Weakly Relative Poverty

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1. Revisiting the theory of relative poverty
2. Calibration to national poverty lines
3. New relative poverty measures
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1. Revisiting the theory of relative poverty

Poverty lines are set in radically different ways between rich and poor countries
Absolute poverty in the developing world...

• **At country level**: all developing countries use poverty lines that aim to have the same real value at different dates and places.

• **At the global level**, the World Bank’s widely-used “$1-a-day” line is absolute in that it aims to have the same purchasing power in different countries and at different dates.
..but relative poverty in the developed world

The more common practice in most OECD countries and Eurostat has been to set the poverty line as a constant proportion—typically 40-60%—of the (date and country-specific) mean or median income:

\[ Z_i = kM_i \quad (0 < k < 1) \]

We call this a strongly relative poverty line
Past arguments for strongly relative measures

1. **Welfarist justification** claims that people attach value to their income relative to the mean in a given society and that poverty lines should be interpreted as a **money metric of utility**. “Relative deprivation.”

2. **Non-welfarist** (“capabilities”) justification: poverty lines should allow for differences in the **cost of social inclusion,**
   - This can be defined as the expenditure needed to cover certain commodities assuring that a person can participate with dignity in customary social and economic activities.

3. **Data argument:** strongly relative measures are claimed to remove the effects of cross-country differences in survey methods and measurement practices.

*None of these arguments are compelling!*
Welfarist interpretation:
Disutility of relative deprivation

- Welfare depends on relative income:
  \( W = W(Y, Y / M) \)
  
  \((Y=\) own income; \( M = \) mean income)\

- The poverty line \((Z)\) is “absolute” in the welfare space, but “relative” in consumption space:
  \( W_Z = W(Z, Z / M) \)

- Inverting gives the poverty line as a function of the mean:
  \( Z = Z(M, U_Z) \quad \left( 0 < \frac{\partial \ln Z}{\partial \ln M} = \frac{1}{1 + M \cdot MRS} < 1 \right) \)

- Elasticity of the poverty line to mean is in [0,1] interval
- And the elasticity will not in general be constant.

⇒ **Strongly relative lines imply that people care only about relative income; no value on own income!**
Non-welfarist interpretation: Capabilities and the cost of social inclusion

• Amartya Sen has argued that “capabilities” should be seen as absolute; in the context of poverty measurement, this means that “…an absolute approach in the space of capabilities translates into a relative approach in the space of commodities”.

• Following Tony Atkinson and Francois Bourguignon we can think of poverty as having both absolute and relative aspects in the income space.
  – The former is a failure to attain basic consumption needs, with associated capabilities of being adequately nourished and clothed for meeting the physical needs of survival and normal activities.
  – On top of this, a person must also satisfy certain social needs, which depend crucially on the prevailing living standards in the place of residence.

• Atkinson-Bourguignon: To be non-poor one needs to be neither absolutely poor (“survival” capabilities) nor relatively poor (social inclusion capabilities).
It can be agreed that certain forms of consumption serve an important social role

- Adam Smith pointed to the social-inclusion role of a linen shirt in eighteenth century Europe:

  “A linen shirt, for example, is, strictly speaking, not a necessary of life. The Greeks and Romans lived, I suppose, very comfortably though they had no linen. But in the present times, through the greater part of Europe, a creditable day-labourer would be ashamed to appear in public without a linen shirt, the want of which would be supposed to denote that disgraceful degree of poverty which, it is presumed, nobody can well fall into without extreme bad conduct.”

- John Maynard Keynes argued that needs are both absolute and relative:

  “…the needs of human beings…fall into two classes—those needs which are absolute in the sense that we feel them whatever the situation of our fellow human beings may be, and those which are relative only in that their satisfaction lifts us above, makes us feel superior to, our fellows.”
Social roles of consumption

- Anthropologists have often noted the social roles played by festivals, celebrations, communal feasts, clothing.
- Seemingly high expenditures on celebrations and festivals by very poor people in survey data for a number of countries (Rao, Banerjee-Duflo).
- Clothing can also serve a social role; conspicuous “designer label,” which he interpreted as status-seeking behavior.
- Qat in Yemen “refusing to take qat is tantamount to accepting ostracisation” (Milanovic, 2008, p.684).
However, the social role of consumption does not imply strongly relative poverty lines

- The key assumption made by strongly relative measures is that the cost of inclusion is a constant proportion of mean income. That is hardly plausible.

