Do Decision Makers and the General Public Agree on Health Inequality?: Pre-Analysis Plan

Gawain Heckley[1], Hugo Norinder[1] and Erik Wengström[2]

[1]Health Economics, Clinical Sciences Malmö, Lund University, Sweden
[2]Department of Economics, Lund University, Sweden

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Abstract

This project aims to investigate if there is agreement regarding inequality aversion among the Swedish public, political, and medical decision-makers, in a discrete choice experiment. Subjects choose between two outcome distributions, where one choice is higher in life expectancy but with a higher variance between groups in the distribution. Furthermore, we consider whether the results are affected by whether a choice is made behind a veil of ignorance or not, a relevant distinction for decision makers who in practice make their decisions without a veil of ignorance. An information experiment is then performed to assess whether decision-makers can be influenced to make choices more in line with the general public's preferences. Half of the decision-makers are provided with the most popular choice made by the public before they make their own choices. If the inequality choices of decision-makers are aligned with the general public or become more aligned after the information intervention, then the inclusion of inequality concerns in decision-making is more straightforward. This plan outlines the research questions, concepts, design, and estimation strategy of the study.

JEL classification: D63, I14
Keywords: Income related health inequality, inequality aversion, information experiment.

1 INTRODUCTION

This document describes the research questions, concepts, design, and estimation strategy of the study.

1.1 Research questions

We have three main research questions:

1. Is there disagreement regarding aversion to income-related health inequality between
   (a) Decision-makers (both political and medical) and the general public?
   (b) the decision-making groups separately?
2. Does removing the veil of ignorance affect aversion to income-related health inequality
   (a) for the general public and decision-makers combined?
   (b) for the general public?
   (c) for decision-makers?
   (d) the difference between the general public and decision-makers without the information intervention
3. Does informing decision-makers about the preferences of the general public
   (a) affect the inequality preferences of decision makers?
   (b) better align decision-makers with the preferences of the general public?
   (c) affect the inequality preference of political and medical decision-makers differently?

   As a robustness check we also assess ordering effects:

4. Robustness check: Are there order effects of performing a DCE first behind a veil of ignorance and second removing the veil of ignorance?

2 CONCEPTS

Previous research has found a stronger preference for reduction in income-related health inequalities than just pure health inequalities (Chap. 13, Cookson et al., 2020). We therefore utilise the extended concentration index by Wagstaff (2002) and the health achievement index (Wagstaff, 2002), which considers the relative trade-off between health improvements and inequality impacts.

The concentration index (CI) is a common measure in economics to quantify degrees of inequality in the distribution, such as income-related health inequality. All individuals are ranked from the worst-off to the best-off by socioeconomic status, such as wealth or income, which is then mapped against health. The range of the CI is $[-1, 1]$, where 0 is perfect equality. -1 corresponds to the total concentration among the lowest-ranked individuals, and 1 means the total concentration among the highest-ranking individuals. The extended CI (ECI) introduces the sensitivity parameter ν, allowing consideration of equity concerns. Wagstaff (2002) defines the extended concentration index as:

$$C(h, \nu) = 1 - \frac{\nu}{\mu_h n} \sum_{i=1}^{n} h_i (1 - r_i)^{\nu - 1} \tag{1}$$

where ν is the ethical parameter that determines the weighting of the distribution, μ_h is the average health, h_i is the individual's health, and r_i is the individual's income rank.

A low ν, $\nu \to 1$, implies a more *egalitarian* view as everyone is weighted more equally. A higher ν implies greater *prioritarianism* of individuals who are worse off. The extreme with $\nu \to \infty$ is consistent with a *Rawlsian* view where only the worst-off individual receives a weight. In Figure 1 below, the weights are plotted for different values of ν:

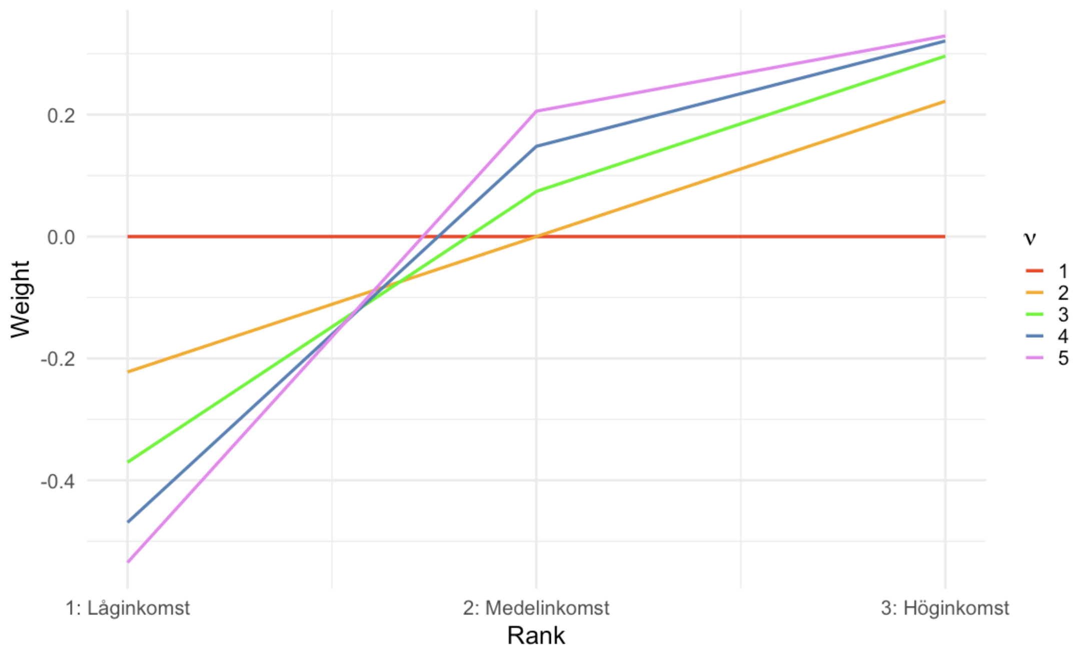

Figure 1: Weights based on rank

Notes: More weight is put on individuals below the 0 line, and the further below the more importance is put on the individual. Source: Own calculations

The health achievement index (HAI) (Wagstaff, 2002), used by Hurley et al. (2020), is an extension of the ECI, and can be defined as:

$$H = I(\nu) = \mu(1 - C(\nu)) = \frac{1}{n}\sum_{i=1}^{n} h_i \nu (1 - r_i)^{\nu - 1} \tag{2}$$

Where r_i is the rank of the individual i, μ is the average health. The HAI captures Atkinson's Equivalently Distributed Equal Health (EDEH) (Atkinson et al., 1970), for the specific case of income rank-related health inequality. EDEH captures the efficiency equity trade-off, where if health improvements are only focused amongst the wealthiest, this will improve general health but may reduce EDEH. We use the HAI as it is rank-dependent and allows us to change the average life expectancy of income tercile groups.

When we calculate the weights for each tercile in the weight function we use the small sample corrected formula from Hardardottir et al. (2021):

$$\text{SSCW} = \frac{1}{R} - \left(\left(1 - \frac{r-1}{R}\right)^{v_i} - \left(1 - \frac{r}{R}\right)^{v_i} \right); r \in \{1, 2, 3\}, R = 3 \tag{3}$$

where $SSCW$ are Small Sample Corrected Weights and R are the total amount of possible ranks r.

3 RESEARCH STRATEGY

This section describes the data collection and sampling in the experiment.

3.1 The survey

The survey has four parts:

- Part 0: Tutorial
- Part 1: Alfaland
- Part 2: Sweden
  - A: without information intervention
  - B: with information intervention
- Part 3: Background questions

The survey questionnaire has three alternative forms:

1. Main survey: Sent to the general population and 50% of the decision-making population. It consists of the parts in this order: 0, 1, 2A, and 3.
2. Information intervention: Sent to 50% of the decision-making population. It consists of the parts in this order: 0, 1, 2B, and 3.
3. Order effects: Sent to 200 individuals to investigate if the order of the parts affects the outcome. It consists of the parts in this order: 0, 2A, 1, and 3.

