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Justice in health: how to measure inequality of what?

Erik Schokkaert (Department of Economics, KU Leuven)

A. Introduction

- Egalitarian approaches: equality of what? Growing criticism on welfarist (subjective well-being) approaches. Individuals should not be compensated for expensive tastes.

- The issue of responsibility has invaded social choice and political philosophy ("*luck egalitarianism*") in recent decades: move towards more general approach ("inequality of opportunity", "inequity in health (care)").

- Yet, first question: (why) should we be interested in inequalities in health (care)?

B. A normative perspective

1. Why care about health inequality?
2. What about inequity in health care?
3. Why focus on socioeconomic inequality?

1. Why care about health inequality?

- A consequentialist hierarchy of principles:
  - what matters is inequality in overall well-being.
  - health is important as a crucial component of well-being.
  - health care is important if it contributes to a better health (or directly to well-being).

- Quality of life involves many dimensions: income or material consumption, health, quality of social interactions and of the natural environment, safety.

...should be considered together

	income	health
individual 1	100	10
individual 2	10	100
average	55	55
ratio	10/1	10/1

	income	health
individual 1	100	100
individual 2	10	10
average	55	55
ratio	10/1	10/1

- "A state of affairs in which those who are otherwise worse off are healthier than those who are otherwise more fortunate is *more* just rather than less just than a state of affairs which is exactly the same except that health is equally distributed" (Hausman, 2007).

- *Accounting for cumulative deprivation requires that one first constructs an index of "quality of life" at the individual level and then aggregates these well-being indices across individuals. Focusing on one dimension (e.g. health) may be very misleading.*

Another illustration: health care expenditures and poverty

- A traditional question: do health care expenditures bring individuals below the (income) poverty line?

- This may be highly misleading: individuals who cannot afford health care expenditures would perhaps remain above the income poverty line but become severely ill. Other individuals avoid severe illness by spending resources on health care. They may then end below the poverty line. Who is best off?

2. What about inequity in health care?

- Beyond consequentialism: respect for autonomy and dignity of all human beings.
- Fits into “relational egalitarianism” (e.g. Elisabeth Anderson).

- Equal treatment in situations of pain, suffering, confrontation with death can be seen as a basic condition of respect for human dignity.

Illustration: Jones et al. (JHE, 2011)

Table 4
Country ranking of inequality.

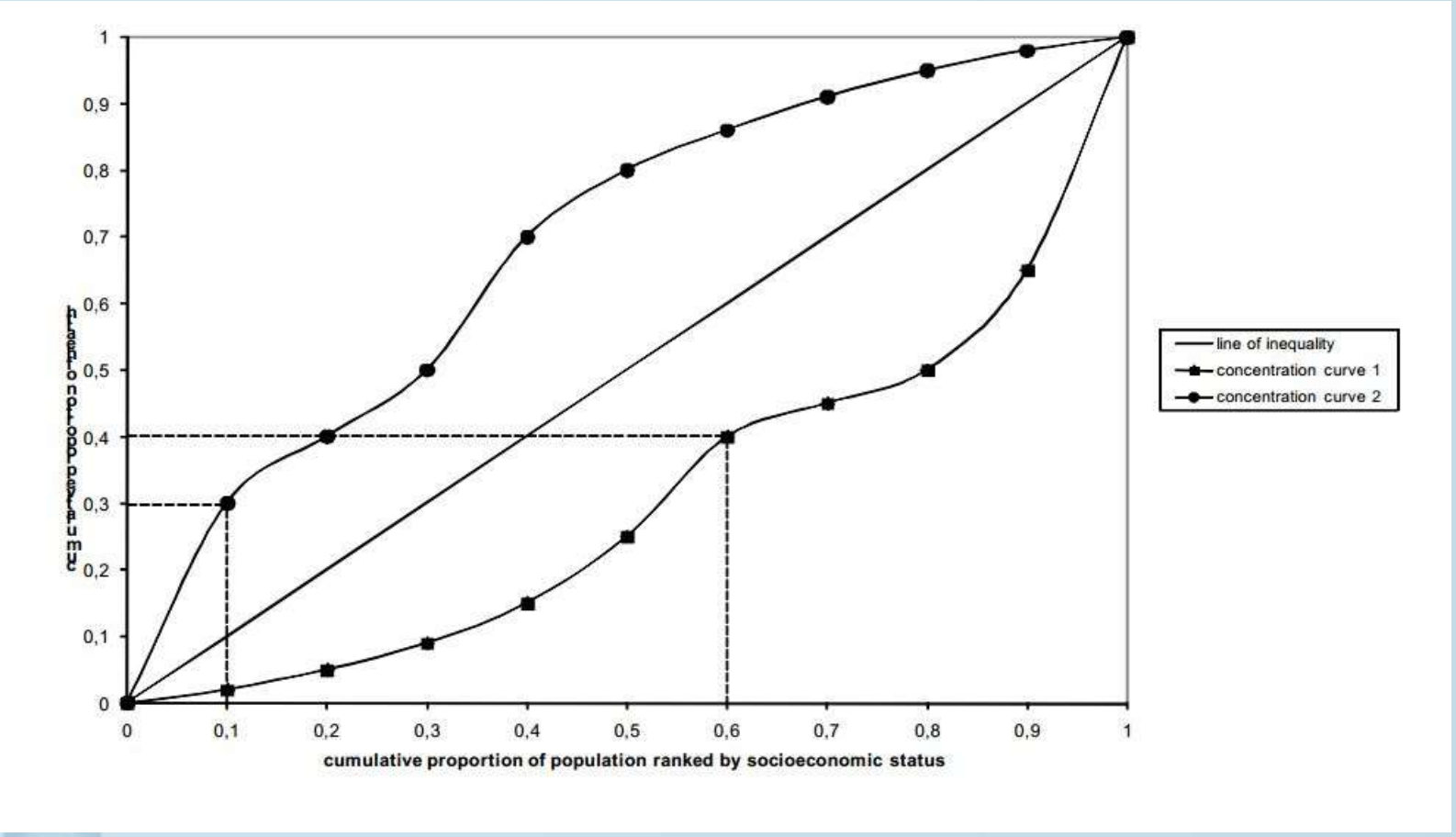
Country	Dignity	Prompt attention	Confidentiality	Clarity of communication	Specialist visits		Hospital visits	
	Index, $I_{1,1}$	Index, $I_{1,1}$	Index, $I_{1,1}$	Index, $I_{1,1}$	Number	Prob	Number	Prob
Portugal (PRT)	10 (0.185)	8 (0.290)	10 (0.214)	10 (0.203)	1 (0.140)	2 (0.086)	3 (−0.192)	10 (−0.016)
Spain (ESP)	9 (0.204)	9 (0.276)	7 (0.292)	9 (0.219)	7 (−0.026)	5 (0.022)	5 (−0.168)	4 (−0.076)
The Netherlands (NLD)	8 (0.237)	5 (0.351)	8 (0.284)	5 (0.336)	4 (−0.051)	10 (−0.011)	7 (−0.158)	2 (−0.085)
Germany (DEU)	7 (0.260)	10 (0.271)	9 (0.260)	8 (0.274)	10 (−0.003)	6 (0.019)	8 (−0.059)	5 (−0.064)
Belgium (BEL)	6 (0.296)	6 (0.325)	5 (0.312)	6 (0.333)	6 (−0.031)	7 (0.017)	2 (−0.222)	1 (−0.141)
Finland (FIN)	5 (0.306)	4 (0.360)	4 (0.345)	7 (0.306)	2 (0.110)	1 (0.105)	4 (−0.17)	6 (−0.053)
Italy (ITA)	4 (0.307)	7 (0.307)	3 (0.346)	1 (0.362)	3 (0.072)	3 (0.071)	9 (−0.036)	9 (−0.024)
Hungary (HUN)	3 (0.339)	2 (0.391)	1 (0.405)	4 (0.347)	8 (−0.019)	8 (0.014)	6 (−0.16)	7 (−0.047)
France (FRA)	2 (0.344)	3 (0.366)	6 (0.307)	3 (0.349)	5 (0.037)	4 (0.034)	10 (−0.019)	8 (−0.037)
Ireland (IRL)	1 (0.350)	1 (0.397)	2 (0.386)	1 (0.362)	9 (0.005)	8 (0.014)	1 (−0.261)	3 (−0.081)

Note: Data on specialist and hospital visits are taken from van Doorslaer and Masseria (2004).
The parentheses show the Abul Naga–Yalcin index for the domains of responsiveness and the concentration index for specialist and hospital visits. These indices are not comparable.
Prob is the probability of any visit; number is the number of visits.

Note: Abdul Naga-Yalcin index takes into account ordinal nature of data.

3. Why focus on socioeconomic inequality?

- The workhorse of the traditional literature: the concentration index.



A shaky normative basis

- Principle of income-related health transfers (Bleichrodt/van Doorslaer, 2006):

  "Transferring health from someone who is better off in terms of socoeconomic status to someone who is worse-off in terms of socioeconomic status does not lead to a reduction in social welfare provided the transfer does not change the ranking of the individuals in terms of socioeconomic status".

  Not very plausible? Illustrates that our intuitions are about well-being.

- Issue of cumulative deprivation can better be tackled with a broader concept of well-being.

- Why would SES be the only cause of “illegitimate” inequalities?
    - Regional differences?
    - What about demographic (age-gender) differences?

- Is it not possible that a part of the socioeconomic inequality is legitimate?
    - What about differences in lifestyle?

C. From socioeconomic inequality to inequality of opportunity

- Define an outcome function:

$$y_i = f(x_i) = f(c_i, r_i)$$

  - "mechanism" determining the outcome (however measured).
  - two sets of variables: "compensation" (circumstances/types) and "responsibility" (effort).
  - typical example of circumstance: SES parents.

Basic idea

- QUESTION: how to “measure” inequality if we want to “compensate” individuals for differences in *c* while holding them “responsible” for differences in *r*?

- *The formal framework is “general”, in that it holds for all possible responsibility cuts.*
- I will come back to the question of the “responsibility cut” later.

- Existing conditional approaches (e.g. socio-economic health inequalities) are just primitive versions of this general framework (with SES as the only compensation variable).

Inequality in fairness gaps

- Fix a reference value for the circumstance variables and calculate a "norm" outcome for *i:*

$$y_i^{NORM} = f(\tilde{c}, r_i).$$

- Calculate the distance between the norm outcome and the actual outcome. This is called the "fairness gap":

$$fg_i = y_i - y_i^{NORM}.$$

- Calculate the inequality $I(fg_i)$.

- How to choose $\tilde{c}$? The best approach is to take the circumstances of the "best-off" type (rather than the average, which is common in the literature).

Indirect approach

- It has become popular in the literature to calculate "inequality of opportunity" as

$$I^{IEOP} = I(y_i) - I(y_i^{NORM}).$$

- Yet this is a very strange measure.
  - EXAMPLE: take $y^{NORM} = (20, 40)$.
  - Compare two outcome distributions: (21, 39) and (39, 21).
  - These will give the same value for I^{IEOP}.

II. Three important questions

- From reduced form to structural modelling.
- How to handle imperfect information?
- A plethora of inconsistent results.

From reduced form to structural modelling

- The literature until now has been dominated by reduced form approaches, in which one estimates, e.g.
$$h = h(SES_i, d_i, P_i).$$

- This makes it nearly impossible to take a sufficiently worked out ethical position. Compare
$$h = h(hc(hn(SES_i, d_i, P_i^1), SES_i, d_i, P_i^2), hn(SES_i, d_i, P_i^1))$$

- Crucial variables work through different channels and there is no reason to think that the responsibility cut would be the same in all these channels.

1. Only a well-specified structural model can identify these different channels.

2. If we want to derive policy conclusions about how to reduce inequality of opportunity, we definitely need a better insight into causal relations (some examples of counterfactual analysis: Garcia-Gomez et al., HE 2015; Jones et al., SCWE 2014).

