



# Summer School on Capability and Multidimensional Poverty

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New Delhi, India

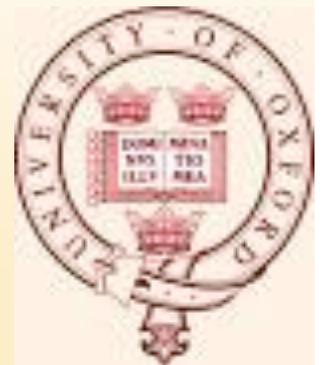


## HDCP-IRC

The Human Development, Capability  
and International Research Centre  
Istituto Universitario di Studi Superiori  
[www.iusspavia.it](http://www.iusspavia.it)

## OPHI

Oxford Poverty & Human  
Development Initiative  
University of Oxford  
[www.ophi.org.uk](http://www.ophi.org.uk)



# Weights in Multidimensional Measures

Sabina Alkire (OPHI)

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# Outline

1. Where are weights applied?
2. Setting Weights: Rationales
3. How are explicit weights set?
  1. Statistical Weights
    1. Frequency weights
    2. Most favourable weights
    3. Multivariate statistical techniques
    4. Regression-based weights
  2. Normative Weights
    1. Equal weights
    2. Expert Opinion
    3. Participation and Public Deliberation
    4. Survey based – subjective
    5. Survey based – necessities

In evaluating this summerschool how do we weight expansions in:

1. Understanding of each of 16 lecture topics
2. Understanding of Capability Approach
3. Completion of paper & stata exercises (each)
4. Collegial Relationships (social capital)
5. Ability to complete your own research
6. Understanding of Indian poverty
7. Future earning potential across 20 years
8. Your satisfaction with life as a whole

# Where do weights enter MD poverty measures?

- Number and kind of indicators (if equally weighted)
- Transformation functions for variables (ranking, z-scores, shortfall, log)
- Degree of substitution among dimensions
- Direct weights set on dimensions
  
- Poverty Measure = Aggregation of
  - weight of each dimension, applied to
  - transformed variable, corrected for
  - substitutability

A very general functional form:

$$I(X|\beta) = \frac{[w_1 I_1(x_1)^\beta + \dots + w_q I_q(x_q)^\beta]^{1/\beta}}{w_1 + \dots + w_q}$$

