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ONLINE APPENDICES

Comparing aversions to outcome inequality and social risk in health and income: an empirical analysis using hypothetical scenarios with losses

HEC-18-0327.R2

APPENDIX A: The questionnaires (original in Spanish and available from authors on request)

Question IH: Questionnaire wording and visual aid for outcome-inequality aversion in health

In the next questions, imagine a community of 1,000 individuals. We are going to talk about the health of this community in the following year: some individuals in the community will be healthy, others will be seriously ill for two weeks, others will be seriously ill for three weeks, others for four weeks, etc. We want you to think how to share those weeks of illness across the individuals of the community.

You are not one of the members of this community, but please imagine that **your opinion will be taken into account by the public authorities** who have to make a decision for them. There are no right or wrong answers.

All the weeks with illness happen at random: i.e. on different and separate weeks. On different weeks means there will be no single week when a substantial proportion of the workforce is off sick at once. On separate weeks means they are non-consecutive. After this illness the individual recovers completely (there are no after-effects). There are no other illnesses. There is nothing individuals can do to change these outcomes.

For each of the following four scenarios, we are going to show you two alternatives (A and B) between which we ask you to choose. Both alternatives A and B are feasible and would cost the same to society.

Outcome of Alternative (A): one half (500 individuals) will not be ill (i.e. they will be healthy) and the other half (500 individuals) will be seriously ill for 3 weeks.

Outcome of Alternative (B): everybody will be seriously ill for 2 weeks.

	Number of individuals		Number of Weeks of illness	I choose:		
	Healthy	Seriously Ill		A	B	A=B
A	500	500	1 2 3	☐	☐	☐
B	1000		1 2			
A	500	500	1 2 3 4	☐	☐	☐
B	1000		1 2			
A	500	500	1 2 3 4 5	☐	☐	☐
B	1000		1 2			
A	500	500	1 2 3 4 5 6	☐	☐	☐
B	1000		1 2			

Question RH: Questionnaire wording and visual aid for social risk aversion in health

In the next questions, imagine a community of 1,000 individuals. We are going to talk about the health of this community in the following year: some individuals in the community will be healthy, others will be seriously ill for two weeks, others will be seriously ill for three weeks, others for four weeks, etc. We want you to think how to share those weeks of illness across the individuals of the community.

You are not one of the members of this community, but please imagine that **your opinion will be taken into account by the public authorities** who have to make a decision for them. There are no right or wrong answers.

All the weeks with illness happen at random: i.e. on different and separate weeks. On different weeks means there will be no single week when a substantial proportion of the workforce is off sick at once. On separate weeks means they are non-consecutive. After this illness the individual recovers completely (there are no after-effects). There are no other illnesses. There is nothing individuals can do to change these outcomes.

For each of the following four scenarios, we are going to show you two alternatives (A and B) between which we ask you to choose. Both alternatives A and B are feasible and would cost the same to society.

Outcome of Alternative (A): a coin is tossed and if "heads" comes up, then everybody will be healthy but if "tails" comes up, then everybody will be seriously ill for 3 weeks.

Outcome of Alternative (B): everybody will be seriously ill for 2 weeks, no matter heads or tails.

							I choose:		
	Number of individuals		Number of Weeks of illness	Number of individuals		Number of Weeks of illness			
	Health	Seriously ill		Health	Seriously ill		A	B	A=B
A	1000		0		1000	1 2 3	☐	☐	☐
B		1000	1 2		1000	1 2			
A	1000		0		1000	1 2 3 4	☐	☐	☐
B		1000	1 2		1000	1 2			
A	1000		0		1000	1 2 3 4 5	☐	☐	☐
B		1000	1 2		1000	1 2			
A	1000		0		1000	1 2 3 4 5 6	☐	☐	☐
B		1000	1 2		1000	1 2			

Question IY: Questionnaire wording and visual aid for outcome-inequality aversion in income

Imagine a community of 250 equal-sized households (of 4 people each), totalling 1,000 individuals. We are going to talk about the income of this community in the following year.: some individuals in the community will not lose income, some will lose one week of income, some will lose two weeks' income, others three weeks', others four weeks', etc. We want you to think how to share those weeks of lost income across the individuals of the community.

You are not one of the members of this community, but please imagine that **your opinion will be taken into account by the public authorities** who have to make a decision for them. There are no right or wrong answers.

