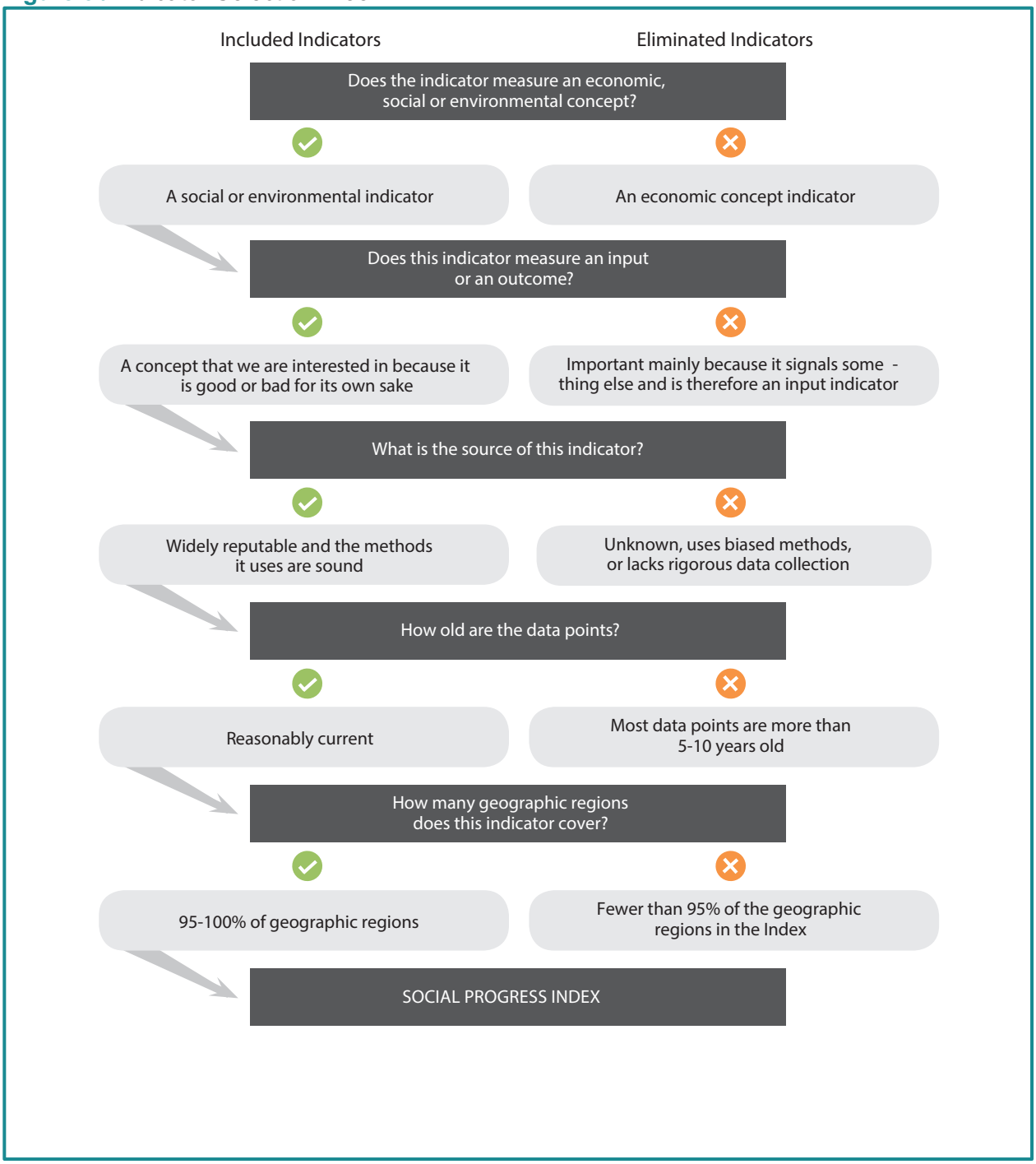
At the most granular level of the Social Progress Index framework, we identify multiple independent outcome measures – indicators – related to each component. Each set of indicators, grouped by component, define and measure the same aspect of social progress. Depending on data availability and ongoing research into social outcomes, indicators may change with each edition of the Social Progress Index. However, the concepts captured by each set of indicators (i.e. components) remains the same. The 2020 Social Progress Index includes 50 indicators, with 3-5 indicators per component (see Figure 2.)

Figure 2 / Social Progress Index Indicator-Level Framework

We only include indicators that are measured well, with consistent methodology, by the same organization and across all (or essentially all) countries in our sample. We evaluate each indicator to ensure that the procedures used to produce the measure are sound and that it captures what it purports to capture. Data for each indicator must come from the same source to ensure consistency in measurement across countries.

Data sources range from large international institutions like the United Nations to non-governmental organizations such as Transparency International. We also include data collected via global surveys, such as Gallup's World Poll (sources are summarized in Appendix 1.) For each indicator, we evaluate the data sources available and consider tradeoffs between the quality and precision of a social indicator and the comprehensiveness of its country coverage. Figure 3 below depicts our decision tree for indicator selection. Geographic coverage tends to exclude many high-quality indicators from consideration because they only cover a subset of countries, such as OECD countries, or a particular region, such as Latin America.

Figure 3 / Indicator Selection Tree



Additionally, we factor into our decision the age of the data, only considering the most recent available data. Across the 163 countries we have a total of 7,979 data points to calculate the 2020 Social Progress Index. Most of the data are reflective of 2019 (72.5%) or 2018 (15.3%). The least-recent data point comes from 2009 (internet users in Somalia).

A final important criterion for indicator data is that they are publicly available. We strive for transparency both in terms of the data we use to inform the Social Progress Index, as well as our calculation methodology. All the raw indicator data we use to calculate the Social Progress Index are published and downloadable on our website at www.socialprogress.org.

Indicator Transformations

When comparing country-level data, we encounter issues that require us to transform the data for certain indicators. In most cases, we transform data to meet clear upper or lower boundaries set by the indicator definition. In others, we address extreme values that may skew results if left untreated. Our main two techniques are to either cap an indicator, setting a clear upper or lower boundary cut-off value, or to log an indicator. We also transform gender parity in secondary attainment to better reflect the parity between boys and girls in a more gender-neutral fashion.

A. Capped Indicators

We impose a top and bottom boundary on three indicators, listed below in Figure 4. We set a floor at 0.03 for gender parity in secondary enrollment to allow for measurement error based on the recommendations of UNESCO.[1] The mobile telephone subscriptions indicator is capped at 100 subscriptions to reflect the boundary set by its unit of measurement (number of subscriptions per 100 people). Greenhouse gas emissions are capped at the 99th percentile to limit the influence of a few significant outliers. The political rights indicator is set to a floor of zero in line with the indicator's definition. Similarly, discrimination against minorities is set to a floor of one. Lastly, we cap years of tertiary schooling at five years to avoid the influence of a few near-outliers on component-level performance.

Figure 4 / Capped Indicators

Indicators	Cap
Gender parity in secondary enrollment	0.03 (bottom)
Mobile telephone subscriptions	100
Greenhouse gas emissions	2980
Discrimination against minorities	1 (bottom)
Political rights	0 (bottom)
Years of tertiary schooling	5

B. Log-transformed Indicators

Three indicators, homicide rate within Personal Safety, citable documents, and quality weighted universities within Access to Advanced Education, contain extreme values in relation to the rest of the indicator data distribution. Based on external research, we determined that these extreme values are not erroneous and should be preserved as a distinguishing characteristic of the countries they describe. As such, we transform these indicators using natural log.[2] Logging allows us to retain the unique differences between countries in performance while creating a more sensible distribution that is less extreme.

C. Calculation of parity

[1] UNESCO Institute for Statistics. "Global Education Digest 2010." 2010, p. 17. http://www.ungei.org/resources/files/GED_2010_EN.pdf

[2] Prior to transformation, we add an alpha of 1 to homicide rate and quality weighted universities, and 0.00001 to citable documents. This ensures we can log all values within the indicator, including zeros, while maintaining nearly the same relative differences between countries.