$I(X | \beta)$  = Individual well-being index

$I_j (x_j)$  = transformed achievement

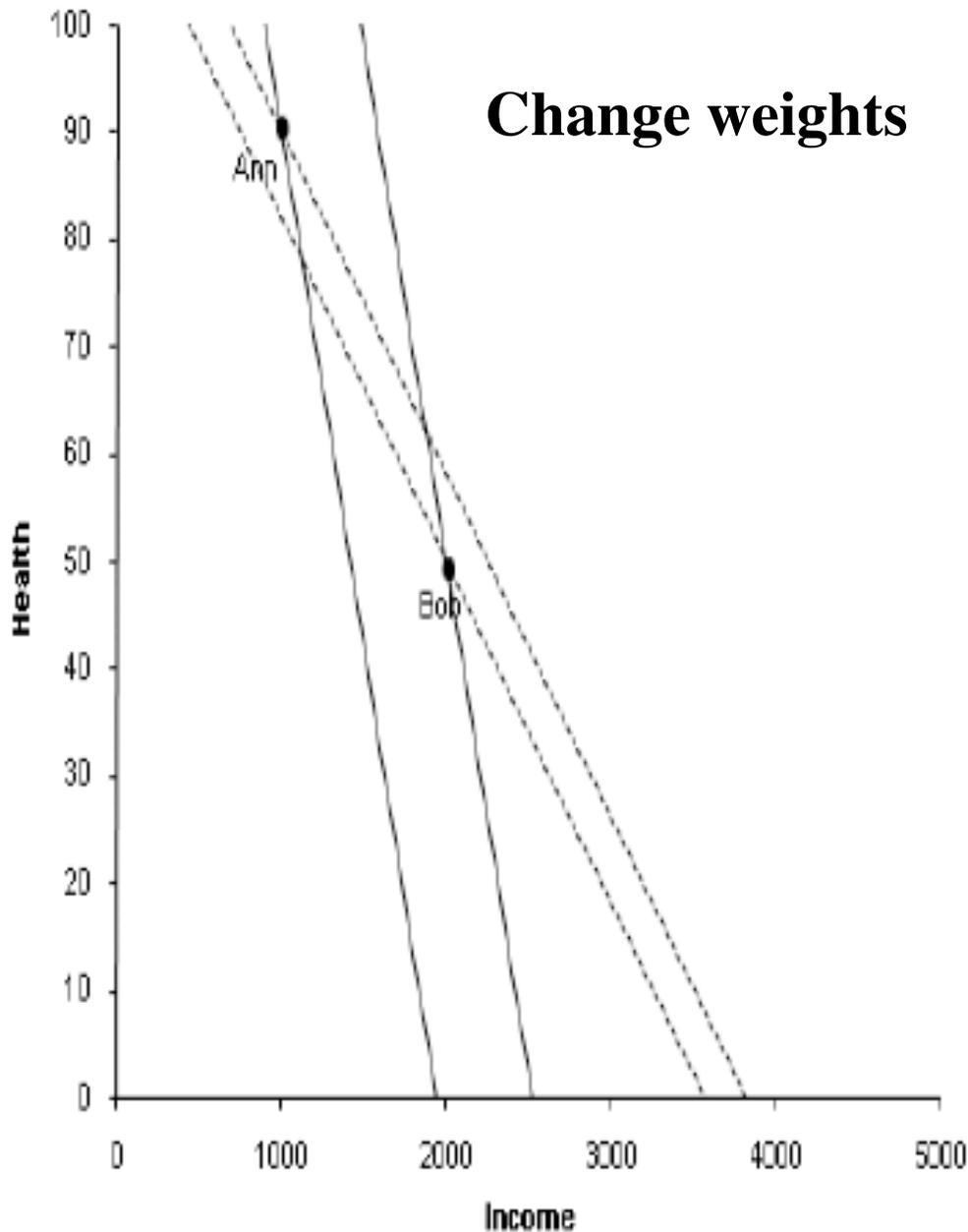
$\beta$  = degree of substitutability (parameter)

$\beta = 1/(1-\sigma)$  where  $\sigma$  = elasticity of subs.

$w$  = explicit weights for each dimension

# A simple comparison (?)

- Two people, Ann and Bob.
- Ann has life expectancy of 90 years
- Bob has life expectancy of 50 years
- Ann has \$1000
- Bob has \$2000
  
- Who is better off? [poverty parallel]



Perfect substitution  $\beta=1$   
 Rescale by median:  $x_j / Me_j$   
 Median income = \$2,500  
 Median health = 80 years

