Measuring Global Poverty

Past, Present and Future

Francisco H. G. Ferreira, DECRG

Policy Research Talk: November 30, 2015

This presentation draws in part on World Bank Policy Research Working Paper 7432, "A Global Count of the Extreme Poor in 2012: Data issues, methodology and initial results", with Shaohua Chen, Andrew Dabalen, Yuri Dikhanov, Nada Hamadeh, Dean Jolliffe, Ambar Narayan, Espen Beer Prydz, Ana Revenga, Prem Sangraula, Umar Serajuddin, and Nobuo Yoshida.

Outline

1. **Past: A brief history of global poverty monitoring at the World Bank**

2. **Present:** The 2015 update to the global poverty count
   i. Another new set of PPP exchange rates
   ii. Basic principles for incorporating them
   iii. Ingredients: Incomes and Prices
   iv. Updating the poverty line
   v. Alternatives, robustness and remaining caveats
   vi. Results

3. **Future**: Whither global poverty measurement?

A brief history of global poverty monitoring at the World Bank

1. Ahluwalia, Carter and Chenery (JDE, 1979):
   - Use India's poverty line (46th percentile of per capita income) and the 1975 PPPs (from the ICP covering 16 countries) to estimate the developing world's poverty headcount.
   - Use consumption and income data from 25 countries, and predicted PPPs from Kravis, Heston, Summers to estimate poverty for 36 countries (covering "80% of the developing world excluding China").

2. Ravallion, Datt and van de Walle (RIW, 1991) and the WDR 1990:
   - Generate the original $1-a-day poverty line, using 1985 PPPs from the Penn World Tables
   - This line (actually $31 per month) was "typical of poor countries" in the sense that it was shared to the nearest dollar by six low-income countries (Bangladesh, Indonesia, Kenya, Morocco, Nepal and Tanzania) and close to this range for two others (Philippines and Pakistan) from a sample of 33 national poverty lines. Two other lines much lower.
   - RDvW use data from 22 countries (predict to 64 countries), estimated global poverty based on 86 countries (covering 3.4 billion people).

A brief history of global poverty monitoring at the World Bank

3. Chen and Ravallion (RIW, 2001):

- Update the line to $1.08-a-day using 1993 PPPs for consumption.
- Global line chosen as the median poverty line of the lowest 10 lines from WDR 1990 set.
- Those 10 countries are Bangladesh, China, India, Indonesia, Nepal, Pakistan, Tanzania, Thailand, Tunisia and Zambia.
- All numbers revised back in time to ensure consistency. Estimates based on data from 83 countries (265 national sample surveys)

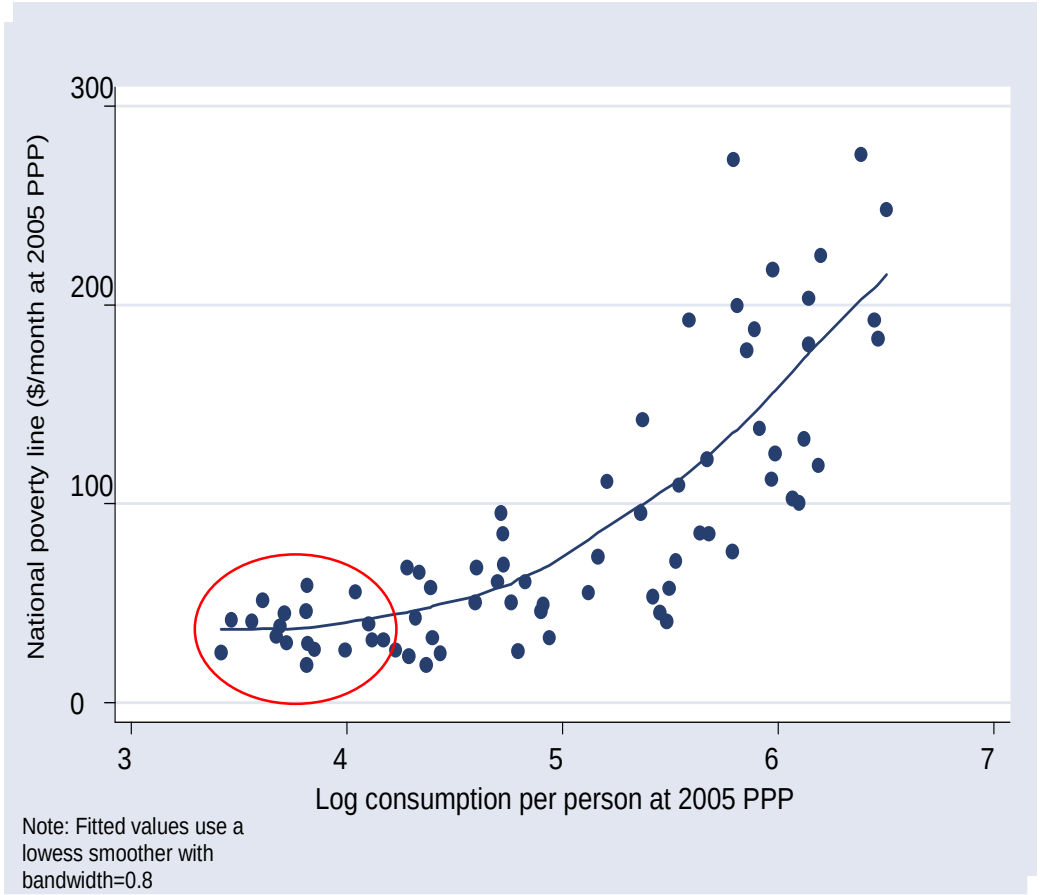
A brief history of global poverty monitoring at the World Bank

4. Ravallion, Chen and Sangraula (WBER, 2009):

   - Update the line to $1.25-a-day using 2005 PPPs for consumption.
   - New compilation of national poverty lines from the Bank's country-level Poverty Assessments (for 74 countries)
     - Poverty lines considered appropriate to living standards in each country,
     - Consultation with Government, or Government's own poverty line.

- Reference group of the poorest 15 countries.
  - Malawi, Mali, Ethiopia, Sierra Leone, Niger, Uganda, Gambia, Rwanda, Guinea-Bissau, Tanzania, Tajikistan, Mozambique, Chad, Nepal and Ghana.

Figure 1: National poverty lines for 74 developing countries plotted against mean consumption using consumption PPPs for 2005



A brief history of global poverty monitoring at the World Bank

Update:	1979 "India line"	1990 "Dollar-a-day"	2001 1.08/day	2008 1.25/day
Source	Ahluwalia et al (1979)	1990 WDR, Ravallion, et al (1991)	Chen and Ravallion (2001)	Ravallion, Chen and Sangraula (2009)
ICP data	1975 PPPs Kravis et al (1978)	1985 PPPs	1993 PPPs	2005 PPPs
Poverty lines used	1 (India)	8 countries	10 countries	15 countries
Method	India's poverty line (46^{th} pctile)	Inspection	Median	Mean
Poverty line (ICP base year USD)	$0.56	$1.01	$1.08	$1.25
Poverty line in 1985 USD	$1.12	$1.01	$0.80	$0.69
Poverty line 1985 IND Rs.		Rs. 4.11	Rs. 3.84	Rs. 4.65

Outline

1. **Past:** A brief history of global poverty monitoring at the World Bank

2. **Present: The 2015 update to the global poverty count**
   i. Another new set of PPP exchange rates
   ii. Basic principles for incorporating them
   iii. Ingredients: Incomes and Prices
   iv. Updating the poverty line
   v. Alternatives, robustness and remaining caveats
   vi. Results

3. **Future**: Whither global poverty measurement?

i. The 2011 Purchasing Power Parity exchange rates

- Price data collected in 2011 (released in 2014)
- Increased coverage of countries: from 146 economies in 2005 to 199 in 2011, covering 99% of nominal world GDP
- Increased coverage of rural prices, particularly in China, India, Indonesia (as compared to 2005)
- 18-ring-country approach from 2005 replaced by subset Global Core List of items from all countries for linking regions in 2011.

