Poverty PPPs

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MIT Sloan, Cambridge
Presentation Outline

- Background
- Project scope and overview
- Input data: sources and validation
- Methodology and Preliminary Results
- Conclusions
- Challenges and Way Forward
Background

- **ICP PPPs**: World Bank (WB) global poverty measures rely on ICP private consumption PPPs to:
  
  i.  [*construct WB IPL*]: convert selected national poverty lines into a common currency, at PPP, to then derive the WB IPL
  
  ii. [*apply WB IPL*]: convert the WB IPL back to LCUs of each country

- **Critique**: concern about using ICP PPPs for global poverty analysis on the grounds that the poor may face different [item] prices and (surely) have different consumption patterns than what is reflected in the national average (item) prices and aggregate (NA) expenditures used in ICP
Project scope and overview

- Explore the sensitivity of the (2011) PPPs to the choice of expenditure weights and products, with a focus on global poverty analysis.

- Poverty expenditures and item-level information sourced from standardized Household Expenditure Surveys (HES) and underlying (2011) ICP data.

- Initiate with Sub-Saharan Africa, other regions will follow.
Standardized surveys were originally prepared for *Deaton and Dupriez (2011)*. The number of surveys has expanded since and now includes additional countries (approx. 102) and more recent surveys.

Surveys standardized by applying a common data dictionary to variables, annualizing consumption data, fixing outliers and mapping items to ICP basic headings.

Our project uses 28 standardized surveys from different countries in Sub-Saharan Africa:
- All sub-regions are represented
- Oldest: 2005 (COD); Most recent: 2014 (LBR); Modal survey year: 2010
- No. of items covered in the 28 surveys ranges from 30 (NAM) to 1296 (BFA); median 360.
- On average, 15 of the 108 HHC ICP basic headings that *could* be present in HHS are missing.
Input data: validation of expenditures

Basic Headings (BH’s)

- In several countries, aggregate expenditures from ICP National Accounts (NA) and Household Survey’s (HHS) show fairly similar patterns in terms of which BH’s have the highest exp. shares (out of total national HH expenditure).

- Expenditures of poor households (1.90 WB IPL; 2011 PPPs) are concentrated around fewer basic headings than agg. expenditures that include all HH’s, regardless of income e.g. after averaging BH exp. shares across all surveys and ranking them by expenditure, largest to smallest, approx. 50% of the top expenditure of the poor can be found in 8 BH’s; versus 12 BH’s in national aggregates.

- Estimates of household consumption levels differ between the NA (WB WDI) and HHS, for the survey year. Unclear which source provides a more accurate measure of consumption.

![Graph showing ratio of survey means from HHS to HHC/capita from National Accounts](image)
Input data: validation of expenditures

Items

- As with BHs, expenditures of poor households are concentrated among fewer items than in aggregates that incl. all households, regardless of income

- In the surveys explored, many of the items with the highest exp. share (out of total national HH expenditure) by poor households are food staples (e.g. cereals, such as maize, millet, sorghum); exceptions: firewood and housing; also, mobile phone related fees

- Still, uncertainty remains on what exactly (and where) the poor buy. This adds to the difficulty of compiling objective ICP lists, especially when poverty items are of concern

- Yet, in many of these surveys, items with high exp. shares (out of total national HH expenditure) by poor households can be found in ICP lists. So, overall, ICP item lists seem to be moving in the right direction for poverty analysis. [Caveat: most HHS in SSA lack enough item-level detail to explore item varieties in depth]

- A handful of items that in some surveys appear as having important exp. shares by poor households are either missing from ICP lists (milling services for cereals), or the given variety is not listed (cassava flour). These and other findings from HHS will be taken into account in upcoming ICP item list revisions
# Ex: items consumed by poor HHs (TZA HHS, 2011)

<table>
<thead>
<tr>
<th>ICP Basic Heading</th>
<th>HHS Item Name</th>
<th>ICP 2011 List</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Global Core (GCL)</td>
</tr>
<tr>
<td>Other cereals, flour and other products</td>
<td>Maize Flour White</td>
<td>✓</td>
</tr>
<tr>
<td>Rice</td>
<td>Rice</td>
<td>✓</td>
</tr>
<tr>
<td>Frozen, preserved or processed vegetables and vegetable-based products</td>
<td>Cassava flour</td>
<td>✓</td>
</tr>
<tr>
<td>Other fuels</td>
<td>Firewood</td>
<td>✓</td>
</tr>
<tr>
<td>Fresh or chilled vegetables other than potatoes</td>
<td>Beans</td>
<td>✓</td>
</tr>
<tr>
<td>Fresh or chilled potatoes</td>
<td>Sweet Potatoes</td>
<td>✓</td>
</tr>
<tr>
<td>Preserved or processed fish and seafood</td>
<td>Dried sardines</td>
<td>✓</td>
</tr>
<tr>
<td>Fresh or chilled fruits</td>
<td>Cooking bananas, plantains</td>
<td>✓</td>
</tr>
<tr>
<td>Telephone and telefax services</td>
<td>Mobile telephone bill (including top-up cards)</td>
<td>✓</td>
</tr>
<tr>
<td>Beef and veal</td>
<td>Beef with bones</td>
<td>✓</td>
</tr>
<tr>
<td>Fresh or chilled vegetables other than potatoes</td>
<td>Other leafy vegetables</td>
<td>✓</td>
</tr>
<tr>
<td>Other edible oil and fats</td>
<td>Other cooking oil</td>
<td>✓</td>
</tr>
<tr>
<td>Other fuels</td>
<td>Kerosene</td>
<td>✓</td>
</tr>
<tr>
<td>Fresh or chilled vegetables other than potatoes</td>
<td>Tomatoes, Round</td>
<td>✓</td>
</tr>
<tr>
<td>Other cereals, flour and other products</td>
<td>Sorghum, flour</td>
<td>✓</td>
</tr>
<tr>
<td>Fresh, chilled or frozen fish and seafood</td>
<td>Fresh, chilled or frozen fish</td>
<td>✓</td>
</tr>
<tr>
<td>Actual and imputed rentals for housing</td>
<td>Paid or estimated monthly rent (Owner or joint owner of dwelling)</td>
<td>✓</td>
</tr>
<tr>
<td>Fresh milk</td>
<td>Fresh cow milk</td>
<td>✓</td>
</tr>
<tr>
<td>Water supply</td>
<td>Water</td>
<td>✓</td>
</tr>
<tr>
<td>Passenger transport by road</td>
<td>Transport by road (bus and taxis)</td>
<td>✓</td>
</tr>
</tbody>
</table>
Methodology