**Start with Equal weights**  
**Who is better off?**

**Change explicit weights:**

$w_i = 0.75$  and  $w_h = 0.25$

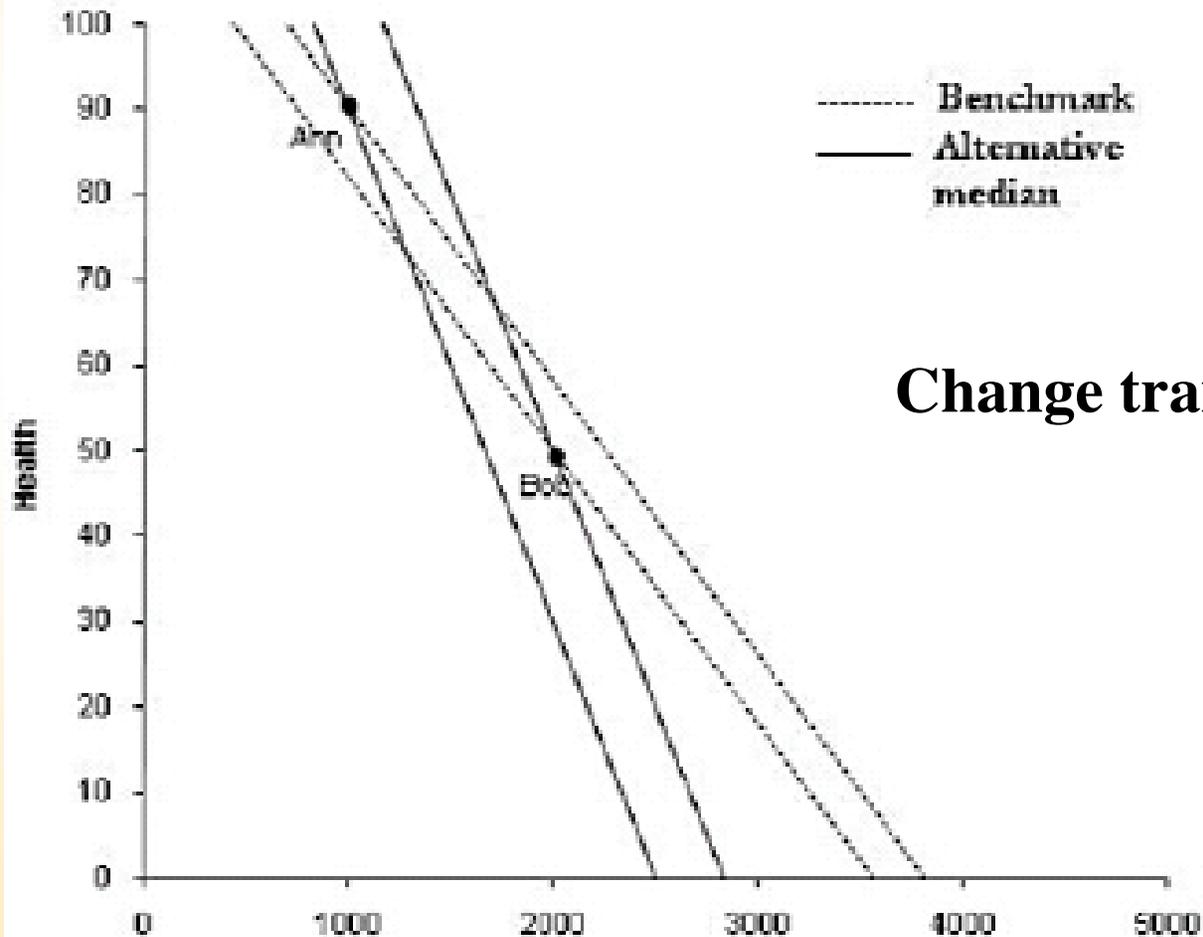
$I_j(x_j) = x_j$

$Me_j = 1$

**Who is better off now?**

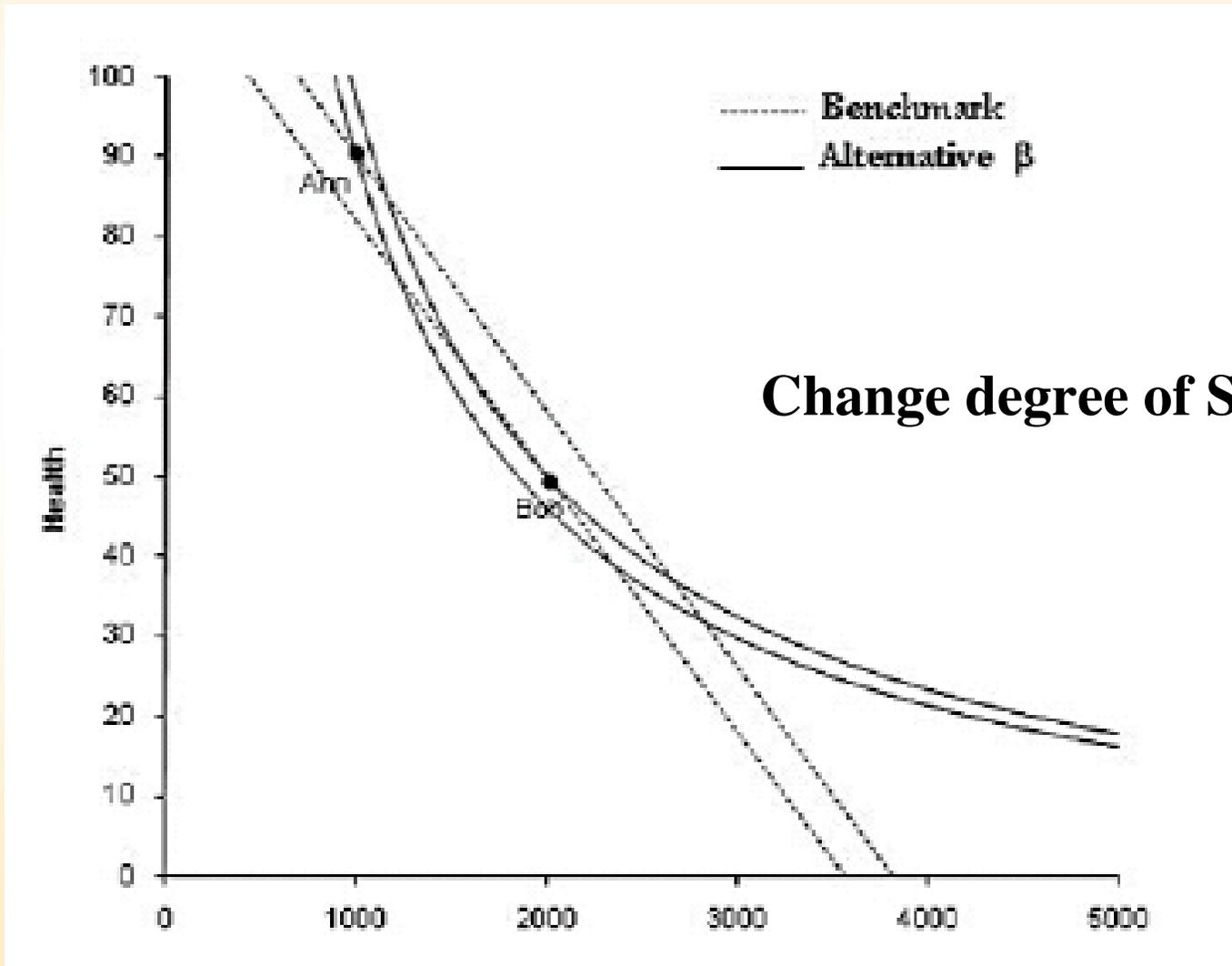
$I_{Ann} = 0.56 < I_{Bob} = 0.76$

# What happens if the median income changes (rescale/different transformation)?



**Change transformation**

What happens if we change  $\beta = 0.1$ ?



**Change degree of Substitutability**

Conclusion: *several* decisions affect weighting, not just explicit weights

- Weights are clearly very important
- However weights are affected by other factors than explicit weights:
  - Number of variables
  - Content of variables
  - Transformation of variables
  - Assumptions regarding Substitutability
  - Kind of data

# Where are weights applied in MD poverty measures?

- *Within* Dimensions
  - E.g. Asset index
  - Education variables in HDI
  - Standard of living variables in HPI
- *Between* Dimensions
  - Across 3 dimensions in HDI/HPI
  - Across Unmet Basic Needs
- *Blended* Approach

# Where are weights set in MD poverty measures?

- **Blended approach:** when variables for one dimension are not aggregated separately, but are directly incorporated into a MD poverty measure, but with lower weights, which may or may not be equal. Example: use ‘nested’ weights.
  - 4 dimensions (empowerment E, assets A, nutrition N, schooling S).
  - E, N, S measured by one indicator each
  - Assets: 8 dichotomous indicators, each weighted =1y
  - Weighting: .25, .25, .25. .(25/8, .25/8...)

# Setting Weights – Rationale(s)

- Statistical – by far the most common
  - Different techniques, eg
    - Data-driven
    - Regression-based
- Normative
  - Different reasons, eg
    - Importance
    - Priority

Weights *between* dimensions, for a poverty measure based on capabilities, must be *normative* rather than statistical.

Weights *within* dimensions might be normative or statistical.

We focus here on normative weights. Why? Less common.

Setting weights: The need for *clarity* on the selection of the *procedure* for setting weights. How and why did you set weights?