Figure 2 shows a flowchart of the experiment with the three main research questions. The squircles indicate non-choice stages of the survey, and rectangles show the choice part of the experiment. The first part gathers the preferences in the fictional country Alfaland, in which the respondents do not know their income position. This is followed by a removal of the veil of ignorance, as all respondents are asked to share their monthly income, and therefore can be shown where in the income distribution they are in the Swedish setting. Half of the decision-makers receive information on the most popular choice the public makes in the Swedish setting, after which all respondents answer background questions.

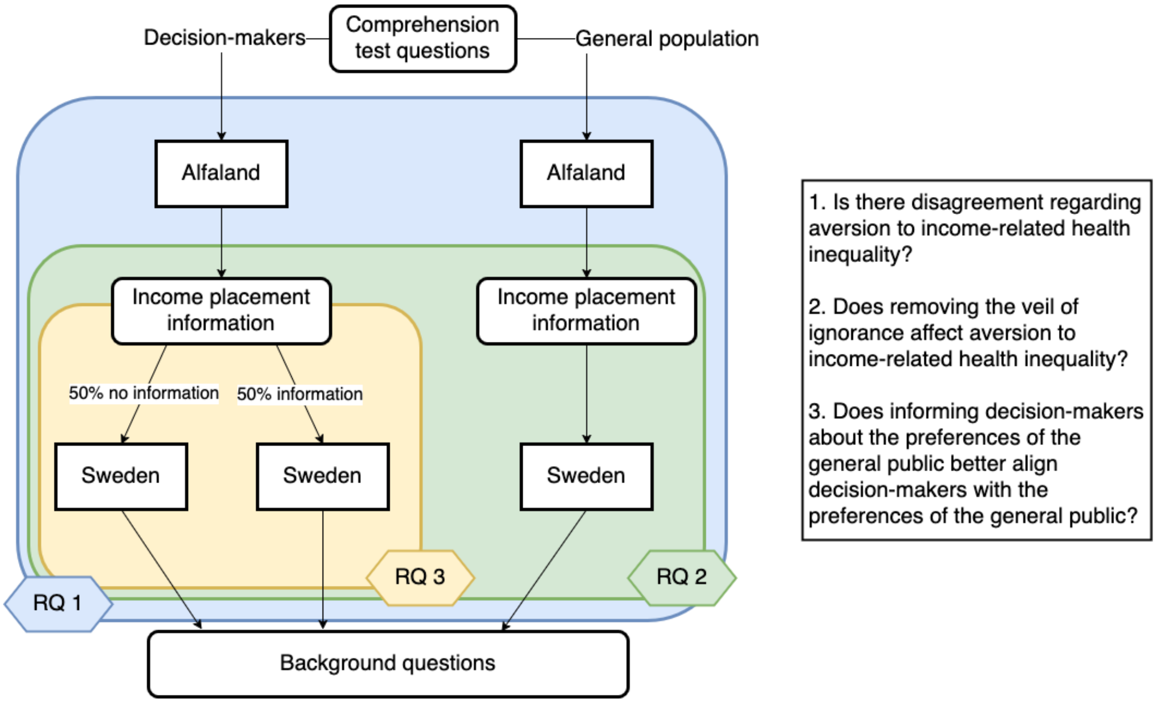

Figure 2: Flowchart of the experiment

The main survey:

The first part of the survey introduces the discrete choice experiment and includes three comprehension test questions that test whether the respondents understand the information provided sufficiently so they can make an informed decision.

The second part of the survey introduces the respondent to the fictitious land Alfaland. Here each respondent is tasked with choosing between five sets of two potential health distributions that follow as a consequence of health intervention A or B. These correspond to different EDEs of different values of the bivariate aversion parameter ν, where an individual with single-peaked preferences would change once, and the change occurs at their level of indifference. This implies that a change marks the lower bound of the interval, allowing us to perform an interval regression (more on this in Section 4) with defined bounds (see Table 3).

The third part of the survey, corresponds to research questions 2 and 3, and repeats the survey experiment as illustrated in figure 2, but removes the veil of ignorance. In this part of the survey the respondents are tasked with the same choices but on a different distribution and now they should consider that the choice of intervention is happening in their home country, Sweden. Respondents are also asked about their income and informed as to which income group they belong to ensure they are aware of how they are likely to be affected by their own choices. In this part the survey half of the decision-makers are introduced to the information intervention - providing them with information on the choices the majority of public support. The complete experiment is depicted in Figure 2.

