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Equality of what in health? Distinguishing between outcome egalitarianism and gain egalitarianism

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Abstract

When deciding how to weigh benefits to different groups, standard economic models assume that people focus on the final distribution of utility, health or whatever. Thus, an egalitarian is assumed to be egalitarian in the outcome space. But what about egalitarianism in the gains space, such that people focus instead on how equally benefits are distributed? This paper reports on a study in which members of the public were asked to rank a number of health programmes that differed in the distribution of benefits and final outcomes in ways that enabled us to distinguish between different types of egalitarianism. The results suggest that outcome egalitarianism dominates, particularly for differences in health by social class, but a sizeable minority of respondents appear to be gain egalitarians, especially when the health differences are by sex. These results have important implications for how we think about outcome-based social welfare functions in economics.

Acknowledgements

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1. Introduction

A central criterion by which public sector resources are allocated is efficiency. Economists have developed methods, like cost-benefit analysis, that help determine an efficient use of resources. But policy-makers – as well as members of the general public – are likely to be concerned about the distributional consequences of alternative allocation decisions as well as their efficiency. Thus, the two main policy concerns are: efficiency, representing how much more welfare is produced compared to the status quo; and equity, representing how equal the distribution of welfare is across the relevant parties.

The conventional frameworks relevant to efficiency judgements and that for equity judgements do not coincide. More specifically, imagine, as in Figure 1, a two-dimensional space with the welfare, or health, of two parties (two individuals, or two homogeneous population groups) represented along the two axes. Efficiency is usually judged by how much *more* the intervention will produce, and therefore, given a specific starting point (*S*), by how far to the north east the end point will lie with respect to this point *S*. However, equity is usually judged by how equal the two parties are in terms of their eventual levels of welfare, and so it will be judged with reference to how close the end point is to the 45 degree diagonal through the origin, *O*. In other words, the frame of reference for efficiency is the "gains space" with the origin at the initial point *S*, whereas the frame of reference for equity is the "outcomes space" with the origin at point *O*, where both parties have zero welfare.

In the health economics literature, the axes can represent one's lifetime total health, and the initial point the amounts of health so far experienced by the individual(s). Then the distinction between the outcomes space and the gains space is equivalent to the distinction between lifetime health and prospective health (see for example Dolan and Olsen, 2001). Since it is impossible to take away from somebody the health experience they have already had, all efficiency judgements take place in terms of prospective health, that is the gains space.

Conventional equity in health can be represented by a concern over the final distribution of health in the outcomes space, across the past and the future, for example by looking at the distribution of expected age of death, or expected lifetime health across different populations. In more general terms, the use of the gains space for efficiency judgements can be justified by appealing to the Pareto criterion: because any end point to the south or to the west of the initial point *S* represents a loss to at least one party, this will not satisfy efficiency.

On the other hand, however, why is equity conceptualised in terms of outcomes, for example as the equality of welfare? In other words, are there any circumstances under which "gain egalitarianism", or the equality of gains, become relevant? Unless the starting point *S* happens to lie on the 45° from the origin *O*, equity in the outcomes space and equity in the gains space will not coincide. Equal outcomes will require unequal gains, and equal gains will result in unequal outcomes. Therefore, if there are to be such circumstances where gain egalitarianism applied, equity in outcomes space needs to be seen as less relevant: i.e. not all unequal outcomes would be automatically regarded as inequitable. For instance, imagine a very poor commune where some members are close to starving. People may think that it is a matter of equity that everybody should achieve the same subsistence-level nutrition even if this meant unequal rations across members, so that outcome egalitarianism applied. But when imagining a much affluent commune where no member was starving, people may think differently. This time, equity might require equal rations for everybody even if this implied unequal outcomes across members, which would be in line with gain egalitarianism. This thought experiment suggests that the same people may be outcome egalitarian or gain egalitarian, depending on the context. Specifically, as in this example, it is a reasonable conjecture that the more "basic" the distribuendum, the more support outcome egalitarianism will receive.

In the area of health, there is some evidence that suggests members of the public think that whereas inequality in life expectancy at birth across the socio-economic classes is inequitable, a similar inequality across the sexes is not inequitable (Dolan et al., 2002). And if so, it may be reasonable to use the outcomes space to assess the equity of health policies that affect different socio-economic groups, but to use the gains space to assess the equity of health policies that affect the two sex groups. (For a theoretical discussion on the equitableness of the inequality in lifetime health between the sexes, see Tsuchiya and Williams, 2004).