“Since any choice of weights should be open to questioning and debating in public discussions, it is crucial that the judgments that are implicit in such weighting be made as clear and comprehensible as possible and thus be open to public scrutiny” (Anand and Sen 1997 p. 6)

# Setting weights: Normative

# A note on language – arbitrary

**Normative weights are often called ‘arbitrary’ -?**

**Arbitrary:** “To be decided by one's liking; dependent upon will or pleasure; at the discretion or option of any one.”

“Derived from mere opinion or preference; not based on the nature of things; *hence*, capricious, uncertain, varying;”

“Unrestrained in the exercise of will; of uncontrolled power or authority, absolute; *hence*, despotic, tyrannical.”

*Oxford English Dictionary, 3<sup>rd</sup> Edition.*

# Equal weights

- Most commonly used approach: HDI theory
- Sometimes is called ‘non-weighting’
- But **this is not accurate**
- Equal weights represent value judgements
- Example:
- BMI, years of school (0.5)
- BMI, yrs school, caloric intake, anaemia, (0.25)
- Weight on BMI?
- Weight on health vs ed?

# Weights and Choice of Dimension

- Choice of dimensions & weights may both be value judgements
- choices are interlinked
- could choose dimensions to be equal in importance
  - e.g. Atkinson (2002): “the interpretation of the set of indicators is greatly eased where the individual components have degrees of importance that, while not necessarily exactly equal, are not grossly different”
- this is particularly relevant when the **same exercise** might address the choice of dimensions and of weights – eg expert opinion, participatory exercises

## Sen: Normative Weights are Value Judgements

***Kinds of value judgements*** required to set weights vary depending on the evaluative exercise.

**Importance:** Absolute importance of a dimension for poverty (national poverty measure across time)

**Priority:** Urgency of making progress in a dimension at a given time (3-year plan)

**Context-specific:** Importance and priority of dimensions in a particular context, which is shaped by the reach and mandate and reporting requirements of the institutions involved (ministry of health, participatory milk cooperative, budget allocations, relevant variables to choose from a given dataset).

## Example: Priority

“For example, the ability to be well nourished cannot in general be put invariably above or below the ability to be well sheltered, so that the tiniest improvement of one will always count as more important than a large change in the other. We may have to give priority to the ability to be well nourished when people are dying of hunger in their homes, whereas the freedom to be sheltered may rightly receive more weight when people are in general well fed, but lack shelter.” (Sen 2004, p.78 – *Feminist Econ.*)

## Example: Importance

In some situations, such as the development of a long term multidimensional poverty measure to replace an income poverty line, the weights should reflect the *importance* of each dimension relative to the other dimensions

- Long term poverty measure
- Comparative

# Need to Justify rationale: 1) normative; 2) priority or importance

## Priority

- Time-specific
- M&E
- Institutional powers
- Planning exercises

## Importance

- Long term
- More
- Comparative

# How should either weights be set (conceptually)?

- What individual does
- What groups do
- What researchers do
- What publication feedback does

## **Sen: Criteria for setting normative weights (theory)**

It is thus crucial to ask, in any evaluative exercise... how the weights are to be selected. This judgmental exercise can be resolved only through reasoned evaluation. **For a given person** who is making his or her own judgments, the selection of weights will require **reflection** rather than interpersonal agreement or a consensus. However, in arriving at an agreed range **for social evaluations** (e.g. in social studies of poverty), there has to be some kind of a **reasoned consensus** on weights or at least on a range of weights. This is a social exercise and requires public discussion and a democratic understanding and acceptance (Sen, 1996, p. 397).

- **So individual reflects** on life; **social** requires reasoned consensus among people with different values.
- - **so are informed by ‘prevailing values’**

“In the case of functionings and capabilities, since there are no markets directly involved, the weighting exercise has to be done in terms of explicit valuations, **drawing on the prevailing values in a given society.**”

- **Open to critical scrutiny**

It is not so much a question of holding a referendum on the values to be used, but the need to make sure that the weights – or ranges of weights – used remain open to criticism and chastisement, and nevertheless enjoy reasonable public acceptance. **Openness to critical scrutiny**, combined with—explicit or tacit—public consent, is a central requirement of non-arbitrariness of valuation in a democratic society.  
(Sen 1997: 206)

## Aggregation & Range

Disagreement is likely to be durable ~ but dominance and intersection approaches can be used with a **range** of weights.

