

# On multidimensional inequality with variable household weight

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We address the issue of assessing multidimensional inequality by introducing a new ordering that compares (discrete) multivariate distributions representing households that differ in several characteristics besides income and that could have different size and weights.

The relevance of the problem arises from the following considerations.

The Lorenz curve and the related Lorenz dominance criterion are the principal tools for ranking income distributions in terms of inequality. They apply whenever distributions are defined over a fixed population and have identical means. These assumptions severely restrict the usefulness of this approach in many important practical situations. Moreover, non-income attributes are regarded as relevant for the purposes of inequality and the observations of common data sets usually are weighted. Therefore, it seems natural to investigate criteria for ranking multivariate distributions with different population, where multiple attributes of well-being have to be compared simultaneously. In fact, we establish a suitable multidimensional extension of a fundamental theorem of inequality measurement, namely the characterization of the Lorenz preorder of real-valued univariate (income) distributions, via a class of reasonable welfare functions (or dually inequality indices) due to Hardy, Littlewood and Polya (1934)). In particular, we compare multidimensional distributions in terms of inequality starting from a certain partial preordering that ranks matrices representing the distribution of commodities among households with different weights.