One way to deal with the dual objectives of efficiency and distributional concerns is to introduce inequality aversion into an outcome-based objective function, as is done with any standard concave social welfare function (SWF). Here, efficiency and equity are collapsed into one objective function, with specific trade offs between them implied. This in effect puts the gains space into the background, and offers a complete ordering of all possible outcomes with reference to the origin *O*, so that any move from any point that crosses a social welfare contour away from the origin *O* is an improvement. As a result, the gains based Pareto criterion in the original sense is also compromised: given diminishing marginal rates of substitution, a move from starting point *S* to any point in the area marked *p* in Figure 1 (i.e. to the north-west from *S and* to the east of the social welfare contour through point *S*) will be regarded as an improvement although one party will be strictly worse off than at the initial point *S*. This reflects a tension between a social welfare judgement placed explicitly within the gains space, and a social welfare judgement placed primarily within the outcomes space.

On the other hand, a gain based assumption in the literature of SWF is the principle of monotonic increase, or the monotonicity principle, which states that social welfare will not decrease when the welfare of at least one party is improved. In other words, starting from point *S*, any move due north (or due east) is associated with a superior social welfare contour. However, if the location of *S* is considered to be sufficiently far away from the 45 degree diagonal through the origin *O* to the north west, in other words if the distribution under *S* is considered to be sufficiently unequal, then since the only party to be made better off would be the already much better off party, some may find it awkward that a move due north be regarded as an improvement. Indeed, there is some evidence to suggest that a significant proportion of the general public may have preferences that violate the monotonicity principle. For instance, Dolan et al has found that up to 20% of those interviewed had such preferences (Dolan et al., 2002). Such perceptions support a backward bending social welfare contour (Abasolo and Tsuchiya, 2004), which allows for the possibility that a move due north from certain points is associated with an inferior contour, because it implies moving away from 45 degree diagonal through the origin *O*. So this is another example of a conflict between a social welfare judgement placed within the gains space, and a social welfare judgement placed within the outcomes space.

This paper uses examples from inequalities in health to explore two issues related to the tension between gain based social judgements and outcome based social judgements. One relates to gain egalitarianism. Our conjecture is that when an existing inequality is perceived to be less inequitable, more people will support gain egalitarianism. The second issue is the violation of monotonicity. Our conjecture here is that when an existing inequality is perceived to be more inequitable, more people will violate the monotonicity principle. In order to explore these conjectures, we assume, in line with previous findings, that inequalities in health across social classes are perceived to be more inequitable than the same degree of inequalities in health across the sexes. We also assume, in line with common sense, that inequalities in life expectancy are more inequitable than inequalities in prevalence of illness. The following sections present the methods of a questionnaire based survey administered in small group settings, the results concerning the two issues above, and a discussion.

2. Methods

2.1 Questionnaire

Respondents were asked five questions on priority setting in health policy. This paper reports on the results of the third and fourth questions, which are referred to as Question 1 and Question 2 hereafter. (For details of the other questions, see Dolan and Tsuchiya, 2005.) The two questions discussed in the current paper involved trade-offs between health maximisation and a more equal distribution of health. Both questions used a benefit trade-off (BTO) method in which the size of the health benefit is used as the currency to express the trade-off between efficiency and equality. Question 1 used life expectancy at birth as the measure of health and Question 2 used the prevalence of long-term limiting illness (see Appendix A for the format of Question 1 – Question 2 followed a similar format).

Question 1 presented respondents with information on life expectancy at birth, at the starting point, which was 73 for the disadvantaged group, *I*, and 78 for the advantaged group, *J*. Both groups are of equal size. Respondents were asked to imagine six scenarios that could increase average life expectancy by varying amounts for the two groups. The six scenarios were presented in random order to avoid any anchoring effects, or ‘status quo’ bias (Samuelson and Zeckhauser, 1998), and respondents were first asked to choose their most preferred scenario. Having done this, they chose their second preferred scenario, third preferred and so on – effectively, ranking all six scenarios in order of preference, with no ties allowed.

The six scenarios, labelled *a* to *f*, are shown below, and the starting point (*S*) and the resulting distributions of health from each scenario are illustrated in Figure 2(a).