We transform gender parity in secondary attainment in Access to Basic Knowledge to reflect the absolute distance from 1, where 1 represents an equal number of girls and boys enrolled. While in most countries, more boys are enrolled in secondary education than girls, there are a select number of countries in which the opposite is true. We therefore use the absolute distance from 1 to acknowledge the lack of parity for both boys and girls across countries.

Determining the Country Sample

The 2020 Social Progress Index ranks 163 countries on social progress. We have selected these countries by collecting all data available across all indicators and determining for which countries we can impute data, and for which countries we will have incomplete information to calculate a Social Progress Index score. Generally, a country cannot have more than one missing indicator per component to be included in the final Social Progress Index score rankings. In some cases, we make exceptions to this rule, particularly as it pertains to Access to Basic Knowledge, where data are notoriously lacking. These exceptions are discussed in the next section.

Alongside the 163 ranked countries, we also include in our country sample 11 'partial' countries. These countries have enough data to calculate between nine to eleven of the twelve components, but not enough data to calculate an overall Social Progress Index score. As with ranked countries, within those nine to eleven components for which enough data are available there cannot be more than one indicator missing per component.

Finally, we exclude from our original calculation sample an additional 18 countries with limited data, but we use the weights generated from PCA (described below) to calculate scores for these countries when possible. These countries do not have enough data to calculate at least 9 components, but ten of them have enough data to calculate at least one component score. We do not impute any missing data for these countries. Their raw indicator data and scores are included in the published dataset on our website.

In addition, we exclude the following four countries from all published documents and presentations due to the uncertain situation in recent years which might not be fully reflected in all indicators and thus might lead to misleading conclusions – Libya, Syria, Venezuela, and Yemen. Should anyone be interested in obtaining the countries' results and collected data, we would be happy to share these.

Moreover, alongside the 163 ranked countries, we calculate a full index score and relative performance for the West Bank and Gaza. In order to do so, we implemented an approach different to other countries, and therefore we are also excluding West Bank and Gaza from direct comparison with ranked countries. Some indicator sources provide data for the West Bank and Gaza, several others provide data separately for the West Bank and for Gaza. In these cases, we calculated a population weighted average to obtain one data point for the whole entity, which was then used in the overall index calculation.

Index Calculation

There are five core steps for calculating the Social Progress Index. We first address missing values, then invert and standardize indicators so that they are comparable in scale. We then use Principal Component Analysis (PCA) to aggregate indicators into a component score. Finally, we calculate dimension and overall Social Progress Index scores by averaging components and dimensions, respectively. Each of these steps is described in more detail below.

A. Missing Values

We ensure that all indicators included in the Social Progress Index are missing as few observations as possible to avoid jeopardizing the statistical quality of the index. Missing values can stem from lack of coverage by the data source, incomplete reporting by the country to international organizations, or outdated data whose publication date is older than 2008. In cases where an indicator is missing a country data point, we assess our imputation methodology both before and during index calculation. Imputations used prior to calculation are included and marked in the published dataset on our website; imputations generated during calculation are not.

Imputations prior to calculation:

We impute missing data prior to calculation under two scenarii: when a country lacks some, not all, indicator data within the examined time period; and when there are gaps in the years of data for indicators. These pre-calculation imputations are imperative to be able to include key countries in Social Progress Index rankings. We mark and publish these values in our dataset available for download, as they rely either on historical data from the same source or supplemental research.

In the first case, we carry back a future value for values used to calculate the Social Progress Indexes for the years 2011-2019 in order to maintain a consistent sample. Similarly we carry forward a historical value in those cases where historical data is available. In most cases we only carry forward or back a value for the maximum of 5 consecutive years. In cases where more data points are missing, we rely on imputations during calculations (see below).

Under the second scenario of pre-calculation imputations, we impute gaps between years by applying linear interpolation. We do so to ensure smooth year-to-year estimates based on current and historical data and by assuming linear change. In cases where there were data in the examined years, but not for all years aligned with 2011 through 2020 Social Progress Indexes, we rely on data older than 2010 (if available) to create linear estimations for the years in between. This is a necessary step in order to ensure that our calculations of social progress over time do not exaggerate annual improvement or decline merely due to gaps in the datapoints themselves.

Imputations during calculation:

After constructing the dataset with pre-calculation imputations as noted above, we assess the number of indicators each country is missing within a component. Using regression imputation, we generally impute data only for those countries for which there is no more than one missing data point per component in each of the twelve components (considered 'ranked countries') and for countries that have no more than one missing indicator data point in nine to eleven components (considered 'partial countries'). We use our country sample data of ranked and partial countries (including both current and historical Social Progress Index years, i.e. 2011-2019) to regress each indicator on the other indicators within a component. By constraining the regression to within-component indicators, we can preserve the signal that the indicator provides to PCA.

In the past, we have strictly adhered to only one missing indicator per component and continue to stress the importance of this aspect of our methodology. However, we allowed for an exception to this rule within the Access to Basic Knowledge component where data availability poses a significant limitation. Therefore, for two indicators within this component we applied a pre-imputation regression methodology: we used indicators not directly included in the index which had a more complete global coverage and were highly correlated with the indicators we needed to predict. We used the Institute for Health Metrics and Evaluation indicators *education in years per capita* (total, males, females) to predict total, males', and females' secondary attainment for

approximately 20 countries with missing data. The latter two variables were then used to calculate the educational parity indicator. The two pre-imputed indicators (secondary attainment and gender parity in secondary attainment) were then used again in the standard regression imputations described above.

We review each imputation to ensure accuracy. In some cases, we combine the regression trend with observed data. For example, when the last observed value for a country is in 2012, we have eight missing values that we impute by regression predictions. If the predicted data do not match the observed values, we take the regression trend from the predictions and apply it on the observed data. If there are no observed values for a country, we apply standard regression imputations as described above. In cases where these imputations do not match expectations or qualitative research, we use regional cohort estimates or carry values consistently across time to minimize bias. For example, for many Middle Eastern countries where Gallup does not ask its survey question on gays and lesbians due to cultural sensitivities, we consider assessments of countries set by the Human Rights Campaign and based on LGBT criminalization laws.[3] If a country is not assessed by the survey and criminalization includes the death penalty, we assign the country zero value for the indicator.

The estimation of missing values is necessary prior to undertaking PCA, which requires a complete dataset for the results to be sound. We do not impute values for countries that do not meet the criteria of ranked or partial countries noted above; these countries are excluded from the main calculation process by which PCA weights are determined.

B. Standardization

We convert indicators to the same scale in a three-step process. First, we set best- and worst-case scenarii to provide concrete boundaries on both ends of the scale that are based on theoretical or historical values. We then invert indicators when increasing values reflect lower social progress. Finally, we standardize the indicators into z-scores prior to applying PCA.

The best- and worst-case scenarii are defined at the indicator level. For some indicators, the lower and upper boundaries are straightforward, such as perceived criminality, which comes from the Global Peace Index and is already measured on a scale from 1 (low) to 5 (high). For indicators that do not have a clear best or worst case or where the probability of reaching a boundary is extremely unlikely (e.g., child mortality, for which the theoretical worst case would be that every child dies before the age of five), we use a boundary based on the worst recorded performance five years prior to the first year of measurement (i.e. 2011 Social Progress Index). Best- and worst-case data values are included with the country dataset when PCA is applied. See Appendix B for the specific values used for each indicator's bounds.

