Assessing the distribution of impacts in global benefit-cost analysis

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Outline

• BCA
  — Separates analysis of efficiency & equity
  — Rationale

• Descriptive analysis of distributional effects
  — Over what domain (population characteristics)?
  — Of what outcome?

• Social welfare functions
  — Integrate efficiency & equity
  — Can approximate evaluation of policy with weighted BCA
Benefit-cost analysis

• Social net benefit = sum over population of net benefits to individuals
• Individual net benefit = monetary value to individual of all the consequences of the policy
  — If population sum > 0, individuals with positive net benefits could (in principle) compensate individuals with negative net benefits, so that everyone would have positive net benefits
    o Kaldor-Hicks compensation test
• Conventional BCA may not permit distributional analysis
  — Benefits and costs often estimated
    o Independently, as population totals
    o Cannot correlate individual benefits with costs
  — Transfer payments often not included
    o Not necessary to calculate population net benefits
    o Can be important for distribution
Rationale for separating efficiency & equity

• Efficiency: increase the size of the “social welfare pie”
  — In principle, everyone can have a bigger piece
• If distribution of resources or well-being is non-optimal, it can (presumably) be improved at lower cost by directed transfers than by reducing efficiency of other policies
  — Tax & transfer policies
Distributional analysis: over what domain?

- Need to identify population characteristics of concern
  - Income, wealth, poverty
  - Race, ethnicity, primary language
  - Gender
  - Age
  - Social class, occupation, education
  - Others

- Could have multidimensional domain
  - Race x income x region
Distributional analysis: of what?

- Distribution of net benefits is more relevant than separate distributions of benefits & of costs
  - Unequal or regressive distribution of costs may be fine if distribution of benefits is parallel
- Often easier to estimate distribution of benefits than of costs
  - Benefits: beneficiaries may be targeted or correlated with population characteristics
    - Specified health condition, location
    - If monetary value of benefit differs by subgroup, need to use appropriate valuation
  - Costs: if costs take the form of increased costs to firms, these are ultimately passed on to: firm owners, workers (lower wages or lower employment), customers (higher prices)
    - Incidence of costs may be difficult to trace
Describing distributional effects: curves & inequality metrics

- Multiple graphs and indices can be used to summarize distribution of net benefits (or other outcome)
- Table
- Lorenz curve & Gini index
  - Distribution of single attribute, often income
- Concentration curve & concentration index
  - Distribution of attribute against living standards (or other population characteristic)
Table 3.1. Distribution of Net Benefits (stylized example; numbers provided solely for illustration)

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Deaths Averted</th>
<th>Benefits (value of deaths averted)</th>
<th>Costs</th>
<th>Net benefits (benefits minus costs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 – $500</td>
<td>10</td>
<td>$600,000</td>
<td>$100,000</td>
<td>$500,000</td>
</tr>
<tr>
<td>$500-$1,000</td>
<td>5</td>
<td>$310,000</td>
<td>$50,000</td>
<td>$260,000</td>
</tr>
<tr>
<td>etc.</td>
<td>etc.</td>
<td>etc.</td>
<td>etc.</td>
<td>etc.</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lorenz curve & Gini index

- Gini index = \( \frac{A}{A + B} \)
  = \( \frac{1}{2} - B \)
  (if axes are scaled 0 to 1)
  - Perfect equality = 0
  - Maximum inequality = 1
Concentration curve

Concentration index

\[ \text{Concentration index} = \frac{1}{2} - \text{area under curve} \]

(if axes are scaled 0 to 1)

- Perfect equality = 0
- Maximum concentration on rich = 1
- Maximum concentration on poor = -1
Social welfare functions

- Requires an interpersonally comparable measure of wellbeing (and changes in wellbeing): $w_i$
- Social welfare is a function of the wellbeing of each person in the population
- Utilitarian: $W^U = \sum_{i=1}^{n} w_i$
  - If wellbeing is a concave function of income (diminishing marginal utility of income) then utilitarian SWF gives priority to poor over rich
- Prioritarian: $W^P = \sum_{i=1}^{n} g(w_i)$
  - $g(\cdot)$ is an increasing, concave function (steeper for small $w$ than for large $w$)
  - Gives priority to people at low wellbeing
- Evaluation by SWF can be approximated by weighted BCA
  - Weight net benefits more for poor over rich, low wellbeing over high
Prioritarian transformation function

\[ g(w_H) + \Delta w \]

\[ g(w_H) \]

\[ g(w_L + \Delta w) \]

\[ g(w_L) \]

Well-being, \( w \)

\( w_L \)

\( w_L + \Delta w \)

\( w_H \)

\( w_H + \Delta w \)