- Good econometrics is badly needed! Normative consideration should not impose a straightjacket on the empirical work.

- There should be more contact between economists estimating sophisticated models of, e.g., lifestyle choices, and normative welfare economists.

How to handle imperfect information?

- In practice, information will be incomplete. The estimation result will be

$$y_i = f\left(c_i^I, r_i^I, res_i\right).$$

- Usually, some circumstance variables are easily observed (e.g. SES of parents).
- Yet, if description of types is incomplete, estimated inequality will be a lower boundary of actual inequality.

$$y_i = f\left(c_i^I, r_i^I, res_i\right)$$

- "Effort" is very often not observed, and even conceptually more difficult.
  - e.g. can we observe the "effort" behind lifestyle choices?

- What if effort and circumstances are correlated? Can individuals be held responsible for the effort distribution of their type?
  - RIA (Roemer's identifying assumption): effort of individual *i* measured by the percentile (s)he occupies in the outcome distribution of his (her) type. VERY CONVENIENT!

- Some have argued that it is sufficient to estimate a reduced form $y_i = h(c_i)$, as the indirect effect of effort through circumstances would then be captured by the reduced form effect of c_i.
  - This does not work for all measures and/or non-linear specifications.

- An alternative? Try to estimate a structural model:

$$y_i = f(c_i, r_i)$$
$$r_i = g(c_i, z_i)$$

(e.g. Jusot, Tubeuf, Trannoy, HE 2013)

How to treat the residuals?

$$y_i = f\left(c_i^I, r_i^I, res_i\right)$$

- Most difficult issue, as the residual will capture "luck", but also the effects of misspecification and omitted variables.

- Often the residual is simply neglected. The interpretation of this practice will depend on the inequality measure used.
  - Direct unfairness - $y_i^{DU} = f(c_i, \tilde{r}, 0)$ – residual interpreted as legitimate cause of differences.
  - Fairness gap - $y_i^{NORM} = f(\tilde{c}, r_i, 0)$ - residual interpreted as illegitimate cause of differences.

Two better alternatives

1. Better: calculate each time the results with the residuals either as *c* or as *r* variable. This gives upper and lower bounds.

2. Take residual as a mixed variable (Ooghe, Theory and Decision, 2015: "partial compensation").
   - Take γres_i as "compensation" and $(1-\gamma)res_i$ as "responsibility" variables.
   - Again, estimation of a structural model may help in getting a better insight into the size of *γ.*

A fundamental question: “luck”

- Certainly in the health context, the treatment of random factors is of utmost importance.
- In the traditional approach “luck” must be seen either as a compensation variable or as a responsibility variable (cf. Dworkin: “brute luck” versus “option luck”).

- Recent proposal by Lefranc and Trannoy (SCWE 2017): treat luck as a “third” category.
  - Distribution-wise compensation principle

$$F_{Y|C,R}(y|c,r) = F_{Y|C,R}(y|c',r)$$

INTERPRETATION: Luck must be distributed in an even-handed way.

A plethora of inconsistent results

- Good that more and more people now start calculating EOP. Yet:
  - different definitions of C and R, largely determined by ad hoc availability of data.
  - conditioning by different variables makes it very difficult to compare studies even for the same country and a fortiori between different countries.
  - basic problems (residuals, luck, ethical choices) very often neglected.
- Perhaps partial approaches (e.g. socioeconomic inequality, preferably based on childhood circumstances) are not so bad after all, if interpreted cautiously?

III. The philosophical discussion again

- *John RAWLS, A theory of justice (1971):*
  - autonomous moral agents must get the freedom and assume responsibility of pursuing their own personal conception of the good life.
  - resulting differences in well-being are their own responsibility.

- *Ronald DWORKIN, What is equality? (1971)*
  - personal talents and handicaps to be seen as internal resources.
  - a good distribution of resources must be endowment-insensitive but ambition-sensitive.

From preferences to control?

- *Richard ARNESON (1989), Gerald COHEN (1989), John ROEMER (1993)*
  - individuals should only be held responsible for characteristics and decisions that are within their own *control* (e.g. not for preferences that are "imposed" upon them by their education)

Responsibility as control

- Seems intuitively very attractive and dominates the empirical work.

- “Genuine control” requires that one also corrects for interindividual differences in (internal) choice-making abilities and in the (external) environment (in so far as it is not chosen by the individual).

Determinism and free will

- Is there any room left for “control” in a deterministic world, if we better and better can understand and explain behaviour?

- In general, in a world where the belief in determinism seems great, “it is difficult to expand equality of opportunity in ways that satisfactorily address the constraining effects of social circumstance, gender socialisation, cultural convictions and so on, without undermining the idea of people as responsible agents” (Phillips, J. Pol. Philosophy, 2006).

Obvious example: lifestyle

- Are lifestyle choices really free choices under control of the individuals?
- Where does “control” start/end?
- What about the (usually very large) unexplained variation? It is strange to give a large ethical weight to the limits of our knowledge.

Example: recreational amenities (Sandy et al., 2011)

- clinical records (11 years) of successive visits by children to pediatric clinics in Indianapolis (age-sex adjusted BMI z-scores)

	0.1 mile	0.25 mile	0.5 mile	1 mile
Fast food	ns	ns	ns	ns
Fitness areas (children < 8)	- 62.44	- 4.81	ns	ns
Kickball diamond (ch < 8)	- 0.42	ns	ns	ns
Playground without equipment (ch > 8)	2.64	0.46	0.30	ns
Volleyball (ch > 8)	- 0.90	ns	ns	ns

A possible way out?

- Responsibility practices in a given society. Even if we cannot choose freely, as human beings we need the feeling that we are to some extent free, and society needs to impose rules that give citizens a “feeling” of responsibility (Strawson).

- This makes the responsibility cut time- and society-dependent (John Roemer).

Responsibility for preferences

- Back to Rawls and Dworkin: individuals are held responsible for their preferences (their conceptions of a good life), even if these preferences are not chosen/are not under their control.

- Dworkin: respect for individuals implies respect for their preferences with which they identify (when people endorse their preferences, it is bizarre to consider these as a piece of bad luck)

Autonomy and freedom (Fleurbaey, 2008)

- Responsibility is not something which justifies disadvantages, but something which is assumed by individuals when they accept liabilities: justified by independent fairness principles.

- Autonomous individuals must have the freedom to practice the activity of choice as much as desired and possible.

An example: Garcia Gomez et al. (2015) – inequity in the face of death

	direct unfairness	fairness gap
all illegitimate	0.0239	0.0239
control approach	0.0102	0.0229
preference approach	0.0146	0.0239
SES	0.0000	0.0020

D. From health to well-being

- Remember: inequality in health is not a very attractive notion from the welfare point of view.
- What if we move from health to well-being? Can we then still keep to our intuition that people should be held “responsible for their preferences”? (Or, better, can we respect preferences?).
- What about multidimensional inequality measures?

I. At a crossroads: an incompatibility

- **Outcomes**: distribution matrix

$$L = \begin{bmatrix} \ell_1^1 & \dots & \ell_1^m \\ \ell_2^1 & \dots & \ell_2^m \\ \dots & \dots & \dots \\ \ell_n^1 & \dots & \ell_n^m \end{bmatrix}$$

- **Preferences**: individuals have a preference ordering R_i over outcomes ("well-considered judgments")

- We write R_i=$R(a_i)$ with a_i a preference vector

$$A = \begin{bmatrix} a_1^1 & \dots & a_1^k \\ a_2^1 & \dots & a_2^k \\ \dots & \dots & \dots \\ a_n^1 & \dots & a_n^k \end{bmatrix}$$

Two principles

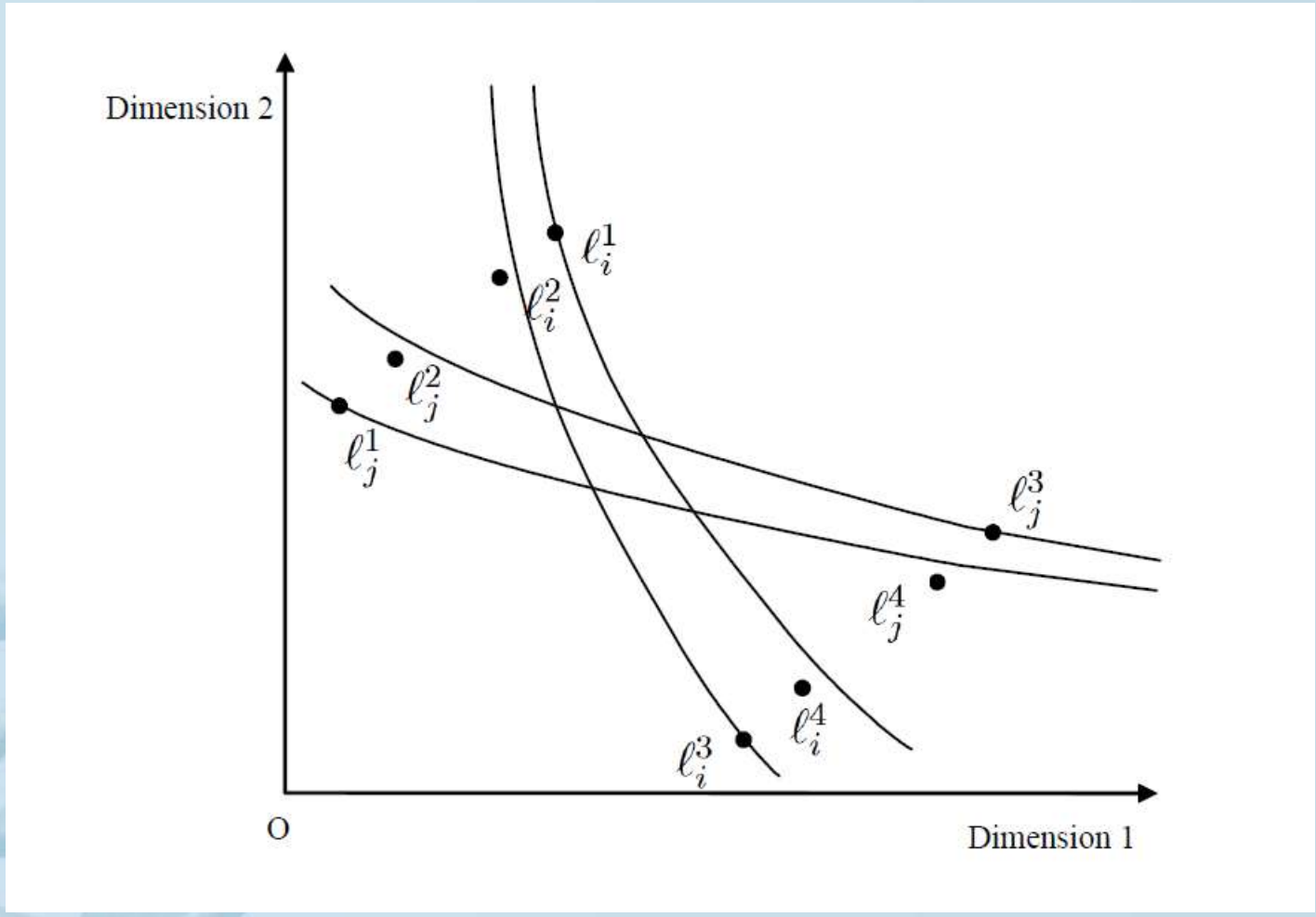
- Respect for preferences:

Weak Pareto Principle. *(L', A) is strictly better than (L, A), if for all individuals i we have that $\ell'_i \, P(a_i) \, \ell_i$.*

- Multidimensional Pigou-Dalton principle:

Multidimensional Pigou-Dalton Transfer Principle. *(L', A') is strictly better than (L, A), if for all individuals $k \neq i, j$ we have that $\ell_k = \ell'_k$ and for individuals i and j we have that for $\delta \in \mathbb{R}^{\mathrm{m}}_{+} \setminus \{0\}$, $\ell'_i = \ell_i + \delta \leq \ell_j - \delta = \ell'_j$.*[6]

A problem (Fleurbaey and Trannoy, SCWE, 2003)



II. Giving priority to respect for preferences

- Either one keeps to the multidimensional Pigou-Dalton criterion, one assumes anonymity in the space of outcomes, and the well-being measures used to aggregate income and health are identical for all individuals,

- *OR* one respects preference heterogeneity and then one cannot satisfy the multidimensional Pigou-Dalton criterion. Moreover, one needs an interpersonally comparable representation of the preference ordering R_i.