Once we establish a full dataset with indicator values for 2011 through 2020 and the best- and worst-case scenarii, we invert indicators for which a higher value denotes lower social progress. There are 21 inverted indicators in the 2020 Social Progress Index. These include: undernourishment, maternal mortality rate, child mortality rate, child stunting, deaths from infectious diseases, unsafe water, unsafe sanitation, unsafe water-, sanitation- and hygiene-attributable deaths, household air pollution-attributable deaths, homicide rate, perceived criminality, traffic deaths, women with no schooling, gender parity in secondary attainment, premature deaths from non-communicable diseases, outdoor air pollution attributable deaths,

[3] Map with regional groupings can be found here: https://assets2.hrc.org/files/assets/resources/Criminalization-Map-042315.pdf?_ga=2.74985554.1358105589.1568572759-1944132585.1568572759

greenhouse gas emissions, PM 2.5, vulnerable employment, early marriage, and discrimination and violence against minorities.

As a final step prior to applying PCA, we standardize the indicators into z-scores. Doing so produces scores with a mean of 0 and standard deviation of 1, ensuring the comparability of the indicators across the dataset in measurement.

C. Component Scores

To calculate component scores, we aggregate the set of indicators within each component into a factor using PCA and all ten years of data.[4] PCA combines indicators in a way that captures the maximum amount of variance in the data while reducing redundancy between indicators. It essentially assigns each indicator a weight, a method we select over equal weighting to ensure that indicators are meaningfully contributing to a component score, while accounting for similarities between them.

Within many of the twelve components, PCA generates similar weights for the indicators we include because we ensure a fair level of correlation between them (e.g., not too high or low a correlation) prior to finalizing our framework. However, for those cases in which indicators are less correlated with other indicators within their component, such biome protection and greenhouse gas emissions in Environmental Quality (discussed further below), we consider PCA a good statistical approach for determining these indicators' contribution to the component scores while remaining objective.

The formula below reflects indicator aggregation into a principal component, where c=Social Progress Index component and i=indicator.

Formula 1

$$Component\ value_c = \sum_i (w_i * indicator_i)$$

Our choice of PCA as the basis for aggregation at the component level was also influenced by the quality and quantity of data available on social progress. For PCA to be valid, each indicator must be relatively free of measurement error (Dunteman, 1989). Thus, it should precisely measure what it was intended to measure and do so consistently across countries. Our design principles and the data we use fulfill this requirement.

To convert each principal component into a component score on a scale of 0 to 100, we use a simple min-max formula, where X=component value and j=country.

Formula 2

$$Component\ score_c = \frac{(X_j - Worst\ Case)}{(Best\ Case - Worst\ Case)} * 100$$

As noted in the prior section, only countries that are ranked or qualify as 'partial' are included in the country sample that determines PCA-generated weights. For countries that do not have enough data to calculate at least nine components, we use the weights generated by the original country sample to calculate component scores when possible. If a country outside the ranked and partial country sample has enough data to calculate all four components within a dimension, we proceed to calculate dimension scores as well.

[4] Each statistical program has several ways to calculate PCA, leading to slight differences in estimations depending on both the command and program used. We use the following command in Stata: *factor [standardized indicator names], factor(1) pcf*

D. Dimension Scores

Each dimension is the arithmetic average of the four components that make up that dimension. Countries that do not have scores in all four components of a given dimension do not have a dimension score. The formula for calculating a dimension score is below, where d=dimension and c=component.

Formula 3

$$Dimension_d = \frac{1}{4} \sum_c Component\ score_c$$

E. Index Scores

The overall Social Progress Index score is calculated as the arithmetic average of the three dimensions. Countries that do not have scores in all three dimensions do not have a Social Progress Index score. The formula for calculating a Social Progress Index score is below, where d=dimension.

Formula 4

$$Social\ Progress\ Index\ score = \frac{1}{3} \sum_d Dimension_d$$

We provide the mean, standard deviation, minimum, and maximum values of the calculated component, dimension, and Social Progress Index scores in Appendix D. In establishing country rankings for overall performance, we divide country scores into six tiers based on hierarchical clustering.

F. World Score Calculation

In order to provide the most accurate assessment of world performance on social progress, we account for countries' populations as well as the statistical interaction between indicators. Therefore, to calculate the world Social Progress Index score, we first aggregate indicators into population-weighted values using data of all ranked and partial countries. We then apply the PCA weights generated by the original ranked and partial country sample to derive component scores and proceed as noted above to calculate dimension and the overall Social Progress Index scores. It is important to note that this method is different than calculating population-weighted scores, and in essence treats the world as a country.

Tiers

Based on hierarchical cluster analysis we calculate six distinct tiers. Each tier groups countries with broadly similar performance on Social Progress Index. Cluster analysis is calculated for each year separately and therefore the cut-offs of the six tiers are different.

Assessing Countries' Relative Strengths and Weaknesses

The component, dimension, and overall Social Progress Index scores are scaled from 0 to 100 to provide an intuitive scale for the interpretation of absolute performance, benchmarking a country against the best and worst-possible scenarios in terms of social progress performance. However, it is also useful to consider relative performance, comparing the level of social progress among countries of similar levels of economic development. For example, a lower-income country may have a low score on a certain component, but could greatly exceed typical scores for countries with similar GDP per capita incomes. Conversely, a high-income country may have a high

absolute score on a component, but still fall short of what is typical for comparably wealthy countries. For this reason, we have developed a methodology to present a country's strengths and weaknesses on a relative basis, comparing a country's performance to that of its economic peers. Results of this analysis are the basis of our country scorecards, which can be found on our website.

We define the group of a country's economic peers as the 15 countries closest in GDP PPP per capita. Standard groupings of countries, such as the World Bank's country income classifications, are not appropriate for relative comparison of countries for two reasons. First, the groupings are too large, representing excessively wide ranges of social performance and therefore few relative strengths and weaknesses. Second, using these groups, countries at the top or bottom of a group may appear to have a misleadingly large number of strengths or weaknesses simply because the group the country is being compared to is at a much lower or higher level of economic development.

Each country's GDP per capita is compared to every other country for which there is full Index data, and the 15 countries with the smallest difference on an absolute value basis are selected for the comparator group. We have found that groupings larger than 15 resulted in a wider range of typical scores and showed too few relative strengths and weakness, while smaller groupings become too sensitive to outliers. Additionally, to reduce the influence of year-to-year fluctuations in GDP data, we use a three-year average (2017-2019).

Once the group of comparator countries is established, the country's performance is compared to the median performance of countries in the group. The median is used rather than the mean to minimize the influence of outliers. If the country's score is greater than (or less than) the average absolute deviation from the median of the comparator group, it is considered a strength (or weakness). Scores that are within one average absolute deviation are within the range of expected scores and are considered neither strengths nor weaknesses. A floor is established so the thresholds are no less than those for poorer countries and the minimum distance from median to strength or median to weakness is 1 point.

We define comparator groups for all countries, regardless of whether they have complete Social Progress Index data or sufficient data for only some indicators, components, and dimensions. However, to maintain stability in comparisons, only countries with full data across all components of the index are included in comparator groups for other countries. Among ranked and partial countries, we do not calculate strengths and weaknesses for Cuba, North Korea, and Somalia due to missing GDP data. We calculate strength and weaknesses for the West Bank and Gaza although we do not publish its rankings due to a different methodology of data aggregation (see above).

Structural Integrity of the Social Progress Index

Throughout the indicator assessment and calculation process, we conduct statistical tests to ensure the structural integrity of the Social Progress Index. Our goal is that no single indicator majorly affects a country's component, dimension, or overall score, and that the indicators within each component are statistically related and compatible. To achieve this, we look at correlations between indicators and between indicators and aggregated scores, Cronbach's alpha, and the Kaiser-Meyer-Olkin measure of sampling adequacy.

In understanding the correlations between indicators, we strive for indicators within components to show correlations of between r=0.3 to r=0.92 (absolute values). Indicators with correlations below 0.3 generally show little conceptual and statistical relation to other indicators. Likewise, if

two indicators are too highly correlated (i.e., r>0.92), we find that the indicators overlap too much in concept and become statistically redundant, which would place too much weight on the concepts they are capturing within the component; we generally remove one of these indicators as well.

