Multi-Dimensional Inequality: Measurement, Interpretation, Policy Issues

Stephan Klasen
University of Göttingen
Germany
December 1, 2009
Introduction

• Measurement issues:
  – Inequality also a multi-dimensional phenomenon (just as poverty);
  – Levels and trends much harder to interpret and compare;
  – Inequality-adjusted HDI
  – Can study pro-poor growth in income and non-income dimensions;

• Policy Issues:
  – What is happening to inequality?
  – What can we do about it?
  – Lessons from Latin America
  – Lessons for donors
Multidimensional inequality

• Well-being a multidimensional concept (e.g. Sen’s capability approach); income just a means to achieve desirable functioning and capabilities;
  – Of particular importance: Education, health, nutrition, social integration, employment, housing (plus political and social rights).

• Inequality in these dimensions considerable in many countries of the world.

• Distinction between inequalities due to ‘circumstance’ versus ‘effort’ (see equality of opportunity literature).

• Total equality in all dimensions not desirable or achievable, but less inequality in most countries surely desirable and achievable.
Why does it matter?

- Intrinsic: A question of justice;
- Instrumental: 4 reasons:
  - (Non-income) inequality undermines social and political stability;
  - Declining marginal valuation of non-income dimensions of well-being (?)
  - Affects development progress overall (declining marginal impact of resources on non-income achievements); plus lower initial inequality facilitates decline in ‘non-income’ poverty;
  - Income and non-income dimensions closely correlated with each other (and causally linked); example education and gender gaps in education.
Measurement Issues

• In principle: just extend methods from income inequality to non-income dimensions (including measures such as Gini coefficient, etc.);
• In practise: Possible but many issues to tackle: example of education:
  – Relevant measure (enrolments, schooling, knowledge, test scores);
  – Household versus individual approach;
  – Stickiness;
  – Upward bound;
  – 'Conditional' versus 'unconditional' inequality;
  – Aggregation issues.
\textit{Unconditional} Bolivia, 1989