	Group *I*	**Group *J***
a	+ 2 years	+ 2 years
b	+ 3 years	+ 1 years
c	+ 4 years	+ 0 years
d	+ 3.5 years	+ 0 years
e	+ 3 years	+ 0 years
f	+ 2 years	+ 0 years

Question 2 presented respondents with prevalence rates of limiting long-term illness, which for the disadvantaged group was 40%, and for the advantaged group was 12%. Again, respondents were asked to imagine six scenarios that could reduce rates of illness by differing amounts for both groups, and to rank the scenarios in order of preference from the first to the sixth. The six scenarios are shown below and were designed to identify different types of preferences similar to those identified in Question 1, and are illustrated in Figure 2(b), where the axes are arranged so that reducing illness be represented in moves towards the right or above.

	Group *I*	**Group *J***
a	- 7 %	- 7 %
g	- 14 %	- 0 %
c	- 12 %	- 2 %
d	- 11 %	- 2 %
e	- 10 %	- 2 %
f	- 7 %	- 2 %

In order to test whether people's aversion to inequality differs according to the groups across which the inequalities exist, half the respondents received a variant where the health differences were by the highest and lowest social classes, and the half received another variant where the same differences existed between women and men. In Question 1, men are the disadvantaged group, and in Question 2 it is women, reflecting the shorter life expectancy of men and the higher level of morbidity amongst women.

2.2 Analysis

The results are summarised by the distribution of ranks and the average ranks given to each scenario by question and by questionnaire variant. Given the study design, individual level results will be summarised in three ways:

1. The ordering for scenarios *a*, *b*, *c*, and *g*, along the $\Delta H_I + \Delta H_J = C$ line. If a respondent is averse to inequalities in consequences, then $c[4,0] \succ b[3,1] \succ a[2,2]$ for Q3 and $g[-14,0] \succ c[-12,-2] \succ a[-7,-7]$ for Q4 should hold. In what follows, we will refer to this ordering as the "concave ordering". On the other hand, if a respondent is gain egalitarian, then their rank ordering will be determined by how close the points are to the line $\Delta H_I = \Delta H_J$, so the reverse preference ordering $a \succ b \succ c$ for Q3 and $a \succ c \succ g$ for Q4 should hold. These will be referred to as the "reverse concave ordering".

2. The ordering for scenarios *c*, *d*, *e*, and *f*, along the straight horizontal line. If a respondent's preference is either increasing in total health or decreasing in outcome inequality, then *c*[4,0] f *d*[3.5,0] f *e*[3,0] f *f*[2,0] for Q3 and *c*[-12,-2] f *d*[-11,-2] f *e*[-10,-2] f *f*[-7,-2] for Q4 should hold. We refer to this ordering as the "dominant ordering". On the other hand, if a respondent is gain egalitarian, then the reverse ordering *f* f *e* f *d* f *c* should hold. This will be referred to as the "reverse dominant ordering".

3. Where the dominant ordering holds, the location of *a* and *b* in this sequence. This will give an indication of the point at which the indifference curve through *a* intersects with the straight horizontal line from *c* to *f*, as in Figure 3, which, assuming symmetry, depicts two mutually exclusive cases where the indifference curve through point *a* falls between points *e* and *f*, and between points *d* and *e*. Note that, while the same can be done to identify the indifference curve through point *b*, given the location of point *g*, the indifference curve through this point is not expected to intersect with the straight horizontal line from *c* to *f*. The ordering between *c* and *g* overlaps with concavity.

In addition, the data are analysed using rank ordered logit regressions (in STATA 8), assuming a simple additive model between health maximisation and inequality reduction. The dependent variable is the rank given to a scenario, and the explanatory variables are the total gain in health across the two groups (GAIN) and the size of the difference in final health resulting from the scenario (INEQ). The performance of the model is assessed by looking at the product moment correlation between the predicted probabilities of a given scenario being ranked first and the average ranks of the scenario.

2.3 Logistics

Letters of invitation were sent out to 2000 people on the electoral register in two wards in Sheffield. Potential respondents were invited to participate in a group interview for which they would be paid £15. Brief discussion groups with groups of 5 to 8 people were conducted before each participant was asked, on an individual basis, to complete the questionnaire. Respondents were prompted by the facilitator to check whether they understood the questions.

3. Results

3.1 Respondents

In total, 257 people (13.2%) agreed to take part. To ensure that the sample was broadly representative of the wider population, 192 respondents were selected based on information on their age and sex obtained from their reply slips. In total, 128 (66.7%) participants attended a group interview. Five respondents had missing or unusable data, and were excluded from subsequent analysis.