Subjective satisfaction measures

- There seems to be a general presumption that subjective satisfaction measures are attractive precisely because they “respect preferences”.
  - Richard Layard: “If we accept the Marxist idea of ‘false consciousness, we play God and decide what is good for others, even if they will never feel it to be so” (2005, p. 121).

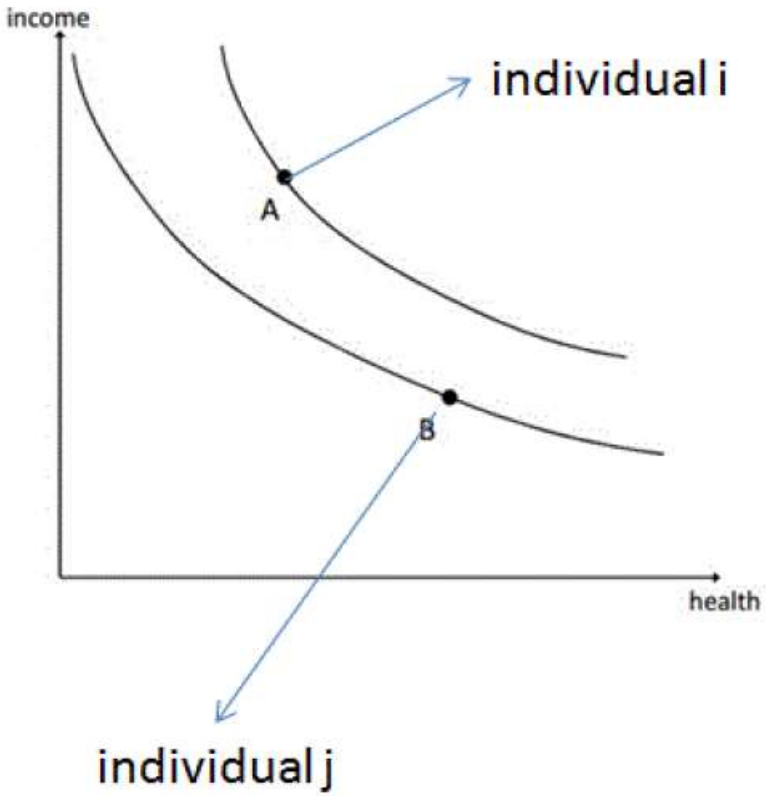
- Is this interpretation correct?

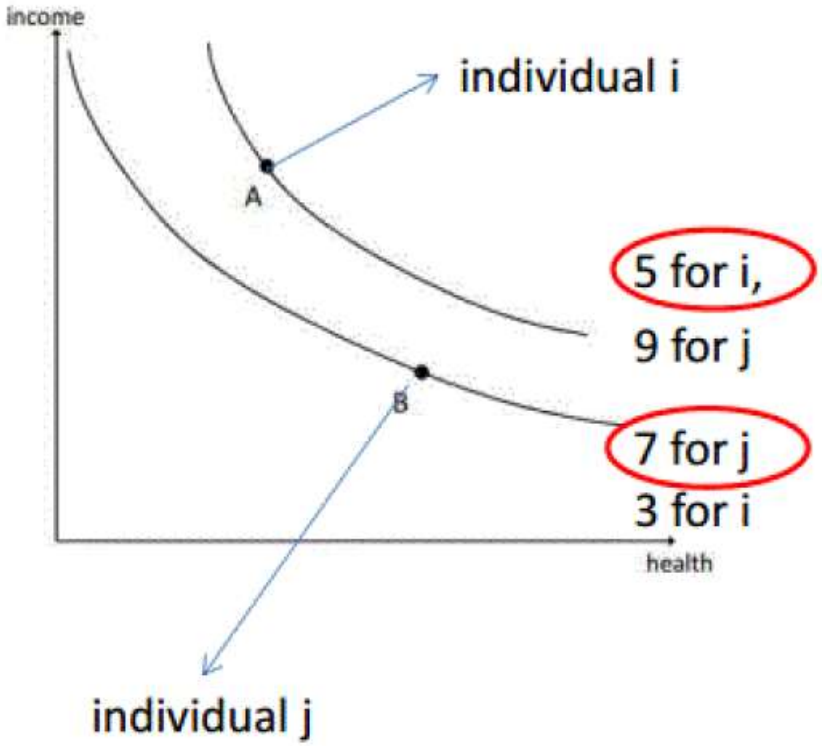
A preliminary point: affects and cognitions

- AFFECTS (pleasure, pain, joy, hate,...): flow constantly ("happiness").
- COGNITIONS: individuals cast (consciously) a judgment over their own life ("satisfaction").

- Very different: feelings may be (are!) a subset of the vector of life dimensions, the judgments should reflect the preference ordering.
- (SEN, 1985, p. 29, *Valuation neglect*: "Valuing a life is a reflective activity in a way that 'being happy' or 'desiring' need not be").

Respecting preferences does not mean equalizing happiness




income
individual i
A
5 for i,
9 for j
B
7 for j
3 for i
health
individual j

Physical-condition neglect

- Sen (1985, p. 21) - *Physical-condition neglect*: “A person who is ill-fed, undernourished, unsheltered and ill can still be high up in the scale of happiness or desire-fulfillment if he or she has learned to have ‘realistic’ desires and to take pleasure in small mercies”.

Ethical issue: the problem of coping

- EXAMPLE 1: individuals who have lost a limb may, after adaptation, recover a good satisfaction score but still express a strong aversion to disability (Frederick and Loewenstein, 1999). Do we respect preferences when we claim that the disabled are equally well-off?

- EXAMPLE 2: countries with higher rates of HIV prevalence do not systematically report poorer life (and even health) satisfaction, yet individuals care about HIV (Deaton, JEP, 2008).

A striking example: locked-in syndrome

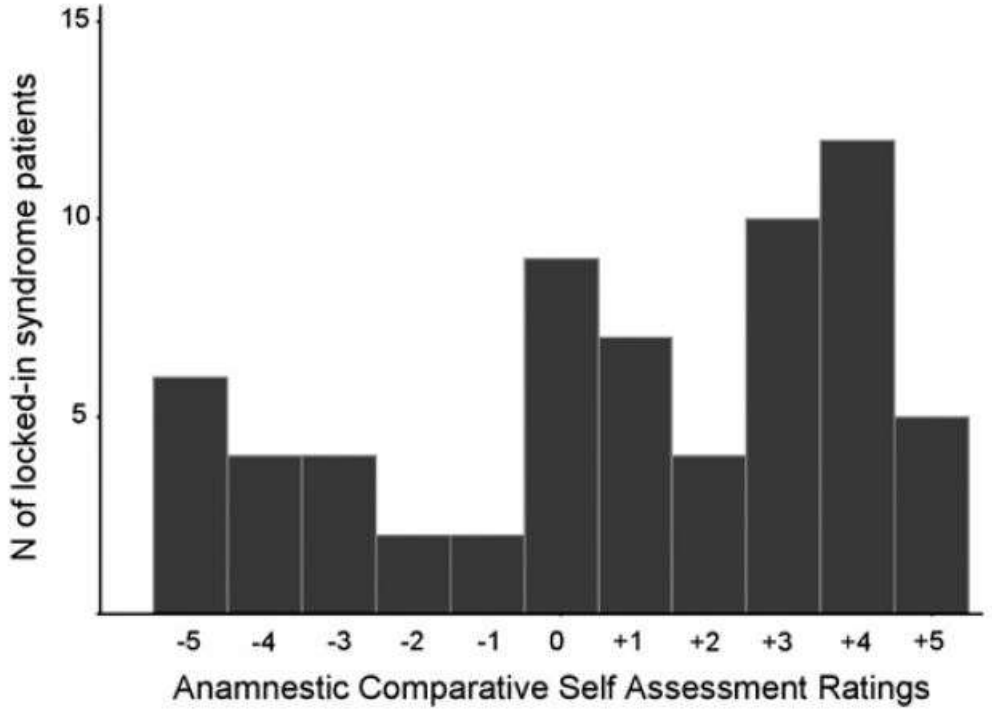
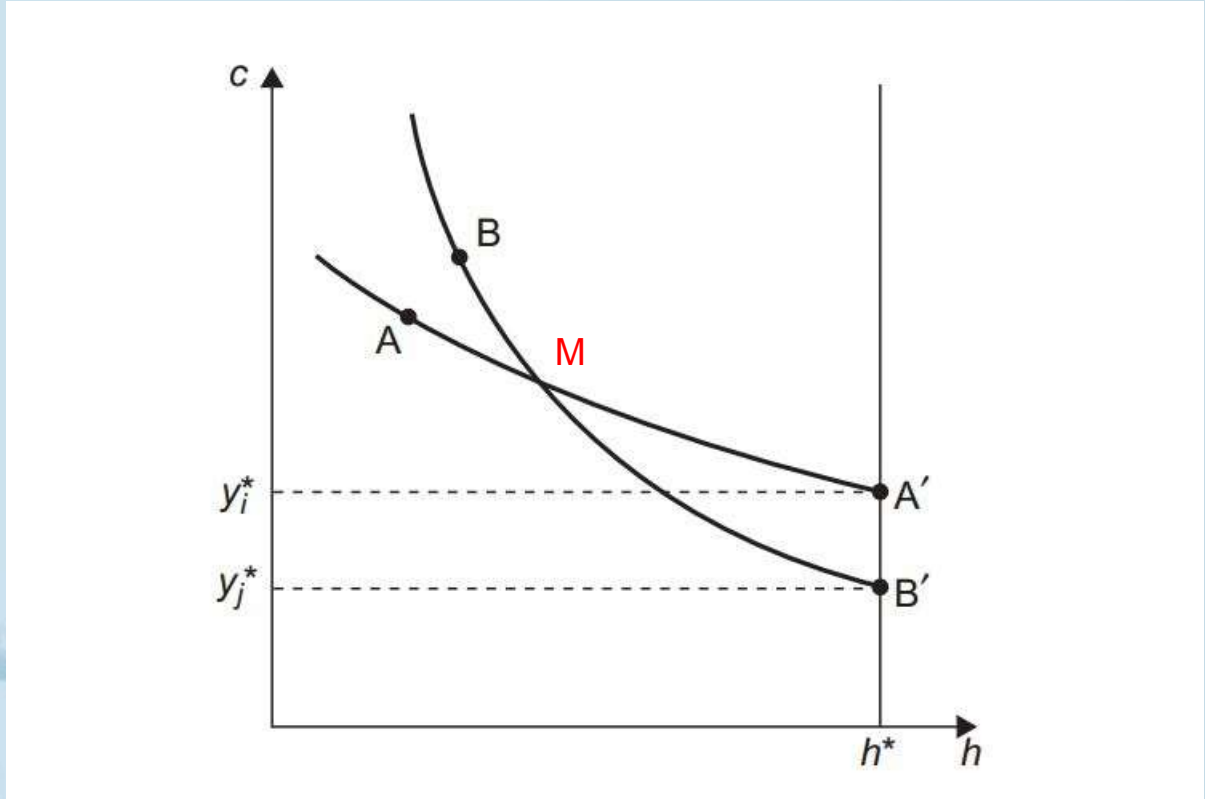


Figure 3 Distribution of Anamnestic Comparative Self-Assessment ratings in locked-in syndrome.