In the case of some indicators, namely biome protection and greenhouse gas emissions (in Environmental Quality), we did not find suitable indicators that could adequately replace the concepts they measure and therefore kept them in the framework despite their lower correlation with other indicators within their respective components.

To evaluate the fit between indicators within each component, we calculate Cronbach's alpha after we transform the indicators and impute missing values. Cronbach's alpha provides a measure of internal consistency across indicators. An applied practitioner's rule of thumb is that the alpha value should be above 0.7 for any valid grouping of variables (Bland and Altman, 1997). As shown in Figure 6, eleven of the twelve components meet the 0.7 threshold. Cronbach's alpha for Environmental Quality is below 0.7 due to the low correlation between indicators.

Figure 5 / Cronbach's Alpha for Each Component

		Cronbach's Alpha
Basic Human Needs	Nutrition and Basic Medical Care	0.94
	Water and Sanitation	0.94
	Shelter	0.94
	Personal Safety	0.75
Foundations of Wellbeing	Access to Basic Knowledge	0.89
	Access to Information and Communications	0.78
	Health and Wellness	0.91
	Environmental Quality	0.57
Opportunity	Personal Rights	0.92
	Personal Freedom and Choice	0.84
	Inclusiveness	0.85
	Access to Advanced Education	0.90

Cronbach's alpha is a good preliminary screen for conceptual fit; however, it does not provide a direct measure of the goodness of fit of a factor analysis (Manly, 2004.) Rather, we assess goodness of fit using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. Generally, KMO scores should be above 0.5. In our data, the mean KMO score is above 0.5 for all components, suggesting that the grouping of indicators chosen for the components of the Social Progress Index provides a good measure of the underlying construct.

Figure 6 / KMO for Each Component

		Mean KMO
Basic Human Needs	Nutrition and Basic Medical Care	0.86
	Water and Sanitation	0.77
	Shelter	0.76
	Personal Safety	0.64
Foundations of Wellbeing	Access to Basic Knowledge	0.82
	Access to Information and Communications	0.73
	Health and Wellness	0.67

	Environmental Quality	0.60
Opportunity	Personal Rights	0.88
	Personal Freedom and Choice	0.78
	Inclusiveness	0.82
	Access to Advanced Education	0.81

Year-to-Year Results Comparison

Each year we conduct a comprehensive review of all indicators included in the Social Progress Index framework to check data updates (which frequently include retroactive revisions) and whether new indicators have been published that are well-suited to describing social progress concepts. Many data sources that we use revise their data collection or estimation methods, which impacts not just newly published data but also previously published data. The Social Progress Index undergoes the same process for the sake of comparability. Using the 2020 Social Progress Index framework and methodology, we provide comparable historical data for nine additional years of the Social Progress Index, from 2011 to 2019. Results for the years 2011 to 2019 are therefore different from results that we have previously published.

It is important to note that while we establish a ten-year time-series of social progress from 2011 to 2020, not all indicator data are updated on an annual basis. Therefore, change over time is best interpreted over the entire span of these ten years rather than focusing on annual change.

The underlying framework (components and dimensions) of the Social Progress Index has remained the same as 2019. However, we added several new indicators and removed a few due to their discontinuation or the lack of updated data. We also changed the sources and the measurement of a handful of indicators. Additionally, of the 50 indicators, majority were retroactively revised by the data sources. We list indicator changes by component below.

Nutrition and Basic Medical Care: Data sources for undernourishment and child mortality retroactively revised prior years' estimations. Deaths for the infectious diseases indicator was not updated and we have therefore realigned the years for a three year lag.

Water and Sanitation: Due to the lack of updates for all indicators that were previously used in this component, we changed the indicators in the component ensuring these are aligned with the indicators used previously. The new indicators are from the Institute of Health Metrics and Evaluation and measure unsafe water-, sanitation- and hygiene- attributable deaths, populations using unsafe or unimproved water sources, and populations using unsafe or unimproved sanitation.

Shelter: We removed quality of electricity as it is no longer collected by the source. Data sources retroactively revised prior years' estimations of access to electricity and household air pollution deaths. We changed the source of usage of clean fuels and technology for cooking indicator to World Health Organization.

Personal Safety: Data sources for homicide rate, political killings and torture, and traffic deaths retroactively revised prior years' estimations.

Access to Basic Knowledge: We removed adult literacy indicator due to significant challenges with the lack of data and we replaced the indicator with women with no schooling. We changed the measurement of secondary enrollment from enrollment to attainment and we changed the source as well. We have also used secondary attainment for males and females to calculate

gender parity in secondary school attainment. Additionally, data sources for primary school enrollment, and access to quality education retroactively revised their prior years' estimations.

Access to Information and Communications:
Data sources for all four indicators retroactively revised prior years' estimations.

Health and Wellness: The V-Dem indicator on access to quality healthcare retroactively revised prior years' estimations. The life expectancy at 60 indicator was not updated and we have therefore realigned the years for a three year lag.

Environmental Quality: We included a new indicator measuring particulate matter 2.5 from Institute of Health Metrics and Evaluation. We changed the measurement of greenhouse gas emissions from per unit of GDP to absolute emissions measured as CO2 equivalents. The environmental performance index (EPI) indicator on biome protection retroactively revised prior years' estimations.

Personal Rights: V-Dem, which is the data source for freedom of expression, freedom of religion, access to justice, and property rights for women retroactively revised prior years' estimations.

Personal Freedom and Choice: Data sources for vulnerable employment and satisfied demand for contraception retroactively revised prior years' estimations. We now use UN Population Division data for the early marriage indicator.

Inclusiveness: V-Dem, which is the data source for equality of political power by gender, equality of political power by socioeconomic position, and equality of political power by social group retroactively revised prior years' estimations.

Access to Advanced Education: We changed the data sources for women's average years in school to measure the proportion of females aged 25–29 with 12–18 years of education from the Institute of Health Metrics and Evaluation. We also revised the measurement of globally ranked universities to take into account other universities (measured by V-dem) which is reflected in quality weighted universities. We removed percent of students enrolled in globally ranked universities and included an indicator measuring citable documents per population to account for other outputs of academic institutions (sourced by Scimago). UNESCO indicator on tertiary school life expectancy retroactively revised prior years' estimations.

Limitations

The Social Progress Index measures how countries at the national level perform on a certain set of indicators that meet the standards and concepts represented by the Social Progress Index framework. It is an important tool that is used to compare countries and assess both absolute and relative levels of performance on social progress to find best practices and to target areas which need improvement or from which other countries can learn. While the Social Progress Index framework captures the multi-dimensional concepts underlying social progress, we are limited in how we measure these concepts by the data available from public sources. Country performance is dependent upon the data published by other sources, and we defer to these sources to respond to country inquiries about the different aspects of social progress (a full list of sources is included in Appendix A).

We also recognize that the indicators in many of the topics we measure are not perfect. We strive to ensure each indicator meets our standards of quality; however, some issues are much more complex than the numbers we use to communicate them. For example, equality of political power

by gender (in Inclusiveness) must consider laws that are in place that require female representation in government, as well as account for places where women might not necessarily have the voice they are supposedly provided under these laws. We view these indicators as a starting point for measurement and conversation, and we continue to refine the index each year to accommodate more recent data with greater geographic coverage that cover important aspects of social progress still not captured by the current indicators available, including violence against women, national environmental degradation, fresh water withdrawals, and more.

Furthermore, the Social Progress Index provides a view into how a country performs on average, which helps inform the many policies and investments that affect social progress at the national level. However, it is only a starting point: aggregate data can obscure substantial regional and state differences in performance that are equally important to a country's policy considerations, especially in geographically large regions. For this reason, we have established several initiatives across Latin America, Europe, South Asia, and North America to explore social progress at a disaggregated regional level. We apply the same Social Progress Index framework to more localized geographic regions, contextualizing indicators and concepts with the input of local stakeholders. These initiatives help further drive action from the broader issues highlighted in the global Social Progress Index.