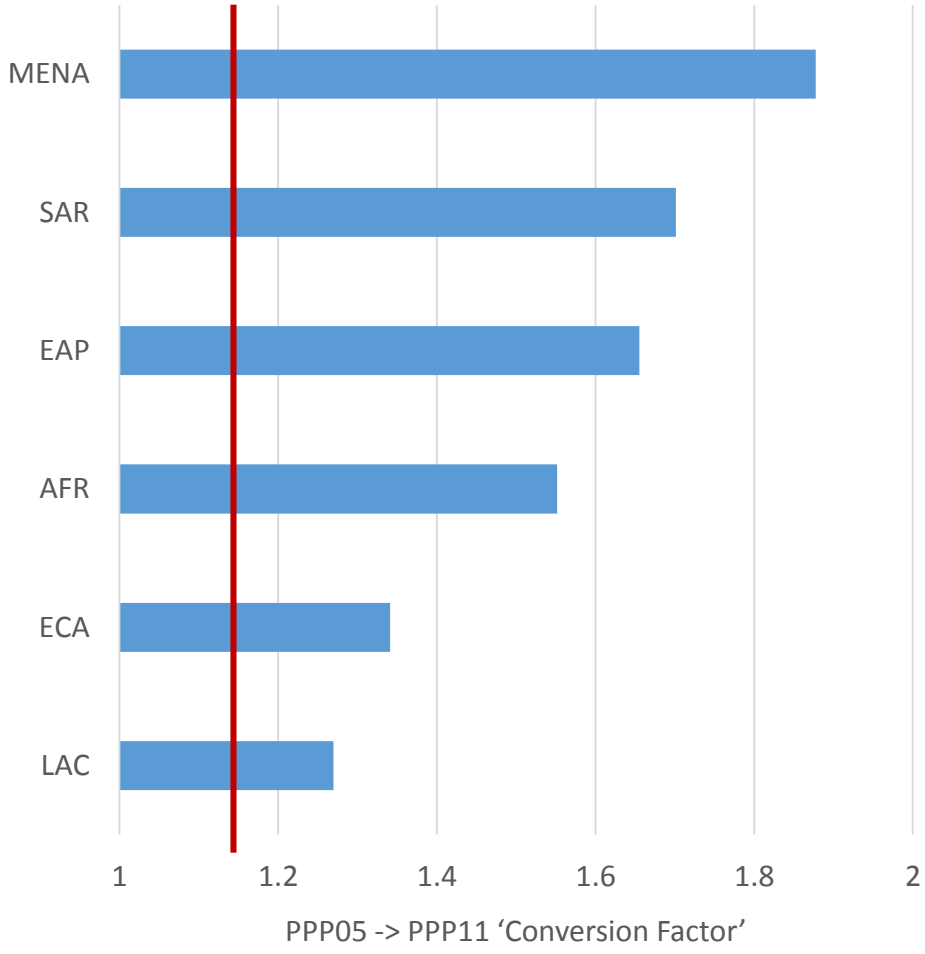
i. The 2011 Purchasing Power Parity exchange rates

- 2011 PPPs indicate shift in regional profile of relative price levels:
  - 2011 PPPs suggest **lower price levels in poor countries** (relative to US) => higher PPP-adjusted USD values of consumption & income.
- Convert 2005 PPP value => 2011 PPP value:

$$\frac{CPI_{11}}{CPI_{05}} \times \frac{PPP05}{PPP11}$$

Change in CPI relative to change in PPPs. Can be thought of as country-specific PPP05 -> PPP11 deflators.

For US, δ = 1.15



ii. Basic Principles

1. Use the most accurate set of prices available to compare the standards of living across countries with very different prices for non-tradable goods and services.

2. Acknowledge that the Bank's poverty reduction goal (and the UN's SDG #1) are set explicitly in terms of the $1.25 line at PPP2005 exchange rates. Minimize changes to the goalpost.

3. The price levels most relevant for this exercise are those faced by the world's poorest people

ii. Basic Principles

1. Use the most accurate set of prices available to compare the standards of living across countries with very different prices for non-tradable goods and services.

2. Acknowledge that the Bank's poverty reduction goal (and the UN's SDG #1) are set explicitly in terms of the $1.25 line at PPP2005 exchange rates. Minimize changes to the goalpost.

3. The price levels most relevant for this exercise are those faced by the world's poorest people

- Derive the new line by:

    i. Inflating the 2005 values of the fifteen RCS lines to 2011 using domestic CPIs
    ii. Convert the resulting values to US dollars (in 2011 prices) using the 2011 PPPs

iii. Ingredient 1: Distributions of individual wellbeing

- Global poverty estimates are based on more than 1,100 income and consumption distributions in **PovcalNet**, obtained from national household surveys for 'developing' countries. Database now also contains data from rich countries, but these are not used for global poverty estimates.
- 133 countries used in the 2015 update. Increased use of microdata, declining use of grouped data.
- Survey data from 2010 to 2014 used in the 2012 estimate cover:
  - 86% of the developing world's population
  - >90% in EAP, ECA, LAC and SAR
  - 68.7% in AFR
  - 37.4% in MENA

2014 Poverty Update – Distribution types

	Grouped	Micro data	Total
Income	6	26	32
Consumption	68	26	94
Total	**74**	**52**	**126**

2015 Poverty Update – Distribution types

	Grouped	Micro data	Total
Income	3	31	**34**
Consumption	5	94	**99**
Total	**8**	**125**	**133**

iii. Ingredient 2: Prices (changes over time)

PovcalNet uses FOUR different categories of price deflators	
WDI annual CPI – general	104
Monthly CPI from NSO (consistent with annual number in WDI)	20
CPI disaggregated by urban-rural areas (official CPI for China and India)	2
CPI adjustment for 7 countries using alternative price indices (Bangladesh, Cambodia, **Ghana**, Iraq, Lao PDR, **Malawi** and **Tajikistan**).	7

Countries in **blue** are among the countries that define poverty line, thus choice of CPI also affects international poverty line.

iii. Ingredient 2: Prices (differences within countries)

- Chen and Ravallion (QJE, 2010) and PovcalNet make urban-rural adjustments to PPPs for China, India & Indonesia in 2005 estimates.
- Adjustments motivated by:
  - A concern for (urban) bias in collection of prices in the 2005 ICP
  - Desire to report rural and urban poverty separately for select countries
- Our estimates continue to use COLAs. Adjustments re-estimated, based on ratios of more recent rural/urban national poverty lines.
  - Adjustments are not done for all countries due to limited data on rural-urban price differences, ICP sampling, and PovcalNet historical data mostly containing national distributions.

iii. Ingredient 2: Prices (differences within countries)

- Socioeconomic Database for Latin America and the Caribbean (SEDLAC):
  - PPP price collection in LAC is urban only.
  - Rural incomes from SEDLAC are adjusted to urban levels (15% uniform adjustment, based on cross-country average difference)
- World Bank poverty database for ECA (ECAPOV) adjusts consumption aggregates for spatial price differences (based on unit values from food consumption in household surveys)

iv. Updating the RCS15 $1.25/day line to 2011 PPPs

Country	Year	2005 PPP	2011 PPP
Malawi*	2004-05	0.86	1.34
Mali	1988-89	1.38	2.15
Ethiopia	1999-2000	1.35	2.03
Sierra Leone	2003-04	1.69	2.73
Niger	1993	1.10	1.49
Uganda	1993-98	1.27	1.77
Gambia, The	1998	1.48	1.82
Rwanda	1999-2001	0.99	1.50
Guinea-Bissau	1991	1.51	2.16
Tanzania	2000-01	0.63	0.88
Tajikistan*	1999	1.93	3.18
Mozambique	2002-03	0.97	1.26
Chad	1995-96	0.87	1.28
Nepal	2003-04	0.87	1.47
Ghana*	1998-99	1.83	3.07
Average		**1.25**	**1.88**

*Countries use category 4 price deflators in conversion.