The fourth and final part of the survey asks respondents for information regarding their background characteristics and follows the literature (Hardardottir et al., 2021; Robson et al., 2024; Hurley et al., 2020) with the addition of the WELLBY.[1] These will be used to perform heterogeneity analysis and to allow us to compare the respondent groups in descriptive differences. Our background questions include:

- Age (18- ∞)
- Sex (M/F/other/prefer not to say)
- Income before taxes each month (in SEK) [Asked in part 2 as part of removing the veil of ignorance]
- If we lined up every adult in Sweden in order of their total income starting at the lowest, which third of the line do you think you would be in? (1, 2, 3) [Asked in part 2 as part of removing the veil of ignorance]
- Highest attained education (Primary - Tertiary)
- Political leaning (left/right) (Likert scale, 0 – 10)
- Risk aversion (averse/loving) (Likert scale, 0 –10)
- Altruism (Unwilling to give to charity - Willing to give to charity) (Likert scale 0 – 10)
- WELLBY (Unsatisfied with life - Fully satisfied with life) (Likert scale, 0 – 10)
- Control question for attention (identify best outcome of a population from a picture)
- Number of kids (0 - ∞)
- Civil status (single, married, divorced, widower/widow, partner living separately)
- Is your party in power in your region? (Yes/No) *[Only for political decision-makers]*

[1] Wellbeing years, measured as self-reported contentment with current life

- Are you on a healthcare-related board (hälsosjukvårdsrelaterad nämnd eller styrelse) as a politician? (Yes/No) *[Only for political decision-makers]*
- My day-to-day work decisions are primarily steered by my personal preferences (Likert scale, 0–10 Disagree – Agree) *Only for decision-makers*
- My day-to-day work decisions are primarily steered by the preferences of the general population (Likert scale, 0–10 Disagree – Agree) *Only for decision-makers*
- Have you made a medical decision about a patient within a month? (Yes/No) *[Only for medical decision-makers]*
- Are you part of a national program board (NPO) (Yes/No) *[Only for medical decision-makers]*

Education is important to analyze as all our doctors have an advanced degree, which sets them apart from the general population. They also have higher incomes than the average individual, which makes a matching heterogeneity study interesting. From the previous literature, we know there are differences in preferences between the general public and decision-makers. We can do a similar analysis with our background information with the doctors and the medical elite. Civil status and children could correlate with different levels of aversion due to family-induced preferences. Risk aversion can be connected to lifestyle choices that could affect preferences. Income and perceived income status are used to see if people are correctly guessing their position in the income distribution or if they are over-/underestimating their position. Receiving information about how you guessed might influence your preferences in the setting of a removed veil of ignorance. Asking whether a politician is in power in their region is important as we can empirically test if there is a difference in responsiveness to voter preferences, i.e. whether politicians in power are better at responding to voter preferences than their opposition or vice versa. We include WELLBY to see if life satisfaction affects preferences as we find no previous study with this included. Medical decision-makers who are active in deciding medical interventions for patients may have a different preference than their non-active counterparts due to meeting the patients.

Variations to the main survey:

The second survey form is for the 50% of decision-makers who receive information on the most popular choice among the general population. This survey is the same as the main survey except that in Sweden, decision-makers are informed which distribution the general public would have chosen, informing the decision-makers but leaving the final choice open to the decision-makers.

The third survey form is a robustness check of whether it matters or not if the veil of ignorance is removed first or second (Alfaland first, Sweden second; or Sweden first then Alfaland).

Other points:

Two sets of distributions are utilised: one for Alfaland and one for Sweden. If the distributions are different, it appears more realistic that the situation has changed when moving from Alfaland to Sweden. To account for the fact that responses may vary depending on the choice of distributions, we randomise which distribution is used in Alfaland and which is used in Sweden. These distributions are found in the end of the survey appendix.

3.2 Sampling

The eligible population

1. A representative sample of 2000 individuals is drawn from the general public who are 18 years and older living in Sweden in 2025 provided by Lysio Research (previously known as Enkätfabriken).