Conclusion

The Social Progress Index provides a benchmark by which countries can compare themselves to others, and can identify specific areas of current strength or weakness. Additionally, scoring on a 0–100 scale gives countries a realistic benchmark rather than an abstract measure. This scale allows us to track absolute, not just relative, performance of countries over time on each component, dimension, and the overall model.

The 2020 Social Progress Index results are a starting point for many different avenues of research into the ways a country is successful or not and whether conclusions can be drawn about the overall effect of social progress on economic growth. Furthermore, while disaggregated scores provide insight into the behavior of the different components that contribute to a country's performance, we believe disaggregation within a country (e.g. regional or state) also provides important insight and actionable information to those seeking to increase social progress. We continue to test our process and methodology at the regional and city level, replicating the steps outlined in this report to produce meaningful results in different areas of the world.

Appendix A: Indicator Definitions and Sources

All data used to calculate the 2020 Social Progress Index and relevant analyses are the most recent available as of July 1, 2020.

Component	Indicator name	Definition	Source	Link
BASIC HUMAN NEEDS				
Nutrition and Basic Medical Care	Undernourishment (% of pop.)	The prevalence of undernourishment expresses the probability that a randomly selected individual from the population consumes an amount of calories that is insufficient to cover her/his energy requirement for an active and healthy life. The indicator is computed by comparing a probability distribution of habitual daily dietary energy consumption with a threshold level called the minimum dietary energy requirement. Both are based on the notion of an average individual in the reference population.	Food and Agriculture Organization of the United Nations	http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/
	Maternal mortality rate (deaths/100,000 live births)	Maternal deaths per 100,000 livebirths in women aged 10-54 years.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
	Child mortality rate (deaths/1,000 live births)	Probability of dying between birth and exactly 5 years of age, expressed per 1,000 live births.	UN Inter-agency Group for Child Mortality Estimation	http://www.childmortality.org
	Child stunting (% of children)	Prevalence of stunting in children under 5.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
	Deaths from infectious diseases (deaths/100,000 people)	Age-standardized mortality rate from deaths caused by HIV/AIDS, tuberculosis, diarrhea, intestinal infections, respiratory infections, otitis media, meningitis, encephalitis, diptheria, whooping cough, tetanus, measles, varicella, herpes zoster, malaria, Chagas disease, leishmaniasis, trypanosomiasis, schistosomiasis, cysticercosis, cystic echinococcosis, lymphatic filariasis, onchocerciasis, trachoma, dengue, yellow fever, rabies, intestinal nematode infections, foodborne trematodiases, leprosy, ebola, zika virus, guinea worm disease, sexually transmitted diseases excluding HIV, hepatitis, and other infectious diseases per 100,000 people.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
Water and Sanitation	Unsafe water, sanitation and hygiene attributable	Age-standardised death rate attributable to unsafe water, sanitation and hygiene (per 100,000 pop.)	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030

Component	Indicator name	Definition	Source	Link
	deaths (per 100,000 pop.)			
	Populations using unsafe or unimproved water sources (%)	Risk-weighted prevalence of populations using unsafe or unimproved water sources, as measured by the summary exposure value (SEV) for unsafe water (%)	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
	Populations using unsafe or unimproved sanitation (%)	Risk-weighted prevalence of populations using unsafe or unimproved sanitation, as measured by the summary exposure value (SEV) for unsafe sanitation (%)	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
Shelter	Access to electricity (% of pop.)	The percentage of the population with access to electricity.	SE4ALL Global Tracking Framework (World Bank, International Energy Agency, and the Energy Sector Management Assistance Program)	https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS
	Household air pollution attributable deaths (deaths/100,000 people)	Age standardized deaths caused from indoor air pollution, including indoor air pollution-derived cases of influenza, pneumococcal pneumonia, H. influenzae type B pneumonia, respiratory syncytial virus pneumonia, other lower respiratory infections, trachea, bronchus, and lung cancers, ischemic heart disease, ischemic stroke, hemorrhagic and other non-ischemic stroke, chronic obstructive pulmonary disease, and cataracts per 100,000 people.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Usage of clean fuels and technology for cooking (% of pop.)	The proportion of population primarily using clean cooking fuels and technologies for cooking	World Health Organization	https://apps.who.int/gho/data/node.main.SDGFUELS712?lang=en
Personal Safety	Homicide rate (deaths/100,000 people)	Number of homicides, defined as unlawful death inflicted upon a person with the intent to cause death or serious injury, per 100,000 people. This indicator is logged for calculation.	UN Office on Drugs and Crime	https://data.unodc.org/

Component	Indicator name	Definition	Source	Link
	Perceived criminality (1=low; 5=high)	An assessment of the level of domestic security and the degree to which other citizens can be trusted. Measured on a scale of 1 (majority of other citizens can be trusted; very low levels of domestic security) to 5 (very high level of distrust; people are extremely cautious in their dealings with others; large number of gated communities, high prevalence of security guards).	Institute for Economics and Peace Global Peace Index	http://visionofhumanity.org/indexes/global-peace-index/
	Political killings and torture (0=low freedom; 1=high freedom)	Physical violence index scaled 0 to 1 that is based on indicators that reflect violence committed by government agents and that are not directly referring to elections. Variable name: v2x_clphy	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/
	Traffic deaths (deaths/100,000 people)	Age standardized rate of deaths per 100,000 people due to road injuries, including pedestrian road injuries, cyclist road injuries, motorcyclist road injuries, motor vehicle road injuries and other road injuries.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
FOUNDATIONS OF WELLBEING				
Access to Basic Knowledge	Women with no schooling	Proportion of females aged 25–29 with no schooling	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/global-educational-attainment-distributions-1970-2030
	Primary school enrollment (% of children)	Total number of students of official primary school age who are enrolled in any level of education, expressed as a percentage of the total population of official primary school age. Statistic is termed 'total net primary enrollment rate.'	UN Educational, Scientific, and Cultural Organization Institute for Statistics	http://data.uis.unesco.org/
	Secondary school attainment (% of population)	Population with at least some secondary education (% ages 25 and older)	United Nations Development Programme (UNDP) Human Development Data	http://hdr.undp.org/en/data
	Gender parity in secondary attainment (distance from parity)	The absolute deviation from parity (=1) in secondary education attainment of women and men.	United Nations Development Programme (UNDP) Human Development Data	http://hdr.undp.org/en/data

Component	Indicator name	Definition	Source	Link
	Access to quality education (0=unequal; 4=equal)	Country experts' aggregated evaluation of the question, "To what extent is high quality basic education guaranteed to all, sufficient to enable them to exercise their basic rights as adult citizens?" measured on a scale of 0 to 4. 0: Extreme. Provision of high quality basic education is extremely unequal and at least 75 percent (%) of children receive such low-quality education that undermines their ability to exercise their basic rights as adult citizens. 1: Unequal. Provision of high quality basic education is extremely unequal and at least 25 percent (%) of children receive such low-quality education that undermines their ability to exercise their basic rights as adult citizens. 2: Somewhat equal. Basic education is relatively equal in quality but ten to 25 percent (%) of children receive such low-quality education that undermines their ability to exercise their basic rights as adult citizens. 3: Relatively equal. Basic education is overall equal in quality but five to ten percent (%) of children receive such low-quality education that probably undermines their ability to exercise their basic rights as adult citizens. 4: Equal. Basic education is equal in quality and less than five percent (%) of children receive such low-quality education that probably undermines their ability to exercise their basic rights as adult citizens. Variable name: v2peedueq_osp	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/
Access to Information and Communications	Mobile telephone subscriptions (subscriptions/100 people)	Subscriptions to a public mobile telephone service using cellular technology, including the number of pre-paid SIM cards active during the past three months, expressed as the number of mobile telephone subscriptions per 100 inhabitants. In the SPI model, scores are capped at 100 mobile telephones per 100 people.	International Telecommunications Union	http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx
	Internet users (% of pop.)	The estimated number of Internet users out of the total population, using the Internet from any device (including mobile phones) in the last 12 months.	International Telecommunications Union	http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