Source: Bruno et al., BMJ, 2011

A way-out? The equivalent income



Equivalent income = actual income – WTP to be in perfect health

Definition

- Fix reference values for all the non-income dimensions.

- *DEFINITION: The equivalent income of an individual is the hypothetical income that, if combined with the reference value on all non-income dimensions, would place the individual in a situation that he/she finds equally good as his/her actual situation.*

Perfect health as a reference value

- In a state of less than perfect health, individuals may have different preferences over ill-health (some people suffer more from the same illness) and therefore the comparison of well-being should be based on health and income.

- In a state of perfect health, differences in preferences should not matter for the comparison of well-being levels but only income should play a role. Perfect health is the same for everyone (no income compensation needed).

Willingness to pay (WTP)

- Equivalent income is expressed in monetary terms but takes into account the welfare effects of being ill.
- The difference between actual income and equivalent income is the welfare loss from not being in perfect health, which depends on preferences.
- The welfare loss is measured by the individual WTP to be in perfect health

$$y_i^* = y_i - WTP_i(y_i, h_i \rightarrow \bar{h})$$

WTP of individual i with income y_i to move from h_i to $\bar{h}$

Compare with GBD-approach

- “Ideal” normative refererence values also play an essential role in the calculation of DALY’s.
- Intuition is very similar: the “burden” of disease is determined by the distance from the best possible situation.
- Of course, the way to evaluate that distance is very different: income instead of time metric.

III. The empirical challenge: identifying preferences

1. “Revealed preferences” – not very relevant for health + authentic preferences not always revealed in actual choices.

2. “Stated preferences” – willingness to pay through contingent valuation techniques.

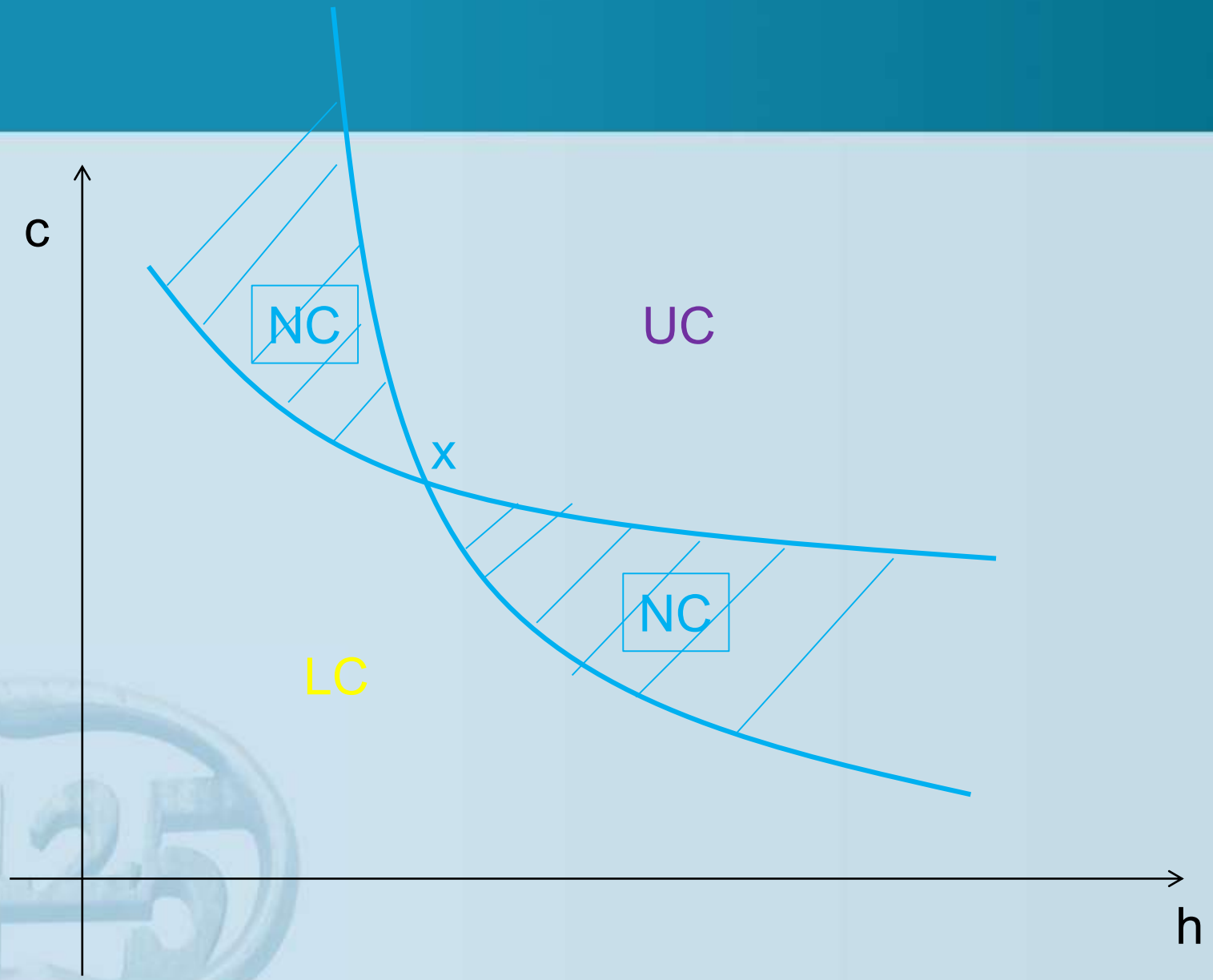
3. Interpreting satisfaction data.

IV. Behavioural economics: shaking preferences?

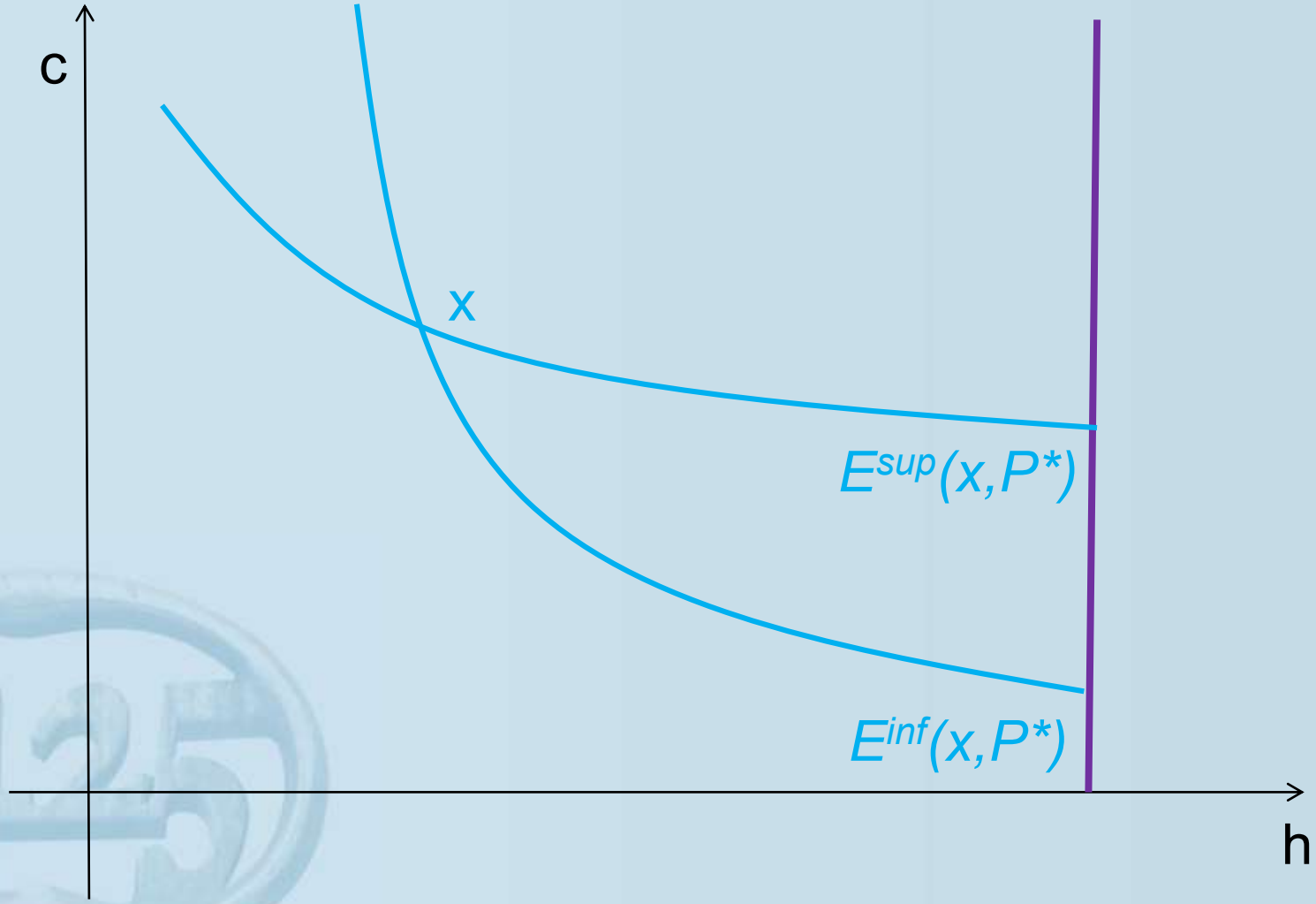
- Preferences are not necessarily “revealed” in actual behaviour, e.g. because of lack of information.
- More basic problem: behavioural anomalies. *Do well-defined preferences exist?*
- To compute equivalent incomes we need information about the whole indifference curve. This may involve highly hypothetical situations, that are difficult to judge.
  - EXAMPLE: is someone who has been chronically ill / handicapped since birth able to evaluate trade-offs in a situation of (near) perfect health?

A note on incomplete preferences

- Questions about “preferences” immediately confront us with the insights from behavioural economics.
- Very promising and important line of research (certainly within the health domain), also from the perspective of responsibility.
- A first start: accept that the preference relation is (or can be) incomplete.



Source: Fleurbaey and Schokkaert, AEJ Micro, 2013


c
x
$E^{sup}(x,P^*)$
$E^{inf}(x,P^*)$
h

Application 1. Socioeconomic inequality and inequality in equivalent incomes (with Carine Vande Voorde, Brigitte Dormont, Marc Fleurbaey, Stephane Luchini, Anne-Laure Samson, Clémence Thébaut)

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Stated preferences survey

- French representative (age/gender/professional status) sample (3331 face-to-face interviews, 18+)
- Three parts in the questionnaire:
  1. Questions on respondent's income, household income, household composition and usual socio-demographic questions
  2. Health in the last 12 months: diseases (closed-ended and open-ended questions), access to health care, health expenditures, **self-assessed health**
  3. Stated preferences by a retrospective hypothetical scenario: decrease of personal consumption/income to avoid health problems that have occurred in the last 12 months

Participation question

- 2836/3331 respondents with complete data
  - 328 protest voters (“question is too difficult”, “it’s not my duty to pay for a better health”)
  - 2508 with WTP≥0 and 1278 with WTP=0
    - WTP = 0 because “my living standard is already so low that I cannot imagine to have less, even with perfect health” or “other aspects of my life are more important for me than my health”

