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BENCHMARKS FOR SDG 4 INDICATORS: METHODOLOGICAL NOTE

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This note presents the methodology used to derive three reference points provided by the UIS to support country and regional benchmarking of SDG 4: (1) the country-specific minimum benchmark, (2) the country-specific ambitious benchmarking, and (3) the regional minimum benchmark. The two country-specific benchmarks are intended to provide countries with levels of the selected indicators that are (1) feasible to achieve given historical trends and (2) tailored to their own starting point. The regional benchmark is intended to provide regions with a minimum level that all countries should achieve.

Country-Specific Minimum and Ambitious Benchmarks

The country-specific minimum benchmark reflects a future level of the indicator that would be feasible for a particular country to achieve given its latest known value of the indicator and historical rates of growth in the indicator observed globally. Because growth rates in an indicator tend to decline as the level of the indicator approaches 100 percent (or for out-of-school youth, 0 percent), the feasible growth rate would be higher for countries further from 100 percent and lower for those closer to 100 percent. The country-specific minimum benchmark for a country is based on an annualized rate of growth in the indicator that is the median of the annual growth rates exhibited historically by countries of the same level. This is considered feasible because half of countries with the same level of the indicator historically achieved a higher rate of growth while half achieved a lower rate. The country-specific ambitious benchmark is based on a more ambitious rate of growth, the 75th percentile rather than the median: this is more ambitious because only 25 percent of countries with the same level as the country have historically achieved a higher rate of growth. Note that the feasibility of these benchmarks depends on numerous factors including secular factors that are not directly or quickly influenced by policy decisions; as a result, the term feasible refers to historical growth rates but excludes other long-term factors that may limit the ability of countries to make progress in an indicator.

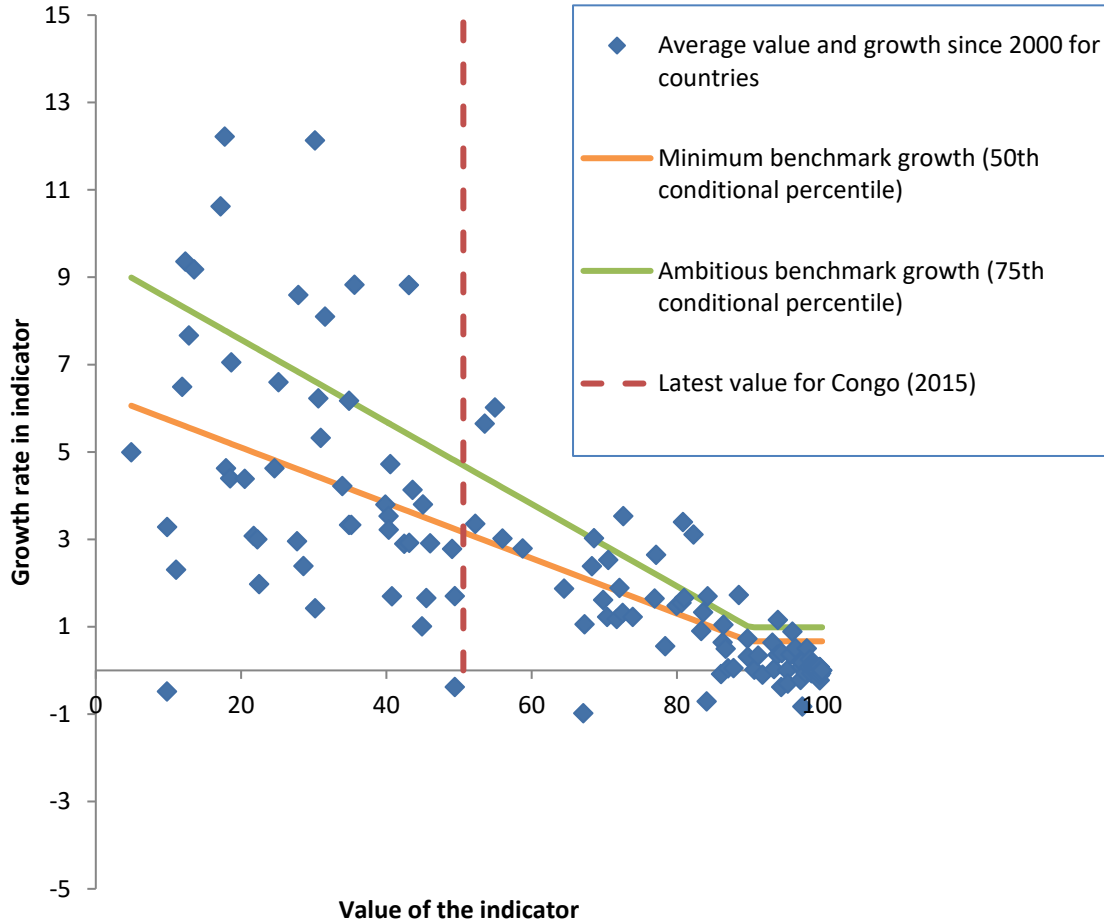
The first step in implementing the methodology is to estimate the relationship between growth in the indicator and the level of indicator based on historical observations. To estimate the relationship between growth and level historically for a given indicator, data on growth (or an alternative measure of progress) for each country since year 2000 and the average level of the indicator for the same period was used. The definition of progress varied by indicator and was specified either as the percentage point difference or as the proportionate change (see Table A1 for specific methodologies for each indicator). The specification was chosen in order to maximize the fit of the model used to estimate the relationship between progress and the indicator level. The term growth rate is used in the proceeding description without loss of generality to other measures of progress included in Table A1).