3.2 Distribution of ranking

The overall rankings for the two questions are reported in Appendix B. Tables 1(a) and 1(b) present the results of the tests for concave ordering. About one half of respondents satisfy concavity on each question in relation to social class and about one-third do so in relation to differences between the sexes. The modal preference is to satisfy the concave ordering in both questions and both variants (a total of 28 respondents out of 123), whilst 11 respondents consistently support the reverse concave ordering.

These rankings suggest that more respondents are averse to inequalities in outcomes than to inequalities in gains since a concave ordering is consistent with outcome egalitarianism (and trading) but not with gain egalitarianism. However, there is considerable difference between the versions of the questionnaire, particularly in Question 3, where over one-third of respondents in the sexes variant exhibit gain egalitarian preferences (compared with less than one in ten in the social classes variant). There is less difference between the variants in Question 4, but gain egalitarianism is still more common in the sexes variant.

It is worth noting that some respondents may have been distribution neutral maximisers. Since maximisers are indifferent between all choices on the $\Delta H_I + \Delta H_J = C$ line, in the absence of being able to give tied ranks, they would have to have chosen randomly. Our experience from earlier piloting, however, suggests that very few respondents would fall into this group. It is also worth noting that, in the choice between three programmes that generate the same overall benefit, many respondents rank the 'middle' option first (that is, prefer a programme that targets the worst off yet at the same time gives something to both groups).

Tables 2(a) and 2(b) show the results of the tests for dominant ordering. Across the two questions and the two variants, the dominant ordering is the modal preference out of the 24 possible combinations. For Q3, the second most frequent ordering is $c \succ e \succ d \succ f$ for the social class variant (13%) and $d \succ c \succ e \succ f$ for the sex variant (12%), which are both similar to the dominant ordering ($c \succ d \succ e \succ f$). Support for the reverse dominant ordering is around 2%. However, the second most frequent ordering for Q4 after the dominant ordering is the reverse dominant ordering across the two variants (13% and 17%). This suggests that a significant minority support gain egalitarianism. Around 32% of those in the social class variant and 26% of those in the sexes variant chose the dominant ordering consistently across the two questions. There were no respondents who chose the reverse dominant ordering across the two questions.

3.3 Location of the indifference curve through points a and b

Tables 3 and 4 summarise the distribution of respondents in terms of the ranking given to scenario *a* (and then *b*), relative to the horizontal straight line between *c* and *f*, provided that dominant ordering is satisfied. The results for Question 3 in Table 3(a) indicate that there is moderate aversion to inequalities in life expectancy across the social classes but there is no aversion to inequalities across the sexes, where men are worse off than women. In fact, $a[2,2] \succ c[4,0]$ holds for the median respondent here, which supports gain egalitarianism. At the same time, $f[2,0] \succ a[2,2]$ holds for 16% of respondents in the social class variant and 25% in the sexes variant, implying backward bending social welfare contours i.e. contours that are strictly in favour of reducing the inequality between two groups even if both groups are worse off as result. Table 3(b), looking at the indifference curve through point *b*[3,1], indicates that the corresponding proportions are 8% and 28%, respectively. Overall, 16% in the social class variant and 18% in the sexes variant have indifference curves through points *a* and *b* that intersect.

The results for Question 4 indicate that, in the context of inequality in long-term illness, people are equally averse to inequalities between the social classes and the sexes, where women are worse off than men. Taken together, the modal preference is to have the indifference curve through *a* located between *e*[-10,-2] and *f*[-7,-2]. On the other hand, the results in relation to point *g* suggest that 21% of the social class variant and 25% of the sexes variant have the ordering *c*[-12,-2] f *g*[-14,-0], implying gain egalitarianism. However, none of these respondents also have *a*[-7,-7] f *c*[-12,-2] i.e. they have intersecting indifference curves.

3.5 Aggregate results

Table 5 reports the regression results. Since the units of health gain in the two questions are not the same, it is inappropriate to compare the regression coefficients across the questions. Moreover, since both GAIN and INEQ are crude proxy measures for total gains and outcome inequalities, it is also inappropriate to compare the relative size of the regression coefficient for GAIN with the coefficient for INEQ within one regression. However, it is meaningful to compare the relative size of the GAIN coefficients (or the INEQ coefficients) across the social class variant and the sex variant, within a given question. All regression coefficients are significant ($p < 0.05$), and have the expected sign: the preferences are for increased total health, and decreased outcome inequality. Both these preferences are stronger in the context of social class than in the case of sex, both in the life expectancy question and the long-term illness question. The final row indicates that the correlation between the predicted probability of a given scenario to be ranked first and the average rank given to the scenario. Since more preferred scenarios have higher probabilities and lower ranks, full agreement will have a correlation coefficient of -1. As can be seen, the four regressions perform well.