This update in historical context

Update:	1979 "India line"	1990 "Dollar-a-day"	2001 1.08/day	2008 1.25/day	2015 1.90/day
Source	Ahluwalia et al (1979)	1990 WDR, Ravallion, et al (1991)	Chen and Ravallion (2001)	Ravallion, Chen and Sangraula (2009)	This paper.
ICP data	1975 PPPs Kravis et al (1978)	1985 PPPs	1993 PPPs	2005 PPPs	2011 PPPs
Poverty lines used	1 (India)	8 countries	10 countries	15 countries	15 (same lines as 2008)
Method	India's poverty line (46th pctile)	Inspection	Median	Mean	Mean
Poverty line (ICP base year USD)	$0.56	$1.01	$1.08	$1.25	$1.90
Poverty line in 1985 USD	$1.12	$1.01	$0.80	$0.69	$0.91
Poverty line 1985 IND Rs.		Rs. 4.11	Rs. 3.84	Rs. 4.65	Rs. 4.11

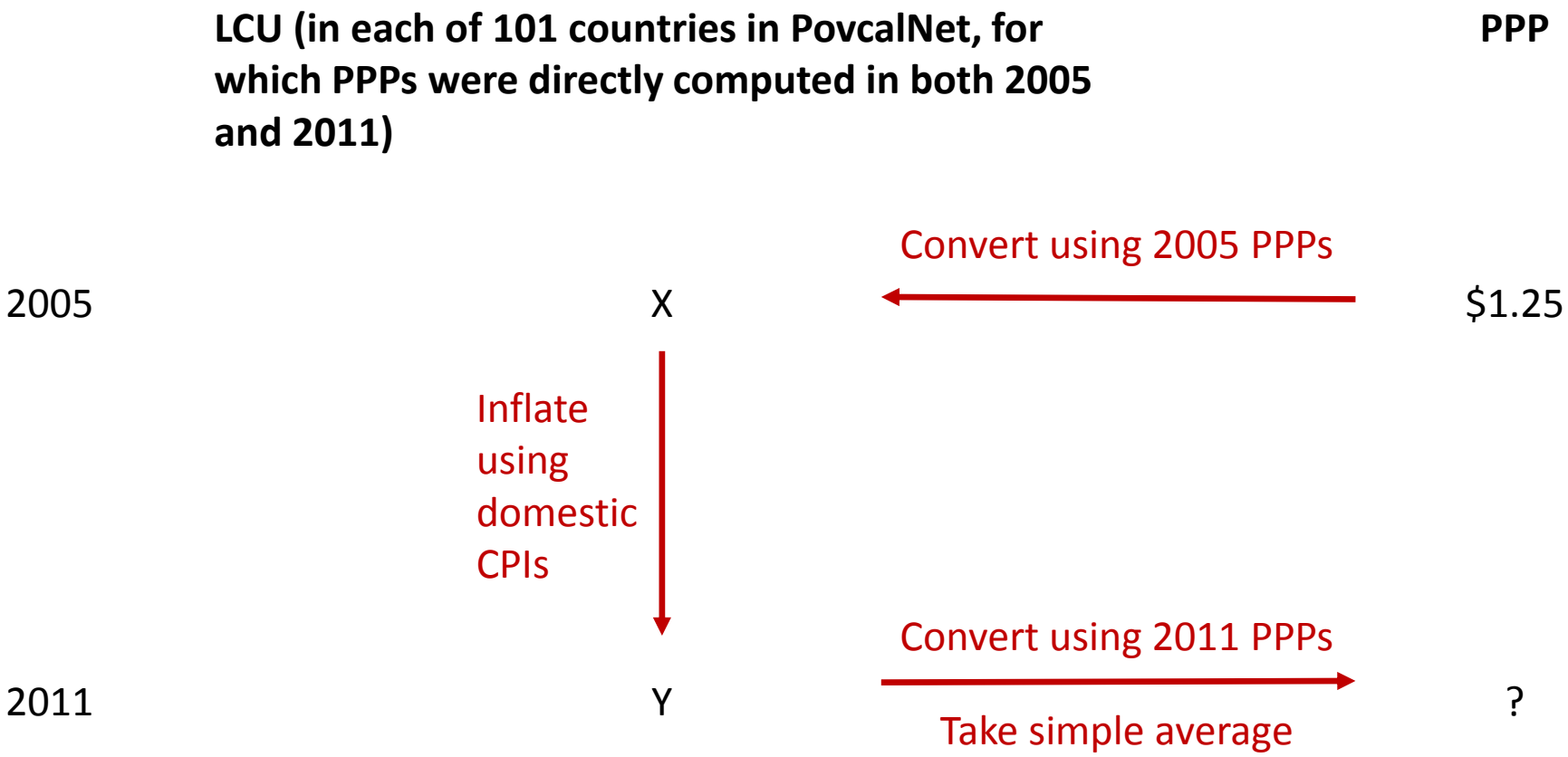
This update in historical context

Update:	1979 "India line"	1990 "Dollar-a-day"	2001 1.08/day	2008 1.25/day	2015 1.90/day
Source	Ahluwalia et al (1979)	1990 WDR, Ravallion, et al (1991)	Chen and Ravallion (2001)	Ravallion, Chen and Sangraula (2009)	This paper.
ICP data	1975 PPPs Kravis et al (1978)	1985 PPPs	1993 PPPs	2005 PPPs	2011 PPPs
Poverty lines used	1 (India)	8 countries	10 countries	15 countries	15 (same lines as 2008)
Method	India's poverty line (46th pctile)	Inspection	Median	Mean	Mean
Poverty line (ICP base year USD)	$0.56	$1.01	$1.08	$1.25	$1.90
Poverty line in 1985 USD	$1.12	$1.01	$0.80	$0.69	$0.91
Poverty line 1985 IND Rs.		Rs. 4.11	Rs. 3.84	Rs. 4.65	Rs. 4.11