By one week of income we mean what is earned in a week (in other words, basically, this will be the weekly wage) but may also include, where appropriate, what is earned in a week through current account interests, property let income, etc. All the income losses happen at random: i.e. on different and separate weeks. On different weeks means there will be no single week when a substantial proportion of the workforce loses income. On separate weeks means they are non-consecutive. There are no other reasons that cause income loss. There is nothing individuals can do to change these outcomes.

For each of the following four scenarios, we are going to show you two alternatives (A and B) between which we ask you to choose. Both alternatives A and B are feasible and would cost the same to society.

Outcome of Alternative (A): one half of the individuals (500 of 125 households) will not lose any income and the other half of individuals (500 of the remaining 125 households) will lose 3 weeks' income.

Outcome of Alternative (B): everybody will lose 2 weeks' income.

	Number of individuals		Number of weeks' income lost	I choose:		
	Not losing	Losing		A	B	A=B
A	500	500	1 2 3	☐	☐	☐
B	1000		1 2			
A	500	500	1 2 3 4	☐	☐	☐
B	1000		1 2			
A	500	500	1 2 3 4 5	☐	☐	☐
B	1000		1 2			
A	500	500	1 2 3 4 5 6	☐	☐	☐
B	1000		1 2			

Question RY: Questionnaire wording and visual aid for question for social risk aversion in income

Imagine a community of 250 equal-sized households (of 4 people each), totalling 1,000 individuals. We are going to talk about the income of this community in the following year.: some individuals in the community will not lose income, some will lose one week of income, some will lose two weeks' income, others three weeks', others four weeks', etc. We want you to think how to share those weeks of lost income across the individuals of the community.

You are not one of the members of this community, but please imagine that **your opinion will be taken into account by the public authorities** who have to make a decision for them. There are no right or wrong answers.

By one week of income we mean what is earned in a week (in other words, basically, this will be the weekly wage) but may also include, where appropriate, what is earned in a week through current account interests, property let income, etc. All the income losses happen at random: i.e. on different and separate weeks. On different weeks means there will be no single week when a substantial proportion of the workforce loses income. On separate weeks means they are non-consecutive. There are no other reasons that cause income loss. There is nothing individuals can do to change these outcomes.

For each of the following four scenarios, we are going to show you two alternatives (A and B) between which we ask you to choose. Both alternatives A and B are feasible and would cost the same to society.

Outcome of Alternative (A): a coin is tossed and if "heads" comes up, then none of the households will lose any income but if "tails" comes up, then all households will lose 3 weeks' income.

Outcome of Alternative (B): all households will lose 2 weeks' income, no matter heads or tails.

							I choose:		
	Number of individuals		Number of weeks' income lost	Number of individuals		Number of weeks' income lost			
	Not losing	Losing		Not losing	Losing		A	B	A=B
A	1000		0		1000	1 2 3	☐	☐	☐
B		1000	1 2		1000	1 2			
A	1000		0		1000	1 2 3 4	☐	☐	☐
B		1000	1 2		1000	1 2			
A	1000		0		1000	1 2 3 4 5	☐	☐	☐
B		1000	1 2		1000	1 2			
A	1000		0		1000	1 2 3 4 5 6	☐	☐	☐
B		1000	1 2		1000	1 2			

Question YEH: Questionnaire wording and visual aid for the income-equivalent health question

Now, we are going to talk about the health and the income of this community of 1000 individuals (that is, 250 households with 4 individuals each). We want you to think about how to distribute the number of weeks of **illness** and the number of **income lost** among the individuals of the community. **You are not one of the members of this community,** but please imagine that your opinion will be taken into account by the public authorities who have to make a decision for them. There are no right or wrong answers. THE WEEKS OF ILLNESS DO NOT AFFECT THE INDIVIDUALS’WEEKLY INCOME, THAT IS, INCOME AND ILLNESS ARE INDEPENDENT. For each of the following six scenarios, we are going to show you two alternatives (A or B) between which we ask you to choose. Both alternatives A and B are feasible and would cost the same to society.

Outcome of Alternative (A): all individuals will be seriously ill for 1 week and all households will lose 6 weeks income.

Outcome of Alternative (B): all individuals will be seriously ill for 5 weeks and all households will lose <u>**5**</u> weeks income.

