Conditions for the Most Robust Multidimensional Poverty Comparisons Using Counting Measures and Ordinal Variables

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The case for an assessment of poverty considering multiple deprivations has been well argued for a long time (e.g. Sen, 2001, 2009). While there is a broad consensus about the multidimensionality of poverty, there is a debate as to whether the multiple indicators of deprivations should be brought together into a composite index or not (e.g. see Ravalion, 2010). On the other hand, it seems that a composite measure of multiple deprivations is unavoidable when the purpose is to quantify the incidence of multiple deprivations within the same individuals. In practice, one of the approaches proposed to measure multidimensional poverty with a composite index is the counting approach, which is based on counting the number of dimensions in which people are deprived (for a discussion of different approaches see Atkinson, 2003). The approach has gained recent popularity with the Alkire-Foster (AF) family of counting poverty indices (Alkire and Foster, 2010).

Counting indices identify the multidimensionally poor by counting the number of dimensions in which they are deprived. First, deprivation in any particular dimension is determined by comparing the achievement in that dimension against the respective dimension-specific poverty line. This is done for all dimensions and then the (weighted) number of deprivations is compared against a multidimensional-deprivation cut-off. By changing the cut-off from some minimum value up to the total number of dimensions, counting measures can adopt different identification criteria. For instance, the AF family can adopt identification criteria ranging from the union to the intersection approach. The AF measures are a function of the headcount of multidimensional poverty, and of the average number of deprivations suffered by the poor (and the average poverty gaps for continuous variables). The intuitiveness and easy applicability of their identification and aggregation methods are reflected in the recent decision by the UNDP to estimate members of the AF family, including the adjusted headcount ratio, for 104 countries (Alkire and Santos, 2010). This is part of an ongoing trend of the AF measures being applied in poverty measurement as well as in other fields unrelated to poverty measurement. In this paper I derive conditions that ensure the robustness of poverty comparisons based on counting indices to changes in their parameters. I consider a broad class of measures, including the AF family. The class of counting measures considered is the union of the classes characterized by Lasso de la Vega (2009) and Rippin (2011).

An immediate concern with any composite index is that the orderings they produce, when comparing different groups, may not be robust to changes in their parameters (e.g. see Ravalion, 2010). For instance in the case of the AF measures, changes in the dimensional weights, poverty lines, or in the multidimensional cut-off, could reverse the rankings of different countries or provide contradictory results regarding direction of changes in poverty over time. With these concerns in mind, Alkire and Foster (2010) and Lasso de la Vega (2009) derived dominance conditions that, when fulfilled, ensure the robustness of comparisons to changes in the value of the multidimensional cut-off for the adjusted headcount ratio. These conditions, however, assume that weights and poverty lines remain fixed. But what if these also move? Similar concerns apply to several other counting measures that, likewise, depend on dimension-specific poverty lines, dimensional weights and/or multidimensional cut-offs. This paper derives extended conditions that, when fulfilled, ensure the robustness of comparisons to changes in these parameters. First, the paper provides dominance conditions for poverty functions that map from ordinal variables. These include the multidimensional headcount ratio and the adjusted headcount ratio, which is a member of the AF family. Then the paper also provides first-order dominance conditions for counting measures that work with continuous variables.

These conditions work with bivariate distributions for all counting measures. However, even though bivariate applications have also been popular in poverty and wellbeing analysis (e.g. Atkinson and Bourguignon (1982), Duclos et al. (2006, 2007)), recent empirical applications of the Alkire-Foster family, and other counting indices, consider more than two variables. Do the paper's conditions work in these circumstances? This question is answered with the following results: 1) When three or more variables are considered, traditional stochastic dominance conditions based on multivariate generalizations of Atkinson and Bourguignon (1982) work for several counting measures for any identification criteria. 2) However, only when the poor are identified by extreme approaches, i.e. by either union or intersection, the mentioned dominance conditions apply to the Alkire-Foster family for any number of variables. Thus the paper shows a limitation in the suitability of traditional dominance conditions to counting measures based on the double cut-off identification method introduced by Alkire and Foster (2010).

An empirical application using the EU-SILC dataset illustrates the relevance of these conditions by establishing the robustness of poverty comparisons, based on counting measures, for 25 European countries considering several dimensions of wellbeing.

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