Valuation question

Mean WTP for perfect health=€75.1 (per month), maximum=€1500

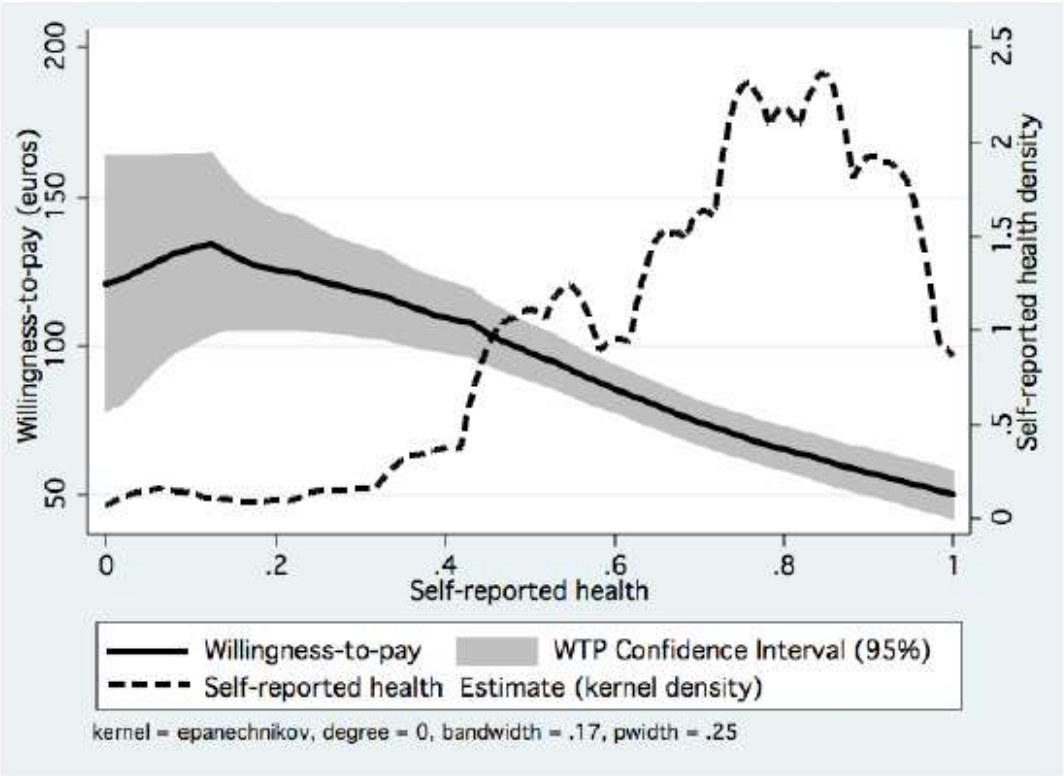


Figure 2: Distribution of self-reported health and relationship with WTP for perfect health

Valuation question

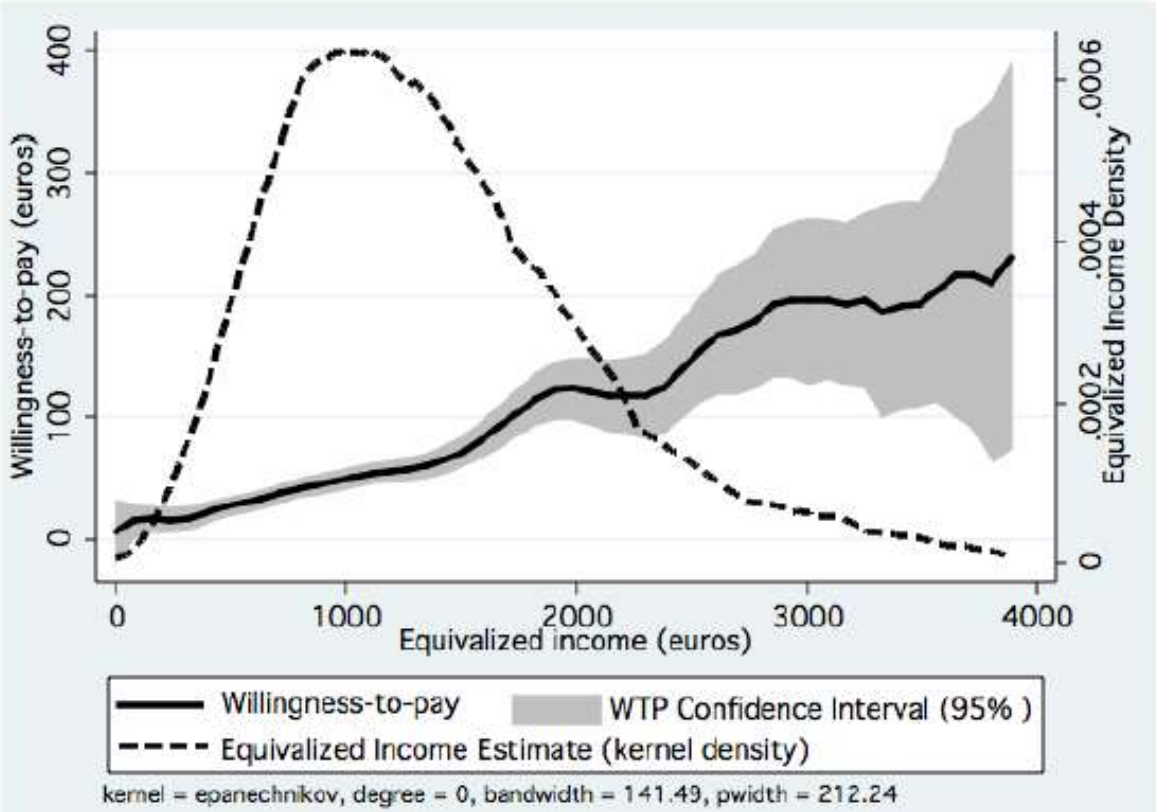


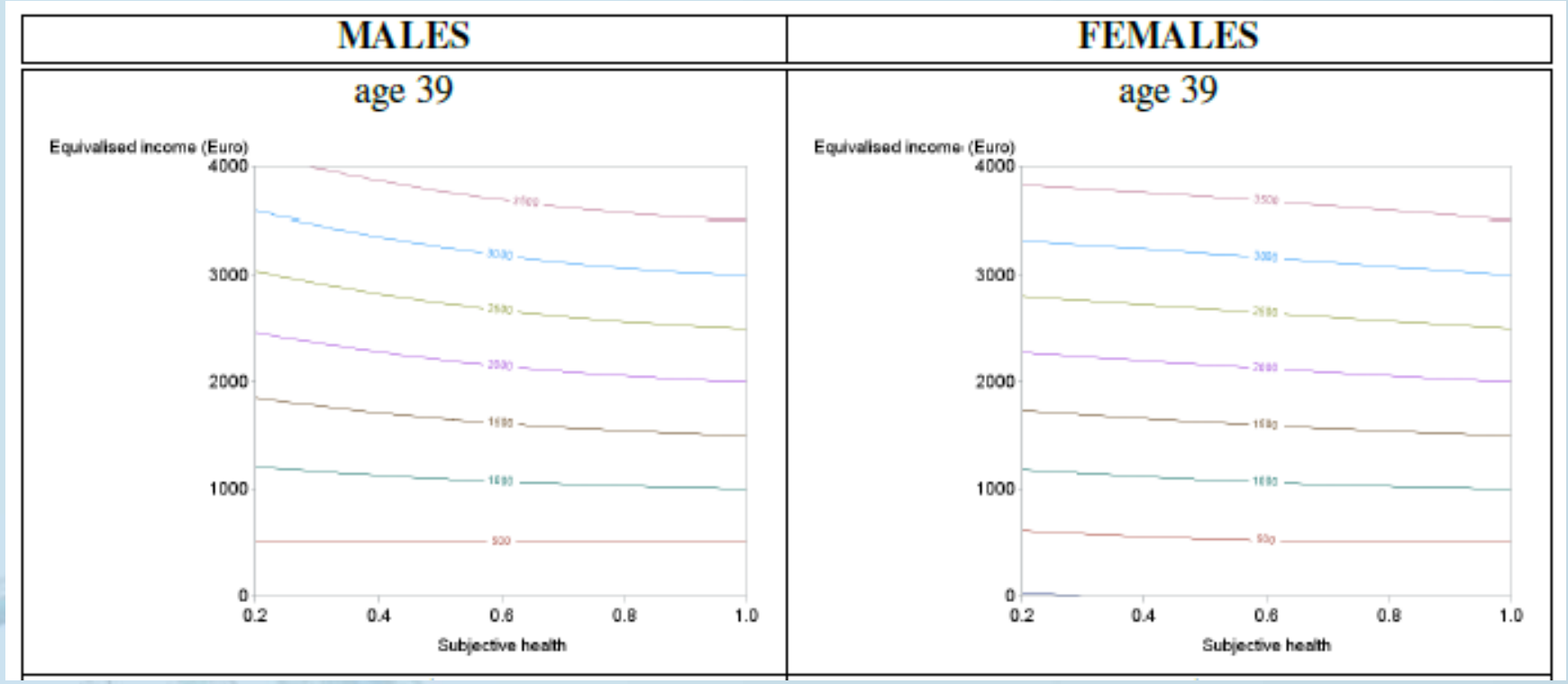
Figure 3: Distribution of income and relationship with WTP for perfect health

Estimation of preferences

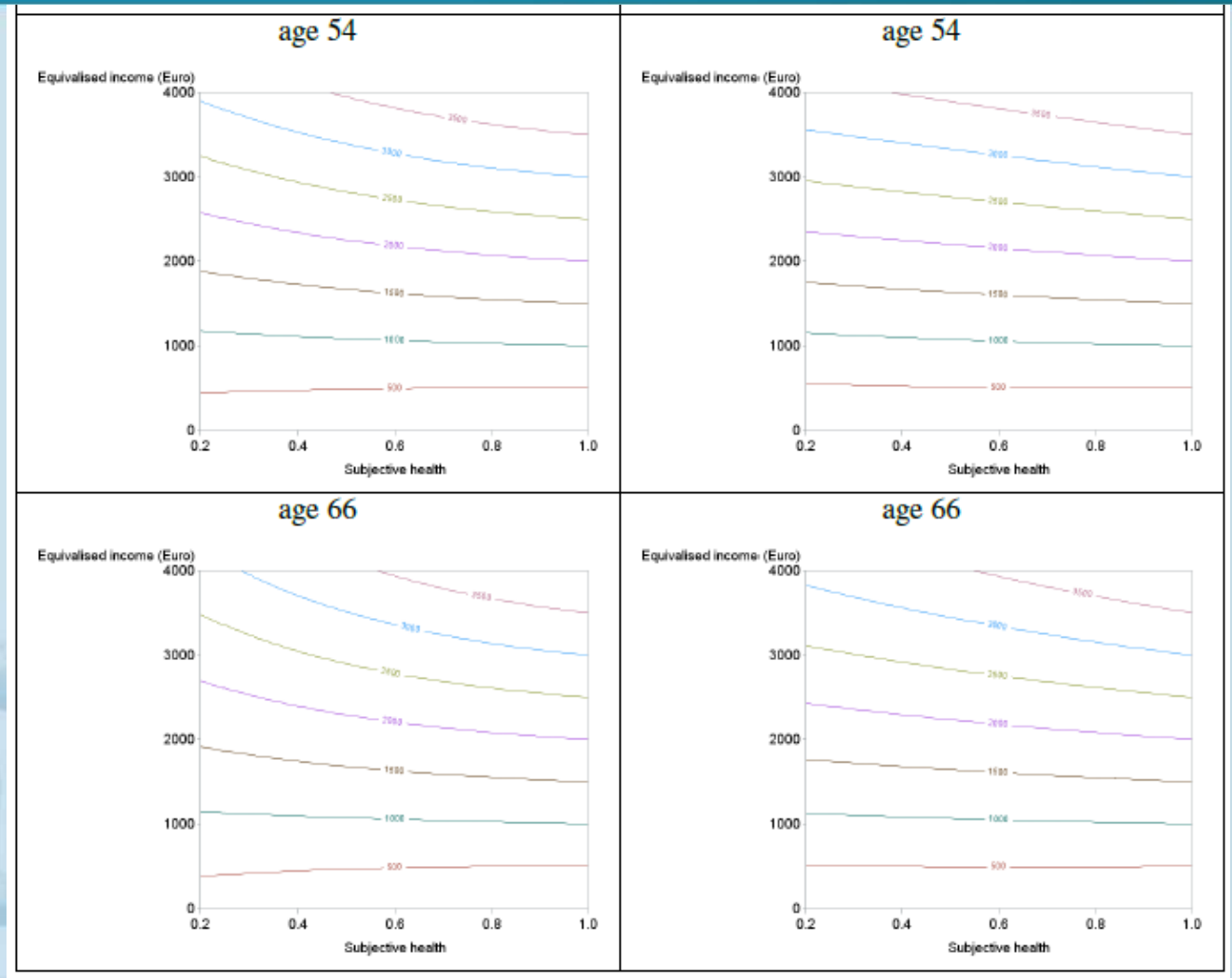
$$WTP_i = \alpha_i(1-h_i) + \beta_i(1-h_i)^2 + \gamma_i y_i(1-h_i) + \delta_i y_i^2(1-h_i) + \mu_i y_i(1-h_i)^2 + \varepsilon_i$$

$$\begin{aligned}
\alpha_i &= \alpha_0 + \alpha_A age_i + \alpha_M male_i \\
\beta_i &= \beta_0 + \beta_A age_i + \beta_M male_i \\
\gamma_i &= \gamma_0 + \gamma_A age_i + \gamma_M male_i \\
\delta_i &= \delta_0 + \delta_A age_i + \delta_M male_i \\
\mu_i &= \mu_0 + \mu_A age_i + \mu_M male_i
\end{aligned}$$