4. Discussion

This study explores peoples' preferences in relation to the distribution of health benefits and final health. It uses a ranking exercise to explore the nature and extent of inequality aversion. There are two conjectures: one is that when an existing inequality is perceived to be less inequitable, more people will support gain egalitarianism; and the second is that when an existing inequality is perceived to be more inequitable, more people will violate the monotonicity principle. The results suggest that most respondents are inequality averse, but the kind of inequality aversion varies across question and variant. With differences in life expectancy by social class, respondents appear to focus heavily on the final distribution of health, in line with outcome egalitarianism. However, with differences in life expectancy by sex, as well as with differences in long-term illness by social class and by sex, about one-third of respondents appear to be focusing on the size of the benefit to each party, in line with gain egalitarianism. The latter does not accord with standard social welfare functions based in the outcomes space, because gain egalitarianism is based in the gains space. However, both are in line with our conjectures. In addition, in the choice between three programmes that generate the same overall benefit, a sizeable minority of respondents prefer the programme that targets the worst off yet at the same time gives something to both groups. Such results might make some intuitive sense but, again, they do not accord with the notion of an outcome based social welfare function.

A dominant ordering is the modal preference across the four question variants, which sits easily with standard outcome-focused economic models. However, a significant minority violates dominance. There is an increasing body of evidence that suggests that violations of standard welfare economic axioms are far from rare (see for example Amiel and Cowell, 1999). We suggest that there is the need for more empirical research, across a range of decision contexts, to understand why so many people have non-standard preferences, including the violation of dominance as defined in this paper.

The regression results show that, both health maximisation and inequality aversion are stronger for inequalities across social classes than across the sexes, and this applies to both inequalities in life expectancy and in long-term illness. This is consistent with the finding that gain-based egalitarianism found more support in the sexes variant than in the social class variant. Regarding inequality aversion in outcomes, there are many respondents, particularly to the social class questions, whose rankings would imply backward bending social welfare functions. In other words, the final distribution of health could mean less health for both groups, so long as the inequality narrows. Again, such responses generate pathological social welfare functions in standard economics terms, but to us, and as we have argued elsewhere (Abasolo and Tsuchiya, 2004), are entirely plausible, particularly if health is seen as a pre-requisite for us to flourish as individuals (Anand, 2002, Culyer, 1971, Culyer, 1989).

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Table 1(a): The support for concave ordering in Q1 on life expectancy (%)

Preference	social class	sexes	total
Outcome based aversion *c*[4,0] f *b*[3,1] f *a*[2,2]	**44**	33	**38**
Gain based aversion *a*[2,2] f *b*[3,1] f *c*[4,0]	9	**35**	24
'Middle' preferred *b*[3,1] f *c*[4,0], *b*[3,1] f *a*[2,2]	17	13	15
All others	30	18.	24

mode in bold
sum to 100% along the columns

Table 1(b): The support for concave ordering in Q2 on long-term illness (%)

Preference	social class	sexes	total
Outcome-based aversion *g*[14,0] f *c*[12,2] f *a*[7,7]	**52**	**39**	**45**
Gain-based aversion *a*[7,7] f *c*[12,2] f *g*[14,0]	24	32	29
'Middle' preferred *c*[12,2] f *a*[7,7], *c*[12,2] f *g*[14,0]	17	17	17
All others	7	12	10

mode in bold
sum to 100% along the columns

Table 2(a): The support for dominant ordering in Q1 on life expectancy (%)

Preference	social class	sexes	total
Dominant *c*[4,0] f *d*[3.5,0] f *e*[3,0] f *f*[2,0]	**57**	**57**	**57**
Gain based *f*[2,0] f *e*[3,0] f *d*[3.5,0] f *c*[4,0]	2	3	2
All others	41	41	41

mode in bold
sum to 100% along the columns

Table 2(b): The support for dominant ordering in Q2 on long-term illness (%)

Preference	social class	sexes	total
Dominant *c*[12,2] f *d*[11,2] f *e*[10,2] f *f*[7,2]	**43**	**35**	**38**
Gain based *f*[7,2] f *e*[10,2] f *d*[11,2] f *c*[12,2]	13	17	15
All others	44	48	46

mode in bold
sum to 100% along the columns

Table 3(a): Distribution (%) of the location of indifference curve through *a* in Question 3 on life expectancy – respondents with dominant ordering only

	social class	sexes	Total
to the right of *c* [4,0]	32	**50**	43
between *c* [4,0] and *d* [3.5,0]	16	8	**12**
between *d* [3.5,0] and *e* [3,0]	**8**	6	7
between *e* [3,0] and *f* [2,0]	28	11	18
to the left of *f* [2,0]*	16	25	21
total (*n*)	25	36	61

Median in bold
* This implies a backward bending iso-welfare contour.