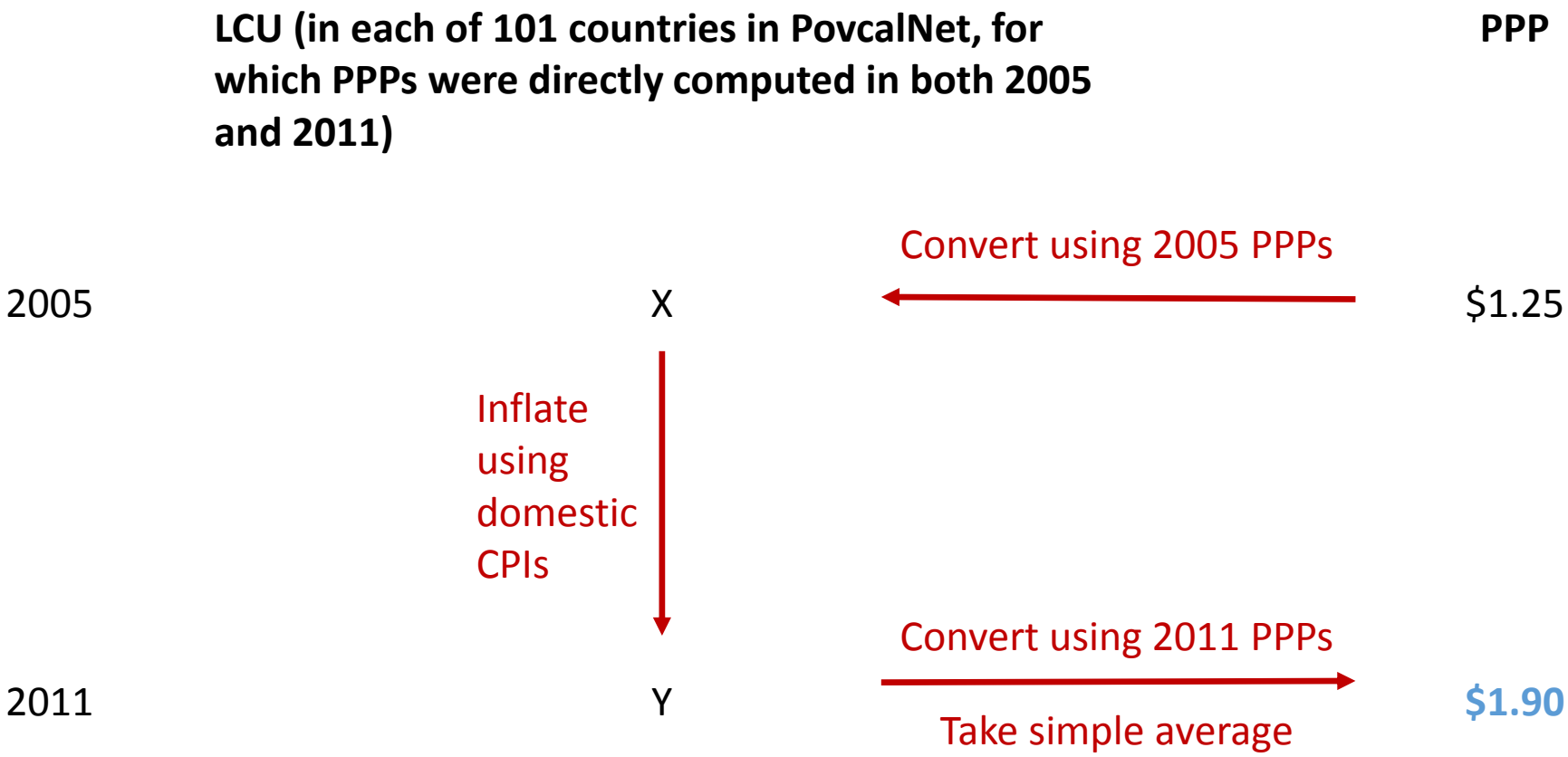
v. Alternatives, robustness and caveats

- Several alternatives for updating the line have been suggested.
- Jolliffe and Prydz (2015) propose a Low Income Country (LIC) poverty line based on the median of estimated (implicit) national poverty lines from **32** Low Income Countries. Yields **$1.25** in 2005 PPPs and **$1.92** in 2011 PPPs.
- Klasen et al (2015) estimate a poverty line of **$1.67** to **$1.70** in 2011 PPPs based on the original RCS sample
  - Flat part re-estimated
  - But estimates are based on WDI CPIs only
- Convert **$1.25** line to 2011 PPP value ($\Delta CPI/\Delta PPP$) for each country (for which poverty is measured). Simple average of these values is **$1.90**.
  - Similar to the approach suggested by Kakwani and Son (2015)

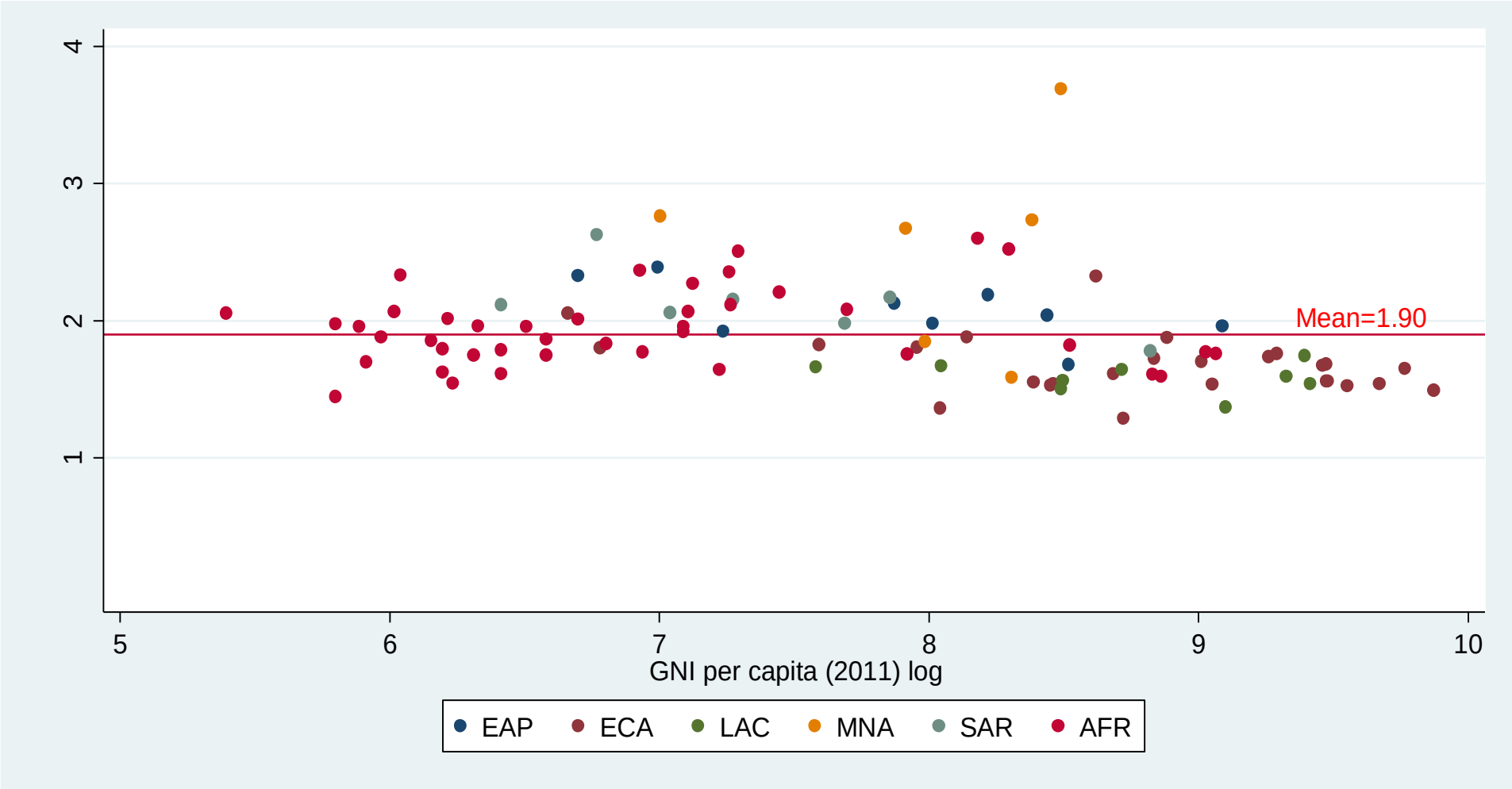
v. Alternatives, robustness and caveats



v. Alternatives, robustness and caveats



Robustness: $1.25 line converted to 2011 PPPs for all countries



Across 101 countries in which we measure global poverty and which are ICP benchmark countries across both rounds.

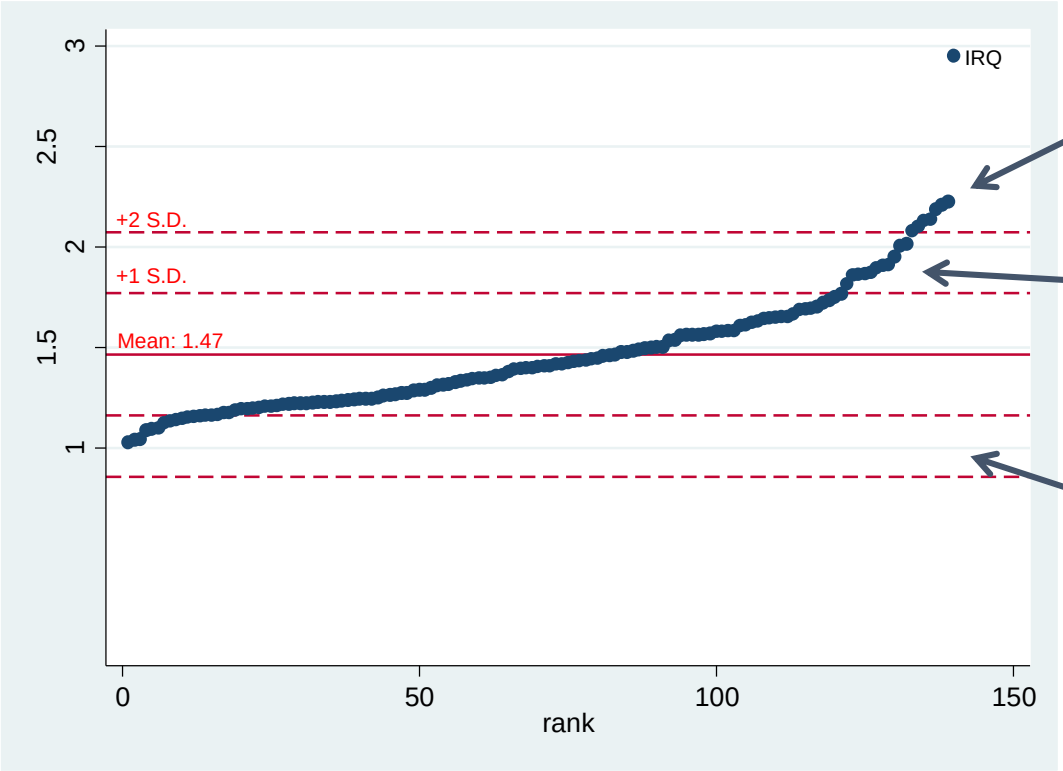
Remaining caveats: (i) underlying welfare aggregates

- As noted, PovcalNet includes both consumption and income distributions
  - This is possibly appropriate, given national differences and priorities
  - But the two are very different concepts, and comparability is difficult
  - Existence of zero incomes are a real problem, that is likely to grow
- Differences in questionnaires hamper comparability even among consumption distributions
  - E.g. URP vs. MMRP questionnaires in India
- MENA: Limited coverage, PPP issues, and widespread conflict precluded presentation of regional numbers.

