

Poverty Counts

The Future of Global Poverty Monitoring at the World Bank

Dean Jolliffe, World Bank DEC Research Group
Espen Beer Prydz, World Bank DEC Data Group



WORLD BANK GROUP

Slides prepared for DEC Policy Research Talk, April 10, 2017

based on material from Ferreira et al (2016), Jolliffe and Prydz (2017, 2016, 2015) and Jolliffe et al (2014).

Presentation roadmap

I. Background

- i. A brief history and overview of global poverty monitoring at the World Bank
- ii. Updating the international poverty line (\$1.25 => \$1.90)

II. Atkinson Commission on Global Poverty, select recommendations & actions

- i. Supplemental Poverty Measures
 - a. Building Blocks – A new set of harmonized national poverty lines
 - b. Income-class lines – Higher absolute poverty lines
 - c. Societal Poverty – A new relative poverty line for global poverty counts
- ii. Total Error
 - a) Sampling and non-sampling error
 - b) Error resulting from changes in estimated real value of \$1.90 in LCU (inflation, PPPs)
 - c) Population
 - d) Error resulting from changes in how welfare measure is estimated

I. Background: Approach similar over past 25 years

Update:	1979	1990	2001	2008	2015
	“India line”	“Dollar-a-day”	1.08/day	1.25/day	1.90/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					
Poverty line 1985 IND Rs.					

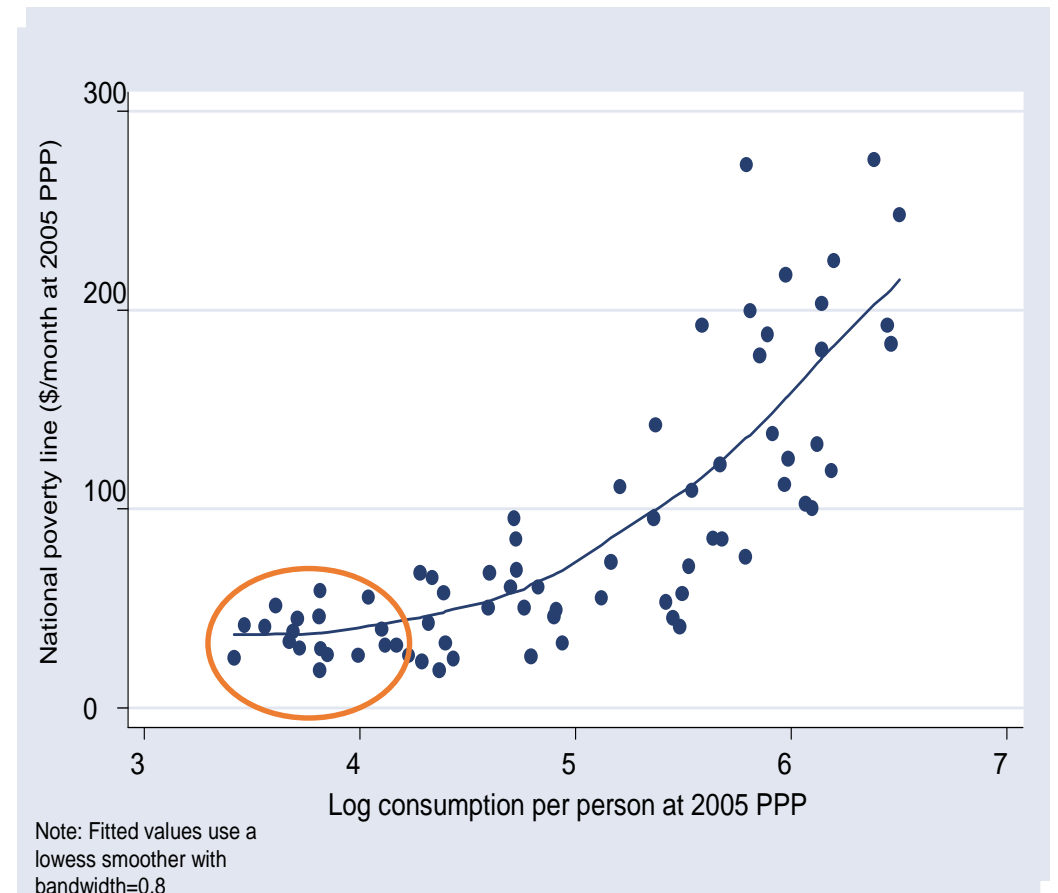
Sillers (2015). “Is \$1.82 the new \$1.25?”

I. Details of the \$1.25 international poverty line (IPL)

Ravallion, Chen & Sangraula (WB, 2009)

- Update the IPL to **per capita \$1.25-a-day** using **2005 PPPs** for consumption.
- Compilation of **national poverty lines** from the Bank's country-level Poverty Assessments for **74 countries**
 - Poverty lines viewed as social assessments of the cost of basic needs in each country,
 - **Basic needs are upward sloping in average wellbeing.**
- 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



Levels on logs

I. Re-estimate the RCS15 \$1.25/day line with 2011 PPPs

i. Poverty line in local currency units (LCU) from survey YEAR.

ii. Inflate LCU to PPP base year (2005, 2011), convert to USD.

This step is sensitive to measure in inflation (J-P)

14 years on average

Mali, 22 years

Non-CPI for Tajikistan, Ghana, Malawi

iii. Convert to USD, average

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	Round(1.88)=>1.90

Presentation roadmap

I. Background

- i. A brief history and overview of global poverty monitoring at the World Bank
- ii. Updating the international poverty line (\$1.25 => \$1.90)

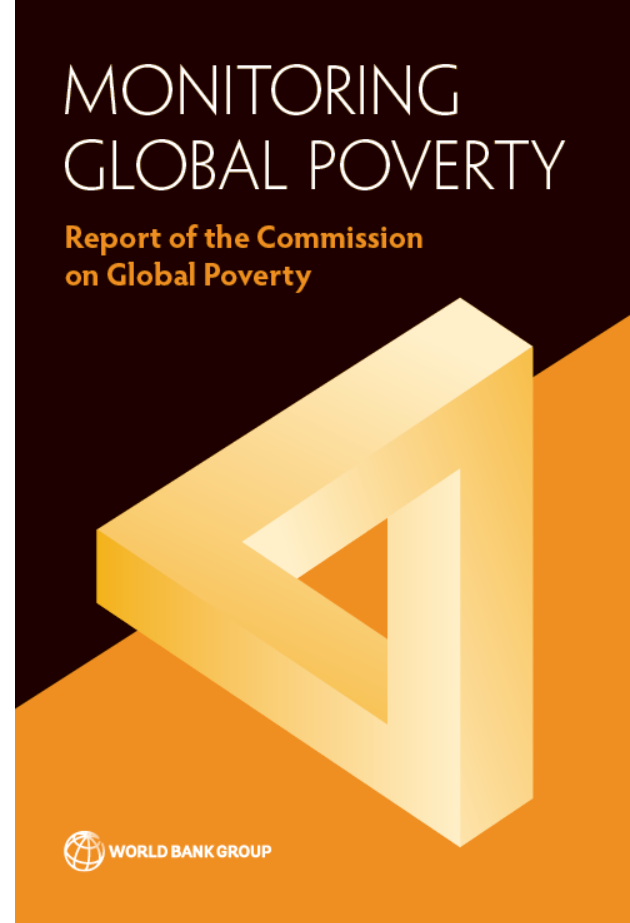
II. Atkinson Commission on Global Poverty

i. Supplemental Poverty Measures

- a. **Building Blocks – A new set of harmonized national poverty lines**
- b. **Income-class lines – Higher absolute poverty lines**
- c. **Societal Poverty – A new relative poverty line for global poverty counts**

ii. Total Error

- a) Sampling and non-sampling error
- b) Population
- c) Error resulting from changes in estimated real value of \$1.90 in LCU (inflation, PPPs)
- d) Error resulting from changes in how welfare measure is estimated



II. Atkinson: Supplemental Measures, societally based

- Introduce two new, distinct types of poverty lines as complements to 1.90
 - Supplemental middle-income poverty lines
 - Higher in value than \$1.90
 - *The same for all countries*
 - Reflecting typical national poverty line for lower and upper middle income countries
 - May be useful in countries where \$1.90 line is less relevant
 - Relative poverty line for global counts of Societal Poverty
 - *Differs for each and every country*
 - Determined by the median value of wellbeing (consumption or income)
- One way to understand social assessments of basic needs is to construct a database of national poverty lines

Building Blocks – A new set of harmonized national poverty lines

- The \$1.25 and \$1.90 IPL are based on 15 estimated national poverty lines from Ravallion, Chen, Sangruala (RCS15, 2009).
- RCS database of 74 poverty lines has been critical input for poverty estimation, establishes principle that global measures informed by social assessments of basic needs.
But in need of an update...
 - **Age:** On average, RCS15 require 14 years of inflation data to bring to 2011. CPI data quality correlated with income status; RCS15 are very poor countries (3 countries CPI not used)
 - **Statistical support:** The 15 countries represent about 13% of the estimated poor in 2011. Deaton's criticism: small shifts in the composition of these countries, large changes in poverty
 - **Mixed units, 5 of the RCS15 are expressed in adult-equivalent units, 10 in per capita:** Per capita lines correspond with wellbeing measure in Povcal net, Reflect needs of average person (adolescent). Per-capita lines typically about 0.7 * value of adult lines
 - **Some countries only report regional, not national poverty lines.**

Building Blocks – A new set of harmonized national poverty lines

- Instead of collecting national poverty lines from poverty assessments, use
 - Poverty headcounts (h) from WDI, Consumption cumulative distribution function (F) extracted from PovcalNet. Identify the unique value z such that $h=F(z)$.
- => 699 national poverty lines harmonized in per capita terms from 107 countries
- This approach ensures:
 - All poverty lines (z) are expressed in per capita terms by definition of wellbeing.
 - All poverty lines (z) correspond to the national headcount by construction.
 - 9-fold increase in statistical support over RCS, covering both old and new lines
 - Our 2011 subsample of national poverty lines (lines from 104 countries, close to 2011), need on average 1 year of inflation data to bring to the 2011 benchmark (contrast 14 yrs.)
- We use this database for estimation of income-class and societal poverty lines

Building Blocks – A new set of harmonized national poverty lines

Regional poverty lines have been used for regional analysis in part because the extreme poverty line (\$1.25, \$1.90) is viewed as *irrelevant in some regions*.