Table 3(b): Distribution (%) of the location of indifference curve through *b* in Question 1 on life expectancy – respondents with dominant ordering only

	social class	sexes	Total
to the right of *c* [4,0]	20	39	31
between *c* [4,0] and *d* [3.5,0]	20	8	13
between *d* [3.5,0] and *e* [3,0]	**52**	**25**	**36**
to the left of *e* [3,0] *	8	28	19
total (*n*)	25	36	61

Median in bold
* This implies a backward bending iso-welfare contour.

Table 4(a): Distribution (%) of the location of indifference curve through *a* in Question 2 on long term illness – respondents with dominant ordering only

	social class	sexes	Total
to the right of *c* [12,2]	9	17	13
between *c* [12,2] and *d* [11,2]	0	17	9
between *d* [11,2] and *e* [10,2]	4	8	6
between *e* [10,2] and *f* [7,2]	**61**	**29**	**45**
to the left of *f* [7,2] *	26	29	28
total (*n*)	23	24	47

Median in bold
* This implies a backward bending iso-welfare contour.

Table 4(b): Distribution (%) of the location of indifference curve through *g* in Question 2 on long term illness – respondents with dominant ordering only

	social class	sexes	Total
to the right of *c* [12,2]	**78**	**75**	**77**
to the left of *c* [12,2] ‡	21	25	23
total (*n*)	23	24	47

Median in bold.
‡ This implies gain egalitarianism.

Table 5: The additive model using rank ordered logit regression

	Q3: life expectancy		Q4: long term illness	
	social class	sexes	social class	sexes
GAIN	**0.88**	**0.74**	**0.14**	**0.08**
INEQ	**-0.31**	**-0.20**	**-0.09**	**-0.03**
Correlation	-0.93	-0.90	-0.97	-0.84

Bold where $p < 0.05$
GAIN: total gain in health across the two groups
INEQ: the size of the difference in final health resulting from the scenario
Correlation: Pearson product moment correlation between the predicted probability of a given scenario being first best, and the average rank of the scenario. The closer this is to -1 the better is the performance of the regression.