For many indicators, countries with lower levels of an indicator made more rapid progress across time historically; for other indicators, progress appeared to not to depend on current level. As a result, two approaches were applied to estimate the relationship between annual progress and current level. For the first approach, where there was an apparent relationship between level and progress, percentiles of progress conditional on level were estimated using quantile regressions. For the country-specific minimum benchmark, the quantile regression is specified as the median growth rate in the indicator as a linear function of the level of the indicator. The model provides estimates of the median growth in the indicator for given level of the indicator. For the country-specific ambitious benchmark, the 75th percentile was used.

For example, **Figure A1** presents the 50th and 75th conditional quantiles for SDG 4.1.2 lower secondary completion rate. The annualized average growth rate for each country and the average value of the indicator since 2000 are plotted in **Figure A1** with the estimated 50th conditional quantile (orange line) and the 75th conditional quantile (green line). The latest value for the Republic of Congo is denoted by the vertical dashed red line; this was 50.6 percent in 2015. The median growth rate for a country with 50.6 percent is indicated by the 50th conditional quantile (orange) line and is 3.2 percent; the 75th percentile growth rate is 4.7 percent. These are found where the latest value (dashed red) line intersects with the respective conditional quantile lines.

The second step in the methodology is to calculate a country-specific minimum benchmark and a country-specific ambitious benchmark for each year until 2030 (note that only the benchmarks for 2025 and 2030 are disseminated). This calculation is done recursively for each country. The minimum benchmark for a given year is equal to the previous year's benchmark (or latest value for the first computation) increased by the estimated median annual growth rate conditional on the previous year's benchmark (or latest value). An analogous calculation is made for the ambitious benchmark using the 75th percentile conditional annual growth rate.