- *The social-inclusion needs of very poor people may well be low, but why would they go to zero in the limit?*
  - Presumably a socially acceptable linen shirt would not have cost any less for the poorest person in eighteenth century Europe as for someone living at the poverty line.
  - Very poor people are highly constrained in spending on things that facilitate their social inclusion, but that does not mean that their inclusion needs are negligible.
Past arguments for strongly relative measures

1. **Welfarist justification** claims that people attach value to their income relative to the mean.

   But it is hardly plausible that people only care about relative position.

2. **Non-welfarist (“capabilities”) justification**: poverty lines allow for the cost of social inclusion.

   Nor is it plausible that the cost of social inclusion goes to zero in the limit. It must be bounded below.

3. **Data argument**: strongly relative measures are claimed to remove the effects of cross-country differences in survey methods and measurement practices.

   This only holds for distribution-neutral differences and if one accepts either or both justifications for strongly relative measures.
Our proposal:
The weak relativity axiom (WRA)

• **Weak relativity axiom:** *If all incomes increase (decrease) by the same proportion then the aggregate poverty measure must fall (rise).*

• In any standard (additive) poverty measure this will be satisfied as long as the elasticity of the poverty line to mean income is less than unity.

• Strongly relative measures do not satisfy WRA
  – Elasticity of $Z$ w.r.t. $M$ of unity.
  – If all incomes grow at the same rate (including for the poor) then measured poverty will not fall.
Restrictions needed to satisfy WRA

• **Proposition 1:** Welfarist poverty lines satisfy the WRA as long as both own income and relative income are valued positively.
  – The elasticity of the poverty line ($\eta$) will rise with the mean if the weight attached to relative income rises sufficiently.
  – More precisely, $\eta$ will be increasing in $M$ if (and only if) the elasticity of the MRS with respect to $M$ is less than -1.

• **Proposition 2:** Non-welfarist poverty lines satisfy the WRA as long as the cost of social inclusion has a positive lower bound.
Our proposed poverty lines satisfy WRA

- Atkinson and Bourguignon:
  \[ Z_{i}^{AB} = \max(Z^*, kM_i) \quad (0 < k < 1) \]

- Ravallion and Chen: a schedule of weakly relative lines:
  \[ Z = \max(Z^*, \alpha + kM_i) \]

- With this modification we can simultaneously:
  - satisfy WRA
  - allow for non-negligible costs of social inclusion for the poorest, and
  - allow the elasticity of \( Z \) to \( M \) to vary (low for poor countries; high for rich ones)
Weakly vs. strongly relative lines

Weakly relative (Ravallion-Chen)

Strongly relative (Atkinson-Bourguignon)

Social inclusion cost for poorest; e.g., Adam Smith’s linen shirt, which costs just as much for the poorest.
Welfarist interpretation

Our schedule of weakly relative lines has a welfarist interpretation in which the utility function takes the form:

\[ W(.) = Y \text{ if } M \leq M^* \equiv (Z^* - \alpha) / k \]
\[ = Y \left( 1 - \frac{k(M - M^*)}{Y} \right) \text{ if } M > M^* \]

- Concerns about relative deprivation only emerge when the mean is above a critical level; \( M > M^* \)
- Beyond that level, the utility from own consumption is discounted according to the degree of relative deprivation
- Mean utility of \((1 - k)M + kM^*\) for \( M > M^* \).
- The marginal disutility of relative deprivation rises with the mean once it is above the critical level.
Weakly relative poverty and distribution-neutral growth

\[
\frac{d \ln F_i(Z_i)}{dt} = \left[ 1 - \frac{d \ln Z_i}{d \ln M_i} \right] \frac{\partial \ln F_i(Z_i)}{\partial \ln M_i} \frac{d \ln M_i}{dt}
\]

Both tend to fall with growth
So rising relative poverty can come hand-in-hand with falling absolute poverty

• With distribution-neutral growth, the trend rate of reduction in relative poverty will tend to fall as absolute poverty falls.