Component	Indicator name	Definition	Source	Link
	Access to online governance (0=low; 1=high)	The availability of e-participation tools on national government portals for of the following uses: e-information – provision of information on the Internet; e-consultation – organizing public consultations online; and e-decision-making – involving citizens directly in decision processes. E-participation is defined as the process of engaging citizens through ICTs in policy, decision-making, and service design and delivery in order to make it participatory, inclusive, and deliberative.	UN Department of Economic and Social Affairs E-Government Survey	https://publicadministration.un.org/egovkb/en-us/Data-Center
	Media censorship (0=frequent; 4=rare)	Country experts' aggregated evaluation of the question, "Does the government directly or indirectly attempt to censor the print or broadcast media?" measured on a scale of 0 to 4. 0: Attempts to censor are direct and routine. 1: Attempts to censor are indirect but nevertheless routine. 2: Attempts to censor are direct but limited to especially sensitive issues. 3: Attempts to censor are indirect and limited to especially sensitive issues. 4: The government rarely attempts to censor major media in any way, and when such exceptional attempts are discovered, the responsible officials are usually punished. Variable name: v2mecenefm_osp	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/
Health and Wellness	Life expectancy at 60 (years)	The average number of years that a person of 60 to 64 years old could expect to live, if he or she were to pass through life exposed to the sex- and age-specific death rates prevailing at the time of his or her 60 years, for a specific year, in a given country, territory, or geographic area.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Premature deaths from non-communicable diseases (deaths/100,000 people)	Mortality rate due to cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases among populations aged 30–70 years.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
	Access to essential services (0=none; 100=full coverage)	The universal health coverage (UHC) index measures the coverage of 9 tracer interventions and risk-standardized death rates from 32 causes amenable to personal healthcare, including vaccine-preventable diseases (e.g., diphteria, tetanus, measles), respiratory infections, cancer (breast, cervical, uterine,	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030

Component	Indicator name	Definition	Source	Link
		testicular), heart diseases, diabetes, kidney disease, and the adverse effects of medical treatment.		
	Access to quality healthcare (0=unequal; 4=equal)	Country experts' aggregated evaluation of the question, "To what extent is high quality basic healthcare guaranteed to all, sufficient to enable them to exercise their basic political rights as adult citizens?" measured on a scale of 0 to 4. 0: Extreme. Because of poor-quality healthcare, at least 75 percent (%) of citizens' ability to exercise their political rights as adult citizens is undermined. 1: Unequal. Because of poor-quality healthcare, at least 25 percent (%) of citizens' ability to exercise their political rights as adult citizens is undermined. 2: Somewhat equal. Because of poor-quality healthcare, ten to 25 percent (%) of citizens' ability to exercise their political rights as adult citizens is undermined. 3: Relatively equal. Basic healthcare is overall equal in quality but because of poor-quality healthcare, five to ten percent (%) of citizens' ability to exercise their political rights as adult citizens is undermined. 4: Equal. Basic healthcare is equal in quality and less than five percent (%) of citizens cannot exercise their basic political rights as adult citizens. Variable name: v2pehealth_osp	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/
Environmental Quality	Outdoor air pollution attributable deaths (deaths/100,000 people)	The number of deaths resulting from ambient particulate matter pollution, including emissions from industrial activity, households, cars and trucks, expressed as the rate per 100,000 people, age adjusted.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Greenhouse gas emissions (total CO2 equivalents)	Emissions of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6), excluding land use, land-use change and forestry. Emissions are expressed in CO2 equivalents using 100 year global warming potentials found in the Intergovernmental Panel on Climate Change Second Assessment Report. In the SPI model, data are capped at XXXX.	World Resources Institute	https://www.climatewatchdata.org/ghg-emissions?source=PIK

Component	Indicator name	Definition	Source	Link
	Biome protection	The percentage of biomes (a naturally occurring community of flora and fauna) in protected areas, weighted by national composition of biomes. Data are capped at 17 by the source.	Environmental Performance Index	https://epi.yale.edu/epi-results/2020/component/epi
	Particulate matter	Population-weighted mean levels of fine particulate matter smaller than 2.5 microns in diameter (PM2.5)	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
OPPORTUNITY				
Personal Rights	Political rights (0=no rights; 40=full rights)	An evaluation of three subcategories of political rights: electoral process, political pluralism and participation, and functioning of government on a scale from 0 (no political rights) to 40 (full political rights). Some countries and territories score below zero on the questions used to compose the indicator. In the SPI model, data below zero are treated as zero.	Freedom House	https://freedomhouse.org/report-types/freedom-world
	Freedom of expression (0=no freedom; 1=full freedom)	Country experts' aggregated evaluation of the question, "To what extent does government respect press & media freedom, the freedom of ordinary people to discuss political matters at home and in the public sphere, as well as the freedom of academic and cultural expression?" Variable name: v2x_freexp	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/
	Freedom of religion (0=no freedom; 4=full freedom)	Country experts' aggregated evaluation of the question, "Is there freedom of religion?" measured on a scale of 0 to 4. 0: Not respected by public authorities. Hardly any freedom of religion exists. Any kind of religious practice is outlawed or at least controlled by the government to the extent that religious leaders are appointed by and subjected to public authorities, who control the activities of religious communities in some detail. 1: Weakly respected by public authorities. Some elements of autonomous organized religious practices exist and are officially recognized. But significant religious communities are repressed, prohibited, or systematically disabled, voluntary conversions are restricted, and instances of discrimination or intimidation of individuals or groups due to their religion are common. 2: Somewhat respected by public authorities. Autonomous organized religious practices exist and are officially recognized. Yet, minor religious	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/

Component	Indicator name	Definition	Source	Link
		communities are repressed, prohibited, or systematically disabled, and/or instances of discrimination or intimidation of individuals or groups due to their religion occur occasionally. 3: Mostly respected by public authorities. There are minor restrictions on the freedom of religion, predominantly limited to a few isolated cases. Minority religions face denial of registration, hindrance of foreign missionaries from entering the country, restrictions against proselytizing, or hindrance to access to or construction of places of worship. 4: Fully respected by public authorities. The population enjoys the right to practice any religious belief they choose. Religious groups may organize, select, and train personnel; solicit and receive contributions; publish; and engage in consultations without undue interference. If religious communities have to register, public authorities do not abuse the process to discriminate against a religion and do not constrain the right to worship before registration. Variable name: v2clrelig_osp		
	Access to justice (0=non-existent; 1=observed)	Country experts' aggregated evaluation of the question, "Do citizens enjoy secure and effective access to justice?" Responses are collected on an ordinal scale, and then converted to a 0-1 scale. 0 signifies secure and effective access to justice is non-existent, and 1 signifies secure and effective access to justice is almost always observed. Variable name: v2xcl_acjst	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/
	Property rights for women (0=no rights; 5=full rights)	Country experts' aggregated evaluation of the question, "Do women enjoy the right to private property?" measured on a scale of 0 to 5. 0: Virtually no women enjoy private property rights of any kind. 1: Some women enjoy some private property rights, but most have none. 2: Many women enjoy many private property rights, but a small proportion enjoys few or none. 3: More than half of women enjoy most private property rights, yet a smaller share of women have much more restricted rights. 4: Most women enjoy most private property rights but	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/