“There is no need here for different people, making their respective judgments, to agree on the same list, or on the same weight for the different items; we are individually free to use reason as we see fit. A framework for the analysis of well-being is just that – not a complete solution of all evaluation problems, nor a procedure for interpersonal agreement on relevant judgments.”

**But who will bell the cat?**

**How set weights *in practice*???**



**Expert Opinion?  
Survey Methods?**

**Participatory Methods?  
Combination?**

# Expert Opinion

Expert opinion has been used to:

- Set priorities in health care
- Devise lists of capabilities, needs and rights.
- Adjust weights of the HDI (Chowdhury and Squire, 2006).

Advantages:

- relatively quick and cheap
- experts grasp complex ideas easily and respond appropriately
- experts to have extensive relevant knowledge

## **Process:**

**1. Select Experts** (number, competence, uncertainty)

**2. Select Choice Procedures**

- E.g. Voting or external aggregation procedure
- Consensus building through discussion, reasonable argument and deliberation

**3. Challenges**

Expertise on *values* of people

How assess expertise vs own views

### **3. Challenges, cont'd**

Tension: experts vs democracy

How revise expert weights?

How often revis expert weights?

Clarifying 'expertise' is political (the experts well placed to comment on local value judgments or needs – NGO staff, facilitators, judges – may not be those considered 'experts' in academia or development.

Empirical comparisons (Ch & Sq – no difference)

# Participatory Approaches

Participatory approaches encourage local people to analyse their own situation, identify priorities, set budgets, develop strategies to further their goals and monitor progress – often with external administrative, technical or financial support.

Eg: Participatory budgeting in Porto Alegre, Brazil – gives rise to *rankings*

- Participatory budgeting involves three parallel streams of meetings:
  - neighborhood assemblies,
  - “thematic” assemblies,
  - meetings of delegates citywide coordinating sessions.
  - meetings continue throughout the year.
- The first stream discusses fund allocations among districts or neighborhoods of the city for the usual departmental responsibilities, such as water supply and sewage, street paving, parks, and schools.
- The district-based meetings begin with 16 “great assemblies” in public places, including union centers, gyms, churches, clubs, and even a circus tent.

- The government presents its investment plan
- This opens a debate for nine months.
- Each district gives two sets of rankings,
  - one set for requirements *within* the district (such as pavement, school construction, or water lines), and
  - the other set for efforts which affect the *whole city* (such as cleaning up the beaches).
- A public debate decides the *criteria* for allocating investment budget among districts – eg. population, an index of poverty, a measure of shortages (such as a lack of pavement or the lack of a school), etc.

End result: an annual ranking involving 40,000 people.

- What kind of value judgement is this?
- Who is included?
- Is there active sharing of information?
- Is there an exchange of reasons?
- Is it transparent?
  
- Question: how do you *use* the rankings.

# “Que dicen los pobres”

- Voices of the poor, in Mexico
- 3,000 “poor” people (adults) engaged in participatory processes.
- Groups were asked to **name and rank** the most important aspects of deprivation and they said:
  1. Income
  2. Access of drinking water
  3. Education
  4. Health
  5. Nutrition
  6. Shelter

# Questions re: VOP/PRSP participation

- How translate the *rankings* information into *weights*?
- Quality of participation
- When revise?

## **Challenges of Participatory approaches:**

- 1. Organisation and facilitation**
- 2. Inequality and unfairness in discussions**
- 3. Deliberation vs. bargaining and power imbalances**
- 4. Participation, information and (under)representation**
- 5. Adaptation vs. listening to the poor**
- 6. External Power and Domination**

## The Contribution of Deliberation

In addition to gathering information, participatory approaches provide a mechanism for public discussion and deliberation, in which participants:

- exchange views and information
- influence proceedings by ‘offering reasons others can accept’
- learn from the experiences of other people and revise their opinions accordingly;
- pool their capacity to analyse the relative merits of different arguments and options; and
- move towards a consensus grounded in the common good.