• With population growth, after some point, it is possible for the numbers of relatively poor to be rising, while the numbers of absolutely poor are falling.
2. Calibration to national poverty lines
Calibrating global relative poverty lines to national lines

• Following Atkinson and Bourguignon, we calibrate our relative poverty lines to how national lines vary across countries.
  – Poverty lines are set by national authorities and WB for the purposes of measuring poverty in a specific country.
  – It would hardly be plausible that the national lines that emerge do not come to reflect prevailing views of what “poverty” means.

• Interpretation: Differences in real poverty lines between countries at different mean consumptions reflect differences in either:
  – the value attached to relative deprivation (following the welfarist model outlined above) or
  – differences in the costs of social inclusion needs (following the non-welfarist model).

• We make the further assumption that our global (weakly) relative poverty lines should change over time consistently with the cross-sectional variation seen between countries.
New data set of national poverty

World Bank Poverty Assessments + country Poverty-Reduction Strategy Papers + national poverty studies + Eurostat

![Graph showing poverty line and mean consumption at $ per person per day at 2005 purchasing power parity]
National poverty lines plotted against mean consumption; all countries available (n=95)
National poverty lines against mean consumption; developing countries only (n=75)

OLS elasticity = 0.66

$1.25 a day
Global relative poverty lines

\[ Z_i \equiv \max\{\$1.25, \ $0.60 + M_i / 3\} = \$0.60 + \max\{\$0.65, M_i / 3\} \]

Excellent fit with data on national lines
Goodness-of-fit with national lines

1. There is a high correlation with the non-parametric regression function in Figure (r=0.994) as well as with the data on national poverty lines (r=0.836).

2. Outperforms a wide range of smooth parametric functional forms.

<table>
<thead>
<tr>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Z_i = \alpha + \beta M_i + \varepsilon_i$</td>
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<tr>
<td>$Z_i = \alpha + \beta_1 M_i + \beta_1 M_i^2 + \varepsilon_i$</td>
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<tr>
<td>$Z_i = \alpha + \beta_1 \ln M_i + \beta_1 \ln M_i^2 + \varepsilon_i$</td>
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<tr>
<td>$\ln Z_i = \alpha + \beta_1 \ln M_i + \beta_1 \ln M_i^2 + \varepsilon_i$</td>
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</table>
Goodness-of-fit cont.,

3. Remarkably, the standard error in predicting the national lines is actually lower using our version of the AB lines than the nonparametric regression in Figure using default smoothing parameter.

4. Neither the fitted values from the nonparametric regression nor a cubic polynomial in $M$ were significant when added to a regression of the national poverty lines on our relative poverty line.

5. Econometric estimation using a constrained version of Hansen’s threshold model gives $1.23$ ($t=7.38$) and slope of $0.325$ ($t=12.70$).

Constrained version of Hansen’s threshold model:

\[
Z_i = \alpha_1 + \beta_1 M_i + \varepsilon_{1i} \quad (M_i < M^*)
\]
\[
Z_i = \alpha_2 + \beta_2 M_i + \varepsilon_{2i} \quad (M_i > M^*)
\]

s.t. $\beta_1 = 0; \quad \alpha_1 = \alpha_2 + \beta_2 M^*$
3. New poverty measures for the developing world
Continuing concerns about data

• Purchasing Power Parity rates
  – Here we use 2005 ICP; also “PPPs for the poor”

• Comparability of surveys over time and across countries
  – Differences in questionnaire design and definitions (consumption or income aggregates)

• Under-reporting and selective compliance
  – But not valid to replace survey means by national accounts aggregates, holding inequality (Lorenz curve) constant
  – The problems are unlikely to be distribution neutral

• Survey coverage has improved over time, but was weaker in the 1980s.
## Absolute poverty measures