The new database of national poverty lines shows that all regions, except MENA, have some countries with national poverty lines that are within 25 cents of \$1.90

&

Except for SA, all regions have some countries with national poverty lines $> 4 \times \$1.90$

=> More reasonable to suggest that within *most* regions \$1.90 is relevant for some countries and irrelevant for others.

WDI/Official World Bank regions

Region	Median	Min	Max
EAP	3.36	1.78	28.14
ECA	9.79	1.89	35.12
LAC	6.28	2.15	8.02
MENA	5.01	2.55	13.76
SA	2.20	1.91	2.97
SSA	2.01	1.27	10.08

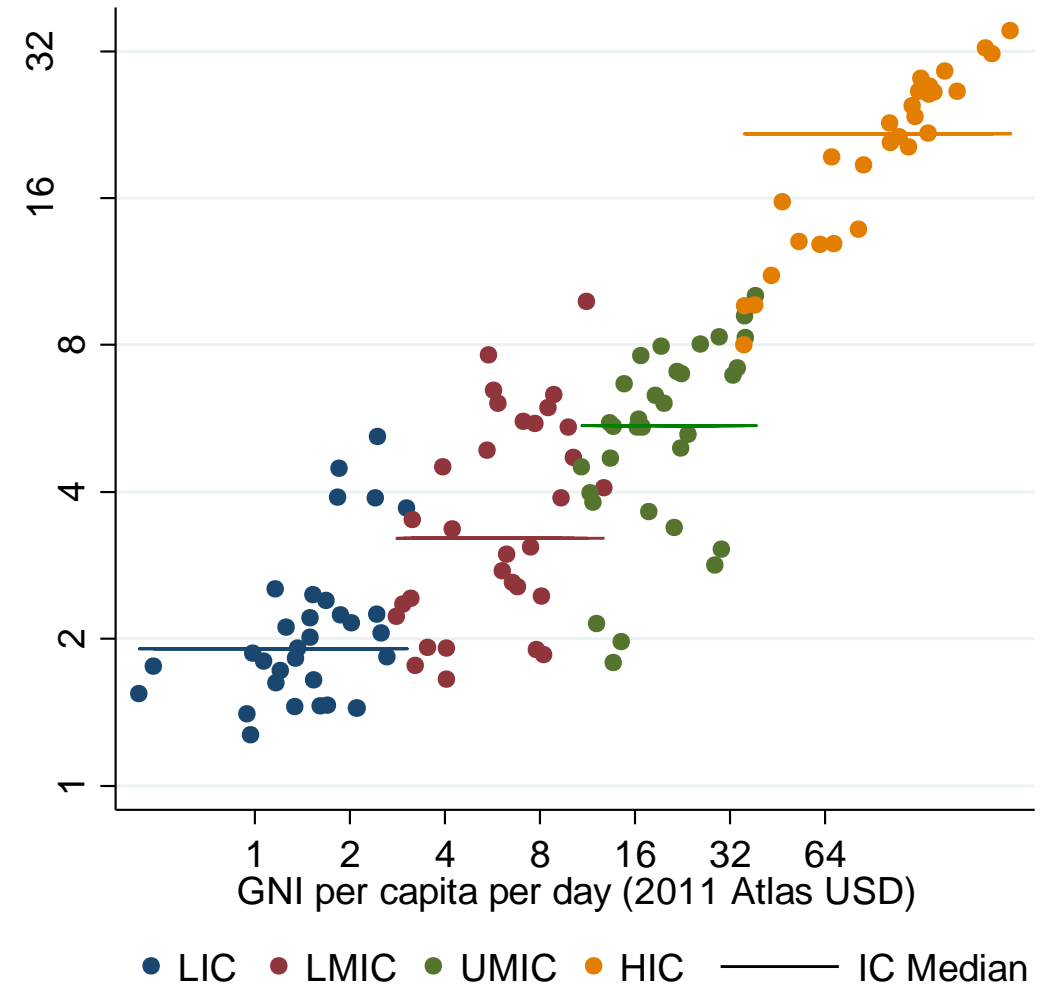
Excluding OECD and “high-income” countries

Region	Median	Min	Max
EAP	3.35	1.78	5.56
ECA	6.06	1.89	19.37
LAC	6.28	2.15	8.02
MENA	3.97	2.55	6.06
SA	2.20	1.91	2.97
SSA	2.01	1.27	10.08

Supplemental Income-class Poverty lines

- Assumes social relevance of a poverty line more linked to income than geography
- The same for all countries, fixed in time
- Reflecting typical national poverty line for lower and upper middle income countries
- Can be used where \$1.90 is less relevant

Income Classifications	Median
Low Income	\$1.9
Lower Middle	\$3.2
Upper Middle	\$5.5
High Income	\$21.7



Presentation roadmap

I. Background

- i. A brief history and overview of global poverty monitoring at the World Bank
- ii. Updating the international poverty line (\$1.25 => \$1.90)

II. Atkinson Commission on Global Poverty, select **recommendations & actions**

i. **Supplemental Poverty Measures**

- a. Building Blocks – A new set of harmonized national poverty lines
- b. Income-class lines – Higher absolute poverty lines
- c. Societal Poverty – A new relative poverty line for global poverty counts**

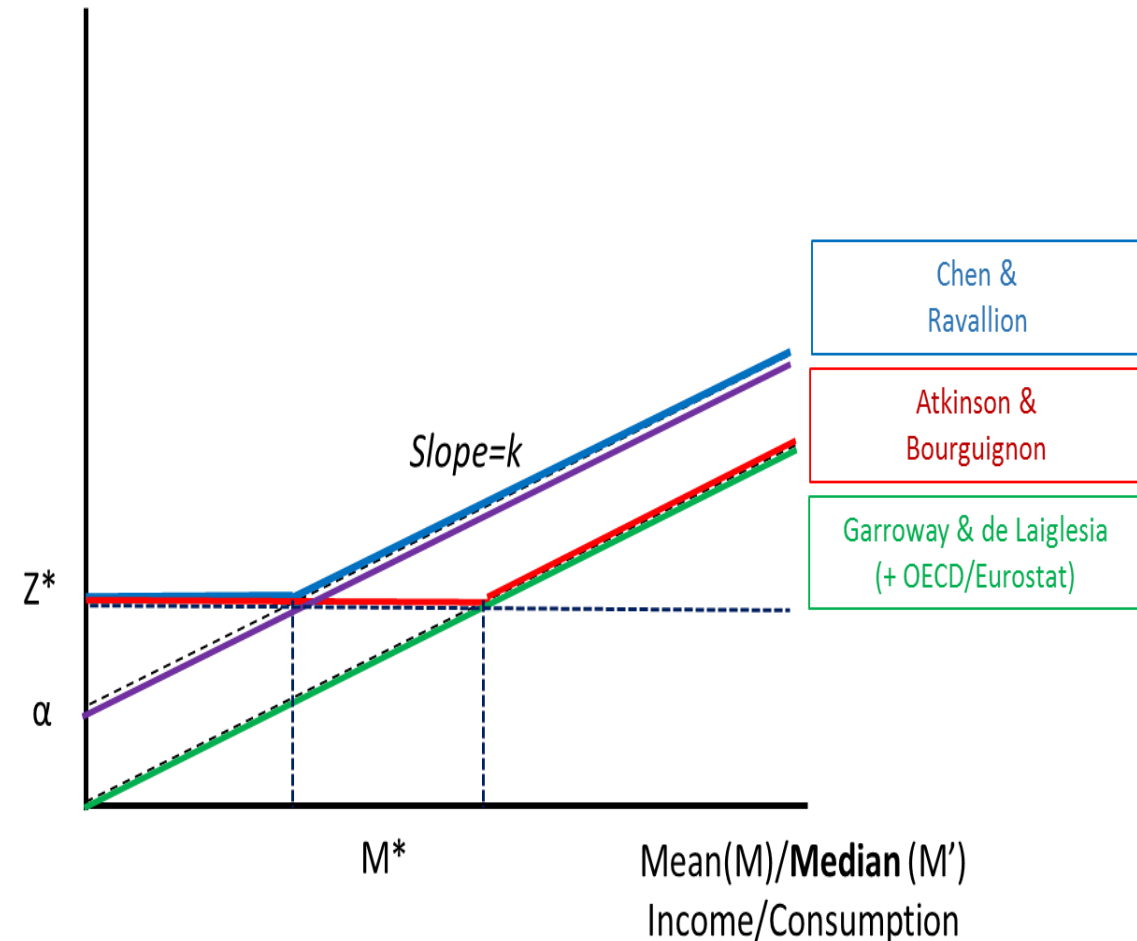
ii. Total Error

- a) Sampling and non-sampling error
- b) Error resulting from changes in estimated real value of \$1.90 in LCU (inflation, PPPs)
- c) Population
- d) Error resulting from changes in how welfare measure is estimated