# Using Subjective Wellbeing weights

A newly popular technique – but problematic:

## **Schokkaert & Fleurbaey 2008**

- “happiness data can help us obtain information on individual preferences about the various dimensions of life...”
- “we ...argue against the welfarist use of such data on the ground that this is unlikely to respect individual preferences on what makes a good life.”

## Example:

- Consider a rich and a poor person.
- 1) an average inhabitant of Iceland with a university degree, a life expectancy of 81.5 years and an income of \$36,510 (PPP-corrected);
- 2) an average inhabitant of Sierra Leone with no schooling, a life expectancy of 41.8 years and an income of \$806 (PPP-corrected).<sup>4</sup>
- Both persons have similar answers about their happiness and satisfaction.
- It is still very possible that both have a strong preference for the former's life and could defend such preferences with good reasons.

# Socially Perceived Necessities

- Is this item ‘essential for everyone to have in order to enjoy an acceptable standard of living in South Africa today’.
- Yes No
- Percentage saying ‘yes’

## Percentage of people defining an item as 'essential'

Mains electricity in the house	92
Someone to look after you if you are very ill	91
A house that is strong enough to stand up to the weather	90
Clothing sufficient to keep you warm and dry	89
A place of worship in the local area	87
A fridge	86
Street lighting	85
Ability to pay or contribute to funerals	82
Separate bedrooms for adults and children	82
Having an adult from the hh at home at all times when children under 10 from the hh are at home	81
Having police on the streets in the local area	
80	
Tarred roads close to the house	80

For the same items, cross-check to  
double check *value vs feasibility*

- ‘Please say whether you have each of the following. If you do not have the item please say whether you don’t have it and don’t want it, or don’t have it and can’t afford it.’
  - ‘have’
  - ‘don’t have and don’t want’ [*not valued*]
  - ‘don’t have and can’t afford’ [*capability poor*]

# Socially perceived necessities

- Individual level responses
  - + Democratic
  - Not informed by discussion
- Apply at the individual level? (*not done*)
- Aggregate – how? Mean?
- Values change; weights change across time?
  - Difficulties in comparisons across time
  - Political considerations

# Summary

- Use normative weights between dimensions
- This is an active area of innovation
- Broad approaches each have +/- :
  - Equal Weights
  - Socially Perceived Necessities / SWB
  - Expert opinion
  - Participatory Approaches

# Summary cont'd

- Weights affect outcomes significantly
- Must consider not only explicit weights but also transformation, choice of dimensions, and substitutability
- Methodologically:
  - Justify selection of weights clearly
  - Report different weights
  - Perform Robustness tests

“A choice procedure that relies on a democratic search for agreement or a consensus can be extremely messy, and many technocrats are sufficiently disgusted by its messiness to pine for some wonderful formula that would simply give us ready-made weights that are ‘just right.’ However, no such magic formula does, of course, exist, since the issue of weighting is one of valuation and judgment, and not one of some impersonal technology.” (Sen 1999:79)

# Statistical weights

- **Frequency-based** – weight each dimension relative to the proportion of population who are deprived in that dimension\*.

*However approaches differ:*

- *Smaller* the proportion, *higher* the weights  
(Desai & Shah, Cerioli and Zani)
- *Smaller* the proportion, *lower* the weights

(why should the weights depend upon numbers?)

# Statistical weights

- **Most Favorable weights**
  - Distinct weights for each Individual
  - Weights chosen endogenously
  - Maximize individual well-being
  - All  $d$  have a minimal weight; ‘best’ performing dimensions have highest weight.
  
  - E.g. Cherchye et al 2006
  
  - (not transparent; comparisons between individuals difficult; interpretation difficult)

# Statistical weights

- **Multivariate techniques to summarize data**
  - Eg PCA, cluster analysis
  - Used to avoid double counting, eg among highly correlated dimensions

# Statistical weights

- **Latent Variable Models**
  - Eg MIMIC, Factor Analysis, etc