Social Choice Experiments

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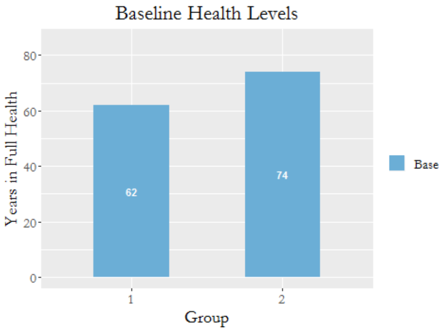
Overview

Objective: Elicit social value judgments using choice experiments.

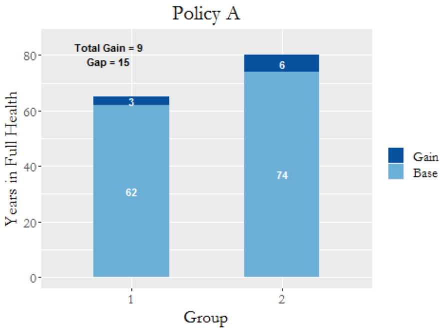
- Benefit Trade-Off
  - Indifferent Point Elicitation
- Constrained Resource Allocation
  - Optimal Allocation
- Noise
- Alternatives

Experiment



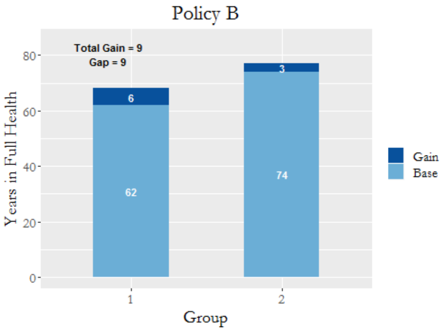
- Imagine society split into two equal groups.
- The first live for the fewest number of years in full health, the second for the most.
- On average the first group lives for 62 years in full health, the second for 74.

Experiment



- Now imagine we can implement a policy which will increase health of either group.
- This example shows an increase of 3 years to Group 1 and an increase of 6 years to Group 2.
- The total gain in health is 9 years and the gap between the groups is now 15.

Experiment



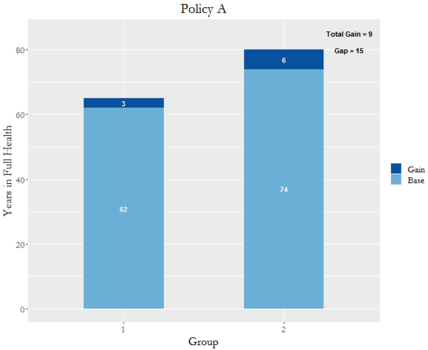
- Alternative policies are available.
- This one gives 6 years to Group 1 and 3 years to Group 2.
- Which gives a total gain of 9 years and leaves a gap of 9 years.

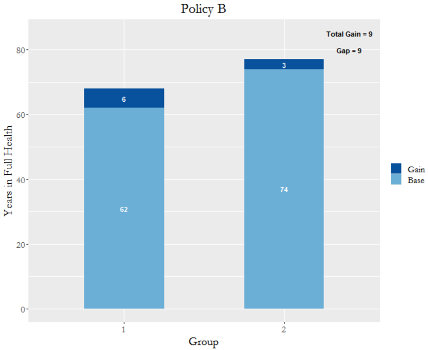
Experiment

- Imagine you are a policy maker who must choose between policies.
- You will now be asked 4 questions, with two policies to choose from.
- Both policies cost the same and affect the same number of people.
- Write your answer to each question as:
    - **A**, if you prefer Policy A
    - **B**, if you prefer Policy B
    - **=**, if you think policies A and B are equally good.