Atkinson: Societal Poverty Measure

- Atkinson Commission recommendation 20:
*... introduce a “societal” headcount measure of global consumption poverty, combining **fixed** and **relative** elements*
- Global relative line existing proposals
 - Observing income gradient in poverty lines (Ravallion, range of basic needs: \$0.63 to \$9)
 - Atkinson & Bourguignon, relative line (intercept=0, slope = 0.37, $Z^*=1.25$)
 - Chen & Ravallion’s weakly relative line (intercept =0.6, slope =0.33, $Z^*=1.25$)
- We build on CR & AB
 - Use our dataset of harmonized lines

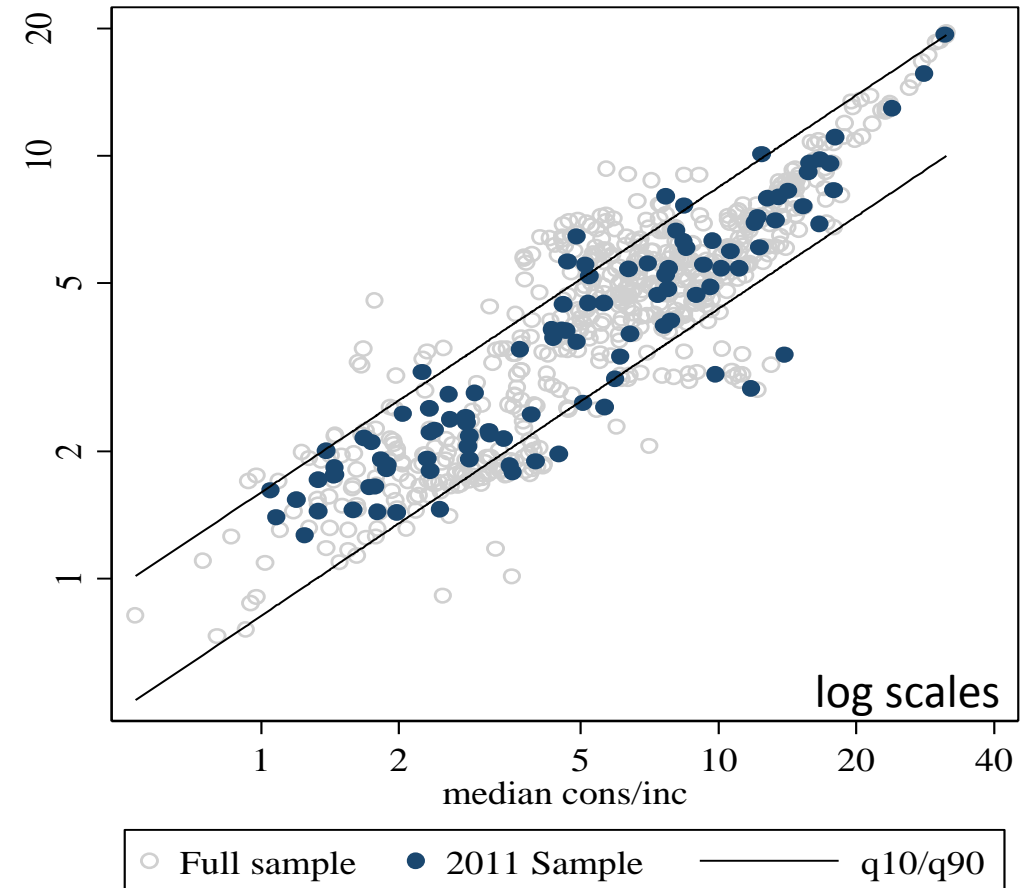
Poverty Line



Atkinson: Societal Poverty Measure

- Plot national poverty lines on average national wellbeing (median, avg, HFCE)
- Upward sloping, definition of basic needs varies widely across nations
- In our data, everywhere upward sloping, no flat part at lower bound (lowess & spline)
- Why a global relative line? Why not use national lines?
 - National lines will continue to be the focus of country dialogue, SPL not a replacement
 - As a global poverty measure, 2x differences in estimated needs across range.

National Poverty Lines and Economic Development



Atkinson: Societal Poverty Measure

Fitting national lines on mean and median consumption (income) preferred model => \$1 + 50% of median

	Our preferred model		Chen & Ravallion model on our data			
	(1)	(2)	(3)	(4)	(5)	(6)
	z	z	z	z	z	z
Survey median	0.50*** (20.13)	0.53*** (51.32)			0.55*** (4.57)	0.49*** (9.81)
Survey mean			0.40*** (11.90)	0.42*** (33.75)	-0.04 (-0.41)	0.03 (0.78)
Constant	1.01*** (6.81)	0.98*** (15.88)	0.73** (3.16)	0.70*** (8.39)	1.05*** (7.01)	0.95*** (12.89)
R-squared	0.86	0.86	0.81	0.82	0.86	0.86
N	104	699	104	699	104	699
Sample	2011 lines	All lines	2011 lines	All lines	2011 lines	All lines

Atkinson: Societal Poverty Measure

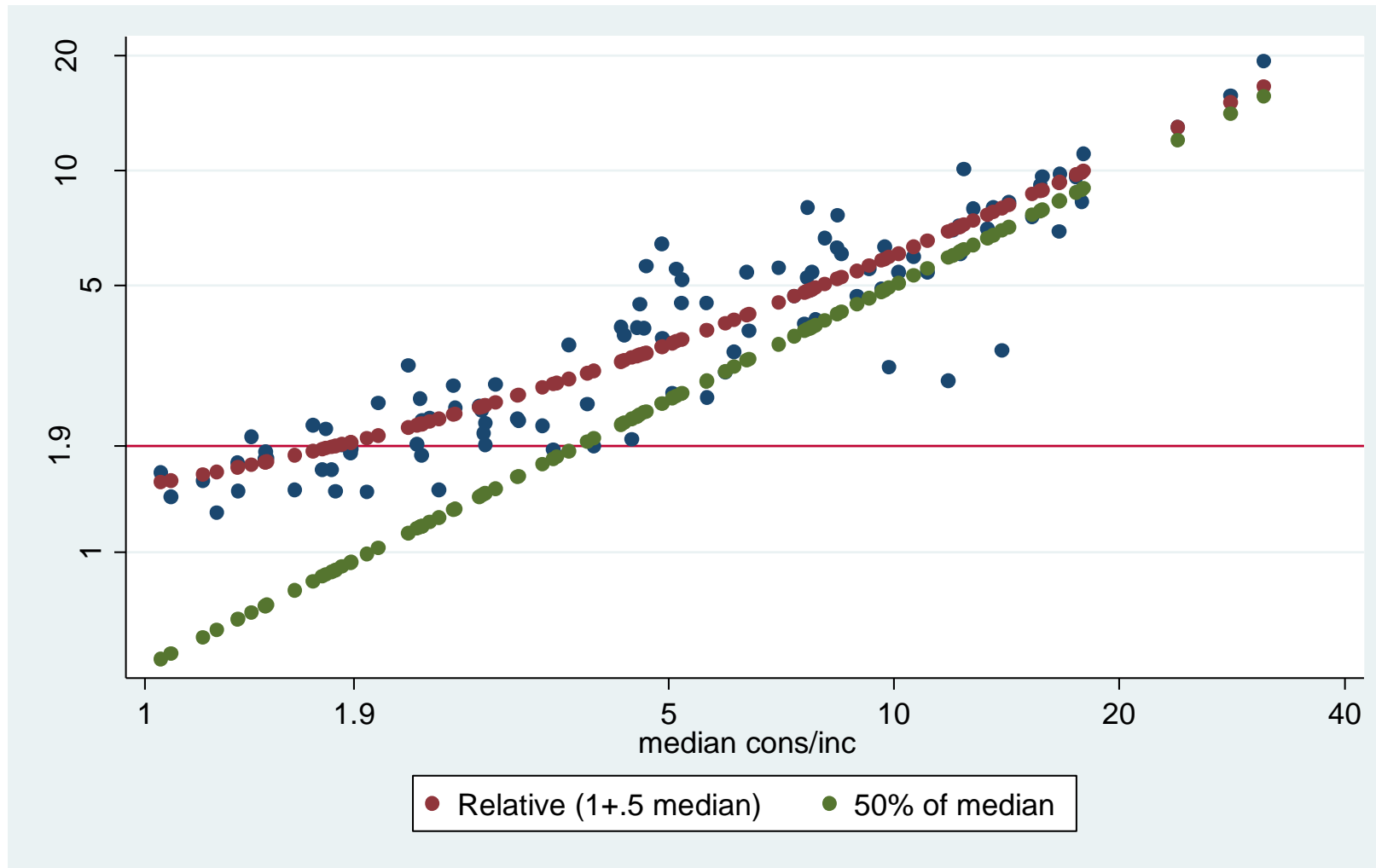
Interpreting \$1 + 50% of median

- ‘**Relativist gradient**’ of 50% of median is used in many high income countries.
 - OECD’s headline poverty indicator based on “half the median household income”.
 - Eurostat ‘at-risk-of poverty thresholds’: 40%, 50%, 60% of national median (& mean) income.
 - NSOs in rich countries frequently also report using similar lines (50% or 60% of median).
- The **intercept (α)** is the fixed element, \$1 has some basis in existing literature
 - \$1/day = global **consumption floor** in 2011 PPPs proposed by Ravallion (2016).
 - Allen (2016) & Lindgren (2015) estimate of **bare-bones basket** is similar.
- Empirically we observe no floor, Z^* , but treating \$1 as the fixed element representing absolute basic needs may be unpalatable (e.g. Allen), even in the limit. Poverty lines are social assessments.
An alternative floor to \$1 is the existing \$1.90 IPL, suggesting an alternative parameterization