Indifference curves



Indifference curves



Principles in inequity measurement

Principle of income-related health transfers	Pigou-Dalton principle
"Transferring health from someone who is better-off in terms of socioeconomic status to someone who is worse-off in terms of socioeconomic status does not lead to a reduction in social welfare provided the transfer does not change the ranking of the individuals in terms of socioeconomic status."	"A redistribution of income (or health) is welfare-improving if it goes from someone at a higher level of *well-being* to someone at a lower level of *well-being*."
Concentration index	**Concentration index**
Inequality in equivalent incomes	**Inequality in equivalent incomes (Gini)**

Simulation results

		Gini income	Gini equivalent income	Concentration index
Base situation		0.27832805	0.28419189	0.02204203
Mean health for all		0.27832805	0.28150891	0
Mean income for all		0	0.04673083	/
Incomes net of OOP		0.27913427	0.28509985	0.02236913
OOP financed with proportional contributions		0.27832805	0.28451679	0.02204203
	CI disease			
Diabetes (6.64%)	-0.10544247	0.27832805	0.28447336	0.01643896
Depression (9.55%)	-0.21234586	0.27832805	0.28325333	0.00786087
Prostate adenoma (0.95%)	0.26382086	0.27832805	0.28445162	0.02301186
Angina pectoris (1.73%)	-0.16082041	0.27832805	0.28416603	0.01988076

Application 2. The welfare cost of disease in Europe

(with Koen Decancq)

KU LEUVEN

A necessary requirement: the consistency principle

- We assume that subjective satisfaction *S(l)* represents preferences, i.e. is one specific cardinalisation of the utility function:

Consistency For all $\ell_i, \ell_i' \in X$, $S_i(\ell_i) \geq S_i(\ell_i')$ if $\ell_i R_i \ell_i'$.

Equivalent income derived from satisfaction data

$$S_i = \alpha + (\mu + \pi' z_i) ln y_i + (\beta + \gamma' z_i)' x_i + \delta' z_i + \varepsilon_i =$$

$$\alpha + (\mu + \pi' z_i) ln y_i^* + (\beta + \gamma' z_i)' \bar{x} + \delta' z_i + \varepsilon_i,$$

$$y_i^* = y_i exp\left[\left(\frac{\beta + \gamma' z_i}{\mu + \pi' z_i}\right)'(x_i - \bar{x})\right]$$

Data

- European Social Survey, 2008 and 2010. (SILC does not contain a question on life satisfaction).
- 18 countries: 15 EU-members, Switzerland, Norway, the Russian Federation. About 52,000 individual observations.
- Dimensions:

Life dimensions	Variable in ESS
Material living conditions	Total household income per capita (after uprating)
Health	Self-reported health
Productive and valued activities	Unemployment status
Leisure and social interactions	Indicator of how often the respondent meets socially with friends, relatives or colleagues.
Economic and physical security	Indicator of whether the respondent feels safe when walking alone in local area after dark

Estimation results

	REFERENCE GROUP	young	female	higher educated
log income (per capita)	0.371*** (0.021)	0.014 (0.010)	0.037 (0.023)	0.027** (0.010)
self-assessed health	0.661*** (0.018)	-0.064** (0.020)	0.002 (0.018)	-0.053** (0.020)
unemployment	-0.840*** (0.080)	0.030 (0.081)	0.222** (0.075)	0.017 (0.085)
social interactions	0.143*** (0.010)	-0.001 (0.011)	0.019+ (0.011)	-0.006 (0.012)
personal safety	0.224*** (0.021)	0.023 (0.021)	-0.060** (0.021)	-0.016 (0.022)

Controls: household size, education, education squared, gender, age, age squared, marital status, religious, urban, ethnic minority, time, *country*.

Social welfare function

$$\textit{Social welfare} = M\,(1 - I_{\rho})$$

"AVERAGE" WELL-BEING

INEQUALITY MEASURE

- The choice of the inequality aversion, or, more generally, the SWF, is a political choice. Different individuals will have different (ideological) convictions about this, but to formulate a policy one has to pick one specific choice.

- Individual preferences refer only to the own situation of the individuals. It is a normative choice to respect the interindividual differences in them.

- *The two should NOT be mixed up.*

Income, equivalent income, happiness (2010)

	Income		Equivalent income		Happiness	
	(NO, CH)		(NO, CH)		(DK, CH)	
DE	28986	(6)	3188	(10)	7.26	(9)
DK	28162	(7)	6938	(4)	8.35	(1)
FR	25779	(10)	3529	(9)	6.34	(15)
ES	22282	(11)	3182	(11)	7.30	(8)
GR	19388	(13)	2564	(13)	5.71	(17)
	(RU, EE)		(RU, HU)		(GR, RU)	

From income to equivalent income (2010)

		from income to equivalent income	health	unemploy-ment	social in-teractions	safety
		(DK, NO, SE)				
DK	(1)	*-75%*	-52%	-3%	-38%	-20%
ES	(7)	*-86%*	-67%	-6%	-39%	-31%
FR	(9)	*-86%*	-67%	-3%	-44%	-29%
GR	(11)	*-87%*	-45%	-5%	-61%	-44%
DE	(13)	*-89%*	-73%	-1%	-48%	-30%
		(EE, HU, RU)				

Inequality (2010)

	Gini coefficient (income)		Gini coefficient (equivalent income)	
	(CZ, SE)		(NO, DK)	
CZ	0.27	(1)	0.73	(10)
DK	0.28	(3)	0.65	(2)
HU	0.30	(6)	0.77	(17)
SI	0.32	(9)	0.75	(14)
CH	0.34	(14)	0.66	(3)
GB	0.36	(16)	0.72	(9)
GR	0.36	(17)	0.75	(13)
ES	0.38	(18)	0.74	(12)
	(GR, ES)		(HU, EE)	

Social well-being (2010)

	Income ($\rho = 0$)		Income ($\rho = 5$)		Equivalent income ($\rho = 5$)	
	(NO, CH)		(NO, SE)		(NO, CH)	
GB	29794	(5)	11262	(9)	282	(7)
DE	28986	(6)	12754	(7)	175	(10)
DK	28162	(7)	13828	(5)	590	(4)
BE	27477	(8)	13299	(6)	375	(6)
ES	22282	(11)	8668	(13)	146	(11)
GR	19388	(13)	7716	(14)	110	(12)
CZ	16729	(14)	8983	(11)	89	(14)
	(RU, EE)		(EE, RU)		(RU, HU)	

Yearly growth rates (2008-2010)

	income growth		welfare growth (ρ=5)		happiness growth	
	(CH, PL)		(CH, RU)		(HU, EE)	
CH	+ 7.35%	(1)	+9.69%	(1)	+2.23%	(6)
DE	+ 0.09%	(3)	- 4.51%	(9)	+4.46%	(3)
BE	- 0.55%	(4)	+ 4.54%	(4)	+3.33%	(5)
DK	- 1.73%	(8)	-4.53%	(10)	-2.00%	(16)
ES	- 2.24%	(11)	-12.04%	(17)	-0.01%	(15)
GR	- 5.81%	(17)	-22.92%	(18)	-5.78%	(18)
EE	- 8.60%	(18)	-7.24%	(14)	+5.16%	(2)
	(GR, EE)		(ES, GR)		(CZ,GR)	

Application 3. Welfare inequality and preference heterogeneity in Russia

(with Koen Decancq and Marc Fleurbaey)

CORE

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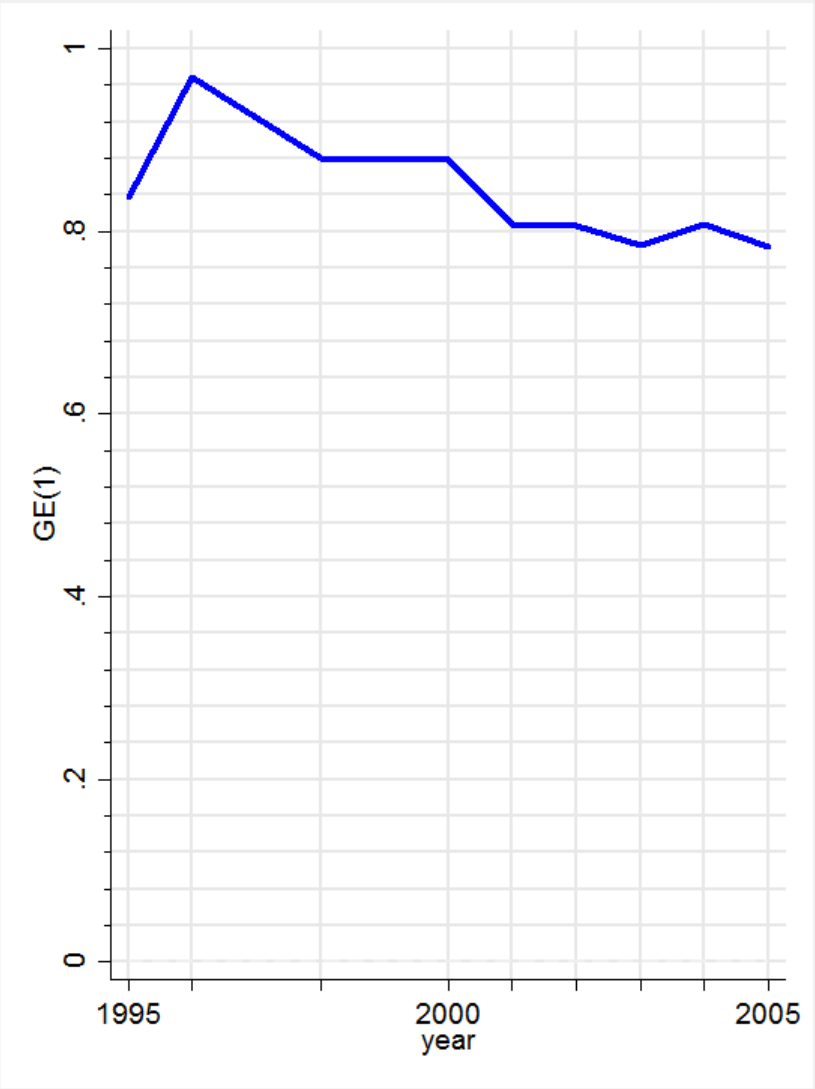
Russia 1995-2005

- Decancq, Fleurbaey, Schokkaert, Economica 2017.
- Russia Longitudinal Monitoring Survey 1995-2005.
- **Outcomes** in five life dimensions: equivalized expenditures, health, quality of housing, unemployment, wage arrears.
- **Preferences** estimated from a life satisfaction regression.

Well-being inequality



What drives this inequality?

