

Measuring Development through Extreme Observations: An Archetypal Analysis Approach to Index Construction

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Abstract : Development is multifaceted, and efforts to hasten growth in all these facets have been gaining traction in recent years. Thus, producing a composite index that is reflective of these multidimensional impacts captures the interests of policymakers. The problem lies in going through a mixture of theoretical, methodological and empirical decisions and complexities which, when done carelessly, can lead to inconsistent and unreliable results. This study looks into index computation from a different and less complex perspective. Borrowing the idea of archetypes or 'pure types', archetypal analysis looks for points in the convex hull of the multivariate data set that captures as much information in the data as possible. The archetypes or 'pure types' are estimated such that they are convex combinations of all the observations, which in turn are convex combinations of the archetypes. This ensures that the archetypes are realistically observable, therefore achievable. In the sense of composite indices, we look for the best among these archetypes and use this as a benchmark for index computation. Its straightforward and simplistic approach does away with aggregation and substitutability problems which are commonly encountered in index computation. As an example of the application of archetypal analysis in index construction, the country data for the Human Development Index (HDI 2017) of the United Nations Development Programme (UNDP) is used. The goal of this exercise is not to replicate the result of the UNDP-computed HDI, but to illustrate the usability of archetypal analysis in index construction. Here best is defined in the context of life, education and gross national income sub-indices. Results show that the HDI from the archetypal analysis has a linear relationship with the UNDP-computed HDI.

Keywords : archetypes, composite index, convex combination, development

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