Max (\$1.90 , \$1 + 50% of median)

Atkinson: Societal Poverty Measure

Assessing fit



Comparing
National poverty lines (blue),
\$1+50% median (red),
50% (green)

Strongly relative line, too
low for poor countries

\$1 + 50% median fits rich
and poor

Atkinson: Societal Poverty Measure

Assessing fit

Comparing

National poverty rates and various measures of societal poverty

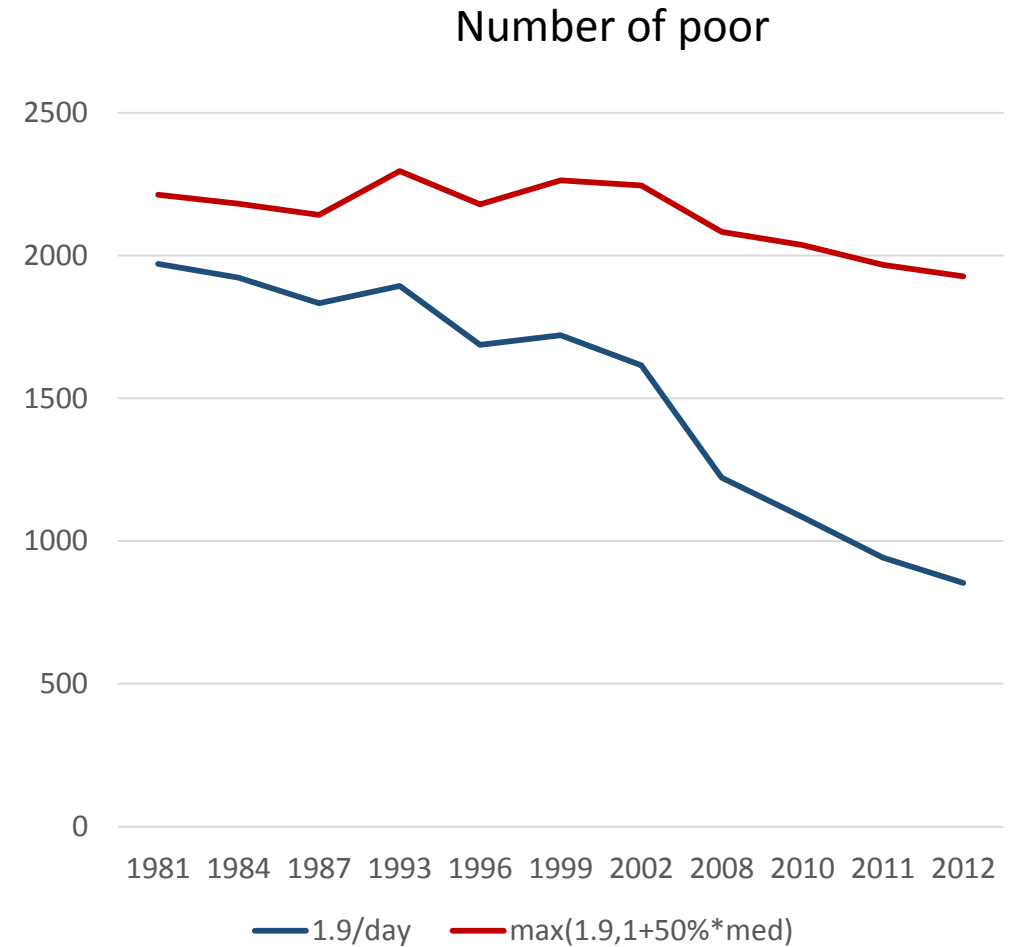
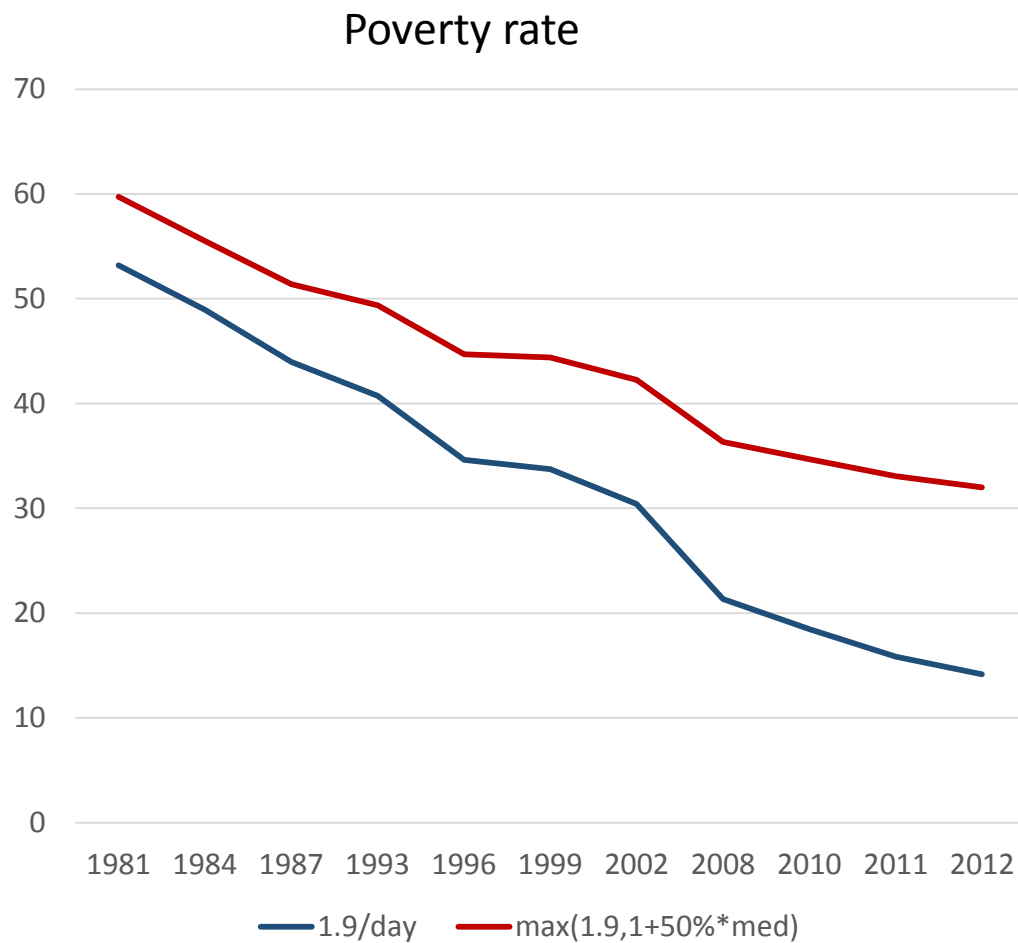
\$1 + 50% median & max(\$1.90, \$1+50% median) both correspond well with national assessments of poverty

Deviation between national & societal poverty rates

	Latest observation		All observations	
Relative global line	Mean absolute deviation	Mean deviation	Mean absolute deviation	Mean deviation
SPL (\$1 + 50% of median)	8.7	1.7	9.5	-1.9
SPL w lower bound at \$1.90	9.1	2.3	9.7	-1.3
Chen and Ravallion (WRPL)	14.0	12.4	12.5	9.5
Strongly relative (50% of median)	19.5	-18.1	18.5	-17.4

Atkinson: Societal Poverty Measure

Comparing extreme poverty trends and societal poverty, $\max(1.9, 1+50\% \text{ median})$



Presentation roadmap

I. Background

- i. A brief history and overview of global poverty monitoring at the World Bank
- ii. Updating the international poverty line (\$1.25 => \$1.90)

II. **Atkinson Commission on Global Poverty, select recommendations & actions**

- i. Supplemental Poverty Measures
 - a. Building Blocks – A new set of harmonized national poverty lines
 - b. Income-class lines – Higher absolute poverty lines
 - c. Societal Poverty – A new relative poverty line for global poverty counts
- ii. **Total Error**
 - a) **Sampling and non-sampling error**
 - b) **Error resulting from changes in estimated real value of \$1.90 in LCU (inflation, PPPs)**
 - c) **Population**
 - d) **Error resulting from changes in how welfare measure is estimated**

II. Atkinson: Report on Total Error, *sampling and nonsampling*

- We have good estimates of sampling error
 - Sampling error: error induced from using a sample to make inference to a population
 - Probability sampling & statistical theory allow us to estimate sampling error
- In contrast, estimating magnitude of nonsampling error is challenging
- Presume nonsampling error \gg sampling error

Example of magnitude of sampling error

Bangladesh, 2010, poverty rate 31.5%, standard error 0.88

=> 95% confidence interval, $31.5\% \pm 1.7\%$

$47 \text{ million} \pm 2.6 \text{ million people}$

$$\hat{\sigma}_{h,SS}^2 = \frac{1}{n} \sum_{i=1}^C \omega_i \hat{\sigma}_{h,i}^2$$

II. Atkinson: Report on Total Error, *nonsampling error*

- Focus tends to be on the international poverty line, but ...