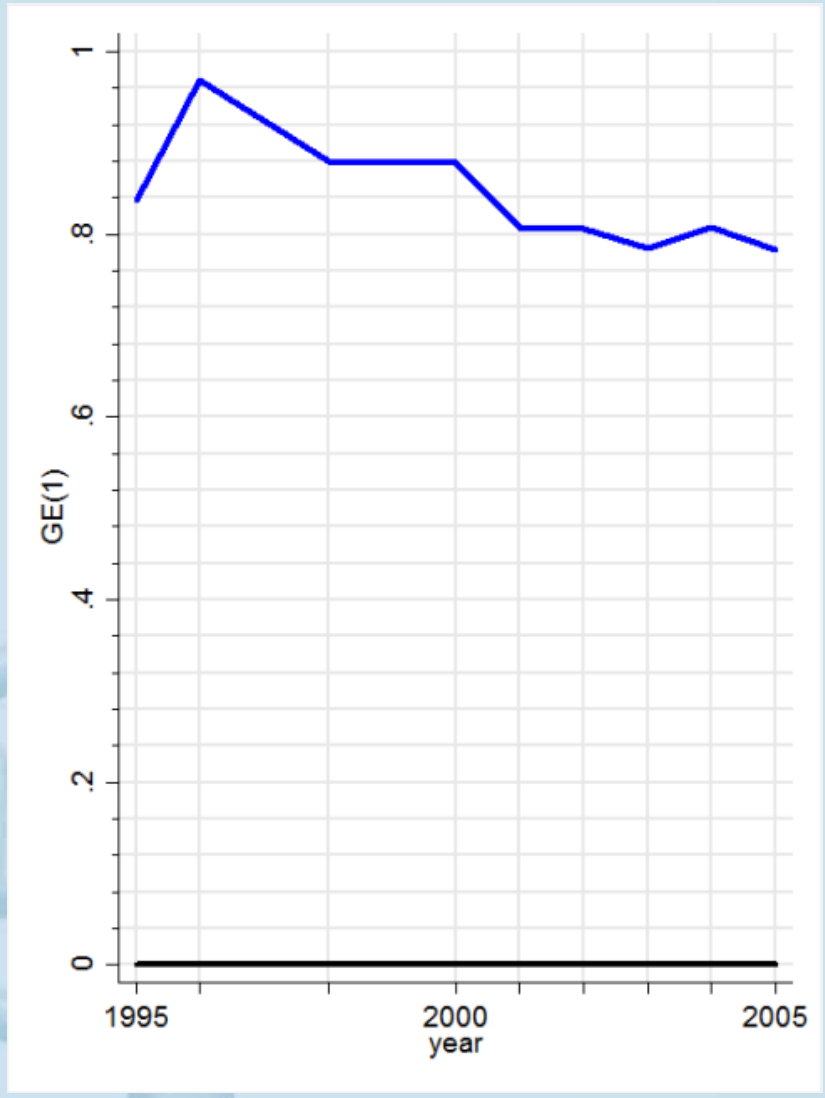
- Correlation between outcomes and preferences?
- Preference heterogeneity?
- Correlation between the outcome dimensions?
- Inequality in the outcome dimensions?

Decomposing well-being inequality

- We construct four building blocks
  - Reshuffled preference matrix $\tilde{A}$
  - Equalized preference matrix $\bar{A}$
  - Reshuffled outcome matrix $\tilde{L}$
  - Equalized outcome matrix $\bar{L}$

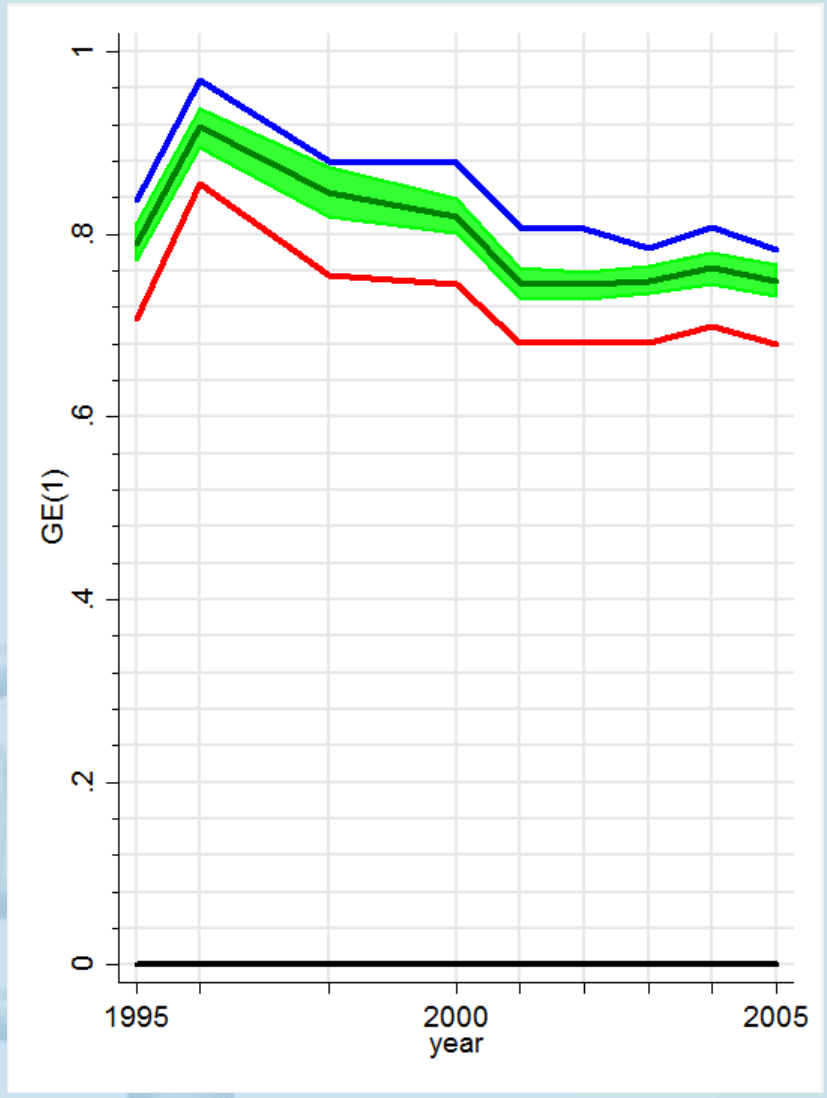
- We use these to decompose the overall inequality in equivalent incomes (remember that expenditures and health are by far the most important life dimensions).

“Preferences first”



$$I(L,A) = \underbrace{(I(L,A) - I(L,\widetilde{A}))}_{\substack{correlation \\ outcome-pref.}} + \underbrace{(I(L,\widetilde{A}) - I(L,\overline{A}))}_{\substack{preference \\ heterogeneity}} +$$
$$\underbrace{(I(L,\overline{A}) - I(\widetilde{L},\overline{A}))}_{\substack{outcome \\ correlation}} + \underbrace{(I(\widetilde{L},\overline{A}) - I(\overline{L},\overline{A}))}_{\substack{outcome \\ inequality}}.$$

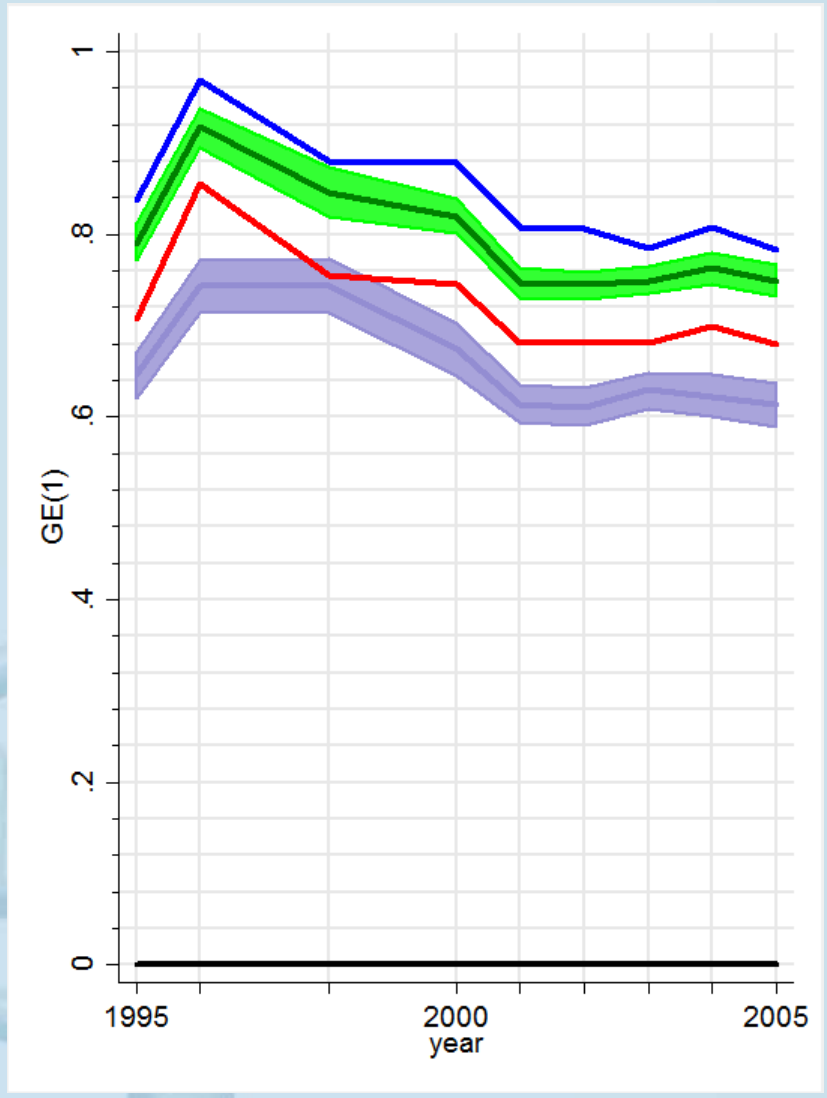
Contribution of preferences



$$I(L,A) = \underbrace{(I(L,A) - I(L,\widetilde{A}))}_{\substack{correlation \\ outcome-pref.}} + \underbrace{(I(L,\widetilde{A}) - I(L,\overline{A}))}_{\substack{preference \\ heterogeneity}} +$$
$$\underbrace{(I(L,\overline{A}) - I(\widetilde{L},\overline{A}))}_{\substack{outcome \\ correlation}} + \underbrace{(I(\widetilde{L},\overline{A}) - I(\overline{L},\overline{A}))}_{\substack{outcome \\ inequality}}.$$