2. Regional politicians (defined as included in the register of politically elected officials from Statistics Sweden), addresses provided by Statistics Sweden.

3. Medical doctors or nurses who are section-heads at a hospital as registered in the occupation register with Statistics Sweden, addresses provided by Statistics Sweden.

4. Primary-care doctors or nurses with management responsibility as registered in the occupation register with Statistics Sweden, addresses provided by Statistics Sweden.

5. Medical decision-makers in any national program area (NPO) are identified through the website Kunskapsstyrning hälso- och sjukvård. We reach these through email, gathered by the contact person from each NPO-group.

6. Ordering effects sample: A representative sample of 200 individuals is drawn from the general public who are 18 years and older living in Sweden in 2025 provided by Lysio Research

The defining characteristic distinguishing decision-makers is primarily their ability to make decisions, either from an elected or occupational position that affects population health outcomes. The expected initial sample size to which invitations to participate in the survey will be sent is about 9,800, where we estimate 4,700 individuals are political decision-makers, 2,000 are the general population, and 3,100 are medical decision-makers. Lysio Research (https://lysio.se/) is our preferred provider used to distribute the survey, through invites by post providing a link/QR code to the survey online. The exception are the NPOs, where we will email them directly and the general population where we use Lysio's representative panel.

We will condition inclusion into the final sample on passing the comprehension tests at the beginning of the survey and on rationality criteria (making a single switch). This is illustrated in Figure 3:

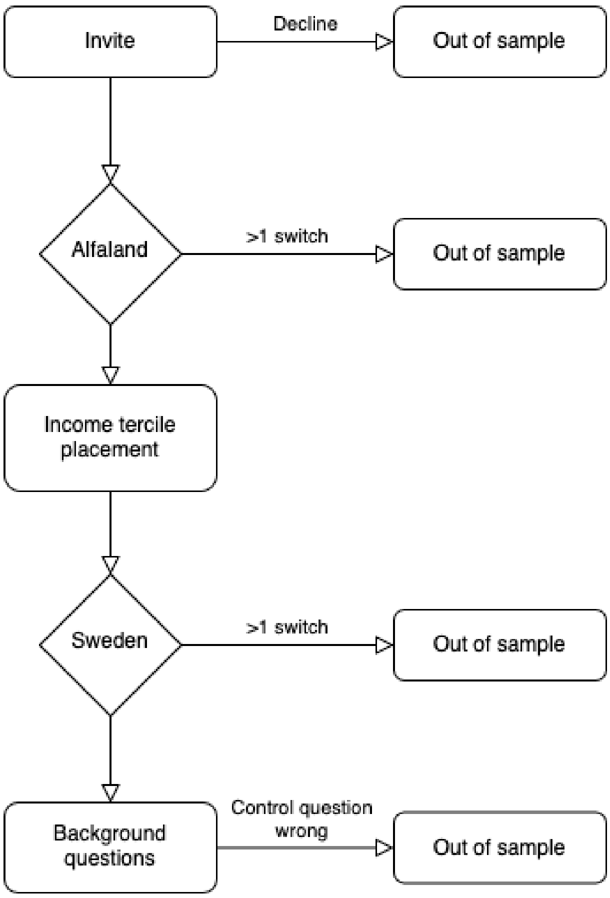

Figure 3: Simplified flowchart illustrating selection of final analysis sample

3.2.1 Statistical power

Lysio ensure that we get 2,000 responses from the general public, we are therefore sample size constrained by the population size of decision-makers because response rates are likely to be quite low for this group. We therefore invite all the eligible groups of decision-makers. Not every decision-maker will respond to the survey. We assume that political decision-makers, section heads and primary care doctors will have a response rate of about 20%, and the medical elite to have 30% response rate. The expected sample sizes of the decision-maker groups is complied in Table 1 below:

Table 1: Estimated sample size accounting for likely response rate

Decision-maker group	**Population size**	**Estimated response rate**	**Estimated sample size**
Politicians	4700	20%	940
Medical elite	1200	30%	360
Doctors and nurses with management responsibility	1900	20%	380

Notes: The estimated sample size of decision-makers who do not receive the information intervention and who receive the information intervention is half of column 4.