Figure A1. Average values and trends historically since 2000 with 50th and 75th conditional percentile lines (Rep. of Congo example): Lower secondary completion rate



Continuing the example of SDG 4.1.2 (lower secondary completion rate) for the Republic of Congo, the recursive setting of benchmarks is demonstrated in **Figure A2** (orange and green points for minimum and ambitious benchmarks, respectively). The latest value for the Republic of Congo was 50.6 percent and the median annual growth rate and 75th percentile annual growth rate for a country with an indicator value of 50.6 percent was 3.2 percent and 4.7 percent, respectively. The minimum benchmark for 2016 is 52.2 percent equivalent to 3.2 percent increase in the indicator from 50.6 percent. The median annual growth rate conditional on having a level of the indicator of 52.2 percent is 3.1 percent. An increase of 3.1 percent from 52.2 percent is 53.8 percent which is the minimum benchmark for 2017¹. This process is repeated to get the minimum benchmarks from 2016 to 2030. An analogous calculation is used for the ambitious benchmark. **Figure A3** presents the minimum and ambitious benchmarks plotted across time for the Republic of Congo.

¹ Note these figures have been rounded and reflect the values used in **Figures A1, A2 and A3**.

Figure A2. Average values and trends historically since 2000 with 50th and 75th conditional percentile lines.