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Mean</th>
<th>10:1</th>
<th>Gini</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean of deciles (unconditional), 1989</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>21.88</td>
<td>40.27</td>
<td>57.50</td>
<td>77.33</td>
<td>100.61</td>
<td>132.39</td>
<td>177.08</td>
<td>246.12</td>
<td>368.36</td>
<td>863.39</td>
<td>213.39</td>
<td>39.46</td>
<td>0.56</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average education</td>
<td>0.22</td>
<td>1.31</td>
<td>2.26</td>
<td>3.20</td>
<td>4.28</td>
<td>5.61</td>
<td>7.32</td>
<td>9.38</td>
<td>11.73</td>
<td>15.2</td>
<td>6.03</td>
<td>69.09</td>
<td>0.43</td>
</tr>
<tr>
<td>Average education of respondents</td>
<td>0.00</td>
<td>0.00</td>
<td>1.29</td>
<td>2.27</td>
<td>3.34</td>
<td>4.72</td>
<td>6.24</td>
<td>8.58</td>
<td>11.56</td>
<td>15.13</td>
<td>5.31</td>
<td>n.d.</td>
<td>0.51</td>
</tr>
<tr>
<td>Average education of respondents (20–30)</td>
<td>0.13</td>
<td>1.72</td>
<td>2.95</td>
<td>4.10</td>
<td>5.18</td>
<td>7.01</td>
<td>8.92</td>
<td>11.25</td>
<td>12.00</td>
<td>14.48</td>
<td>6.69</td>
<td>111.38</td>
<td>0.39</td>
</tr>
<tr>
<td>Average education of partners</td>
<td>0.00</td>
<td>1.35</td>
<td>2.83</td>
<td>4.13</td>
<td>5.30</td>
<td>6.52</td>
<td>8.57</td>
<td>11.35</td>
<td>12.70</td>
<td>16.77</td>
<td>6.95</td>
<td>n.d.</td>
<td>0.42</td>
</tr>
<tr>
<td>Maximum education</td>
<td>0.48</td>
<td>2.52</td>
<td>3.52</td>
<td>4.82</td>
<td>5.88</td>
<td>7.50</td>
<td>9.78</td>
<td>11.99</td>
<td>13.87</td>
<td>16.98</td>
<td>7.64</td>
<td>35.36</td>
<td>0.38</td>
</tr>
<tr>
<td>Maximum education of respondents</td>
<td>0.00</td>
<td>0.00</td>
<td>1.29</td>
<td>2.27</td>
<td>3.34</td>
<td>4.72</td>
<td>6.24</td>
<td>8.58</td>
<td>11.56</td>
<td>15.13</td>
<td>5.40</td>
<td>n.d.</td>
<td>0.51</td>
</tr>
<tr>
<td>Maximum education of respondents (20–30)</td>
<td>0.11</td>
<td>1.67</td>
<td>2.90</td>
<td>3.86</td>
<td>5.00</td>
<td>6.64</td>
<td>8.65</td>
<td>11.11</td>
<td>12.00</td>
<td>14.70</td>
<td>6.58</td>
<td>133.63</td>
<td>0.40</td>
</tr>
<tr>
<td>Maximum education of partners</td>
<td>0.00</td>
<td>1.37</td>
<td>2.85</td>
<td>4.25</td>
<td>5.40</td>
<td>6.75</td>
<td>8.88</td>
<td>11.64</td>
<td>12.84</td>
<td>16.89</td>
<td>7.09</td>
<td>n.d.</td>
<td>0.42</td>
</tr>
<tr>
<td>Individual education</td>
<td>0.00</td>
<td>0.28</td>
<td>1.91</td>
<td>3.09</td>
<td>4.50</td>
<td>5.62</td>
<td>7.50</td>
<td>0.24</td>
<td>2.06</td>
<td>16.10</td>
<td>6.09</td>
<td>n.d.</td>
<td>0.47</td>
</tr>
</tbody>
</table>
### Mean of deciles (unconditional), 1998