- 2 main ingredients

Indicator of
economic wellbeing
(ie. Consumption or
income)

Selection of
poverty line,
expressed in common
currency

- Aggregated to a summary index for a *common year*
 - Global headcount of extreme poverty in 2013, 10.7%, 767 million people
- *Key Assumptions*
 - Measure of wellbeing comparable across countries and over time
 - Common poverty line is comparable across countries and over time.

Total Error -- an incomplete sketch of nonsampling error

World

Coverage of all countries & line up methodology

PPP, comparability of international poverty line across countries

Inflation, comparability of poverty line over time

Nation

Census Coverage (e.g. conflict zones, homeless, slums; post-enumeration)

Census age, forecast error

Sample

non-response

variation in data processing (data entry, data cleaning)

variation in fieldwork protocols (training, supervision, timing)

Comparability of wellbeing measures

consumption, income

variation in elements of wellbeing (shelter, durables, health)

variation in instrument (survey) design

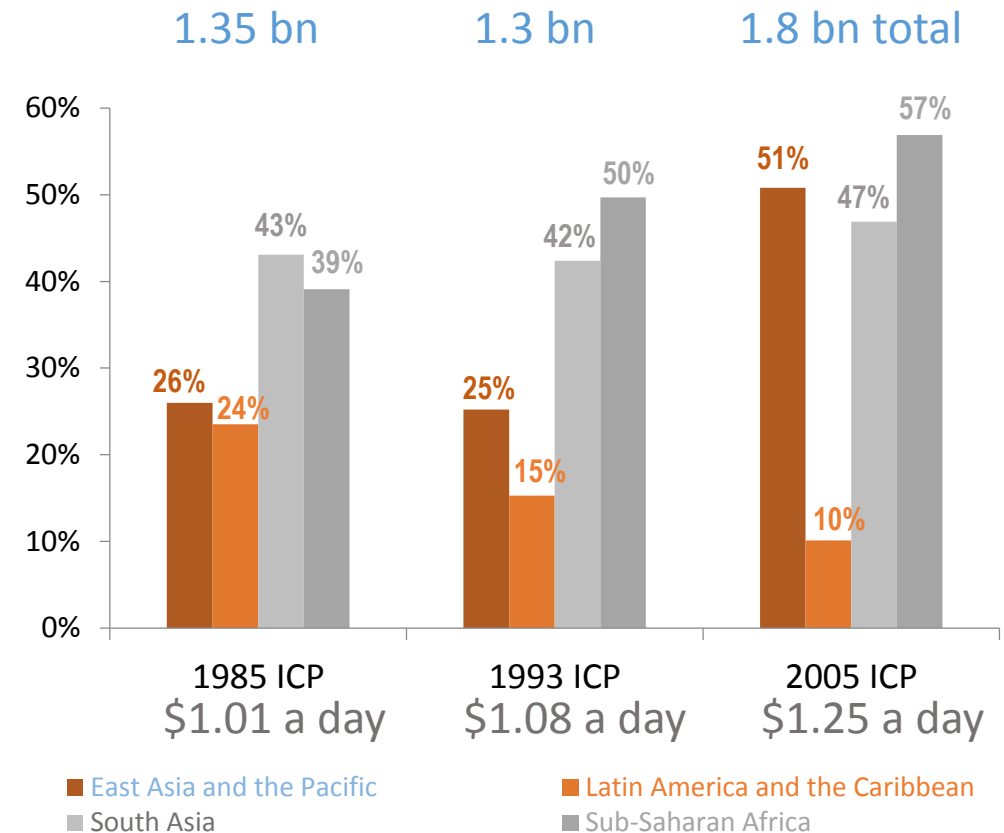
Note overlapping concern for national and global poverty counts



Total Error: Purchasing Power Parity exchange rates (PPPs) *designed to maintain comparability across countries*

- PPPs maintain purchasing power in terms of goods and services, including non-tradeables.
- PPPs keep \$1.90 comparable across countries.
- Collected at irregular intervals: 1985, 1993, 2005, **2011**
- **Significant changes occur with each new PPP. Signal or noise?**
- Atkinson: Fix PPP exchange rates at 2011 values through 2030. Poverty line only adjusted with inflation data.

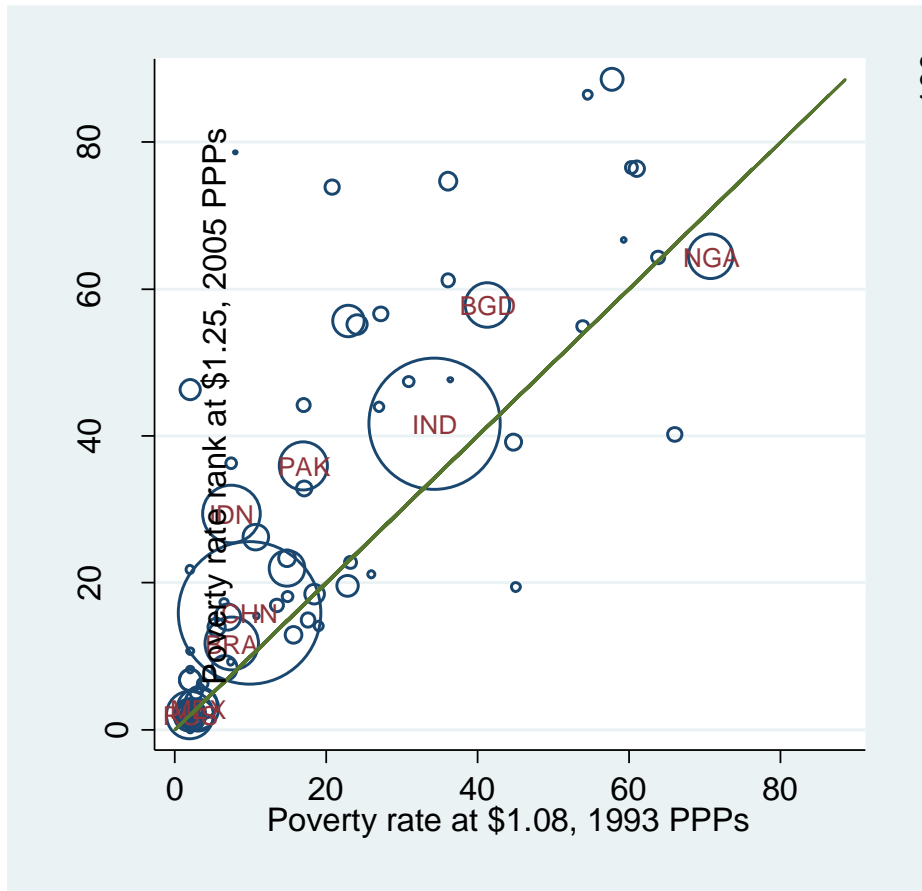
1993 headcount based on three PPP Indices



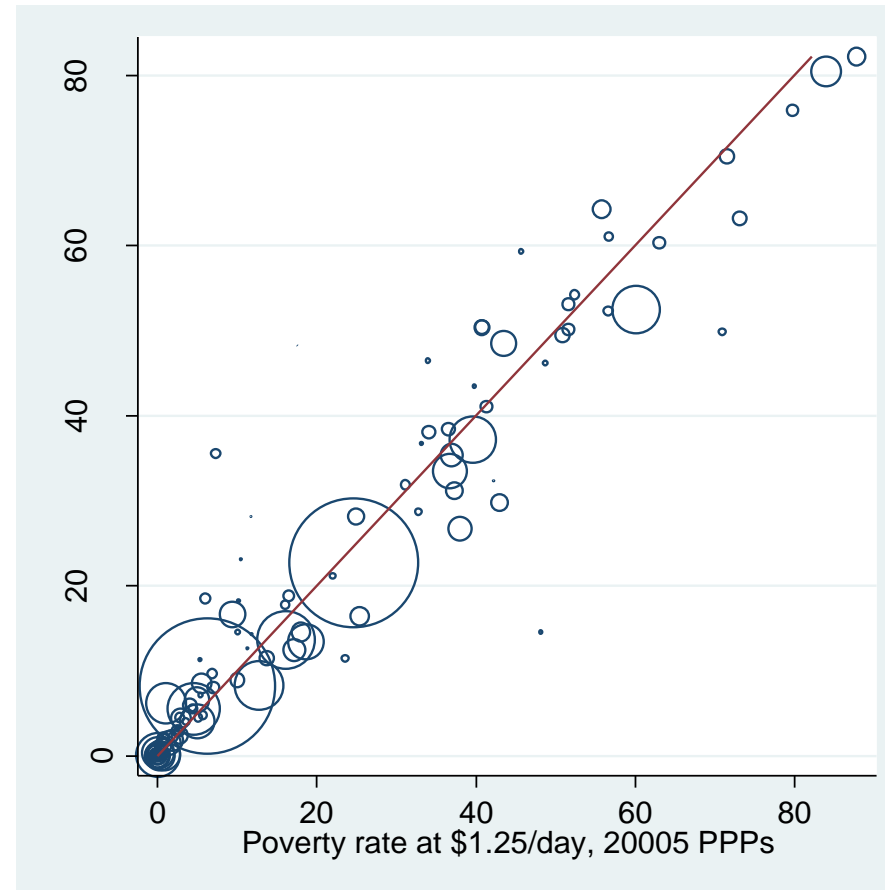
2011 PPPs: Fewer country re-rankings than in previous revisions