Experiment

Question 1





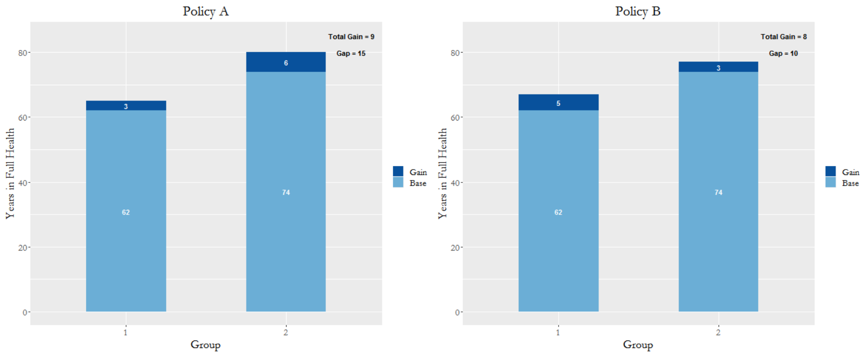
A Prefer Policy A

= Equally Good

B Prefer Policy B

Experiment

Question 2



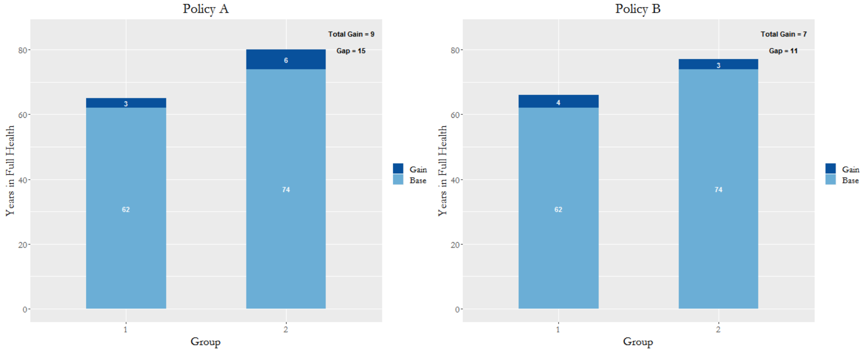
A
Prefer Policy A

=
Equally Good

B
Prefer Policy B

Experiment

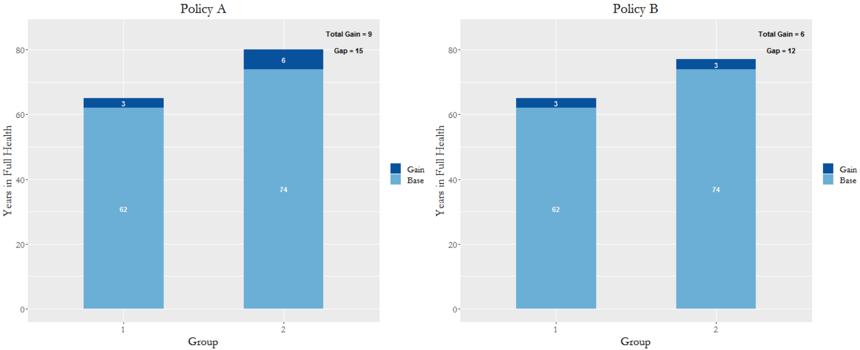
Question 3



A	**=**	**B**
Prefer Policy A	Equally Good	Prefer Policy B

Experiment

Question 4



A	**=**	**B**
Prefer Policy A	Equally Good	Prefer Policy B

Elicitation

$$h_{EDE}^{A} = \left(\sum_{i=1}^{N} \omega_i h_{iA}^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}} \quad (1)$$

$$h_{EDE}^{B} = \left(\sum_{i=1}^{N} \omega_i h_{iB}^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}} \quad (2)$$

Find h_{2B} such that:

$$h_{EDE}^{A} = h_{EDE}^{B} \quad (3)$$

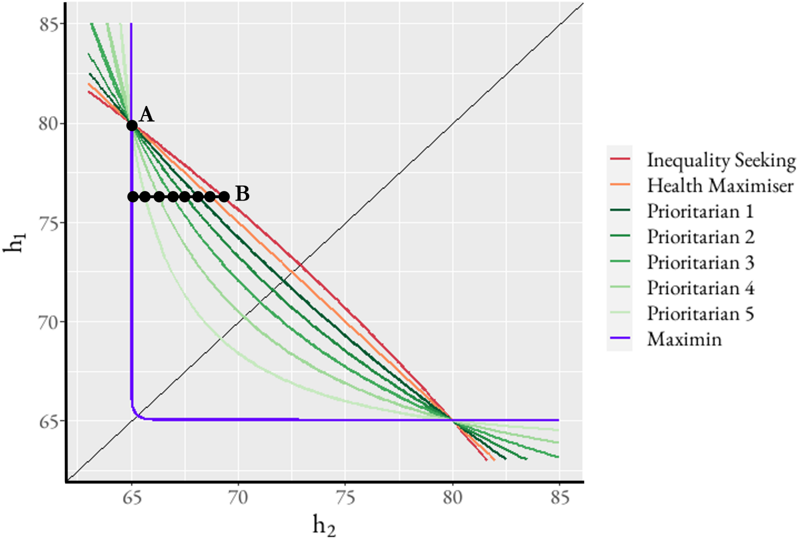
Solve for ε.