	HEALTH		INCOME		I choose:		
	Number of individuals seriously ill	Number of weeks of illness	Number of individuals losing income	Number of weeks of income lost	A	B	A=B
A	1000	1	1000	1 2 3 4 5 6	☐	☐	☐
B	1000	1 2 3 4 5	1000	1 2 3 4 5			
A	1000	1	1000	1 2 3 4 5 6	☐	☐	☐
B	1000	1 2 3 4 5	1000	1 2 3 4			
A	1000	1	1000	1 2 3 4 5 6	☐	☐	☐
B	1000	1 2 3 4 5	1000	1 2 3			
A	1000	1	1000	1 2 3 4 5 6	☐	☐	☐
B	1000	1 2 3 4 5	1000	1 2			
A	1000	1	1000	1 2 3 4 5 6	☐	☐	☐
B	1000	1 2 3 4 5	1000	1			
A	1000	1	1000	1 2 3 4 5 6	☐	☐	☐
B	1000	1 2 3 4 5	1000	0			

APPENDIX B: Key considerations in the design of the questionnaire.

There are five main challenges in designing the survey.

(1) Constituents of the scenarios. While health primarily affects individuals, income affects households. For example, transferability of health is limited so that health cannot be removed from one family member to give another family member. On the other hand, money is substantially more transferable than health – indeed, a household is a unit where income is shared across members. A related issue concerns measurement: while it is possible to conceptualise household income, it is not possible to conceptualise "household health". These suggest that the natural health measure is at the individual level, whilst the natural income measure is at the household level. At the same time, the health-individual and income-household pattern may invite respondents to think that loss of income may not be a problem if other household members could supplement. In order to avoid this, while the income questions state that individuals are grouped in equal-sized households, the actual questions refer to the number of individuals affected.

(2) Initial distribution of outcome inequality or social risk. Scenarios could start from a baseline with outcome inequality and/or social risk, or from a baseline of outcome equality and/or no social risk. Since the real world is not equal and is uncertain, using a baseline with inequality and risk may make the results more policy relevant. However, to be able to draw conclusions that, for example, social risk aversion in health is higher or lower than outcome-inequality aversion in income, the design should be such that the observed results are not contaminated by the baseline risk in health being perceived, on average, as being higher or lower than the baseline inequality in income. A baseline scenario with no outcome inequality or social risk will control for this. The downside of this approach is that the scenarios may appear highly unrealistic.

(3) Scenarios with losses rather than gains. Firstly, while scenarios where households experience a significant increase in income for a fixed duration are plausible, scenarios where individuals experience a significant increase in health for a fixed duration are less so, because most people are already reasonably healthy. Introducing some artificially lowered level of baseline health (and baseline income) to start with would mean an additional layer of complexity. Secondly, respondents may find loss scenarios more credible, where health and income are simply lost, compared to gain scenarios, where respondents may want to know what the opportunity costs (if any) are and/or why they cannot be sustained.

(4) The size of the losses. Lifetime health and lifetime income typically have a positive correlation, and the causality can go in either direction. Persistent poverty is likely to have adverse effects on health, and serious long-term illness can affect employability and income. These effects can be cumulative and be disproportionately large relative to the number of time periods affected. If it is not credible to

respondents that lifetime health and lifetime income are independent of each other, then this will make it difficult to isolate the two in interview scenarios. One way to minimise this problem is to consider relatively small changes in health and income over a limited time-horizon. However, if the changes are too small, respondents may regard them as too trivial, which may result in underestimation of distributional preferences.

(5) Measurability of the losses. Operationalisation of outcome-inequality aversion and social-risk aversion require measurable goods. Incentivised studies of inequality and risk aversion in income typically contrast scenarios with different size payoffs over a fixed-time period. However, it is difficult to find a simple cardinal scale of magnitude of ill-health that all respondents can be expected to understand. One possibility would be to use prevalence of the loss in Bleichrodt et al. (2008) when modelling aversion to health inequality. Another option would be to use different durations of losses of a given magnitude (numbers of weeks of given loss over a year) in health and in income, rather than different magnitudes of losses for a fixed duration (e.g. different health problems, or different amounts of income lost) as this would increase comparability and parallels between health and income. The implication of this design is that the risk scenarios do not vary the probability of losses, which is fixed at 50%, but varies instead the magnitude of the loss.

To summarise, these five considerations have led to the decision to measure health in terms of serious illness affecting individuals for limited durations over a one-year period, and to measure income in terms of lost income affecting households for the same durations, assuming a static one-period model and a baseline scenario with no outcome inequality and no social risk.