Changes to national poverty rates: 2008 vs 2015 update

2008 update from 1993 PPPs to 2005 PPPs

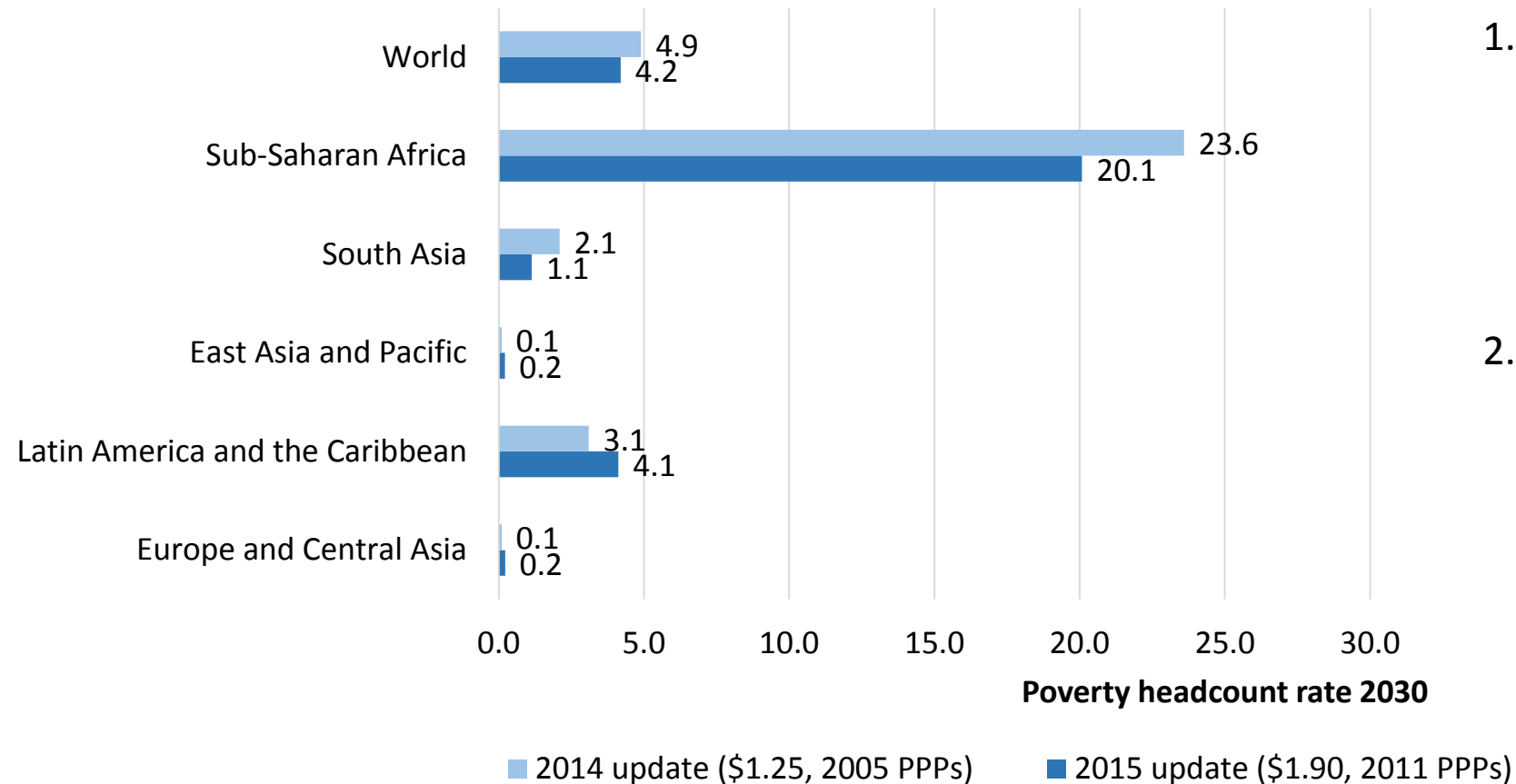


2015 update from 2005 PPPs to 2011 PPPs



How much of off-diagonal is error or correction of error?

Global prospects for 2030 insensitive to PPP changes (2005 vs. 2011)



1. As extreme poverty becomes more regionally concentrated, the relative error resulting from cross-region price differences shrinks.
2. Fixing PPPs at 2011 levels means that we are substituting PPP error for CPI error (as cross-country spatial measure)



Povcal inflation data

PovcalNet uses 4 types of price deflators

WDI annual CPI – general	103
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 6 countries using alternative price indices (Bangladesh, Cambodia, Ghana , Lao, Malawi and Tajikistan).	6

Moving towards greater conformity with WDI CPI, GPWG & PovCal teams

Towards 2 categories, WDI and non-CPI

Reasons for not using CPI include: quality concerns, rural representation, purchasing patterns of the poor.

Countries in **blue** are among the countries that define 1.90 poverty line, thus choice of CPI also affects international poverty line.

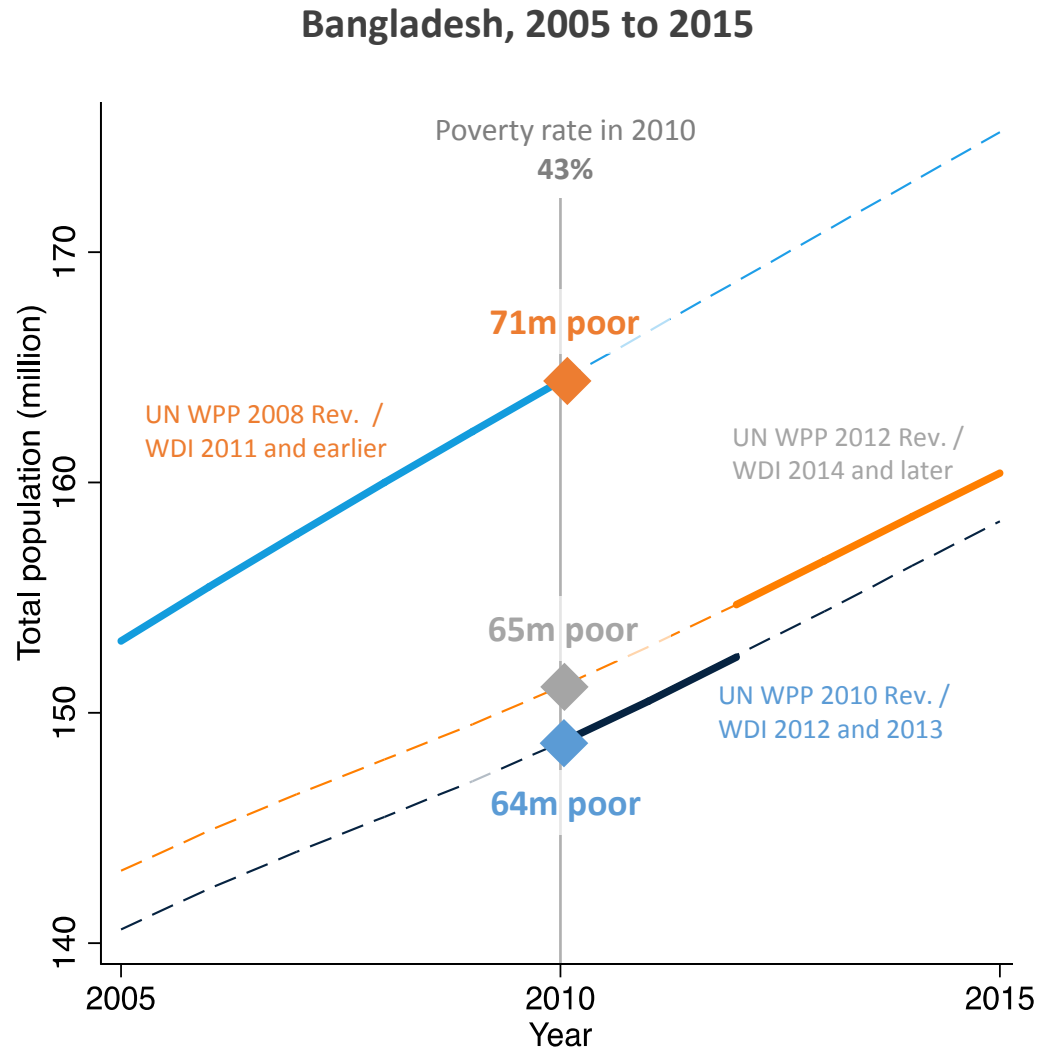


Total Error: Inflation data

- National distributions of welfare and now poverty lines are adjusted for inflation to align values to a reference reporting year (i.e. 2013 most recent estimates)
- Current international poverty line (\$1.90) is sensitive to the choice of CPIs
 - National poverty lines (RCS15), inflated from 2005 to 2011 with inflation data, then converted with PPP (6 years, 15 countries)
 - Using only WDI CPIs, the \$1.25 poverty line converts into \$1.70/day at 2011 PPPs. Using PovcalNet CPIs => \$1.90/day.
 - Magnitude: 766 million poor in 2013 at \$1.90, 588 million poor at \$1.70; 23% difference
- Ferreira et al. justifies use of PovcalNet inflation, but we have two competing measures of inflation. In order to understand total error, need to start the process of quantifying potential error by source.
- In 2030, we'll need 19 years of CPI data for all countries – bringing \$1.90 in 2011 LCU to 2030 LCU; if no new PPPs.