Social Value Judgements

Table: Value Judgements from Choices

		Indifferent Between	
Choice	**Value Judgement**	Health A	Health B
AAAA	Inequality Seeking	65,80	$>$ 68, 77
=AAA	Health Maximiser	65,80	68,77
BAAA	Prioritarian 1	65,80	67.5,77
B=AA	Prioritarian 2	65,80	67,77
BBAA	Prioritarian 3	65,80	66.5,77
BB=A	Prioritarian 4	65,80	66,77
BBBA	Prioritarian 5	65,80	65.5,77
BBB=	Maximin	65,80	65,77
BBBB	Egalitarian	65,80	$<$ 65,77

Atkinson Social Indifference Curves



To R Shiny...

Optimal Allocations

$$\max_{x_1}\left[h_{EDE} = \left(\sum_{i=1}^{N} \omega_i h_i^{1-\varepsilon}\right)^{\frac{1}{1-\varepsilon}}\right] \tag{4}$$

$$s.b.t. \quad m = x_1 - x_2 \tag{5}$$

$$x_j^* = \frac{m - \frac{y_j}{p_k}\left(\frac{p_k}{p_j}\right)^{\frac{1}{\varepsilon}} + \frac{y_k}{p_k}}{1 + \frac{p_j}{p_k}\left(\frac{p_k}{p_j}\right)^{\frac{1}{\varepsilon}}}, \qquad \forall j \in (1,2), \neq k. \tag{6}$$

Inequality Aversion

Given x_j^*:

$$\varepsilon = \frac{\log\left(\dfrac{p_k}{p_j}\right)}{\log\left(\dfrac{m - x_j^* + \dfrac{y_k}{p_k}}{x_j^* \cdot \dfrac{p_j}{p_k} + \dfrac{y_j}{p_k}}\right)} \tag{7}$$

Random Behavioural Model

Assume:

$$\tilde{X}_i \sim Dirichlet(a_i), \qquad E[\tilde{X}_i] = \tilde{x}_i^* \tag{8}$$

Estimate parameters ε and σ by:

$$max(LL_j) = \sum_{t=1}^{T} \log \left(\frac{\Gamma\left(\sum_{i=1}^{2} a_{ijt}\right)}{\prod_{i=1}^{2} \Gamma(a_{ijt})} \prod_{i=1}^{2} \tilde{x}_{ijt}^{a_{ijt}-1} \right) \tag{9}$$

Where:

$$\tilde{x}_i^*(\sigma - 1) = a_i \qquad \forall i \tag{10}$$

Random Utility Model

Assume:

$$V(\mathbf{x}) = W(\mathbf{x}) + \epsilon_{\mathbf{x}}. \tag{11}$$

Probability of choosing a particular $\mathbf{x}_j$ allocation, from all feasible options $j \in J$:

$$P(1\{\mathbf{x_j}\}) = P\left(V(\mathbf{x_j}) = max\left\{[V(\mathbf{x}_1), V(\mathbf{x}_2), \dots, V(\mathbf{x}_J)]\right\}\right), \tag{12}$$

Maximum likelihood, for each participant, across all rounds $t \in T$:

$$LL = \sum_{t=1}^{T}\sum_{j=1}^{J_t} \log\left(1\{\mathbf{x_{jt}}\}\left(\frac{\exp\left[\frac{W(\mathbf{x_{jt}})}{\sigma}\right]}{\sum_{j=1}^{J_t}\exp\left[\frac{W(\mathbf{x_{jt}})}{\sigma}\right]}\right)\right). \tag{13}$$

Alternative Designs

- Discrete Choice
- Staircase Designs

Summary

- Benefit Trade-Off
    - Indifferent Point Elicitation
- Constrained Resource Allocation
    - Optimal Allocation
- Noise
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