Remaining caveats: (ii) PPP outliers

ΔCPI and ΔPPP both reflect changes in prices, expect to co-move. Large deviations, *potentially* due to data quality issues in CPI and/or PPP, result in large shifts in poverty.

'Outliers' identified by: Ratio of ΔCPI (CPI2011/CPI 2005) to ΔPPP (PPP2011/PPP2005) for each country. Decisions also reflect concerns from country economists



> mean + 2 S.D.:
Bangladesh, Cabo Verde, Egypt, Iraq, Jordan, Yemen
For these countries we report numbers with 2005 PPPs and $1.25 line

> mean + 1 S.D.:
Cambodia and Lao PDR and 6 other PovcalNet countries
Substitution considered on case-by-case basis with poverty economists

< mean - 1 S.D.:
BLR, UKR, MEX and OECD/Eurostat
No action taken

Mean: 1.466; S.D.: 0.304
(without IRQ: 1.455; 0.277 – same countries excluded)

vi. Results (Recall basic effect of new PPPs)

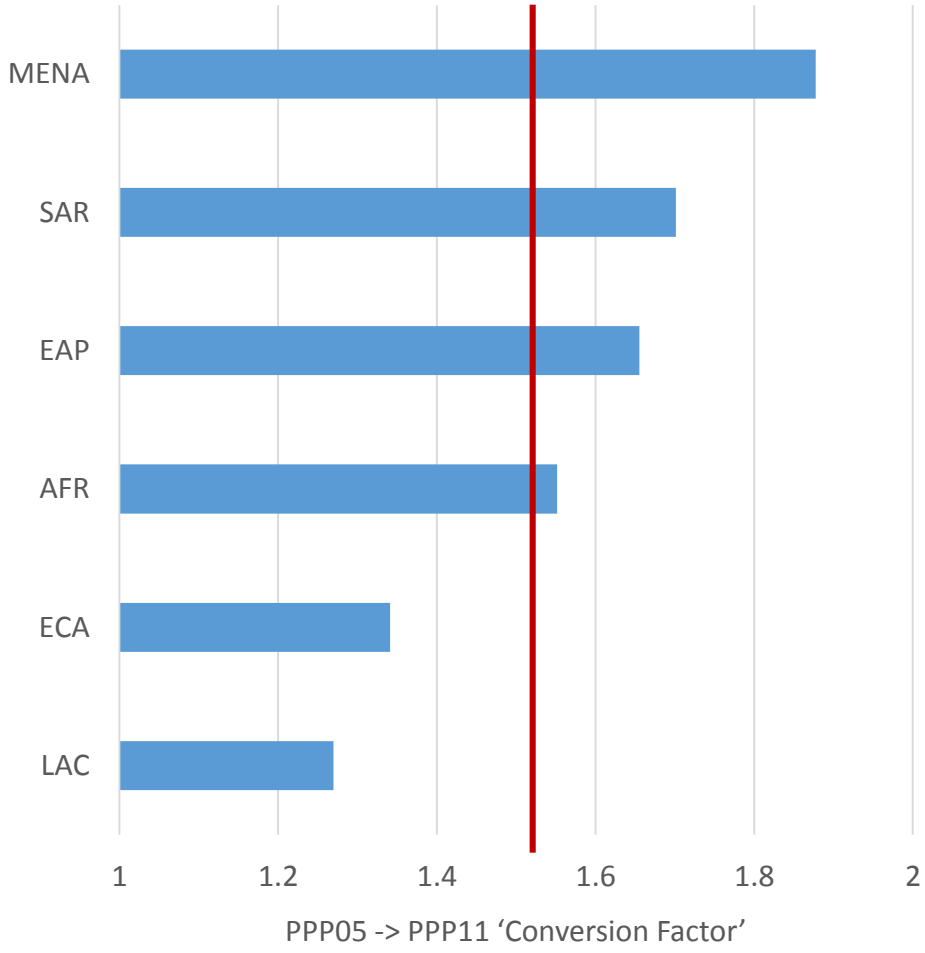
- 2011 PPPs indicate shift in regional profile of relative price levels:
  - 2011 PPPs suggest **lower price levels in poor countries** (relative to US) => higher PPP-adjusted USD values of consumption & income.

- Convert 2005 PPP value => 2011 PPP value:

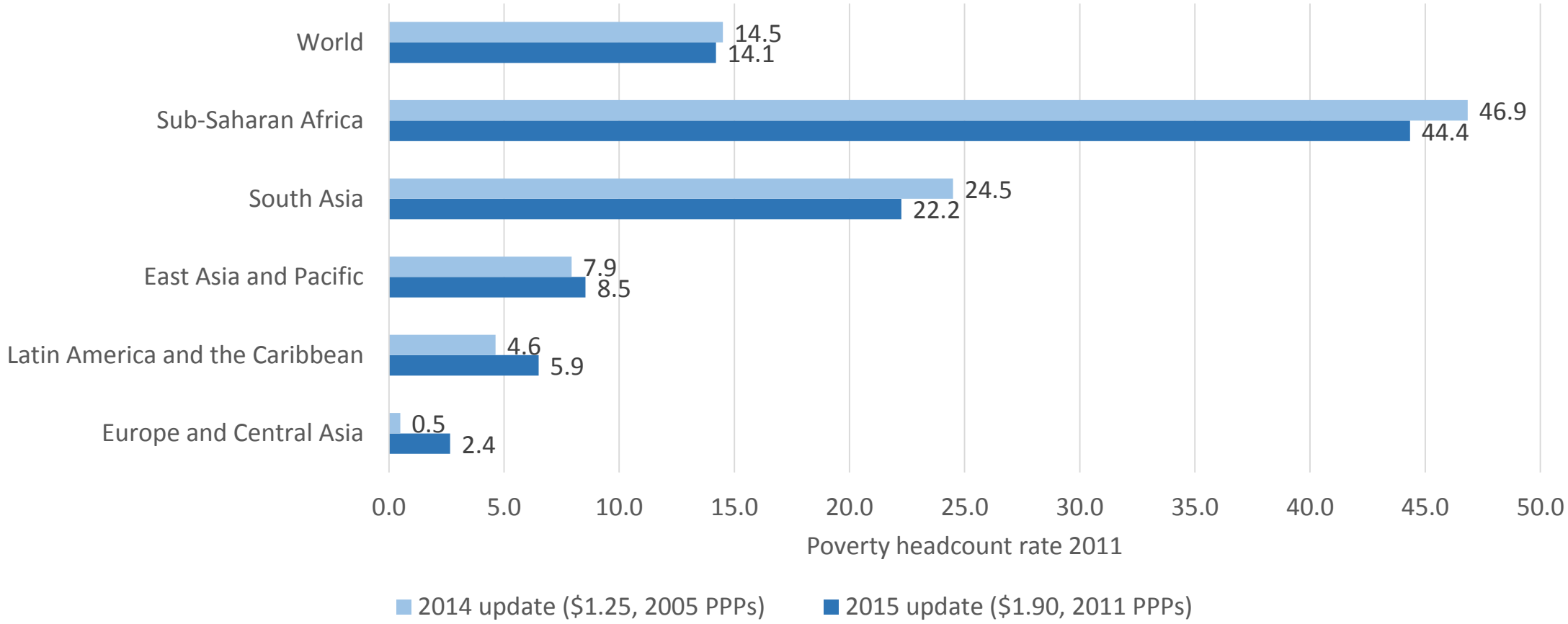
$$\frac{CPI_{11}}{CPI_{05}} \times \frac{PPP05}{PPP11}$$

Change in CPI relative to change in PPPs. Can be thought of as country-specific PPP05 -> PPP11 deflators.