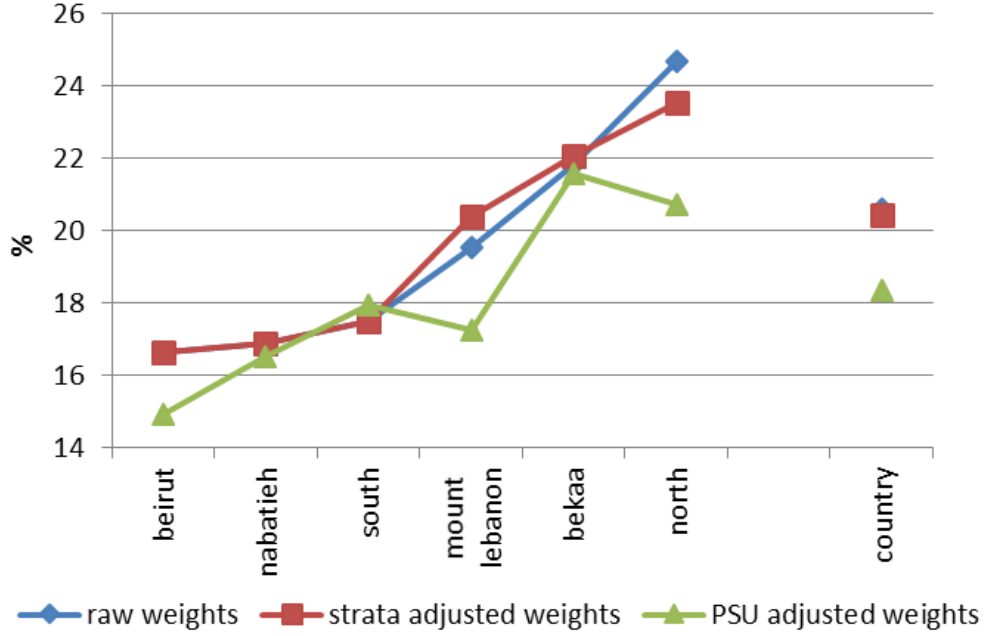
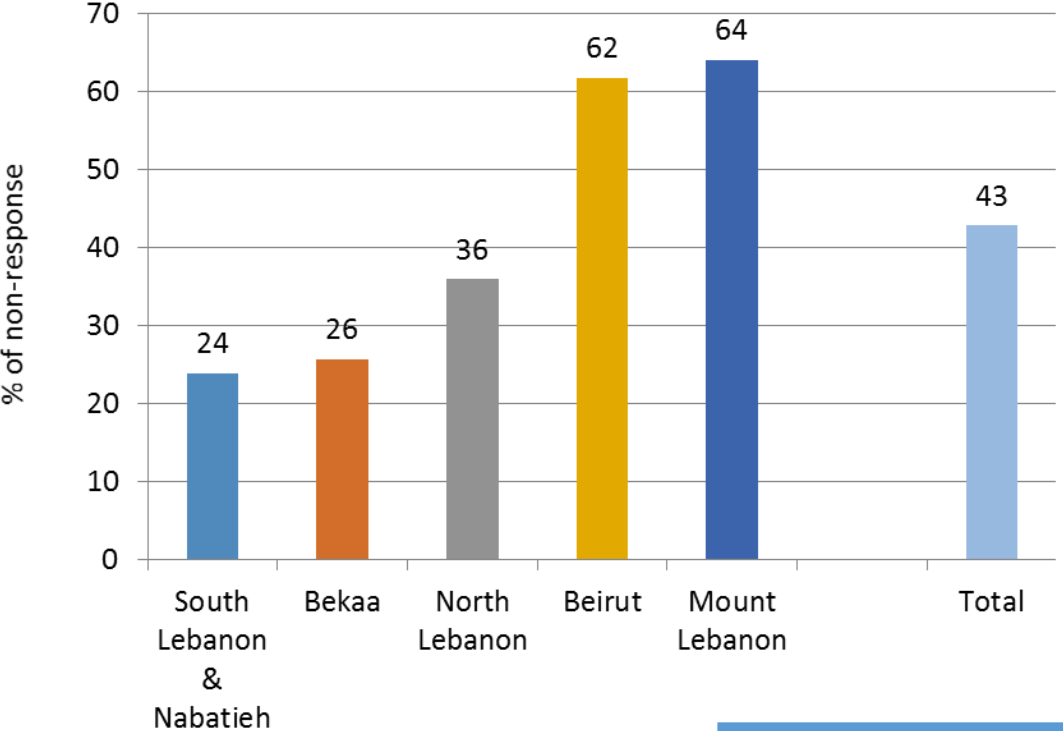
Total Error: Census data



- UN World Population Prospects (WPP) estimates serve as inputs to WDI and as baseline for official poverty estimates.
- Example of **Bangladesh**:
 - Census in 2011
 - UN WPP **pre-census estimates** significantly higher than **post-census estimates**
 - With each revision, number of poor in Povcal changes, even at given poverty rate
- Bangladesh not exceptional
 - United States NRC (2000): **4.8% average absolute error in UN/WB 5-year projections**
- Census forecast error perhaps easiest source of error to account for.

Total Error: Collecting the sample data, *Nonresponse*

Non-response rates at regional level, Lebanon



Correlation at PSU level	non-response rate
consumption per capita	0.25***
% of pop with secondary and university education	0.36***

(Atamanov, Jolliffe, et al. 2017, "Poverty and nonresponse," mimeo)

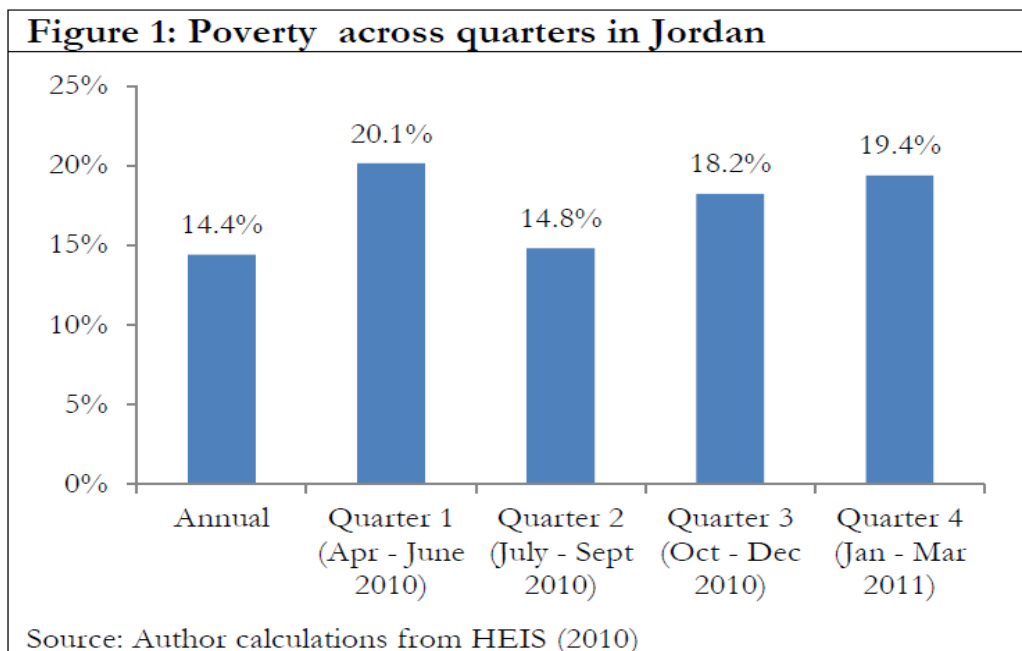
Total Error: Collecting the sample data *variation in fieldwork protocols - timing*

Poverty in Afghanistan – variation over season

Quarter	Poverty %
1 Fall-harvest 2007	23
2 Winter 2007/08	32
3 Spring 2008	44
4 Summer 2008	46
Annual	36

Temporally stratified samples revealed massive variation in poverty, due to seasonality and food price shocks.