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Mean</th>
<th>10:1</th>
<th>Gini</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>36.37</td>
<td>63.30</td>
<td>89.26</td>
<td>119.22</td>
<td>155.89</td>
<td>203.15</td>
<td>269.64</td>
<td>369.20</td>
<td>555.27</td>
<td>1242.70</td>
<td>312.10</td>
<td>34.17</td>
<td>0.54</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average education</td>
<td>0.87</td>
<td>2.37</td>
<td>3.51</td>
<td>4.78</td>
<td>6.06</td>
<td>7.34</td>
<td>8.70</td>
<td>9.81</td>
<td>12.43</td>
<td>16.04</td>
<td>7.21</td>
<td>18.44</td>
<td>0.35</td>
</tr>
<tr>
<td>Average education of respondents</td>
<td>0.00</td>
<td>1.36</td>
<td>2.72</td>
<td>3.95</td>
<td>5.16</td>
<td>6.68</td>
<td>8.34</td>
<td>9.42</td>
<td>10.75</td>
<td>16.39</td>
<td>6.48</td>
<td>n.d.</td>
<td>0.41</td>
</tr>
<tr>
<td>Average education of respondents (20–30)</td>
<td>0.99</td>
<td>3.45</td>
<td>5.00</td>
<td>6.45</td>
<td>7.98</td>
<td>8.99</td>
<td>9.99</td>
<td>9.99</td>
<td>13.71</td>
<td>16.59</td>
<td>8.05</td>
<td>16.76</td>
<td>0.31</td>
</tr>
<tr>
<td>Average education of partners</td>
<td>0.54</td>
<td>2.23</td>
<td>3.85</td>
<td>5.13</td>
<td>7.51</td>
<td>8.58</td>
<td>9.50</td>
<td>10.00</td>
<td>14.23</td>
<td>17.04</td>
<td>7.86</td>
<td>11.59</td>
<td>0.36</td>
</tr>
<tr>
<td>Maximum education</td>
<td>1.47</td>
<td>3.48</td>
<td>4.87</td>
<td>6.44</td>
<td>8.23</td>
<td>9.01</td>
<td>10.00</td>
<td>10.71</td>
<td>15.76</td>
<td>17.04</td>
<td>8.74</td>
<td>11.60</td>
<td>0.31</td>
</tr>
<tr>
<td>Maximum education of respondents</td>
<td>0.00</td>
<td>1.36</td>
<td>2.72</td>
<td>3.95</td>
<td>5.16</td>
<td>6.68</td>
<td>8.34</td>
<td>9.42</td>
<td>10.75</td>
<td>16.39</td>
<td>6.58</td>
<td>n.d.</td>
<td>0.41</td>
</tr>
<tr>
<td>Maximum education of respondents (20–30)</td>
<td>0.89</td>
<td>3.00</td>
<td>4.45</td>
<td>5.35</td>
<td>7.08</td>
<td>8.40</td>
<td>9.28</td>
<td>10.00</td>
<td>12.70</td>
<td>16.46</td>
<td>7.82</td>
<td>18.49</td>
<td>0.32</td>
</tr>
<tr>
<td>Maximum education of partners</td>
<td>0.54</td>
<td>2.25</td>
<td>3.89</td>
<td>5.19</td>
<td>7.64</td>
<td>8.73</td>
<td>9.66</td>
<td>10.00</td>
<td>14.69</td>
<td>17.04</td>
<td>7.96</td>
<td>31.56</td>
<td>0.36</td>
</tr>
<tr>
<td>Individual education</td>
<td>0.15</td>
<td>1.73</td>
<td>3.22</td>
<td>4.63</td>
<td>4.63</td>
<td>7.97</td>
<td>9.11</td>
<td>10.00</td>
<td>12.63</td>
<td>16.91</td>
<td>7.24</td>
<td>111.76</td>
<td>0.38</td>
</tr>
</tbody>
</table>
### Conditional Bolivia, 1989

<table>
<thead>
<tr>
<th>Mean of the deciles (conditional), 1989</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Mean</th>
<th>10:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>21.88</td>
<td>40.27</td>
<td>57.50</td>
<td>77.33</td>
<td>100.61</td>
<td>132.39</td>
<td>177.08</td>
<td>246.12</td>
<td>368.36</td>
<td>863.39</td>
<td>213.39</td>
<td>39.46</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average education</td>
<td>3.04</td>
<td>3.48</td>
<td>4.11</td>
<td>4.47</td>
<td>5.54</td>
<td>6.07</td>
<td>6.99</td>
<td>7.94</td>
<td>9.37</td>
<td>11.47</td>
<td>6.03</td>
<td>3.77</td>
</tr>
<tr>
<td>Average education of respondents</td>
<td>2.20</td>
<td>2.93</td>
<td>3.25</td>
<td>3.75</td>
<td>4.69</td>
<td>5.41</td>
<td>6.34</td>
<td>7.19</td>
<td>8.70</td>
<td>10.68</td>
<td>5.51</td>
<td>4.85</td>
</tr>
<tr>
<td>Average education of respondents (20–30)</td>
<td>3.30</td>
<td>4.62</td>
<td>5.20</td>
<td>5.91</td>
<td>6.78</td>
<td>8.06</td>
<td>8.32</td>
<td>8.84</td>
<td>9.24</td>
<td>10.47</td>
<td>6.69</td>
<td>3.17</td>
</tr>
<tr>
<td>Average education of partners</td>
<td>3.88</td>
<td>4.03</td>
<td>4.96</td>
<td>5.20</td>
<td>6.40</td>
<td>6.73</td>
<td>7.65</td>
<td>8.68</td>
<td>10.04</td>
<td>12.26</td>
<td>6.98</td>
<td>3.16</td>
</tr>
<tr>
<td>Maximum education</td>
<td>4.41</td>
<td>4.77</td>
<td>5.52</td>
<td>5.91</td>
<td>7.08</td>
<td>7.75</td>
<td>8.70</td>
<td>9.73</td>
<td>11.23</td>
<td>13.29</td>
<td>7.64</td>
<td>3.00</td>
</tr>
<tr>
<td>Maximum education of respondents</td>
<td>2.20</td>
<td>2.93</td>
<td>3.25</td>
<td>3.75</td>
<td>4.69</td>
<td>5.41</td>
<td>6.34</td>
<td>7.19</td>
<td>8.70</td>
<td>10.68</td>
<td>5.63</td>
<td>4.85</td>
</tr>
<tr>
<td>Maximum education of respondents (20–30)</td>
<td>3.19</td>
<td>4.50</td>
<td>4.83</td>
<td>5.72</td>
<td>6.55</td>
<td>7.52</td>
<td>8.48</td>
<td>8.16</td>
<td>9.53</td>
<td>10.82</td>
<td>6.58</td>
<td>3.39</td>
</tr>
<tr>
<td>Maximum education of partners</td>
<td>4.00</td>
<td>4.10</td>
<td>5.02</td>
<td>5.31</td>
<td>6.52</td>
<td>6.91</td>
<td>7.84</td>
<td>8.85</td>
<td>10.18</td>
<td>12.40</td>
<td>7.11</td>
<td>3.10</td>
</tr>
</tbody>
</table>
Same country, different worlds—a human development index by income group