APPENDIX C: Obtaining the social welfare function aversion parameters

Appendix C1: Obtaining the aversion parameter of a social welfare function with constant relative aversion

Let us assume a social welfare function $W = f(x_i, x_j)$, where *x* represents wellbeing over the one-year period (in terms of the annual number of weeks without losses in either health or income, and $46 \leq x \leq 52$ in this study); for the inequality questions, subscripts *i* and *j* represent two homogeneous groups of individuals of equal size; for the risk questions, i and *j* represent two different states of the world with equal probabilities. An established social welfare function with constant relative aversion is the Atkinson specification (Atkinson, 1970). However, this is defined for gains, and is not suitable in this context. Therefore, an alternative specification is used:

$$W_R(x)\begin{cases} = \frac{x^{1-r_R}}{1-r_R} & \text{if } r_R \neq 1 \\ = \log(x) & \text{if } r_R = 1 \end{cases} \tag{1}$$

Here, r_R is the constant relative aversion parameter, which is 0 for neutrality, positive for aversion, and negative for inequality or risk seeking. The (expected) social welfare for each scenario can be expressed as:

$$E(W_R) = \frac{q_i x_i^{1-r_R} + q_j x_j^{1-r_R}}{1-r_R} \tag{2}$$

Here, in the case of inequality aversion, q is the relative size of the two groups; and for social risk aversion, q is the probability of the two possible outcomes. If the respondent is indifferent between (x_{iA}, x_{jA}) for scenario A and $(x_{iB}, x_{jB})$for scenario B, then $W_R(\mathrm{x_A}) \cong W_R(\mathbf{x_B})$, so

$$\frac{q_i x_{iA}^{1-r_R} + q_j x_{jA}^{1-r_R}}{1-r_R} \cong \frac{q_i x_{iB}^{1-r_R} + q_j x_{jB}^{1-r_R}}{1-r_R} \tag{3}$$

Given that: $q_i = q_j = 0.5$; $\mathrm{x_{iA}} = 52$; and $\mathrm{x_{iB}} = \mathrm{x_{jB}} = 50$ throughout; therefore,

$$\frac{\left[52^{1-r_R} + x_{jA}^{1-r_R} - 2\times 50^{1-r_R}\right]}{1-r_R} = 0 \tag{4}$$

This cannot be solved for the value of r_R, which has been obtained for each value of x_{jA} by numerical approximation using MS Excel. Note, the social welfare function assumes strong monotonicity and thus is unspecified for $x_{jA} \geq 50$ (we assume the best possible value for x_{jA} is 49.9 weeks). Thus, the analysis uses five unique values of x_{jA} (one for being indifferent at each of the four scenario pairs, and one for $x_{jA} = 49.9$).

Appendix C2: Obtaining the aversion parameter of a social welfare function with constant absolute aversion

Absolute aversion to inequality or social risk is defined as $-W''/W'$. An established social welfare function with constant absolute aversion is the Kolm specification (Kolm, 1976). However, as with the Atkinson specification, this is defined for gains, and is not suitable in this context. Therefore, an alternative specification is used:

$$W_a(x) = 1 - \exp(-r_A x) \tag{5}$$

where r_a is the constant absolute aversion parameter. This is 0 for neutrality, positive for aversion, and negative for inequality or risk seeking. Using the same notations *i*, *j*, and *q* as in the paper, (expected) social welfare for each pair is:

$$E(W_a) = q_i(1 - \exp(-r_A x_i)) + q_j(1 - \exp\left(-r_A x_j\right)) \tag{6}$$

In our design, if constant absolute aversion is assumed, combinations that go *across* domains (i.e. inequality in health and in income; risk in health and in income) are not directly comparable. This is addressed by the exploratory income-equivalent health question (YEH): for example, the three weeks' of serious illness can be expressed in terms of an equivalent number of weeks' of income loss which is regarded as equally bad. Assuming additive separability between social welfare from health and social welfare from income, a *conversion rate* between weeks of ill health and the equivalent number of weeks of income loss can be approximated for each respondent at a point of indifference as:

$$-\frac{y_B - y_A}{h_A - h_B} \tag{7}$$

where *h* represents the number of weeks of serious illness, *y* represents the number of weeks of income loss and A and B represent the alternatives in each scenario. Therefore, suppose a respondent is indifferent on the third pair of scenarios, where, alternative A involves everybody experiencing serious illness for one week *and* six week's income loss; and alternative B has five weeks of serious illness *and* three weeks of income loss for everybody. One week of serious illness is then equivalent to losing 3/4 weeks' income. If the respondent is indifferent at one of the six pairs of the YEH question, the value of y_B is directly observed; otherwise, this may be inferred to be at the midpoint of the interval where the respondent switches from A to B. This procedure allows for up to 13 different conversion rates. Then, this value is used to convert the number of weeks in the IH and RH questions into the number of income-equivalent weeks (IHE and RHE) at the individual respondent level.