Seasonality in a non-agricultural economy



Jolliffe & Serajuddin, 2017. “Noncomparable Poverty Comparisons, *Journal of Development Studies*.”

Total Error: Collecting the sample data *variation in how we ask about consumption*

- Differences in questionnaire affect consumption:
 - A few examples: diaries vs. recall, number of food prompts, number of visits, standard or nonstandard units, food away from home,
 - Recall frame, *“In the last X days, did you consume ... ?”*
 - INDIA EXAMPLE: Since 1950s - India used uniform 30-day recall period (URP), then switched recall frame twice. In 2009, switched to “modified mixed reference period” (MMRP), short for some, long for others.
 - =>
 - MMRP consumption: poverty rate is 9 points lower than URP (for 2011/12).
 - Difference of **109 million** poor people in India’s and global estimates.

Total Error: Variation in how we ask about consumption

LSMS data experiment in El Salvador

Detailed consumption list
(94 items) vs. short,
aggregated list (27 items)
e.g. cheese vs.
3 specific types of cheese

Estimated consumption
26% - 43% greater with
more specific food
prompts.

**Table 4: Total Household Consumption Percentiles
Comparison of the Short- and Long-Questionnaire Samples**

Percentile	<i>Short Questionnaire</i>		<i>Long Questionnaire</i>		Difference (percentage)
	Consumption	Std. Dev.	Consumption	Std. Dev.	
10 th	98.5	(5.00)	141.0	(11.2)	43%
20 th	137.7	(7.27)	179.0	(10.9)	30%
30 th	172.6	(6.83)	219.8	(11.5)	27%
40 th	204.2	(7.67)	257.2	(16.4)	26%
50 th (median)	245.2	(8.16)	310.8	(20.2)	27%
60 th	295.1	(10.4)	375.6	(29.2)	27%
70 th	352.3	(15.6)	478.7	(34.0)	36%
80 th	452.6	(16.4)	609.0	(34.3)	35%
90 th	619.2	(24.1)	869.0	(63.9)	40%

Total Error: Variation in how we ask about consumption

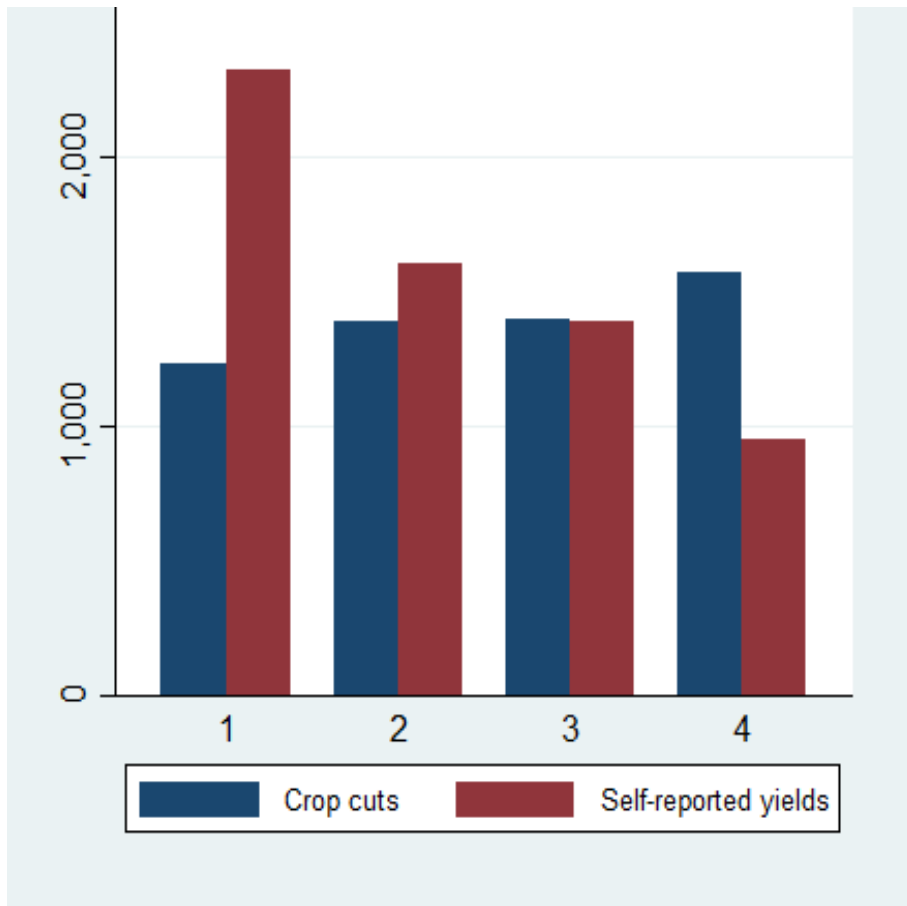
LSMS data experiment in Tanzania

- Beegle et al. (2012) administered 7 different types of common questionnaires to random samples. All designed to measure consumption. Samples well balanced.
- Exact same instrument except increase recall period from 1 week to 2 weeks
 - => 12% drop in average consumption
 - => 8 point (%) increase in poverty
- Same recall period, but long list collapsed to comprehensive groups
 - => 24% drop in average consumption
 - => 32% drop in shared prosperity
- Caveat: Recent results from a similar experiment in Indonesia, little change above 100 food items. Significantly less stark differences.

Tangent: Measurement error in farm income & productivity

LSMS experiment in Ethiopia

Median maize yields (kg/ha) by plot size



- Majority of extreme poor derive their livelihood from agricultural activities.
- Improving farmland productivity a powerful force for poverty reduction
- Decades of research suggests there is an inverse relationship (IR) between farm size and productivity, plot size and productivity
- This finding is based on self-reports of farm output
- LSMS-ISA experiment in Ethiopia demonstrates that:
 - Yields based on self-reported production (red) are systematically over estimated on small plots
 - The IR disappears based on crop cuts (blue)

A few concluding comments

- Next steps for total error?
 - Consider including sampling error as input to our poverty data base
 - Create typology of primary sources of nonsampling error
 - Where known, identify bounds of error by source
 - Where not known, consider data experiments to assess error
 - Once major sources identified and credible bounds on error for each, consider Monte Carlo exercise for first attempts at partially quantifying total error.

A few concluding comments

Why so much variation in national household surveys?

- NSOs collect household survey data for **national** poverty policies, not global poverty measurement.
 - Typically reflecting country context, some countries collect data on consumption, expenditure, and/or income
 - Level of economic development affects instrument design
 - Differing adjustments for adult-equivalence (and/or economies of scale)
- Some efforts to standardize
 - Some regional efforts to bring more uniformity of instrument
 - WB staff often 'teach' Deaton-Zaidi guidelines for consumption
 - PovcalNet requests data in per-capita terms
- Current interagency efforts to propose guidelines for household survey data collection
 - Cross disciplinary agreement on many issues

A few concluding comments

An exciting time for the global poverty work, Atkinson follow up

- Collaboration between research group, data group, poverty global practice, Living Standards Measurement Study and increased collaboration with other practices.
 - Experiments on water quality, soil quality, GPS, cell phone follow ups, drones, geo-spatial,
- Broadening portrayal of poverty, partly in response to Atkinson report
 - Income-class lines
 - Societal Poverty
 - Multi-dimensional poverty indices
 - Global reporting on poverty and household typologies (step 1)
- Total error
 - Current objective is to talk about bounds to our poverty estimates
 - Proposal that we view total error as less about estimating precision (or IEG for poverty estimation) and more about improving data quality

Thank you

Primary References

Ferreira, F. H. G., Chen, S., Dabalen, A., Dikhanov, Y., Hamadeh, N., Jolliffe, D., Narayan, A., Prydz, E., Revenga, A., Sangraula, P., Serajuddin, U., and N. Yoshida. 2015. "A global count of the extreme poor in 2012 : data issues, methodology and initial results." *Journal of Economic Inequality*, 2016, 14(2):141-172 (also PRWPS7432). doi: 10.1007/s10888-016-9326-6

Jolliffe, D., Lanjouw, P., Chen, S., Kraay, A., Meyer, C., Negre, M., Prydz, E., Vakis, R. and K. Wethli. *A Measured Approach to Ending Poverty and Boosting Shared Prosperity: Concepts, Data, and the Twin Goals*. Policy Research Report. Washington, DC: World Bank, 2014. doi:10.1596/978-1-4648-0361-1. <http://www.worldbank.org/AMeasuredApproach>

Jolliffe, D. and E.B. Prydz. "Reaching Global Poverty Goals: How Does Purchasing Power Parity matter?" World Bank Policy Research Working Paper series no. 7256, 2015. <http://documents.worldbank.org/curated/en/docsearch/document-type/620265>

Jolliffe, D. and E.B. Prydz. "Estimating International Poverty Lines from Comparable National Thresholds," *Journal of Economic Inequality*, 2016, 14(2): 185-98. (also PRWPS7606). doi: 10.1007/s10888-016-9327-5
<http://documents.worldbank.org/curated/en/2016/03/26083870/estimating-international-poverty-lines-comparable-national-thresholds>

Jolliffe, D. and E.B. Prydz. "Societal Poverty: A relative and relevant measure," mimeo.