Source: Grimm and others 2006.
## Quintile specific HDI by country

(*L^Q* computed using asset index)

<table>
<thead>
<tr>
<th>Country</th>
<th>Q = 1</th>
<th>Q = 2</th>
<th>Q = 3</th>
<th>Q = 4</th>
<th>Q = 5</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burkina Faso (2003/2003)</td>
<td>0.257</td>
<td>0.306</td>
<td>0.331</td>
<td>0.365</td>
<td>0.489</td>
<td>0.348</td>
</tr>
<tr>
<td>Bolivia (2002/2003)</td>
<td>0.550</td>
<td>0.640</td>
<td>0.704</td>
<td>0.741</td>
<td>0.863</td>
<td>0.690</td>
</tr>
<tr>
<td>Côte d’Ivoire (1998/1999)</td>
<td>0.343</td>
<td>0.416</td>
<td>0.434</td>
<td>0.515</td>
<td>0.561</td>
<td>0.430</td>
</tr>
<tr>
<td>Cameroon (2001/2004)</td>
<td>0.417</td>
<td>0.477</td>
<td>0.529</td>
<td>0.553</td>
<td>0.644</td>
<td>0.523</td>
</tr>
<tr>
<td>Colombia (2003/2005)</td>
<td>0.673</td>
<td>0.741</td>
<td>0.800</td>
<td>0.857</td>
<td>0.927</td>
<td>0.790</td>
</tr>
<tr>
<td>Guinea (1995/1999)</td>
<td>0.340</td>
<td>0.457</td>
<td>0.490</td>
<td>0.594</td>
<td>0.696</td>
<td>0.467</td>
</tr>
<tr>
<td>Indonesia (2000/2003)</td>
<td>0.593</td>
<td>0.651</td>
<td>0.700</td>
<td>0.764</td>
<td>0.874</td>
<td>0.701</td>
</tr>
<tr>
<td>Madagascar (2001/1997)</td>
<td>0.343</td>
<td>0.463</td>
<td>0.496</td>
<td>0.563</td>
<td>0.684</td>
<td>0.488</td>
</tr>
<tr>
<td>Mozambique (2002/2003)</td>
<td>0.305</td>
<td>0.355</td>
<td>0.380</td>
<td>0.417</td>
<td>0.504</td>
<td>0.387</td>
</tr>
<tr>
<td>Nicaragua (2001/2001)</td>
<td>0.531</td>
<td>0.629</td>
<td>0.678</td>
<td>0.720</td>
<td>0.830</td>
<td>0.667</td>
</tr>
<tr>
<td>South Africa (2000/1998)</td>
<td>0.627</td>
<td>0.680</td>
<td>0.718</td>
<td>0.765</td>
<td>0.828</td>
<td>0.713</td>
</tr>
<tr>
<td>Vietnam (2004/2002)</td>
<td>0.561</td>
<td>0.640</td>
<td>0.700</td>
<td>0.743</td>
<td>0.879</td>
<td>0.691</td>
</tr>
<tr>
<td>Zambia (2002/2002)</td>
<td>0.317</td>
<td>0.390</td>
<td>0.431</td>
<td>0.476</td>
<td>0.583</td>
<td>0.426</td>
</tr>
</tbody>
</table>