Next, the aversion parameters are derived from the numbers of weeks without loss, where the respondent is indifferent between (x_{iA}, x_{jA}) and (x_{iB}, x_{jB}), then $W_A(x_A) \cong W_A(x_B)$, so:

$$E(W_a) = q_i(1-\exp(-r_A x_i)) + q_j(1-\exp(-r_A x_j)) \tag{8}$$

Again, since $q_i = q_j = 0.5$; $x_{iA} = 52$; and $x_{iB} = x_{jB} = 50$ throughout, therefore:

$$\exp(-r_A 52) + \exp(-r_a x_{jA}) - 2\exp(-r_A 50) = 0 \tag{9}$$

Again, this cannot be solved for the value of r_A, which has been obtained for each of the five values of x_{jA} by numerical approximation for the four main aversions (IH, RH, IY and RY). As with the constant relative aversion, the social welfare function satisfies strong monotonicity, and therefore is not specified for $x_{jA} \geq 50$ (the same best possible value of 49.9 weeks is imposed).

Inequality aversion in income-equivalent health (IHE) and social risk aversion in income-equivalent health (RHE) are generated by applying the income-equivalent converter to the IH and RH questions, these involve up to 65 unique values of x_{jA} (13 × 5). This makes it impractical to numerically search for the value of ra for each value of x_{jA} in the same manner. Instead, these are approximated adapting a method used in Dolan and Tsuchiya (2009). The objective of the exercise is to identify the aversion parameter r_A of the SWF with constant absolute aversion that has a contour through two points, A and B. First, imagine a straight line through A and B. The gradient of this line is given by $-\frac{x_{jB}-x_{jA}}{x_{iA}-x_{iB}}$. Second, imagine a point C, which is midway between A and B, so $\left(\frac{x_{iA}+x_{iB}}{2}, \frac{x_{jA}+x_{jB}}{2}\right)$. Third, imagine the social welfare contour through A and B and the contour of the same SWF through C. Fourth, approximate the social conversion rate as the social marginal rate of substitution (SMRS) of this contour at C with the gradient of the straight line between A, C and B. Given the constant absolute aversion specification, the SMRS is $\frac{\exp(r_A x_j)}{\exp(r_A x_i)}$. Thus, at point C, we have $-\frac{x_{jB}-x_{jA}}{x_{iA}-x_{iB}} \cong \exp\left(r_A \frac{x_{iA}+x_{iB}}{2}\right) / \exp\left(r_A \frac{x_{jA}+x_{jB}}{2}\right)$. This can be solved as

$$-\ln\left(\frac{x_{jB}-x_{jA}}{x_{iA}-x_{iB}}\right) \cong \left(r_A \frac{x_{iA}+x_{iB}}{2}\right) - \left(r_A \frac{x_{jA}+x_{jB}}{2}\right)$$

$$r_A \cong -\ln\left(\frac{x_{jB}-x_{jA}}{x_{iA}-x_{iB}}\right) \Big/ \left(\frac{x_{iA}+x_{iB}-x_{jA}-x_{jB}}{2}\right).$$

Since the values of x_{iA}, x_{iB}, and x_{jB} in the scenarios are known for each respondent, the value of r_A can be calculated for the relevant level of x_{jA} for each respondent.

Applying the same method to the main questions indicates that this gives a reasonable approximation. (Full details available from authors on request.)

APPENDIX D: Descriptive statistics, aversion parameter intervals & frequencies for each response pattern

Table D1: Definitions of background variables and descriptive statistics

Variable	Definition	Mean (S.D.)
Female	Individual being a female (yes=1, no=0)	0.525
Age	Age of the individual (continuous)	45.214 (17.648)
Primary	Individual has primary school education or less (yes=1, no=0)	0.160
Secondary	Individual has secondary education (yes=1, no=0)	0.238
University	Individual has a university degree (yes=1, no=0)	0.602
Employed	Individual being currently employed (yes=1, no=0)	0.648
Unemployed	Individual being currently unemployed (yes=1, no=0)	0.082
Student	Individual being currently studying (yes=1, no=0)	0.065
Homemaker	Individual being currently homemaker (yes=1, no=0)	0.053
Retired	Individual being retired (yes=1, no=0)	0.151
Health very Good	Individual having very good health (yes=1, no=0)	0.273
Free rider charity	Individual agrees to statement "There is no need for me to donate to charity, because others already to it" (agree=1, disagree=0)	0.112
Free rider blood	Individual agrees to statement "There is no need for me to donate blood, because others already to it" (agree=1, disagree=0)	0.102
Selfsuff	Interviewer agrees to statement "The respondent did not needed help in the interview" (agree=1, disagree=0)	0.581