Component	Indicator name	Definition	Source	Link
		a small minority does not. 5: Virtually all women enjoy all, or almost all, property rights. Variable name: v2clprptyw_osp		
Personal Freedom and Choice	Vulnerable employment (% of employees)	Contributing family workers and own-account workers as a percentage of total employment.	International Labor Organization/World Bank	https://data.worldbank.org/indicator/SL.EMP.VULN.ZS
	Early marriage (% of women)	The percentage of women aged 15-19 years who are married or in-union.	United Nations Population Division	https://www.un.org/en/development/desa/population/theme/marriage-unions/marriage_estimates.asp
	Satisfied demand for contraception (% of women)	The percentage of total demand for family planning among married or in-union women aged 15 to 49 that is satisfied with modern methods.	United Nations Population Division	http://www.un.org/en/development/desa/population/theme/family-planning/cp_model.shtml
	Corruption (0=high; 100=low)	The perceived level of public sector corruption based on expert opinion, measured on a scale from 0 (highly corrupt) to 100 (very clean).	Transparency International	www.transparency.org/cpi
Inclusiveness	Acceptance of gays and lesbians (0=low; 100=high)	The percentage of respondents answering affirmatively to the question, “Is the city or area where you live a good place or not a good place to live for gay or lesbian people?”	Gallup World Poll	https://ga.gallup.com/
	Discrimination and violence against minorities (1=low; 10=high)	Group Grievance indicator. Discrimination, powerlessness, ethnic violence, communal violence, sectarian violence, and religious violence, measured on a scale on 1 (low pressures) to 10 (very high pressures).	Fund for Peace Fragile States Index	https://fragilestatesindex.org/
	Equality of political power by gender (0=unequal power; 4=equal power)	Country experts' aggregated evaluation of the question, "Is political power distributed according to gender?" measured on a scale of 0 to 4. 0: Men have a near-monopoly on political power. 1: Men have a dominant hold on political power. Women have only marginal influence. 2: Men have much more political power but women have some areas of influence. 3: Men have somewhat more political power than women. 4: Men and women have roughly equal political power. Variable name: v2pepwrgen_osp	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/
	Equality of political power by socioeconomic position (0=unequal	Country experts' aggregated evaluation of the question, "Is political power distributed according to socioeconomic position?" measured on a scale of 0 to 4. 0: Wealthy people enjoy a virtual monopoly on political	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/

Component	Indicator name	Definition	Source	Link
	power; 4=equal power)	power. Average and poorer people have almost no influence. 1: Wealthy people enjoy a dominant hold on political power. People of average income have little say. Poorer people have essentially no influence. 2: Wealthy people have a very strong hold on political power. People of average or poorer income have some degree of influence but only on issues that matter less for wealthy people. 3: Wealthy people have more political power than others. But people of average income have almost as much influence and poor people also have a significant degree of political power. 4: Wealthy people have no more political power than those whose economic status is average or poor. Political power is more or less equally distributed across economic groups. Variable name: v2pepwrses_osp		
	Equality of political power by social group (0=unequal power; 4=equal power)	Country experts' aggregated evaluation of the question, "Is political power distributed according to social groups (defined by caste, ethnicity, language, race, religion or some combination thereof)?" measured on a scale of 0 to 4. 0: Political power is monopolized by one social group comprising a minority of the population. This monopoly is institutionalized, i.e., not subject to frequent change. 1: Political power is monopolized by several social groups comprising a minority of the population. This monopoly is institutionalized, i.e., not subject to frequent change. 2: Political power is monopolized by several social groups comprising a majority of the population. This monopoly is institutionalized, i.e., not subject to frequent change. 3: Either all social groups possess some political power, with some groups having more power than others; or different social groups alternate in power, with one group controlling much of the political power for a period of time, followed by another – but all significant groups have a turn at the seat of power. 4: All social groups have roughly equal political power or there are no strong ethnic, caste, linguistic, racial, religious, or regional differences to speak of. Social	Varieties of Democracy (V-Dem) Project	https://www.v-dem.net/en/data/data-version-10/

Component	Indicator name	Definition	Source	Link
		group characteristics are not relevant to politics. Variable name: v2pepwrsoc_osp		
Access to Advanced Education	Years of tertiary schooling	Number of years a person of tertiary school entrance age can expect to spend within tertiary education. For a child of a certain age a, the school life expectancy is calculated as the sum of the age specific enrolment rates for the levels of education specified. The part of the enrolment that is not distributed by age is divided by the school-age population for the level of education they are enrolled in, and multiplied by the duration of that level of education. The result is then added to the sum of the age-specific enrollment rates. The indicator seeks to show the overall level of development of an educational system in terms of the average number of years of schooling that the education system offers to the eligible population, including those who never enter school. In the SPI model, data are capped at 5.	UN Educational, Scientific, and Cultural Organization Institute for Statistics	https://data.unodc.org/
	Women with advanced education (%)	Proportion of females aged 25–29 with 12–18 years of education.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/global-educational-attainment-distributions-1970-2030
	Quality weighted universities (points)	The number of universities in a country weighted by the quality of universities, measured by university rankings on any of the three most widely used international assessments. Universities in the top 400 on any list are given double weight. Not ranked universities are given 10% weight of the top ranked universities. Variable name: v2canuni	Times Higher Education World University Rankings, QS World University Rankings, and Academic Ranking of World Universities; Varieties of Democracy (V-Dem) Project ; SPI calculations	https://www.timeshighereducation.com/world-university-rankings/2020/world-ranking https://www.topuniversities.com/university-rankings/world-university-rankings/2021 http://www.shanghairanking.com/ARWU2019.html https://www.v-dem.net/en/data/data-version-10/
	Citable documents	Citable documents - articles, reviews and conference papers - per 1,000 population.	Scimago Journal & Country Rank	https://www.scimagojr.com/countryrank.php

Component	Indicator name	Definition	Source	Link
	GDP per capita, PPP (constant 2011 international $)	GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2017 international dollars.	World Bank	http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD

Appendix B: Indicator Boundaries

Indicator	Best case	Worst case
Undernourishment (% of pop.)	2.5	55.7
Deaths from infectious diseases (deaths/100,000)	0	1633.489
Child stunting (% of children)	0	62
Maternal mortality rate (deaths/100,000 live births)	0	746.19
Child mortality rate (deaths/1,000 live births)	0	210.341
Unsafe water, sanitation and hygiene attributable deaths (per 100,000 pop.)	0	204.412
Populations using unsafe or unimproved water sources (%)	0	88.817
Populations using unsafe or unimproved sanitation (%)	0	94.755
Usage of clean fuels and technology for cooking (% of pop.)	95	5
Access to electricity (% of pop.)	100	0
Household air pollution attributable deaths (deaths/100,000)	0	262.096
Traffic deaths (deaths/100,000)	0	99.681
Political killings and torture (0=low freedom; 1=high freedom)	1	0
Perceived criminality (1=low; 5=high)	1	5
Homicide rate (deaths/100,000)	0	105.231
Access to quality education (0=unequal; 4=equal)	4	0
Women with no schooling	0	0.866
Gender parity in secondary attainment (distance from parity)	0.03	0.835
Primary school enrollment (% of children)	100	35.307
Secondary school attainment (% of population)	100	3.2
Access to online governance (0=low; 1=high)	1	0
Media censorship (0=frequent; 4=rare)	4	0
Internet users (% of pop.)	100	0
Mobile telephone subscriptions (subscriptions/100 people)	100	0
Access to quality healthcare (0=unequal; 4=equal)	4	0
Access to essential services (0=none; 100=full coverage)	100	21.361
Premature deaths from non-communicable diseases (deaths/100,000)	0	1506.06
Life expectancy at 60 (years)	28.27	11.176
Greenhouse gas emissions (total CO2 equivalents)	0	2980
Particulate matter	0	101.452
Biome protection	17	0
Outdoor air pollution attributable deaths (deaths/100,000)	0	111.802
Political rights (0=no rights; 40=full rights)	40	0
Freedom of expression (0=no freedom; 1=full freedom)	1	0
Freedom of religion (0=no freedom; 4=full freedom)	4	0
Access to justice (0=non-existent; 1=observed)	1	0
Property rights for women (0=no right; 5=full rights)	5	0
Vulnerable employment (% of employees)	0	94.719
Corruption (0=high; 100=low)	100	0