<table>
<thead>
<tr>
<th></th>
<th>1981</th>
<th>1990</th>
<th>2005</th>
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<tbody>
<tr>
<td><strong>Percentage below poverty line</strong></td>
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<tr>
<td></td>
<td>51.9</td>
<td>41.7</td>
<td>25.2</td>
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<td>Of which:</td>
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<tr>
<td>East Asia and Pacific</td>
<td>77.7</td>
<td>54.7</td>
<td>16.8</td>
</tr>
<tr>
<td>Latin America</td>
<td>12.9</td>
<td>11.3</td>
<td>8.2</td>
</tr>
<tr>
<td>South Asia</td>
<td>59.4</td>
<td>51.7</td>
<td>40.3</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>53.4</td>
<td>57.6</td>
<td>50.9</td>
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</table>

| **Number of people below poverty line in millions** |       |       |       |
|                                                     | 1899.8| 1818.5| 1373.7|
| Of which:                                           |       |       |       |
| East Asia and Pacific                                | 1071.5| 873.3 | 316.2 |
| Latin America                                        | 47.1  | 49.6  | 45.3  |
| South Asia                                           | 548.3 | 579.2 | 595.6 |
| Sub-Saharan Africa                                   | 212.3 | 297.5 | 388.4 |
Absolute poverty has fallen whatever line is used.

1990 vs 2005: Dominance up to about $13 per day.
## Relative poverty measures

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<td>2320.0</td>
<td>2586.6</td>
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<td>709.5</td>
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<tr>
<td>Latin America</td>
<td>192.2</td>
<td>189.5</td>
<td>248.1</td>
</tr>
<tr>
<td>South Asia</td>
<td>568.6</td>
<td>660.4</td>
<td>932.5</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>234.5</td>
<td>320.1</td>
<td>424.2</td>
</tr>
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Absolute and relative poverty in the developing world

![Graph showing absolute and relative poverty in the developing world from 1980 to 2005. The x-axis represents years from 1980 to 2005, and the y-axis represents the headcount index (% below poverty line). Two distinct areas are marked: Weakly relative poverty and Absolute poverty.](image-url)
Numbers of absolutely poor and relatively poor

Number of poor (million)

1,200 1,400 1,600 1,800 2,000 2,200 2,400 2,600 2,800


- Red: Relatively poor
- Blue: Absolutely poor
Counts of absolutely poor by region
Counts of relatively poor by region

- East Asia and Pacific
- South Asia
- Sub-Saharan Africa
- Latin America

Population in relative poverty (millions)

Years: 1981 to 2005
4. Conclusions
Conclusions 1

- From a welfarist perspective, our weakly relative poverty lines place a natural upper bound on the weight attached to relative deprivation, namely that it cannot matter so much that measured poverty does not fall when all incomes increase by the same proportion.

- From a capabilities perspective, our approach relaxes the assumption that the cost of social inclusion is non-negligible for very poor people.
  - While we can agree with Adam Smith that a linen shirt was essential for not being poor in eighteenth century Europe, a socially adequate shirt would not cost any less to the poorest person than the richest.
  - Yet the prevailing method of measuring relative poverty essentially says that the cost of social inclusion can be negligibly small for the poorest people.
Conclusions 2

• A simple, data-consistent, schedule of relative poverty lines is shown to provide an excellent fit to data on national lines, but with an elasticity that rises from zero to unity, but never reaches unity.

• On implementing our weakly relative poverty lines using almost 700 surveys for 116 countries we find that
  – there is more relative poverty in the developing world than has been thought
  – the pace of progress against relative poverty over 1981-2005 is less encouraging than that against absolute poverty.

• We find that 47% of the population of the developing world lived in relative poverty in 2005, down from 53% in 1990 and 63% in 1981.

• This was not a sufficient rate of decline in the incidence of poverty to prevent a rise in the number of poor, in contrast to our absolute poverty measures that show falling poverty counts in the aggregate.
Conclusions 3

- With economic growth, the relative poverty line tends to rise, and proportionately more as average income rises.
- Both the direct impact on the poverty line and the effect on the responsiveness of the poverty rate to economic growth tend to bring down the trend rate of decline in relative poverty.
- High growth rates in East Asia were sufficient to bring down the number of relatively poor, despite the rising relative poverty line.
- That was not so in most other regions.

*Slower progress against relative poverty can thus be seen as the “other side of the coin” to success against absolute poverty.*