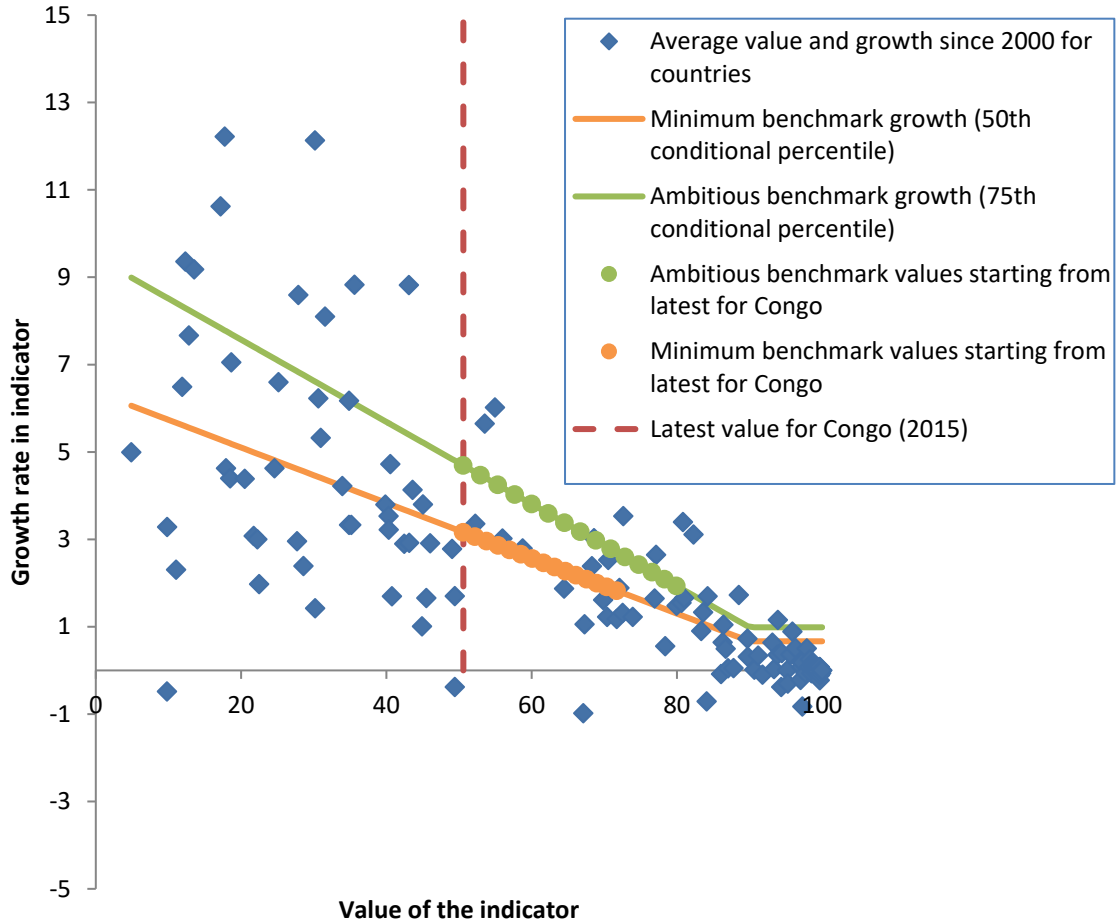
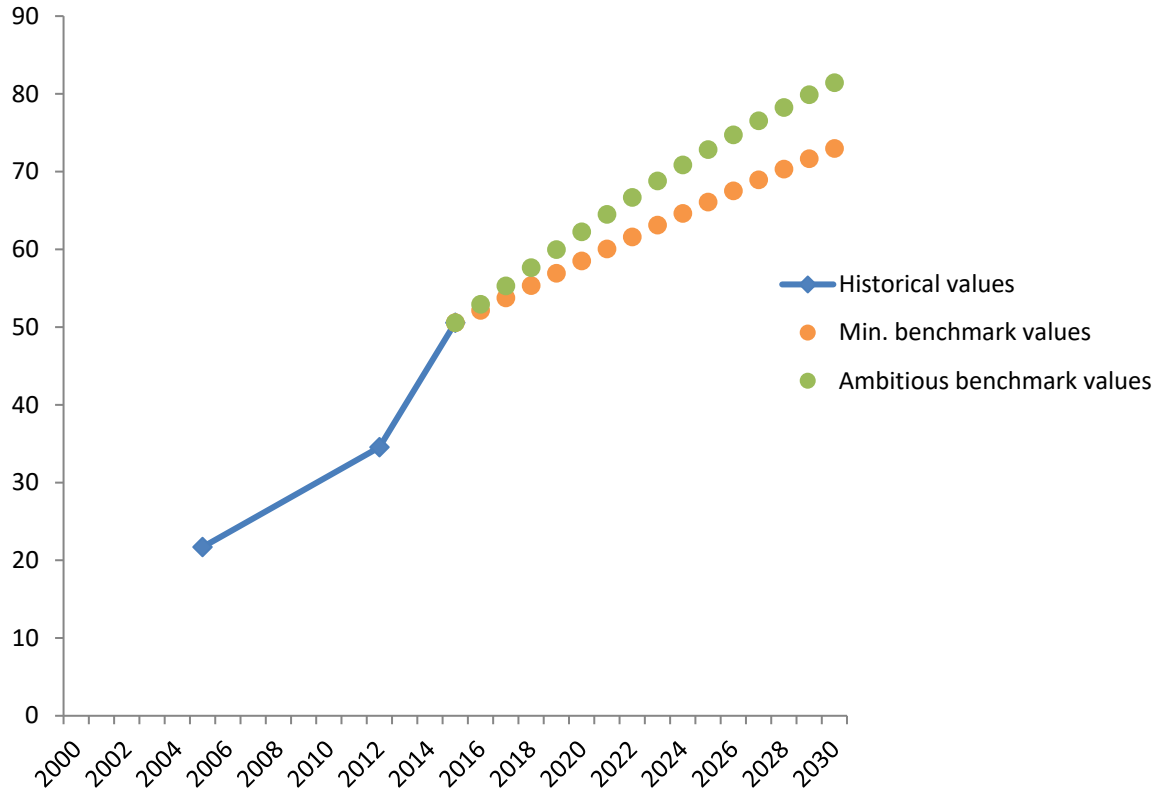


Figure A3: Projections and benchmarks plotted by time (Congo example)