Figure 1: The Outcomes space and the Gains space

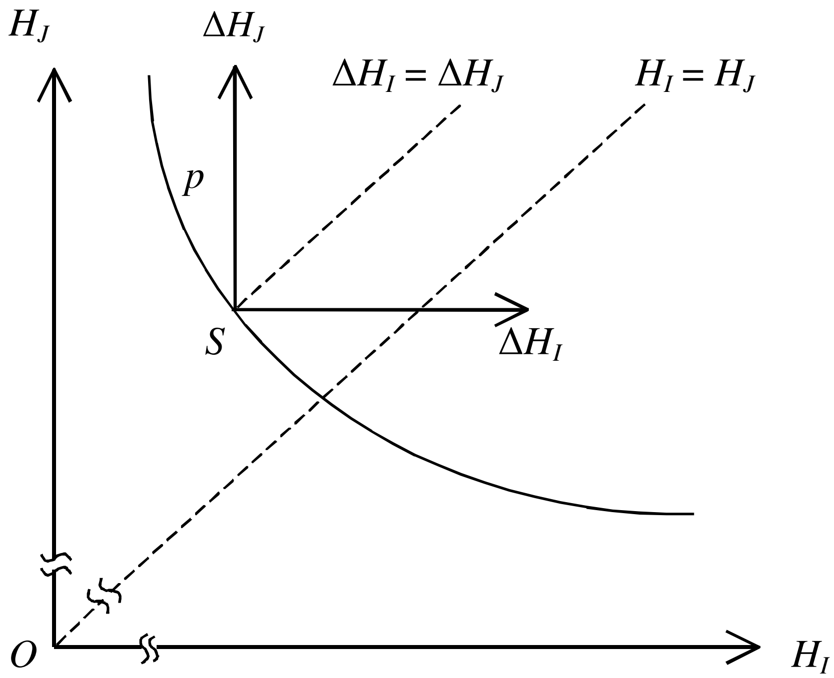
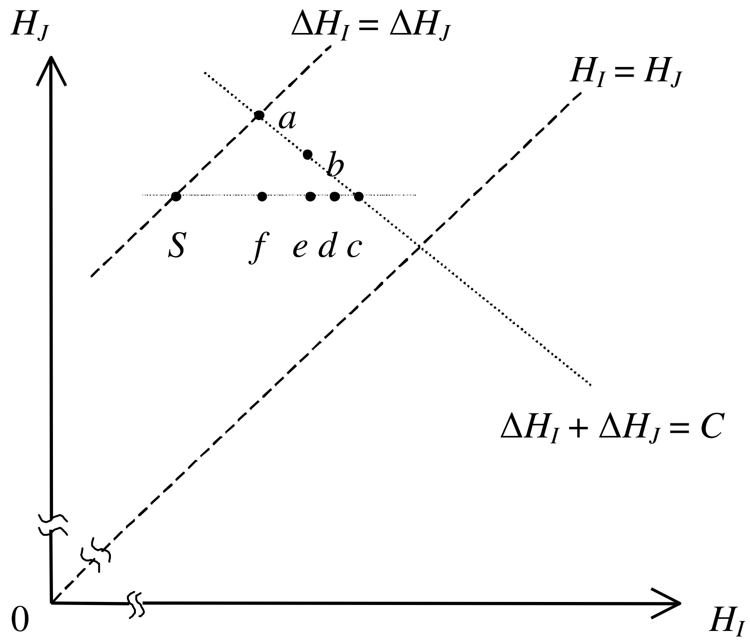
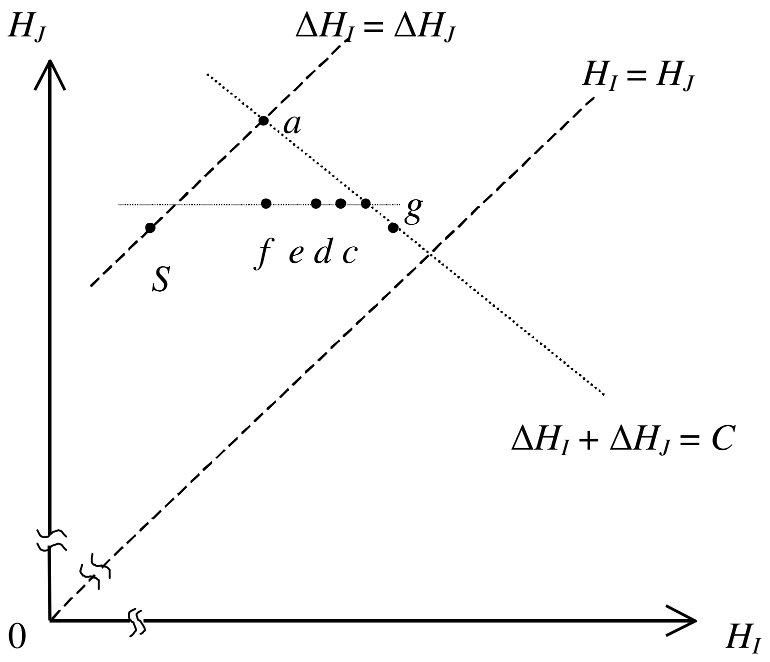