Note D1: Of the 422 respondents, four were excluded for indicating indifference at more than one scenario pair in at least one of the four main questions; another respondent was excluded for doing the same in the fifth question; and one respondent was excluded because of missing values in covariates – resulting in an analysis sample of 414. The sample is mostly representative of the Spanish general public, with the exception of education. According to the Spanish National Health Survey of adults for 2011-12 the proportion of individuals with university education is about 15%, secondary education 58% and primary education or less 27%. Instituto Nacional de Estadística. Ministerio de Sanidad, Servicios Sociales e Igualdad: Encuesta Nacional de Salud 2011–2012. https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2011.htm

Table D2: Aversion parameter intervals and frequencies for each response pattern

Aversion category	Response pattern	Type of preference	IH n(%)	RH n(%)	IY n(%)	RY n(%)	Constant relative aversion parameter	Constant absolute aversion parameter
1	B B B B	B at the first scenario pair	83 (20.5)	101(24.4)	161 (38.9)	119 (28.7)	$24.171 < r_R < 182.100$	$0.481 < r_A < 6.931$
2	= B B B	Indifferent at the first scenario pair, and B at the second	2 (0.5)	1 (0.2)	0 (0.0)	3 (0.7)	$r_R = 24.171$	$r_A = 0.481$
3	A B B B	A at the first scenario pair, and B at the second	94 (22.7)	129 (31.2)	97 (23.4)	135 (32.6)	$0 < r_R < 24.171$	$0 < r_A < 0.481$
4	A = B B	A at the first scenario pair, indifferent at the second and B at the third	45 (10.9)	27 (6.5)	39 (9.4)	27 (6.5)	$r_R = 0$	$r_A = 0$
5	A A B B	A at the first two scenario pairs, and B at the third	101 (24.4)	91 (22.0)	65 (15.7)	75 (18.1)	$-8.177 < r_R < 0$	$-0.164 < r_A < 0$
6	A A = B	A at the first two scenario pairs, indifferent at the third, and B at the fourth	5 (1.2)	4 (1.0)	2 (0.5)	6 (1.5)	$r_R = -8.177$	$r_A = -0.164$
7	A A A B	A at the first three scenario pairs, and B at the last	22 (5.3)	15 (3.6)	12 (2.9)	16 (3.9)	$-11.909 < r_R < -8.177$	$-0.241 < r_A < -0.164$
8	A A A =	A at the first three scenario pairs, and indifferent at the last	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	$r_R = -11.909$	$r_A = -0.241$
9	A A A A	A throughout the four scenario pairs	62 (15.0)	46 (11.1)	38 (9.2)	33 (8.0)	$r_R < -11.909$	$r_A < -0.241$
	TOTAL		414(100)	414(100)	414(100)	414(100)		

Note D2. Across all the questions, most respondents chose either alternative A or B, and few indicated indifference (see columns 4-7).

Table D3: Frequencies for response patterns to the Income-Equivalent Health question (YEH)

Response Pattern	Pair wise choice	YHE conversion rate	Number of observations	Percentage
BBBBBB		0.125	32	7.7%
=BBBBB	1	0.250	2	0.5%
ABBBBB		0.375	38	9.2%
A=BBBB	2	0.500	8	1.9%
AABBBB		0.625	97	23.4%
AA=BBB	3	0.750	10	2.4%
AAABBB		0.875	58	14.0%
AAA=BB	4	1.000	11	2.7%
AAAABB		1.125	35	8.5%
AAAA=B	5	1.250	2	0.5%
AAAAAB		1.375	11	2.7%
AAAAA=	6	1.500	0	0.0%
AAAAAA		1.625	110	26.6%
Total (N)			414	

Note D3. Mean value for YEH is 0.938 and standard deviation is 0.495

APPENDIX E: The results of the interval regression analysis

Table E1: Results of the random effects pooled interval regressions with bootstrapped standard errors (400 draws), constant relative aversion (full results)