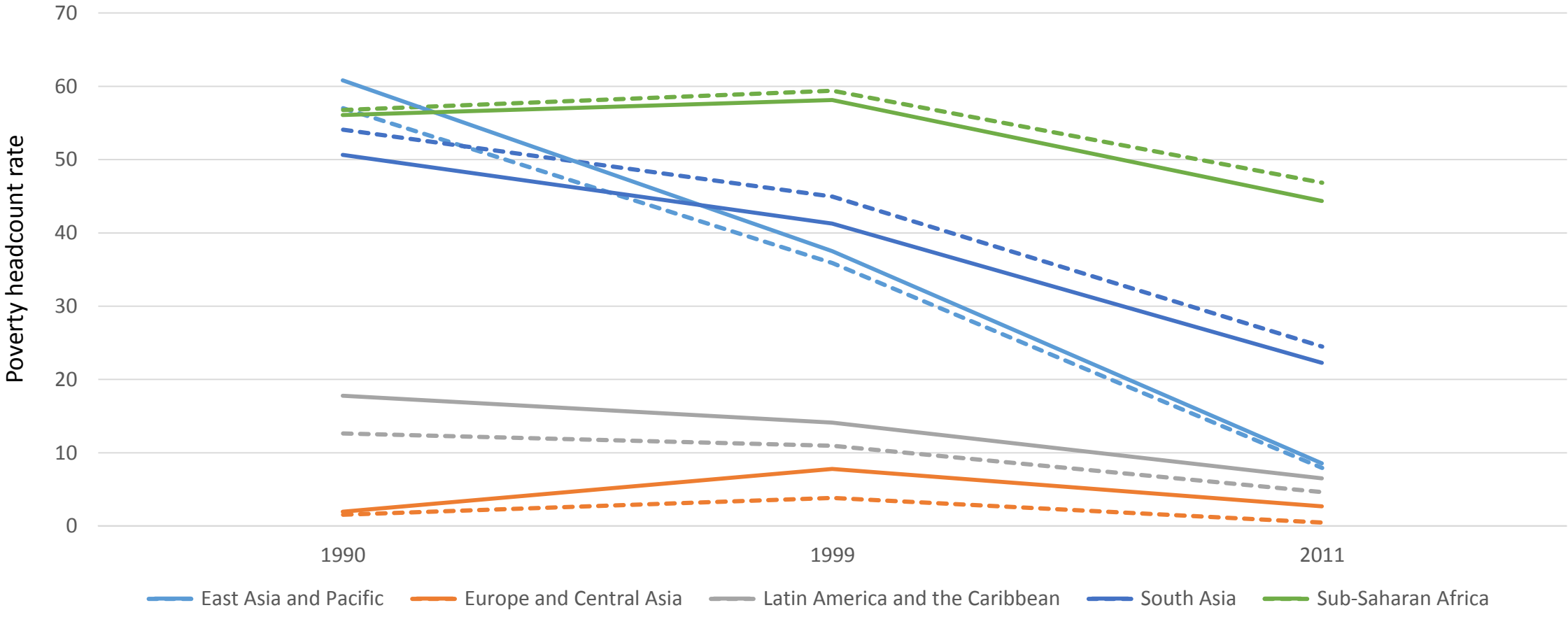
δ_z = 1.90/1.25 = 1.52



vi. Results: global and regional patterns (mostly) preserved



vi. Results: Regional trajectories (1990-2011) also largely preserved

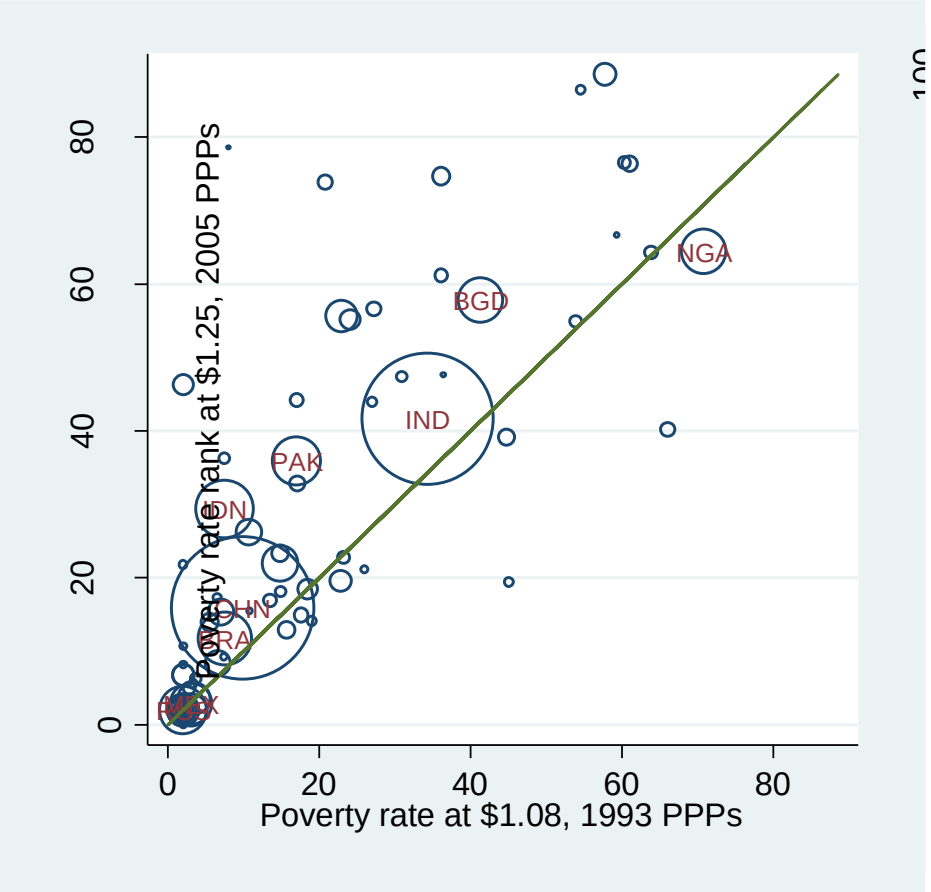


--- 2014 estimates (2005 PPPs, $1.25 line) **— 2015 estimates (2011 PPPs , $1.90 line)**

