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# Spatial Price Adjustment for Subnational Poverty Measurement

The purpose of our research project is to identify reliable and feasible methods for determination of appropriate spatial price adjustment for subnational poverty measurement. Our research focuses on the measurement of the international poverty ($1.9 per capita per day in 2011 Purchasing Power Parity [PPP] terms) among Sub-Saharan African (SSA) countries. Our paper consists of two main components. First, we review a set of spatial price adjustment methods by clarifying their data requirements and reliability and limitations for poverty measurement. Then, building on the review, we empirically assess the feasibility and performance of those spatial price adjustment methods by focusing on a couple of case-study countries.

## Context

While price adjustment, both temporally and spatially, is essential in welfare and poverty measurement, SSA is one of the regions in which global poverty is measured for most countries without spatially deflated consumption aggregates. The lack of spatial price adjustment becomes also a critical issue when focusing on subnational variations in poverty. Because price levels are generally higher in urban areas than in rural areas, there is a risk to underestimate poverty in urban areas and overestimate in rural areas. Given the scale of Africa's urbanization, it is even more urgent to measure poverty by taking account of spatial price differentials, which requires a concerted effort to address the existing data and methodological gaps.

## Methodological review

The first component of our research is a methodological review of existing spatial price adjustment methods and empirical studies that apply those methods to measure spatial price differentials and poverty. The review has identified a list of spatial price adjustments that are potentially applicable to the international poverty measurement, such as standard bilateral price index (e.g., Paasche and Laspeyres indices), multilateral price index (e.g., the Elteto-Koves-Szulc [EKS] and the country product dummy (CPD) methods), and Engel curve approaches. For each of them, we clarify advantages and disadvantages from the perspective of the poverty measurement practice.

In addition, we delineate various methodological issues to deal with. For example, some countries have adopted a multiple poverty line approach, which sets different poverty lines across regions and use nominal consumption aggregates to measure poverty. The regional price

levels calculated by such approach often differ widely from other spatial price index approaches. Another methodological issue is the treatment of housing and other non-food items. Price data is sometimes lacking non-food items and at times the information provided is of poor quality. Housing is particularly problematic given its large expenditure shares in urban areas.

Our research also highlights the importance of the choice of reference area in calculating spatial price index. The guiding principle is to select as the reference area the geographic area in which the cost of basic needs (CBN) basket is estimated for the construction of the poverty line. In case of the international poverty measurement, this issue has an additional complexity. The PPP is used to convert the poverty line ($1.9) to local current units. While aiming to incorporate the price level differences across countries, the PPP was constructed in many countries based the price data collected only in urban areas (or capital cities). In such cases, consumption aggregates need to be spatially deflated relative to the price levels of urban areas (or capital cities).

Case studies

The second component of our research focuses on a couple of countries to empirically assess the performance of spatial price adjustment approaches reviewed above. Countries with relatively good data availability, such as Ghana and Rwanda, are chosen so that different data and adjustment approaches, or methods can be tested. For each of those countries, we apply bilateral index approaches, multilateral index approaches, and Engel curve approaches, using different data (unit values from budget surveys, market survey price data, and CPI raw price data). We then compare poverty measures based on each set of these approaches.

This analysis would help to understand some key questions as follows: What is the expected range of poverty estimates derived by the choice of spatial price adjustment approach? What factors (e.g., too small number of item observations in the price data, limited geographic coverages in price data collection, etc.) cause such variations? And the most importantly, given the limited price data availability (and its heterogeneity) among SSA countries and the evidence provided in this research for each approach, which spatial price adjustment approach(s) should be recommended?