We use STATA18 to calculate the sample size needed in a two-sided t-test of means, and an assumed effect size of $d = 0.3$. We start by assuming a sample size of 2,000 individuals from the general population, and we assume $\alpha = 95\%$, and $\beta = 0.8$. Using the sample size for the general population (2,000), we need 92 individuals to respond to our survey from the smallest decision-making group, which is comfortably within our expected sample size accounting for response rates for the smallest decision-maker group. To compare between the medical decision-making groups, we calculate the needed sample size using the expected smallest decision-maker group, the medical elite without the information intervention, 180 assumed respondents. The power calculation result gives us a required minimum sample size of 171 respondents in any other decision-making group, which is within what we expect the sample size will be for the next smallest group. According to these calculations we have sufficiently large sample sizes to test for a 0.3 difference in inequality aversion parameter preferences for all our research questions with $\alpha = 95\%$, and $\beta = 0.8$. The relevant power calculation results for specific questions are presented in Table 2:

Table 2: Estimated minimum sample size required for each research question

Research question	Group A	$N1_A$	Comparison group B	Estimated minimum size required
1a), 3b), 2a), 2b), 2d)	General population	2,000	Decision-makers with(out) information	92
1b), 2c), 3a), 3c)	Medical Elite decision-makers	180	Other decision-maker group	171

3.2.2 Assignment to treatment

We employ Qualtrics (https://www.qualtrics.com/), which can automatically apply a randomization scheme that sorts 50% of decision-makers into treatment – receiving information on general population's choices. Only decision-makers can be assigned to treatment.

3.3 Data gathering

SCB provide the names and home addresses for the political and medical decision-makers (but not NPO), which we pass on to Lysio. Lysio send out the survey invites via mail and respondents access the survey via a QR code link, this link provides a further link to the Qualtrics survey. This way all responses to the Qualtrics survey are fully anonymous. The addresses are only used for sending the survey out and to send out reminders. The actual response is not connected to the individuals presence in the register.

We employ Qualtrics to perform the survey and for data collection. A pilot using the Swedish sample on Prolific (https://www.prolific.com/) was used to test comprehension of the figures, gaining baseline statistics on completion time, and to investigate whether we can make the survey clearer. The opinions and suggestions have been implemented in the final survey based on this pilot.

The data collection will take place over 3 to 5 months from start to finish to let respondents answer within a reasonable time frame. Reminders will be sent out to nonrespondents. The survey data will not store any personal identifiers such as IP-address, name, or email. The background characteristics found in Part 3 of the survey are designed to allow analysis of differences across our population groups whilst not enabling identification of specific individuals.

3.3.1 Data processing and storage

The raw data is collected through Qualtrics and is stored safely without personal identifiers. We let Lysio connect individuals with QR code links to the online survey, but no link will exist between the study population's list of postal addresses and the Qualtrics survey. This ensures anonymity.

We will store the data on a secure server using Lund University's research data service https://www.medarbetarwebben.lu.se/lagring-forskningsdata.

Data processing includes cleaning the data, doing preliminary analysis, preparing for the decision-maker survey wave, and finally doing the final analysis with the correct specification. The authors have ownership over the processed data and the data will be available as processed for replication purposes, fully anonymised.

4 EMPIRICAL ANALYSIS

4.1 Variables

The main outcome is the estimated ν_i, which we estimate using the set of five discrete choices between two income-related health distributions in the survey. Figure 4 shows how the choice is represented in the survey:

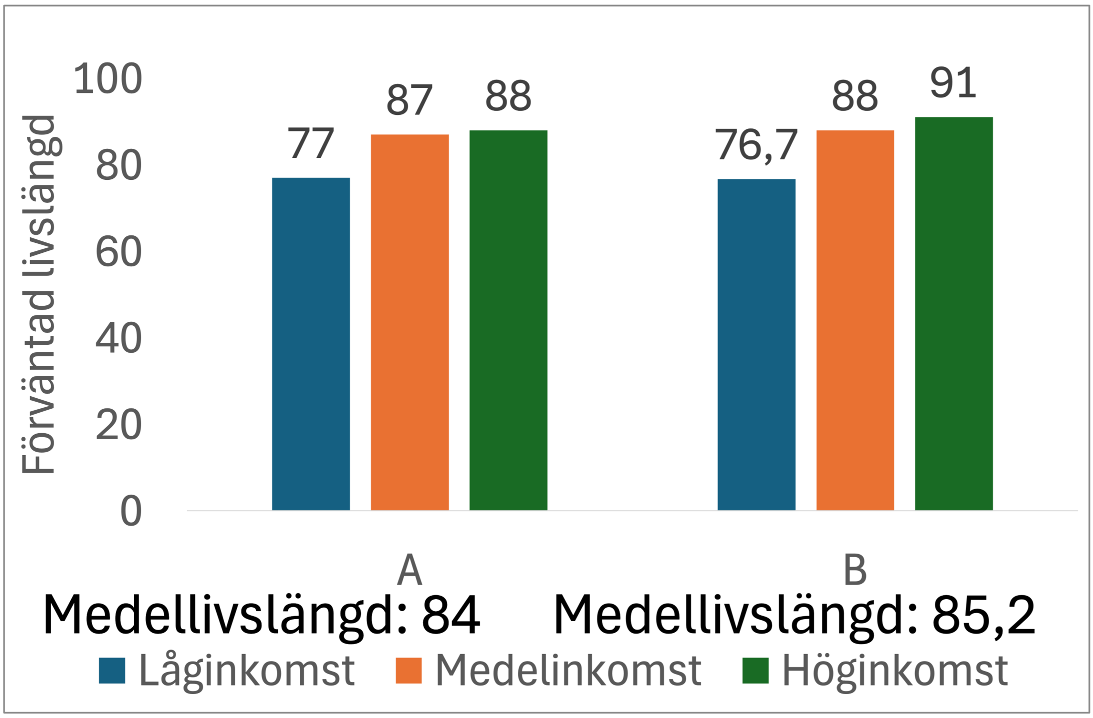

Figure 4: The choice between A and B, for $\nu = 4$

Notes: The outcome of the two possible interventions A and B. The expected average life-years (förväntad livslängd) is higher in B, but the poorest group is worse off than in intervention A. This trade-off between injustice in length of life and the efficiency of increasing average life-years is measured by ν.

The background variables outlined in subsection 3.1 are collected and will be used in subgroup analysis.

4.2 Regression Analysis

Estimation of the parameter ν will be performed using interval regression (Stewart, 1983). Interval regression is appropriate for this study as we utilise when individuals switch from one distribution to another. However, the switching point occurs between two discrete points which doesn't reveal the preferred point estimate just that the preference may lie within the interval. Interval regression accounts for this.

We assume that individuals have single-peaked preferences of aversion to inequality, therefore, there should only be one switch between A and B. Multiple switchers will be removed and also analysed as a special case. The switch occurs when you have reached your value of $\nu_i \in [a, b)$, marking the lower bound a. If you switch at $\nu_{choice} = 3$, then you have an aversion $\nu_i \in [3, 4)$. Table 3 shows the bounds used in the analysis:

Table 3: Lower and higher bounds of ν_i when a switch occurs

Switch from A to B at ν	**Lower bound**	**Higher bound**
Only B	1	<1.24
1.24	1.24	<2
2	2	<3
3	3	<4
4	4	<5
5 or only A	5	<∞

An individual who always chooses distribution A (See Figure 4) displays semi- to fully Rawlsian preferences for equity, $\nu \in [5, \infty)$. The lowest ν we estimate is $\nu = 1.24$ as $\nu = 1$ gives an equal weight on each individual. Choosing a slightly bigger ν allows us to extend the possible intervals. An individual who always chooses distribution B will have $\nu = 1.24$ as the upper bound. A clear advantage of interval regression is that you can interpret the dependent variables like an OLS regression, which in our case would be how much higher or lower the decision-makers' preferences lie from the general population.