vi. Results: Fewer country re-rankings than in previous PPP revisions

Changes to national poverty rates: 2008 vs 2015 update

2008 update from 1993 PPPs to 2005 PPPs



2015 update from 2005 PPPs to 2011 PPPs

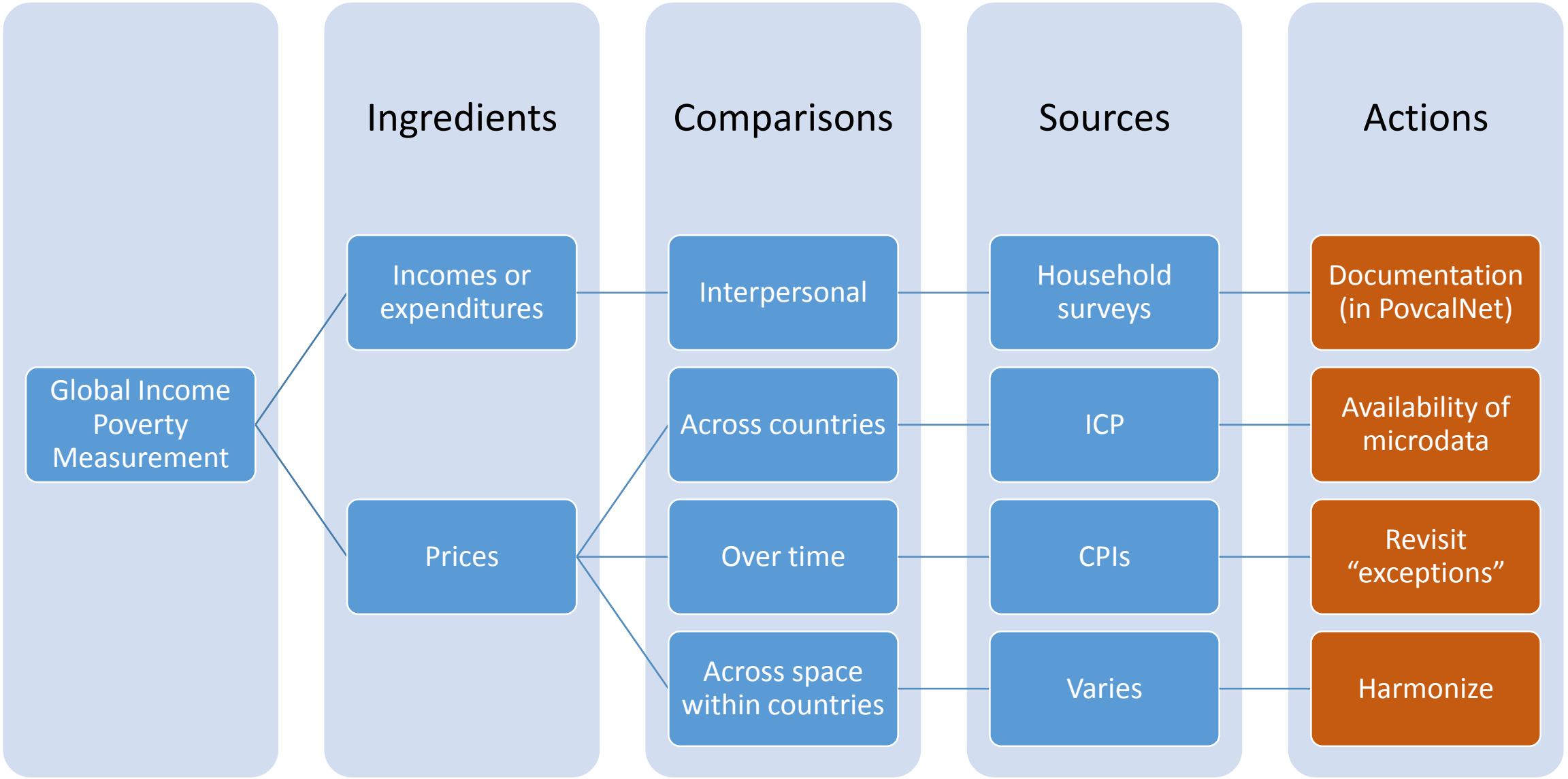
Outline

1. **Past:** A brief history of global poverty monitoring at the World Bank

2. **Present:** The 2015 update to the global poverty count
   i. Another new set of PPP exchange rates
   ii. Basic principles for incorporating them
   iii. Ingredients: Incomes and Prices
   iv. Updating the poverty line
   v. Alternatives, robustness and remaining caveats
   vi. Results

3. **Future: Whither global poverty measurement?**

i. Continued improvements on the basics



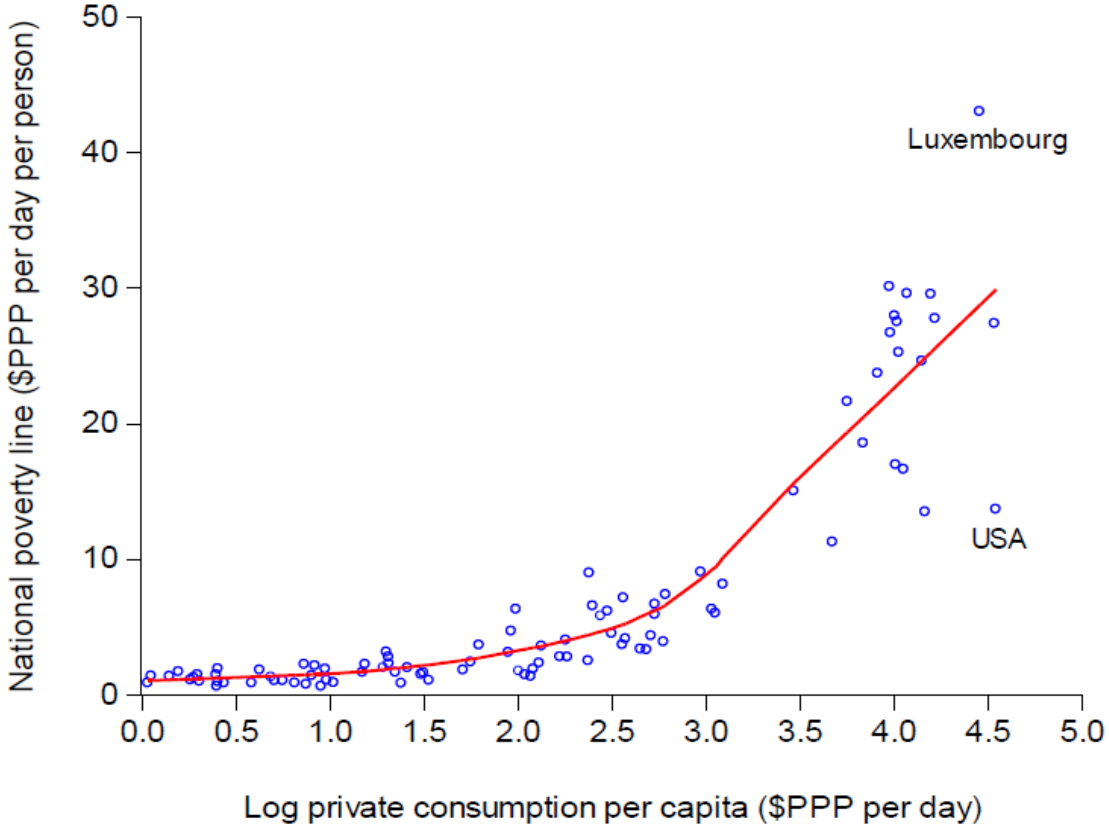
ii. Incorporating relativity?

This homeless US citizen may well live on U$2 per day. Is there a sense in which he should be counted as poor?

ii. Incorporating relativity?

"To the extent that poverty means a low level of welfare and welfare depends on relative consumption as well as own consumption, higher monetary poverty lines will be needed in richer countries to reach the same level of welfare" (Ravallion, forthcoming)