• 108 ICP BHs were included in calculations to ensure consistency with the ICP results

• Iterative scheme was employed to deal with circularity in order to identify poor households across the surveys, as PPPs use expenditure weights of the poor who in turn are identified as poor on the basis of PPP-converted poverty lines (see, e.g. Deaton & Dupriez, 2011)
Methodology: identification of poor households

- Dealing with circularity to consistently identify poor households across the surveys

1. Convert IPL to LCU using PPPs
   (Bring IPL to year of HHS by using General CPI)

2. Identify poor HHs in the HES (below IPL or within an interval of the IPL)

3. Estimate average basic heading expenditure shares of the identified poor

4. BH shares of the poor + Unweighted BH-level PPPs
   = Poverty (weighted) PPPs

[Steps (1) through (4) are repeated until the poverty (weighted) PPPs, for each country, converge]
Main principles

- HHS mapped to ICP 108 basic headings (harmonized)
- Standard ICP aggregation methods are used (CPD and GEKS-Fisher)
- Baseline
  - Published regional results (NA weights)
  - subsample of SSA – 28 countries (NA weights)
  - subsample of SSA – 28 countries (HHS weights)
- Scenarios
  - below IPL (using HHS weights, plutocratic)
  - around IPL (using HHS weights, democratic), using two kernels – quartic and uniform
Main principles

- **Country-product-dummy (CPD),** with country and product dummy variables

\[
\ln p_{ij} = \pi_1 D_1 + \pi_2 D_2 + \ldots + \pi_M D_M + \eta_1 D_1^* + \eta_2 D_2^* + \ldots + \eta_n D_n^* + u_{ij}
\]

- **GEKS-Fisher**

\[
\text{PPP}_{jk} = \left( \prod_{i=1}^{M} \left[ F_{jl} \cdot F_{lk} \right] \right)^{1/M}
\]
Two kernels used

- **Quartic** (biweight) kernel
  \[
  K(u) = \frac{15}{16} (1 - u^2)^2 1_{\{|u|\leq 1\}}
  \]

- **Uniform** kernel
  \[
  K(u) = \frac{1}{2} 1_{\{|u|\leq 1\}}
  \]
As bandwidth increases the kernel estimated PPPs are getting closer to the below PL PPPs; however, the changes are relatively small compared to the overall distance between below PL and around PL PPPs.
Results: PPP sensitivity to kernel form

- Ratio of PPPs estimated with two kernels, with different bandwidths
  Effect is smaller as bandwidth increases:

<table>
<thead>
<tr>
<th>s.d.</th>
<th>bw=0.5</th>
<th>bw=0.25</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.13%</td>
<td>0.33%</td>
<td></td>
</tr>
</tbody>
</table>

![Graph showing effect of kernel (quartic vs. uniform) with bandwidths bw=0.5 and bw=0.25](image-url)
Results: PPP sensitivity to bandwidth

- PPP changes with bandwidth using quartic kernel
  Effect is smaller as bandwidth increases:

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 to 0.5</td>
<td>0.11%</td>
</tr>
<tr>
<td>0.5 to 0.25</td>
<td>0.20%</td>
</tr>
</tbody>
</table>
Results: Poverty PPPs vs ICP PPPs

- Differences among various Poverty PPP methods are insignificant when compared against ICP PPPs (baseline on the graph)

\[
\begin{array}{ccc}
\text{Poverty PPPs vs. ICP PPPs} \\
\text{s.d.} & \text{quartic kernel} & 2.69\% \\
& \text{uniform kernel} & 2.69\% \\
& \text{below PL} & 2.99\%
\end{array}
\]
Results: BH weights according to different kernels

- Effect of kernels on BH weights is relatively small (BH shares for South Africa is shown below)
Challenges and way forward

- More exploration at the item-level using HHS data
- Further inspection on the quality of national accounts
- Investigate behavior of different kernel forms, under different bandwidths
- Further harmonize HHSs, reduce effect of bad survey data
- Expand analysis to more regions
THANK YOU