	IH vs RH			IY vs RY			IH vs IY			RH vs RY		
	Coeff.	**Std. Error**	**P-value**	**Coeff.**	**Std. Error**	**P-value**	**Coeff.**	**Std. Error**	**P-value**	**Coeff.**	**Std. Error**	**P-value**
Female	2.909	1.748	0.096	1.305	2.110	0.536	1.906	1.971	0.334	2.473	1.861	0.184
Age	-0.832	0.334	0.013	-0.348	0.351	0.322	-0.618	0.388	0.111	-0.546	0.324	0.092
Age^2 /100	0.009	0.004	0.015	0.003	0.004	0.397	0.006	0.004	0.174	0.007	0.004	0.073
Secondary (†)	-0.532	2.673	0.842	-0.630	2.835	0.824	-1.451	2.856	0.612	0.359	2.761	0.896
University (†)	-2.104	2.509	0.402	-1.064	2.865	0.710	-4.991	2.759	0.070	1.551	2.717	0.568
Unemployed (‡)	-2.413	2.467	0.328	0.217	2.913	0.941	1.144	3.318	0.730	-3.090	3.262	0.343
Student (‡)	-9.781	3.415	0.004	-4.118	3.438	0.231	-5.498	3.818	0.150	-7.885	2.945	0.007
Housewife (‡)	0.680	5.917	0.908	9.623	6.934	0.165	4.298	5.492	0.434	5.374	5.898	0.362
Retired (‡)	-7.147	4.484	0.111	-2.980	5.036	0.554	-6.161	4.837	0.203	-4.359	4.611	0.344
Health V good	1.579	1.865	0.397	-0.489	2.313	0.832	-1.177	2.164	0.586	2.136	2.283	0.349
Free rider charity	4.118	3.512	0.241	4.956	3.889	0.202	5.861	3.602	0.104	2.982	3.442	0.386
Free rider blood	1.157	3.168	0.715	9.880	3.916	0.012	1.572	4.095	0.701	8.788	3.586	0.014
Selfsuff	-1.949	1.796	0.278	-0.711	2.065	0.731	-1.208	2.014	0.549	-1.496	1.945	0.442
Dummy	4.011	1.129	0.000	-2.891	1.235	0.019	10.012	1.332	0.000	2.923	1.032	0.005
Constant	22.200	7.679	0.004	21.995	8.198	0.007	21.622	9.112	0.018	16.397	7.240	0.024
Sigma u	12.767	1.068	0.000	14.710	1.211	0.000	13.886	1.140	0.000	14.556	1.079	0.000
Sigma e	14.094	0.825	0.000	15.306	0.926	0.000	15.795	0.917	0.000	12.622	0.838	0.000
Rho	0.451	0.057		0.480	0.059		0.436	0.057		0.571	0.055	
	Log pseudo likelihood=-1443.941 Wald chi2(14) = 40.62 Prob > chi2=0.002 LR test sigma u=0: chibar2(01) =68.62; Prob ≥ chibar2 = 0.000			Log pseudo likelihood=--1347.837 Wald chi2(14) = 25.79 Prob > chi2=0.028 LR test sigma u=0: chibar2(01) =74.38; Prob ≥ chibar2 = 0.000			Log pseudo likelihood=--1456.622 Wald chi2(14) = 79.59 Prob > chi2=0.000 LR test sigma u=0: chibar2(01) =60.83; Prob ≥ chibar2 = 0.000			Log pseudo likelihood=-1316.780 Wald chi2(14) = 41.69 Prob > chi2=0.001 LR test sigma u=0: chibar2(01) =115.58; Prob ≥ chibar2 = 0.000		

† Baseline category: primary
‡ Baseline category: employed

Table E2: Results of the random effects pooled interval regressions with bootstrapped standard errors (400 draws), constant absolute aversion (full results)