Figure 1: Poverty lines across countries of the world

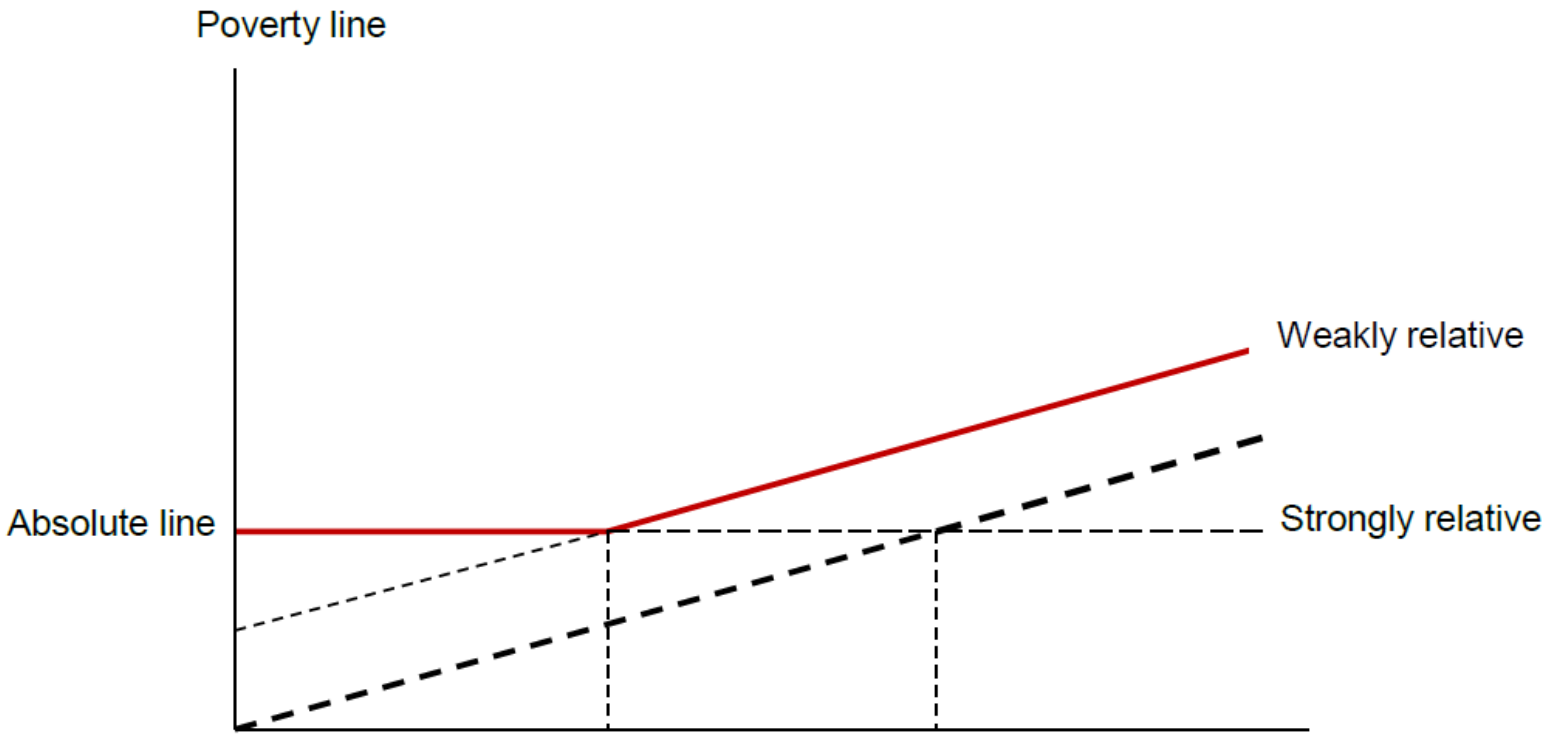


Source: Ravallion, M. (forthcoming): "Toward Better Global Poverty Measures"

ii. Incorporating relativity?

Ravallion (forthcoming) proposes: (i) keep the current absolute line as a lower bound; (ii) create an upper-bound international poverty line that is weakly relative - it rises with income with an elasticity lower than unit - and is still anchored on observed national poverty lines.

Figure 2: Strongly and weakly relative poverty lines



Source: Ravallion, M. (forthcoming): “Toward Better Global Poverty Measures”

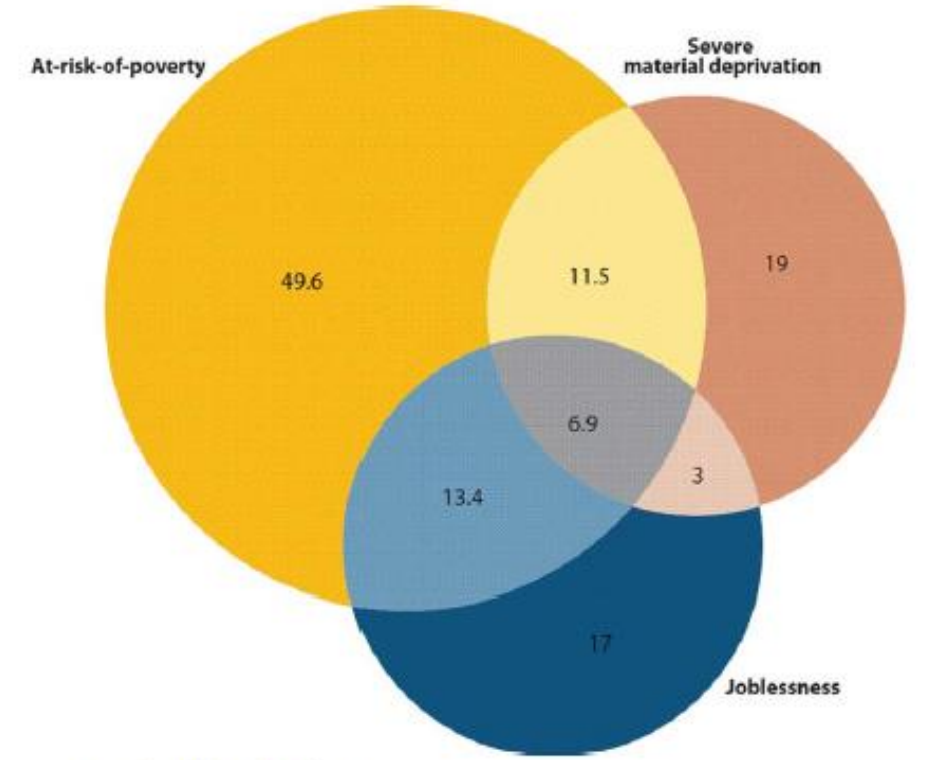
iii. Incorporating non-income dimensions?

Multidimensional analysis of poverty is recommended when:

1. When there are at least two welfare dimensions of interest between which there are no natural aggregators (e.g. prices)…
2. …and when correlations between them matter.

"It is possible for a set of univariate analyses done independently for each dimension of well-being to conclude that poverty in A is lower than poverty in B while a multivariate analysis concludes the opposite, and vice-versa. The key to these possibilities is the interaction of the various dimensions of well-being in the poverty measure and their correlation in the sampled populations" (Duclos, Sahn and Younger, EJ 2006, p.945)

Figure 2. Multiple Indicators from the Europe 2020 Target



Note: Figures for EU-27 in million of persons.
Source: EU-SILC, Eurostat-CEPS/INSTEAD calculations. Reprinted from Atkinson, A. B., E. Marlier, F. Monatigne, and A. Reinstadler. 2010. "Income Poverty and Income Inequality." In A.B. Atkinson and E. Marlier, eds., *Income and Living Conditions in Europe*, 127. Luxemburg: Eurostat.

iii. Incorporating non-income dimensions?

- Old debate: aggregation into an index vs. dashboard
- My take (with M.A. Lugo): a middle ground focused on making the association between dimensions explicit.
- But: how to present this information succinctly for 130 countries?
  - If you summarize the population mass in the intersections of the Venn diagram above, you are back at the MPI (Alkire & Foster, 2011):

$$g_{ij}^{\alpha}(k) \qquad \text{Typical entries into which are} \qquad \begin{cases} \left[\dfrac{y_{ij}-z_j}{z_j}\right]^{\alpha}, i : c_i \geq k \\ 0, i : c_i < k \end{cases}$$

  - Has both attractive and unattractive features.
  - May be best option for a reduced, core set of three or four dimensions?

iv. Individual poverty
v. Chronic poverty

- Two additional directions of interest in advancing global poverty measurement are:

1. Given intra-household inequalities, is poverty more severe among women than men? Or children than adults? Or the elderly?
   - Inroads into this question have been made (typically at the country level), and are usually based on disaggregated consumption patterns.
   - Data requirements for doing this globally need to be ascertained.

2. Cross-sectional household surveys are snapshots, and we typically care more about the chronically poor than about the transient poor.
   - Assessing the extent of global chronic poverty would require panel (or synthetic panel) data that are currently not available.

Conclusions (i)

1. Given the prevalent view that the 2011 PPPs capture recent price level differences across countries more accurately, global poverty comparisons needed adjusting.

2. This adjustment was implemented so as to minimize differences w.r.t. the $1.25 line at 2005 PPPs, in order to preserve goalposts for international goals.

3. Because the 2011 PPPs found lower prices in poorer countries, maintaining purchasing power parity translates into higher incomes (and poverty lines) in dollar terms.

   - **On average, $1.90 at 2011 PPPs has roughly the same purchasing power in poor countries as $1.25 at 2005 PPPs.**
   - **As a result, changes to both levels and trends of poverty incidence (regionally and globally) are muted.**

Conclusions (ii)

- Significant challenges remain going forward, including:
  - Better understanding the drivers of periodic changes in PPPs (for which access to ICP micro-level price data is essential)
  - Improving and harmonizing within-country cost-of-living adjustments
  - Defining an upper-bound international poverty line that incorporates the existence of relative deprivation
  - Monitoring deprivation in key non-income dimensions – e.g. health and education – as well as associations among them (and with income)
  - Investigating poverty at the individual level, accounting for intra-household differences between genders and age groups
  - Investigating poverty dynamics to separate chronic from transient poverty

Thank you