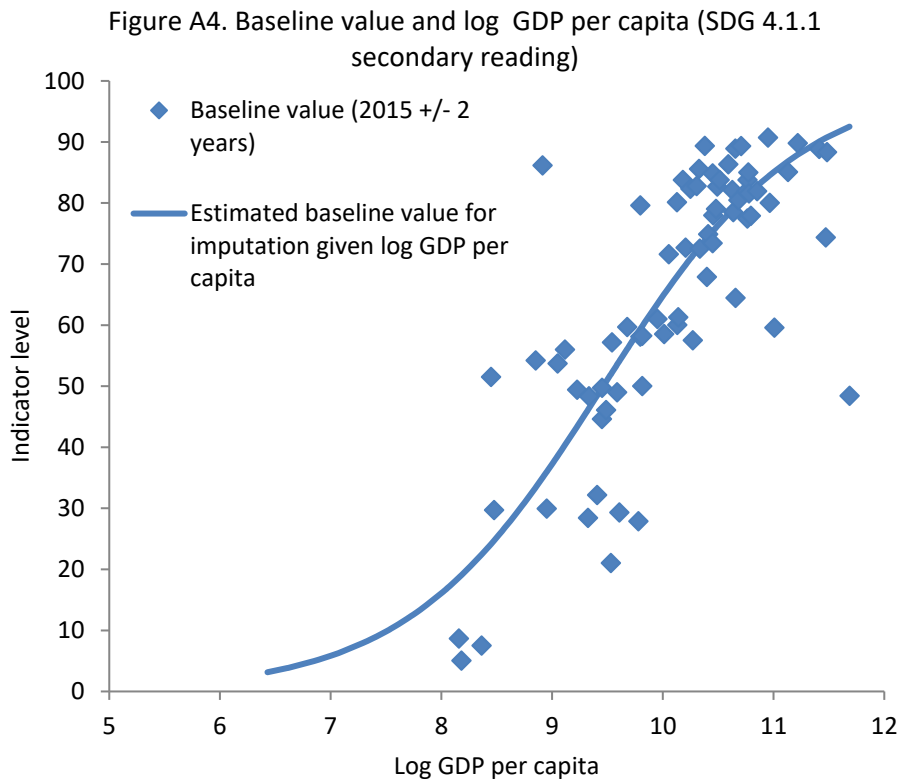


Imputation

Only one data point is required to generate the country-specific minimum and ambitious benchmarks for a country. For countries with no data points, an imputation method was used to estimate a 2015 baseline value from which the country-specific minimum and ambitious benchmarks could then be generated. The purpose of the imputed values was to provide data for defining regional minimum benchmarks which are described below. Note that imputed values were not used in estimating the conditional percentile lines used in the first step of the country-specific benchmarks described above. Country-specific benchmarks are not presented for countries that have no data points for an indicator.

The imputation method for countries without data involved estimating the relationship between countries' GDP per capita and indicator level. Imputed values were then estimated based on a country's GDP per capita. For countries without GDP per capita data, no imputations were calculated. To estimate this relationship, the relationship was modeled using a linear regression with the level of the indicator converted to logits (log odds) as the dependent variable and log GDP per capita as the independent variable. For example, **Figure A4** depicts SDG 4.1.1 (lower secondary reading) and log GDP per capita as well as the fitted line based on the estimated regression model. Countries without values for the indicator were assigned fitted baseline values given their log GDP per capita (blue line,

Figure A4).



Regional benchmarks

Applying benchmarks to all countries within a region requires a measure that balances feasibility for low performing countries and relevance for high performing countries. This is particularly challenging in regions with a wide range of outcomes. The adopted approach is to define a minimum regional benchmark for 2030 that all countries in a particular region should achieve. To do this, the average of the country-specific minimum benchmarks for the lowest tercile (third) of countries was used, including minimum benchmarks based on imputed baselines described previously. This acts as a minimum acceptable level for countries within a region. Note that the regional minimum benchmark is not a target that the region’s average of the indicator is intended to achieve² but rather a minimum level for all countries including the lowest performing. It is possible that the baseline or latest regional average exceeds this minimum regional benchmark.

² A target for a region might, for example, be the average of the minimum country-specific benchmarks or ambitious country-specific benchmarks for the countries within a region.