



THE HABITAT COMMITMENT PROJECT

Assessing the Past for a Better Urban Future

APPENDIX: METHODOLOGY



The work presented in this book is part of a larger research agenda of the Global Urban Futures Project (GUF) at The New School. The research and analysis is a collective effort by students and faculty of the Milano School of International Affairs, Management, and Urban Policy at The New School.

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APPENDIX

Methodology: Calculating the HCI

The HCI is constructed using a process adapted from the SERF methodology developed by Fukuda-Parr et al. in *Fulfilling Economic and Social Rights*.¹ While we used the SERF methodology for creating achievement possibility frontiers to predict maximum performance levels based on income, the HCI uses a larger number of indicators and also expands the SERF methodology to address changes over time.

- For each indicator the data are plotted in relationship to the country's per capita GDP (PPP, 2011 International Dollars), using all available data from 1995 to present.
- Frontier points along the outer edge of the plot are identified using visual inspection, with the requirement that the frontier include observations from a minimum of four countries.
- Econometric methods are used to specify the frontier, considering multiple functional forms— linear, logarithmic, inverse, quadratic, power, growth, and exponential, etc. The best fit relationship is determined by statistical measures of goodness of fit (R^2), and visual inspection of the shape.
- The function plateaus at a point where the frontier indicates per capita GDP is high enough that countries at that level and beyond are capable of full or near-full achievement of the indicator.



- Indicator values (X) are rescaled as a percentage of achievement between the lowest level of achievement recorded by any country at any income (X_m), and the maximum possible level of achievement for the country's per capita GDP, as calculated by the Achievement Possibilities Frontier (X_f).

A problem arises for instance where a country's per capita income has met, and continued to grow beyond, the point which is determined to be sufficient to fully achieve an indicator. In these circumstances, the more that income rises above the point at which total fulfillment is possible without having actually achieved total fulfillment reflects a greater lack of commitment at the country level. Therefore, a country with capacity far beyond what is needed for total fulfillment of an indicator should be held to a higher standard than countries at or just above the level of income required for maximum achievement.

To reflect this in the HCI, for countries with per capita GDP above the level at which the function plateaus, Y_p , scores are adjusted downwards as per capita GDP increases without achieving complete fulfillment of the indicator. The adjustment uses the following equation, with Y being the country's per capita GDP, Y_p being the per capita GDP level at which the frontier plateaus, S being the rescaled score, and β is fixed at 0.5.

$$A = 100 \left[\left(\frac{S}{100} \right)^{(Y/Y_p)^\beta} \right]$$

This mathematic formula for adjusting scores for countries with incomes above the point at which full achievement should have been possible was selected by Fukuda-Parr et. al for several reasons:

- **No Penalty on 100% Fulfillment** - For countries that have achieved total fulfillment

of an indicator, there is no inappropriate penalty for continued economic growth.

- **Asymptotic Equality** - The adjusted performance score approaches the observed indicator score as the value of the resource capacity indicator approaches Y_p from above, ensuring there is no rapid drop in scores when a country's income reaches Y_p .

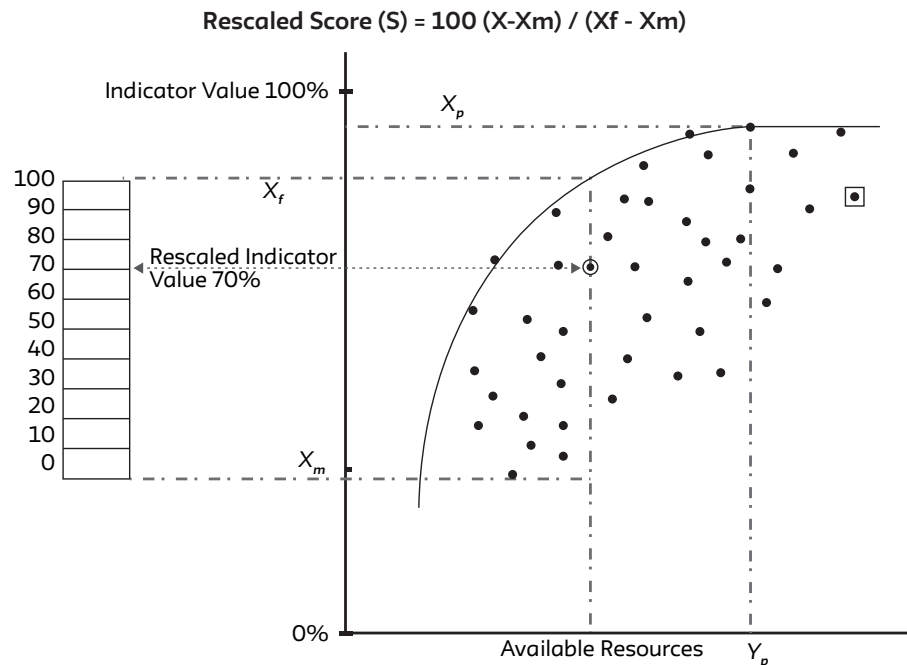
- **Increasing Penalty with Resource Capacity** - The downward adjustment of scores increases as income grows beyond Y_p . Two countries with sufficient capacity to fulfill an indicator and the same raw score will be scored differently according to the

extent to which income exceeds Y_p .

- **Penalty Decreases with Rising Y_p Values** - Higher Y_p values indicate lower feasible rates of transformation, and therefore a lower penalty.

- **Penalty Declines with Increasing Achievement** - as the adjusted scores approach 100, the penalty for failing to achieve total fulfillment becomes less severe.

¹ Fukuda-Parr, Sakiko, Terra Lawson-Remer, and Susan Randolph.
Fulfilling social and economic rights. Oxford University Press, USA, 2015.



Source: Randolph, Prairie, and Stewart 2012, Figure 2

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