USA (2000)                0.837 | 0.893 | 0.927 | 0.957 | 1.011 | 0.940
Finland (2000)             0.870 | 0.897 | 0.919 | 0.944 | 0.989 | 0.930
Inequality in Human Development

• HDR 2010 concerned with issue of inequality in human development:
  – Reform of GDI and GEM measures;
  – Multidimensional poverty index;
  – Inequality in human development:
    • HDI at the household level (Harttgen and Klasen)
    • Inequality adjusted HDI at low levels of aggregation (Foster, Szeleky, et al.)
  – How to interpret ‚lower‘ inequality in non-income dimensions?
PPG in Non-Income Dimensions

• Study distributional pattern of improvements in non-income dimensions;
• Can use and interpret ‘growth incidence curves’ (NIGIC)
• Possible at individual and household level;
• Absolute versus relative improvements;
• Conditional versus unconditional NIGICs; Relation to incidence analysis.
• Care needed when interpreting results: example education.
• See also UNESCO (2008, 2009) for further results.
Income, Bolivia 1989-1998

Graph showing the annual growth rate and absolute change in income for different percentiles in Bolivia from 1989 to 1998.
NIGIC Education,
Burkina Faso 1994-2003
Some interim conclusions

• Inequality not only an issue of income but also visible in non-income dimensions;
• Levels and trends in non-income inequality require careful interpretation;
• Can study human development and pro-poor growth in non-income dimensions;
• Complements traditional expenditure incidence analysis;
Policy Issues

• What are trends in income inequality?
  – After much stability increasing inequality in most countries since 1980s;
  – Heavily affected by transition countries and some rapidly growing developing countries (China, India, Vietnam, Uganda, etc.);
  – Significant negative welfare and poverty consequences;
  – Threats to social stability and further economic growth;
  – But recent trend of declining inequality in Latin America;
  – Significant decline in inequality since mid-1990s.

• Non-income inequality? Hard to tell at present. Know a bit about trends in global inequality in non-income dimensions.
Gini coefficients for China, India, Brazil
The Welfare Consequences of Inequality Changes:

Sen Index: $S = y (1 - G)$
The poverty consequences of inequality changes
Why diverging trends?

• China: shift to urban-based, export-oriented growth pattern; rural, Western economy is falling relatively behind;
• India: pro-rich pattern of growth; unequal distribution of human capital and public services; large gender gaps in education and employment;
• Brazil: Rising inequality associated with anti-poor effects of inflation, high and rising skill premia, educational inequalities, shrinking state.
• Brazil managed same poverty reduction as India despite much lower economic growth!
Decline in Inequality in LAC

• Broad-based decline in income inequality;

Source: CEDLAS
Declining relative inequality in education
Rising absolute inequality in education
Declining primary enrolment inequality
Rising tertiary enrolment inequality
Factors that contribute to Declining Inequality: Case of Brazil

• Macro stability (defeat of inflation, competitive exchange rates);
• Positive terms of trade and business cycle effects (labor market linkages);
• Reductions in educational inequality (promotion of mass education and educational quality);
• Increase in tax/GDP ratios (increases scope for pro-poor expenditures)
• Rising pro-poor social expenditures: particularly expansion of conditional cash transfer programs (improve both distribution as well as education/health of the poor);
What can donors do?