	IH vs RH			IY vs RY			IHE vs IY			RHE vs RY			IHE vs RHE		
	Coeff.	Std. Error	P-value	Coeff.	Std. Error	P-value	Coeff.	Std. Error	P-value	Coeff.	Std. Error	P-value	Coeff.	Std. Error	P-value
Female	0.058	0.035	0.096	0.026	0.042	0.537	0.042	0.087	0.631	0.060	0.071	0.401	0.077	0.097	0.423
Age	-0.017	0.007	0.013	-0.007	0.007	0.321	-0.009	0.015	0.546	-0.008	0.012	0.482	-0.016	0.016	0.328
Age^2 /100	0.000	0.000	0.015	0.000	0.000	0.398	0.000	0.000	0.752	0.000	0.000	0.464	0.000	0.000	0.440
Secondary (†)	-0.011	0.053	0.841	-0.013	0.057	0.824	-0.142	0.137	0.297	0.043	0.100	0.666	-0.092	0.149	0.537
University (†)	-0.042	0.050	0.403	-0.021	0.057	0.713	-0.243	0.133	0.067	0.091	0.099	0.358	-0.129	0.141	0.359
Unemployed (‡)	-0.048	0.049	0.329	0.004	0.058	0.941	-0.058	0.129	0.652	-0.077	0.128	0.550	-0.176	0.116	0.129
Student (‡)	-0.195	0.068	0.004	-0.082	0.069	0.232	-0.206	0.142	0.147	-0.271	0.106	0.010	-0.422	0.157	0.007
Housewife (‡)	0.014	0.118	0.908	0.192	0.138	0.166	0.282	0.304	0.353	0.384	0.286	0.179	0.275	0.369	0.457
Retired (‡)	-0.143	0.090	0.111	-0.060	0.101	0.554	-0.171	0.203	0.399	-0.113	0.157	0.472	-0.205	0.221	0.355
Health V good	0.032	0.037	0.395	-0.010	0.046	0.833	-0.011	0.097	0.911	0.051	0.084	0.545	0.067	0.102	0.511
Free rider charity	0.082	0.070	0.242	0.099	0.078	0.202	0.103	0.156	0.509	0.070	0.134	0.602	0.050	0.176	0.776
Free rider blood	0.023	0.063	0.719	0.197	0.078	0.012	0.185	0.204	0.364	0.423	0.184	0.022	0.238	0.207	0.250
Selfsuff	-0.039	0.036	0.279	-0.014	0.041	0.733	-0.095	0.091	0.300	-0.024	0.071	0.732	-0.107	0.097	0.270
dummy	0.080	0.023	0.000	-0.058	0.025	0.019	0.242	0.043	0.000	0.017	0.038	0.651	0.133	0.043	0.002
Constant	0.442	0.153	0.004	0.438	0.164	0.007	0.673	0.368	0.067	0.349	0.273	0.201	0.704	0.389	0.070
Sigma u	0.255	0.021	0.000	0.294	0.024	0.000	0.707	0.096	0.000	0.558	0.083	0.000	0.795	0.094	0.000
Sigma e	0.281	0.016	0.000	0.305	0.018	0.000	0.517	0.051	0.000	0.488	0.072	0.000	0.569	0.092	0.000
Rho	0.451	0.057		0.480	0.059		0.651	0.083		0.566	0.122		0.661	0.101	
	Log pseudo likelihood=-1114.106 Wald chi2(14) = 40.50 Prob > chi2=0.002 LR test sigma u=0: chibar2(01) =68.81; Prob ≥ chibar2 = 0.000			Log pseudo likelihood=-1045.602 Wald chi2(14) = 25.73 Prob > chi2=0.028 LR test sigma u=0: chibar2(01) =74.44; Prob ≥ chibar2 = 0.000			Log pseudo likelihood=-1347.190 Wald chi2(14) = 46.74 Prob > chi2=0.000 LR test sigma u=0: chibar2(01) =80.27; Prob ≥ chibar2 = 0.000			Log pseudo likelihood=-1322.5349 Wald chi2(14) = 26.10 Prob > chi2=0.025 LR test sigma u=0: chibar2(01) =73.99; Prob ≥ chibar2 = 0.000			Log pseudo likelihood=-1469.289 Wald chi2(14) = 32.97 Prob > chi2=0.003 LR test sigma u=0: chibar2(01) =150.69; Prob ≥ chibar2 = 0.000		

† Baseline category: primary
‡ Baseline category: employed

Note E1 and E2: Estimates of each pair of aversions show that there is a similar pattern across constant relative and constant absolute aversion in terms of the sign and statistical significance of the parameters. Seven variables were significant across different questions, but none were consistently so across all four hypotheses. Variables corresponding to employment status and self-assessed health were not significant in any of the models. Although these regressions have been built to test our four null hypotheses rather than to explore the particular determinants of aversions, it can be seen that being female is associated with higher levels of aversions in the health context whilst age is associated with higher aversions levels up to a certain age, when the association turns to be negative. Having university qualification is associated with a lower aversion to inequalities (both in health and in income) whilst those with who free ride in the context of blood donation are more social-risk averse in health and in income as well as inequality-averse in income.

References to the appendices

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