Early marriage (% of women)	0	62.992
Satisfied demand for contraception (% of women)	100	4.3
Equality of political power by socioeconomic position (0=unequal power; 4=equal power)	4	0
Equality of political power by social group (0=unequal power; 4=equal power)	4	0
Equality of political power by gender (0=unequal power; 4=equal power)	4	0
Discrimination and violence against minorities (0=low; 10=high)	1	10
Acceptance of gays and lesbians (0=low; 100=high)	1	0
Citable documents	5.595	0
Women with advanced education (%)	1	0
Years of tertiary schooling	5	0
Quality weighted universities (points)	1092.6	0

Appendix C: PCA-Derived Indicator Weights

Indicator	Unscaled	Scaled
Undernourishment (% of pop.)	0.21	0.19
Deaths from infectious diseases (deaths/100,000)	0.22	0.19
Child stunting (% of children)	0.22	0.20
Maternal mortality rate (deaths/100,000 live births)	0.23	0.21
Child mortality rate (deaths/1,000 live births)	0.23	0.21
Unsafe water, sanitation and hygiene attributable deaths (per 100,000 pop.)	0.35	0.33
Populations using unsafe or unimproved water sources (%)	0.36	0.34
Populations using unsafe or unimproved sanitation (%)	0.36	0.34
Usage of clean fuels and technology for cooking (% of pop.)	0.36	0.34
Access to electricity (% of pop.)	0.35	0.33
Household air pollution attributable deaths (deaths/100,000)	0.35	0.33
Traffic deaths (deaths/100,000)	0.31	0.24
Political killings and torture (0=low freedom; 1=high freedom)	0.33	0.25
Perceived criminality (1=low; 5=high)	0.36	0.27
Homicide rate (deaths/100,000)	0.32	0.24
Access to quality education (0=unequal; 4=equal)	0.21	0.18
Women with no schooling	0.25	0.21
Gender parity in secondary attainment (distance from parity)	0.25	0.21
Primary school enrollment (% of children)	0.22	0.19
Secondary school attainment (% of population)	0.25	0.21
Access to online governance (0=low; 1=high)	0.35	0.28
Media censorship (0=frequent; 4=rare)	0.20	0.16
Internet users (% of pop.)	0.36	0.29
Mobile telephone subscriptions (subscriptions/100 people)	0.33	0.27
Access to quality healthcare (0=unequal; 4=equal)	0.26	0.23
Access to essential services (0=none; 100=full coverage)	0.30	0.26
Premature deaths from non-communicable diseases (deaths/100,000)	0.26	0.24
Life expectancy at 60 (years)	0.30	0.27
Greenhouse gas emissions (total CO2 equivalents)	0.15	0.11
Particulate matter	0.43	0.31
Biome protection	0.34	0.25
Outdoor air pollution attributable deaths (deaths/100,000)	0.46	0.33
Political rights (0=no rights; 40=full rights)	0.24	0.21
Freedom of expression (0=no freedom; 1=full freedom)	0.24	0.21
Freedom of religion (0=no freedom; 4=full freedom)	0.21	0.19
Access to justice (0=non-existent; 1=observed)	0.23	0.20
Property rights for women (0=no right; 5=full rights)	0.21	0.19
Vulnerable employment (% of employees)	0.33	0.27

Corruption (0=high; 100=low)	0.31	0.25
Early marriage (% of women)	0.30	0.25
Satisfied demand for contraception (% of women)	0.28	0.23
Equality of political power by socioeconomic position (0=unequal power; 4=equal power)	0.26	0.21
Equality of political power by social group (0=unequal power; 4=equal power)	0.26	0.20
Equality of political power by gender (0=unequal power; 4=equal power)	0.27	0.21
Discrimination and violence against minorities (0=low; 10=high)	0.22	0.18
Acceptance of gays and lesbians (0=low; 100=high)	0.25	0.20
Quality weighted universities (points)	0.25	0.22
Citable documents	0.30	0.26
Women with advanced education (%)	0.29	0.26
Years of tertiary schooling	0.30	0.26

Appendix D: Descriptive Statistics for 2020 Social Progress Index, Component, and Dimension Scores

The following descriptive statistics are based on the sample of 179 countries for which we can calculate at least 9 components for the 2020 Social Progress Index.

	Obs.	Mean	Standard Deviation	Minimum	Maximum
Social Progress Index	168	67.91	15.36	31.06	92.73
Basic Human Needs	169	76.04	17.85	21.31	98.07
Foundations of Wellbeing	179	69.96	14.09	36.69	93.39
Opportunity	171	57.71	16.00	20.73	88.66
Nutrition and Basic Medical Care	179	84.52	14.34	37.09	98.98
Water and Sanitation	179	75.19	24.58	5.91	99.80
Shelter	178	77.00	22.50	24.78	99.00
Personal Safety	170	67.41	14.86	17.46	96.58
Access to Basic Knowledge	179	77.12	17.98	24.88	99.01
Access to Information and Communications	179	66.10	20.40	5.80	97.70
Health and Wellness	179	62.56	15.68	17.35	91.05
Environmental Quality	179	74.04	13.59	21.65	93.78
Personal Rights	174	68.71	22.12	7.22	96.78
Personal Freedom and Choice	178	63.43	16.14	20.77	91.38
Inclusiveness	173	46.33	16.98	3.17	85.72
Access to Advanced Education	178	53.08	19.13	12.80	90.53

Appendix E: Bibliography and Further Reading

Bland, J. M., and D. G. Altman. “Cronbach’s Alpha.” *BMJ (Clinical Research Ed.)* 314, no. 7080 (1997): 572.

Dunteman, George H. *Principal Components Analysis*. SAGE, 1989.

Fleurbaey, M. and D. Blanchet. *Beyond GDP: Measuring Welfare and Assessing Sustainability*, Oxford University Press, 2013.

Manly, Bryan F. J. *Multivariate Statistical Methods: A Primer*. CRC Press, 1994.

For further reading on social progress, development, and composite indices, we recommend:

Bishop, Matthew, and Michael Green. *The Road from Ruin: How to Revive Capitalism and Put America Back on Top*. New York: Crown Business, 2011.

Delgado, Mercedes, Christian Ketels, Michael E. Porter, and Scott Stern. *The Determinants of National Competitiveness*. Working Paper. National Bureau of Economic Research, July 2012. http://www.nber.org/papers/w18249.

Fehder, Daniel, Michael E. Porter, and Scott Stern. “The Empirics of Social Progress: The Interplay between Subjective Well-Being and Societal Performance.” *AEA Papers and Proceedings,* 108 (2018): 477-482.

Furman, Jeffrey L., Michael E. Porter, and Scott Stern. “The Determinants of National Innovative Capacity.” *Research Policy* 31, no. 6 (2002): 899–933.

Gehl, Katherine M., and Michael E. Porter. “Why Competition in the Politics Industry is Failing America.” Harvard Business School, 2017. https://www.hbs.edu/competitiveness/Documents/why-competition-in-the-politics-industry-is-failing-america.pdf

Joint Research Centre-European Commission. Handbook on constructing composite indicators: methodology and user guide. OECD Publishing, 2008.

Kuznets, Simon. "Economic Growth and Income Inequality." The American Economic Review 45, no. 1 (1955): 1-28.

Porter, Michael E. *Competitive Advantage of Nations: Creating and Sustaining Superior Performance*. Simon and Schuster, 2011.

Porter, Michael E. *Competition in Global Industries*. Harvard Business Press, 1986.

Sen, Amartya Kumar. *Commodities and Capabilities*. North-Holland Publ., 1985.

Sen, Amartya Kumar. *Development as Freedom*. Oxford University Press, 1999.

Stevenson, Betsey, and Justin Wolfers. *Economic growth and subjective well-being: Reassessing the Easterlin paradox*. No. w14282. National Bureau of Economic Research, 2008.

Stiglitz, Joseph, Amartya Sen, and Jean-Paul Fitoussi. "The measurement of economic performance and social progress revisited." *Reflections and overview. Commission on the Measurement of Economic Performance and Social Progress, Paris* (2009).