Let *DM* be a dummy variable identifying decision-makers, *POL* a dummy variable identifying regional politicians, *NPO* a dummy variable identifying the medical elite, DOC a dummy variable identifying the other medical decision-makers, *VoI* be a dummy variable identifying the setting in Alfaland, and *Info* a dummy variable identifying the information intervention. $\mathbf{X_i'}$ is a vector of background characteristics, corresponding to the background questions from the survey.

To answer question 1, we utilise the following equation:

$$\begin{aligned} y_{i|VoI=1,Info=0} = \beta_0 + \beta_1 DM_i + \beta_2 DM_i \times POL_i + \\ + \beta_3 DM_i \times DOC_i + \beta_4 DM_i \times NPO_i + \mathbf{X_i'}\zeta + \varepsilon_i \end{aligned} \tag{4}$$

In which $y_{i|VoI=1} = \{\nu_L, \nu_H\}$ is the interval of the two inequality indifference parameters where the individual decided to switch for the sample questions regarding Alfaland (behind the veil of ignorance), β_0 is the ν-value of the general population, β_1 measures the difference between the general population and being a decision-maker (DM_i) and answers question 1a. β_2–β_4 shows the difference between a political decision-maker, the medical elite, and the other medical decision-makers, and answers question 1b. ε_i are standard errors clustered on the individual level.

To answer research question 2a, we utilise the following equation, with no distinction of subsample:

$$y_i = \phi_0 + \phi_1 VoI + \mathbf{X_i'}\zeta + \varrho_i \tag{5}$$

where ϕ_0 is the setting in Sweden, ϕ_1 is the difference between Alfaland and Sweden, and ϱ_i are standard errors clustered on the individual level. A test of whether ϕ_1 is significantly different from zero is a test of question 2a.

To answer research question 2b–d, we utilise the following equation, using the entire sample:

$$y_{i|Info=0} = \tau_0 + \tau_1 VoI + \tau_2 DM_i + \tau_3 DM_i \times VoI + \mathbf{X_i'}\zeta + \vartheta_i \tag{6}$$

Coefficients τ_0 and τ_1 provide the inequality aversion parameter for the general population in Sweden and the difference in Alfaland, respectively, and a test of whether τ_1 is significantly different from zero answers question 2b. Coefficients τ_2 and τ_3 provide the inequality aversion parameters for the decision-makers in Sweden and the difference between Sweden and Alfaland, respectively, and a test of whether τ_3 is significantly different from zero answers question 2c. The sign of τ_3 and the answer to question 2c together provide the answer to question 2d.

To answer research question 3a–b, we utilize the following equation, focusing only on the decision maker subsample ($DM = 1$) and the sample questions for Sweden ($VoI = 0$):

$$y_{i|DM=1,VoI=0} = \delta_0 + \delta_1 Info + \mathbf{X_i'}\zeta + \varphi_i \tag{7}$$

where δ_0 is the inequality aversion parameter of decision-makers with the VoI removed, δ_1 is the difference in inequality aversion parameter of decision-makers with the information intervention and answers question 3a. Question 3b is answered by considering the sign of δ_1 in relation to the observed difference in inequality aversion preferences between the general public and decision-makers combined with the result of question 3a.

Question 3c is answered with the following equation:

$$
\begin{aligned}
y_{i|DM=1,VoI=1} = \gamma_1 POL_i + \gamma_2 DOC_i + \gamma_3 NPO_i + \\
+\gamma_4 Info \times POL_i + \gamma_5 Info \times DOC_i + \gamma_6 Info \times NPO_i + \\
+\mathbf{X_i'}\zeta + \varphi_i
\end{aligned}
\tag{8}
$$

where we compare $\gamma_4 - \gamma_6$ to see if there is a difference in how information affects the different groups, and φ_i are standard errors clustered on the individual level.

Our main analysis will consider both analyses without and with a vector of background characteristics as controls ($\boldsymbol{X}$). This is to assess if potential differences between decision-makers and the general population are due to differences in background factors that make up these two groups. The background characteristics are the background questions from the end of the survey, seen in Section 3.1. We will assess the importance of these variables to understand how the representativeness of the decision-maker group affects the conclusions we draw and what this potentially means in practice.

5 RESEARCH TEAM

The research team consists of Dr Gawain Heckley, Professor Erik Wengström, and Hugo Norinder.

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