Figure 2(a): The starting point and the six scenario outcomes in Q3



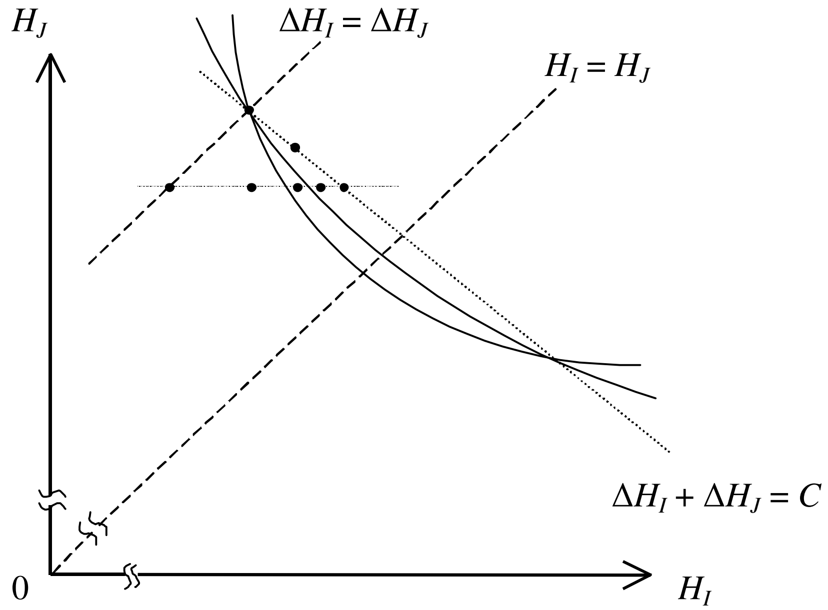
The move from the starting point S to a corresponds to the equal gain line $\Delta H_I = \Delta H_J$.
Points a, b, and c lie on the constant total gain line $\Delta H_I + \Delta H_J = C$.
Points c, d, e, f, and S lie on a horizontal line with H_J held constant.

Figure 2(b): The starting point and the six scenario outcomes in Q4



The move from the starting point S to a corresponds to the equal gain line $\Delta H_I = \Delta H_J$.
Points a, c, and g lie on the constant total gain line $\Delta H_I + \Delta H_J = C$.
Points c, d, e, and f lie on a horizontal line with H_J held constant.

Figure 3: Two alternative indifference curves through *a*



Labels for the points are dropped (see Figure 1 above).
The figure shows two symmetric contours through point *a* that intersect with the horizontal line *c*-*d*-*e*-*f* at different points.

Appendix A: Format for life expectancy question

Whilst actual life expectancy varies between individuals, on average, people in social class 1 live to be **78** and in social class 5 they live to be **73**. Imagine that you are asked to choose between six programmes that will **increase** average life expectancy.

Social class 1	Social class 5	
78 +0 years = 78 years	73 +2 years = 75 years	☐

Social class 1	Social class 5	
78 +0 years =78 years	73+3 years =76 years	☐

Social class 1	Social class 5	
78 +1 years =79 years	73+3 years =76 years	☐

Social class 1	Social class 5	
78 +2 years =80 years	73+2 years =75 years	☐

Social class 1	Social class 5	
78 +0 years =78 years	73+3.5 years = 76.5 years	☐

Social class 1	Social class 5	
78 +0 years =78 years	73+4 years =77 years	☐

Appendix B1: Ranks given to different scenarios in Q1 on life expectancy (%)

scenario	variant	1	2	3	4	5	6	average rank
a [2,2]	social class	**24**	19	6	11	20	20	3.46
	sexes	**44**	10	7	3	7	29	3.07
b [3,1]	social class	11	15	**43**	20	9	2	3.07
	sexes	9	**39**	19	19	12	3	2.94
c [4,0]	social class	**54**	20	11	0	9	6	2.07
	sexes	**38**	13	26	10	9	4	2.52
d [3.5,0]	social class	6	**32**	19	26	11	7	3.28
	sexes	6	28	20	**32**	9	6	3.28
e [3,0]	social class	2	15	17	**30**	**30**	7	3.93
	sexes	1	4	20	26	**39**	9	4.23
f [2,0]	social class	4	0	6	13	20	**57**	5.19
	sexes	3	6	7	10	25	**49**	4.96

mode in bold
sum to 100% along the rows
social class variant: n = 54
sexes variant: n = 67

Appendix B2: Ranks given to different scenarios in Q2 on long term illness (%)

scenario	variant	1	2	3	4	5	6	average rank
a [7,7]	social class	19	7	7	4	**35**	29	4.13
	sexes	**38**	4	7	6	16	29	3.45
g [14,0]	social class	**50**	4	15	6	11	15	2.69
	Sexes	**38**	6	15	6	9	28	3.25
c [12,2]	social class	11	**48**	11	6	19	6	2.89
	Sexes	9	**42**	9	13	22	6	3.14
d [11,2]	social class	2	11	**50**	20	11	6	3.44
	Sexes	1	9	36	**40**	10	3	3.58
e [10,2]	social class	4	19	11	**52**	11	4	3.59
	Sexes	3	20	**30**	28	15	4	3.43
f [7,2]	social class	15	11	6	13	13	**43**	4.26
	Sexes	12	19	3	7	29	**30**	4.14

mode in bold.
sum to 100% along the rows
social class variant: $n = 54$
sexes variant: $n = 67$