• Reducing inequality critical to promote overall development; Important element in any poverty reduction strategy; Inequality reduction feasible!
• Monitor non-income inequality (levels and trends);
• Include inequality issues in country dialogue and technical work;
• Promote/support policies to reduce non-income inequality:
  – Education and health policies focusing on the disadvantaged;
  – Promote female education and economic empowerment;
  – Redistributive tax and expenditure policies;
  – Pro-poor safety net programs (non-contributory social pensions, public works, conditional cash transfer programs, microcredit and microinsurance);
Economic growth and poverty reduction: measurement and policy issues

Stephan Klasen
Professor, University of Göttingen

Draft version, for comments

DAC Network on Poverty Reduction, OECD, 4-5 November 2004
1) Objectives of the paper

2) Measuring Pro Poor Growth (income dimension)

3) Measuring Pro Poor Growth in Non-Income Dimensions

4) Policies and PPG: Focus on Agriculture, Infrastructure and Private Sector Development

5) Open Questions
1. Objectives

- Synthesize and structuring the debate on measuring PPG in the income dimension

- Adding a new element: The Non-Income Dimension of PPG

- Summarize/suggest necessary policy shifts in the three key areas of the POVNET to achieve PPG
2) Measures of Pro-Poor Growth

Pro-Poor Growth

Income Dimension

Non Income Dimension

Relative:
\[ \delta Y_p > \delta Y_a \]

Absolute

Gender

Education

Health

Weak Absolute:
\[ \delta Y_p > 0 \]

Strong Absolute:
\[ \delta Y_p($) > \delta Y_a($) \]
Measuring PPG (income dimension)

• Relative growth versus absolute growth
• Underlying question: relationship/trade-off (?) between growth and inequality
• Suggestion: split discussion
  • Was growth biased towards the poor? relative growth
  • How much income growth for the poor? absolute growth
Absolute Change and Growth of Unconditional NIGIC for Average Education versus Absolute Change in Income
3. Measuring PPG (non-income dimension)

• PPG debate only on income dimension so far (OOPG studies) leading to several problems:
  • Neglect multidimensionality of poverty
  • Not in line with spirit of MDGs
  • Neglects gender differentials
  • Monitoring of MDGs only focused on average achievements, need to track distribution
  • Tools for monitoring available to track changes in distribution e.g. Growth Incidence Curves for Education
  • Can see linkages between PPG in income and non-income dimensions.
Lessons learned

- Extending analysis to non-income dimensions is highly useful for the formulation of pro poor policies.
- Instrument can be used for monitoring (esp. MDG 2-6) and better targeting.
- Linkages between income poverty and poor non-income achievements can be analysed and acted upon at every point in the distribution.
- PPG in non-income dimension likely to differ greatly across countries.
4) Policies and PPG: Focus on the three key areas of POVNET

• General:
  • Direct and indirect ways of promoting PPG
  • Focus on improving the environment of poor producers
  • Active policies (technology transfer, R@D investments,..)
  • Role of social funds and pro poor decentralization

• Agriculture
  • Policies should aim to improve productivity
  • Investment R@D, rural infrastructure, financial markets
  • Reduction of transaction costs for the poor
Policies and PPG: Focus on the three key areas of POVNET

• Private Sector Development
  • Rather overall approach than sector strategy
  • Focus on investment climate for poor producers
  • Ensure functioning of markets
  • Setting up innovative social security systems (e.g. credit and insurance markets)

• Infrastructure
  • From supply to demand driven policy agendas
  • Raising productivity via infrastructure investment
  • Careful analysis of what is needed in a particular context (e.g. roads, electricity, ...)