Contribution of preferences

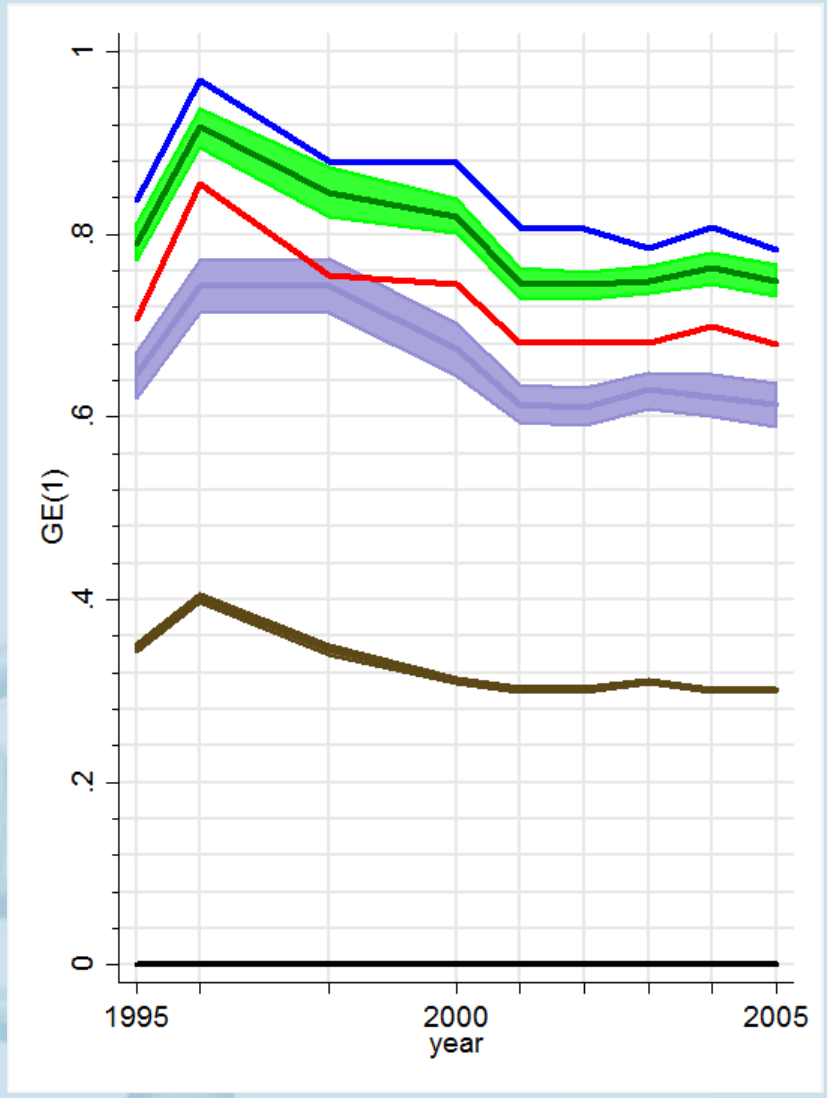
Outcome correlation



$$I(L,A) = \underbrace{(I(L,A) - I(L,\widetilde{A}))}_{\substack{correlation \\ outcome-pref.}} + \underbrace{(I(L,\widetilde{A}) - I(L,\overline{A}))}_{\substack{preference \\ heterogeneity}} +$$
$$\underbrace{(I(L,\overline{A}) - I(\widetilde{L},\overline{A}))}_{\substack{outcome \\ correlation}} + \underbrace{(I(\widetilde{L},\overline{A}) - I(\overline{L},\overline{A}))}_{\substack{outcome \\ inequality}}.$$

Removing the outcome correlation decreases well-being inequality

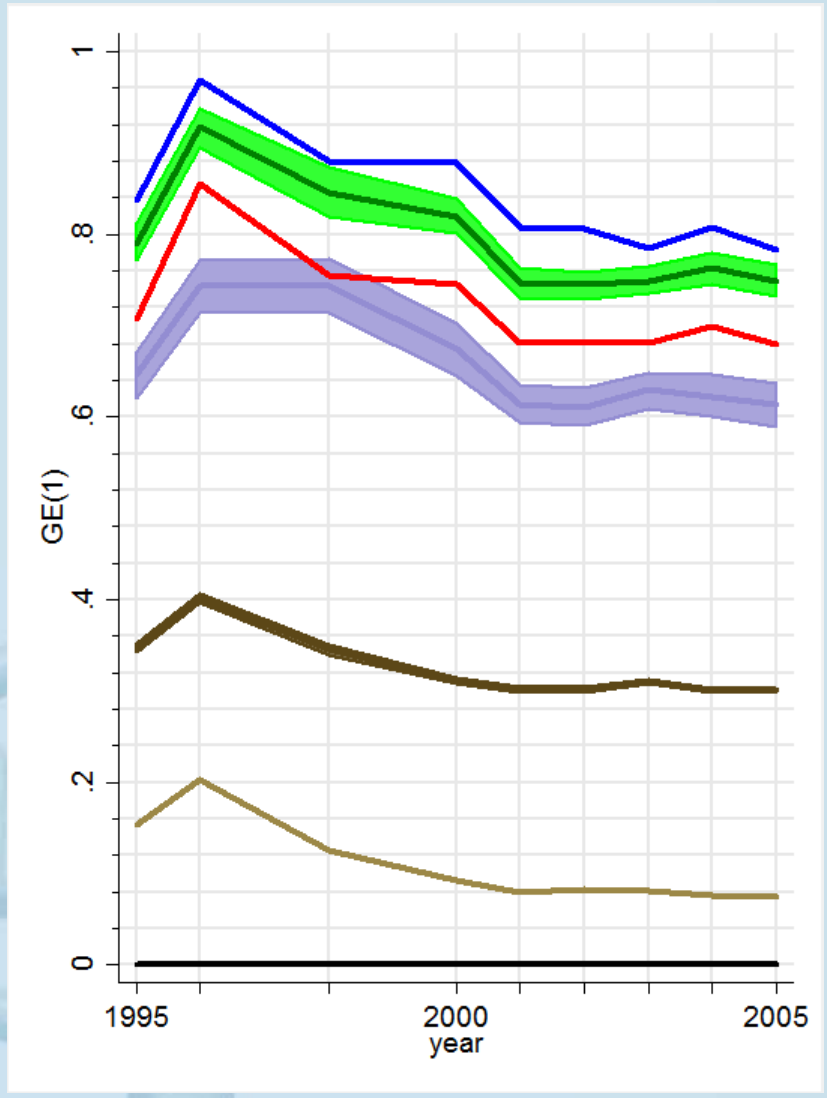
Equalizing expenditures



$$I(L,A) = \underbrace{(I(L,A) - I(L,\widetilde{A}))}_{\substack{correlation \\ outcome-pref.}} + \underbrace{(I(L,\widetilde{A}) - I(L,\overline{A}))}_{\substack{preference \\ heterogeneity}} + \underbrace{(I(L,\overline{A}) - I(\widetilde{L},\overline{A}))}_{\substack{outcome \\ correlation}} + \underbrace{(I(\widetilde{L},\overline{A}) - I(\overline{L},\overline{A}))}_{\substack{outcome \\ inequality}}.$$

Equalizing expenditures decreases well-being inequality (a lot)

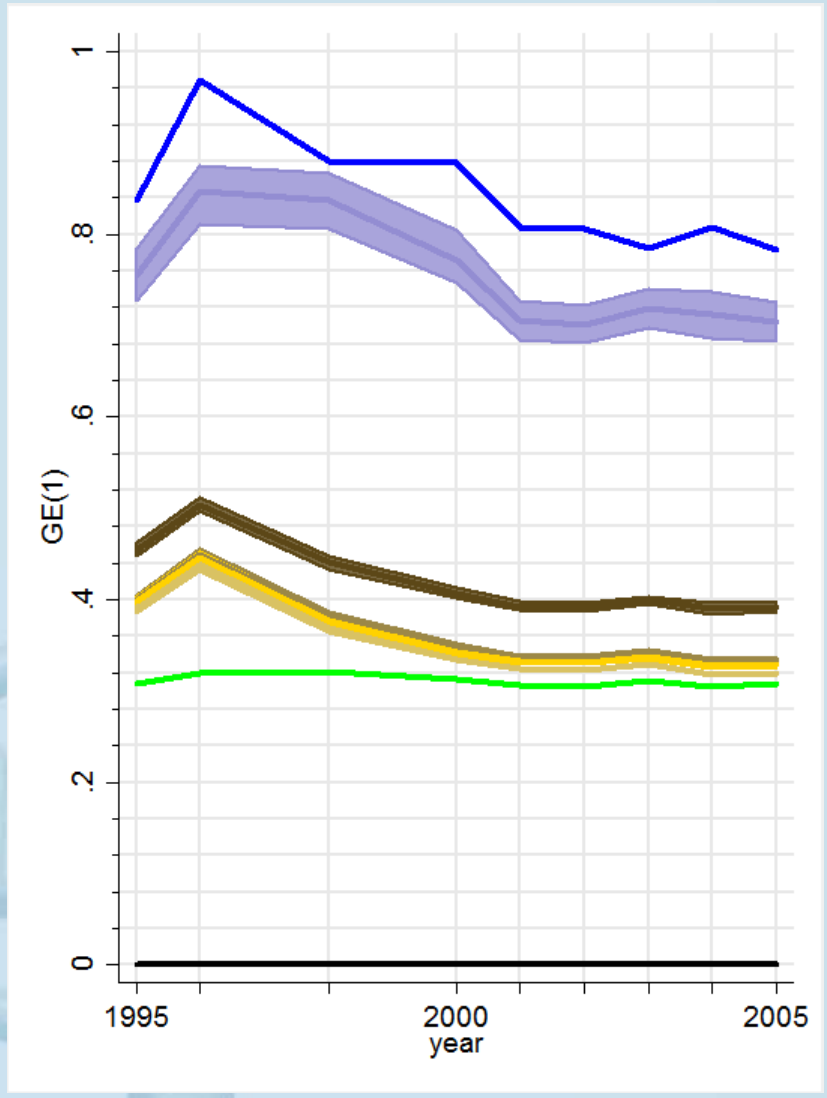
Equalizing health



$$I(L,A) = \underbrace{(I(L,A) - I(L,\widetilde{A}))}_{\substack{correlation \\ outcome-pref.}} + \underbrace{(I(L,\widetilde{A}) - I(L,\overline{A}))}_{\substack{preference \\ heterogeneity}} + \underbrace{(I(L,\overline{A}) - I(\widetilde{L},\overline{A}))}_{\substack{outcome \\ correlation}} + \underbrace{(I(\widetilde{L},\overline{A}) - I(\overline{L},\overline{A}))}_{\substack{outcome \\ inequality}}.$$

Equalizing health inequality decreases well-being inequality further

“Outcomes first”-decomposition



$$I(L,A) = \underbrace{(I(L,A) - I(\tilde{L},A))}_{\substack{outcome \\ correlation}} + \underbrace{(I(\tilde{L},A) - I(\overline{L},A))}_{\substack{outcome \\ inequality}} +$$
$$\underbrace{(I(\overline{L},A) - I(\overline{L},\tilde{A}))}_{\substack{correlation \\ outcome-pref.}} + \underbrace{(I(\overline{L},\tilde{A}) - I(\overline{L},\overline{A}))}_{\substack{preference \\ heterogeneity}}.$$

Considerable well-being inequality remains after all outcomes have been equalized

Conclusion

- Normative evaluation should start from an explicit choice of value judgments: ethical discussion comes first.
- Ethical opinions differ. Sensitivity analysis creates room for social debate.

- Ultimately, the goal should be to derive policy conclusions. Necessary to go beyond associations and try to identify the causal relations that explain the inequality results.

Estimation and evaluation in EOP studies

- In my view, it is scientifically sound and ethically attractive to clearly distinguish between the “estimation” and the “evaluation” stage:
  - STEP 1: try to understand as well as possible the relationship between the outcomes and the different circumstance, responsibility, mixed variables. *Do not put the empirical analysis in the straitjacket of a simplified normative theory.*
  - STEP 2: implement an attractive inequality measure.
  - STEP 3: take care to calculate upper and lower bounds. Think explicitly about the residuals.

- STEP 4: compare results for different sets of values.

- STEP 5: perform counterfactual analysis to analyse the effects of different policies. Evaluation of policies may depend on value judgments.

Two approaches to responsibility

- APPROACH 1: “responsibility” (“desert”?) is a basic ethical concept.
- APPROACH 2: “responsibility” is derived from a more basic concern to put individuals in good conditions of autonomy and freedom so that they can be the master of their lives.
  - In this second approach “responsibility” is not a “disciplining” ex post device but the other side of the medal of respect for personal dignity.
- Many of the intuitions of the first approach will come in again as soon as we take incentives into account: but we then talk about feasibility, not about ethical desirability.

Preferences and well-being measurement

- From a preferentialist perspective, estimating individual preferences is of utmost importance. Not trivial in the health domain, where important outcomes do not necessarily reflect deliberate choice.

- The real challenge: identifying “authentic” preferences if real-life decisions are based on poor information and if people follow (irrational?) decision heuristics.

- Most fascinating normative questions now on the borderline between behavioural and health economics.