KU LEUVEN

The importance of non-market valuation for the measurement of individual well-being

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Introduction

1. For coherent (consequentialist) policy evaluation, we need a measure of individual well-being.

   - The choice of such a measure is a normative question.
   - I propose a preferentialist approach. Preferences are defined as the reflection of a life project, the well-informed and well-considered judgments about what is important in life.
   - As non-market goods are crucial for well-being, non-market valuation will necessarily play an essential role in such an approach.

2. Subjective well-being/life satisfaction/happiness are not attractive from a normative point of view.

3. Equivalent income as a possible alternative.

4. Applications:
   (a) Identifying the poor in Colombia (satisfaction data);
   (b) Healthy-equivalent incomes in France (contingent valuation).

5. Incomplete preferences

1. We need a measure of individual well-being for policy evaluation

The problem

- To evaluate policies, we are interested in the “quality of life” of individual human beings.
- Quality of life involves many dimensions: income or material consumption, health, quality of natural environment, social interactions, safety.

- For policy purposes, we should be able to formulate trade-offs between different functionings in a consistent way.
- These trade-offs must be formulated at the level of the individual.

Some notation

- Let ℓ_i denote the vector of *m* aspects of life ("functionings") that may matter to individual *i* (examples: consumption or income y_i, health, environment, leisure, job characteristics,...)

- Individuals have a life project, i.e. an informed judgment about what makes a life good or bad. Represented by a preference ordering R_i over the vectors ℓ_i.

- Subjective individual satisfaction is given by a "satisfaction function" $S_i(\ell_i)$.

- A method of interpersonal well-being comparisons must be able to rank the triplets (ℓ_i, R_i, S_i).

Why do we need a well-being measure?

- Describe a social state as $(\ell_1, \dots, \ell_n) = [(y_1, h_1, z_1, \dots, y_n, h_n, z_n, e]$.
- Individual preferences:

$$u_i(y_i, h_i, z_i, e) \geq u_i\left(y'_i, h'_i, z'_i, e'\right) \Leftrightarrow (y_i, h_i, z_i, e) R_i (y'_i, h'_i, z'_i, e').$$

- Preference respecting social welfare function (<u>not</u> necessarily welfarist):

$$W(u_1(y_1, h_1, z_1, e), \dots, u_n(y_n, h_n, z_n, e))$$

- Evaluate the effects of a policy change (dy, dh, dz, de):

$$dW = \sum_i \frac{\partial W}{\partial u_i} \frac{\partial u_i}{\partial y_i} \left[dy_i + \frac{\partial u_i / \partial h_i}{\partial u_i / \partial y_i} dh_i + \frac{\partial u_i / \partial z_i}{\partial u_i / \partial y_i} dz_i + \frac{\partial u_i / \partial e}{\partial u_i / \partial y_i} de \right]$$

Why then a “global” approach to well-being?

$$dW = \sum_i \frac{\partial W}{\partial u_i}\frac{\partial u_i}{\partial y_i}\left[dy_i + \frac{\partial u_i/\partial h_i}{\partial u_i/\partial y_i}\,dh_i + \frac{\partial u_i/\partial z_i}{\partial u_i/\partial y_i}\,dz_i + \frac{\partial u_i/\partial e}{\partial u_i/\partial y_i}\,de\right]$$

1. The “willingness-to-pay” for the different components will (in general) depend on the level for the other relevant components of well-being (unrealistic separability assumptions necessary to avoid this problem).
2. Interindividual preference differences complicate that issue further.
3. There is no good justification for welfare evaluation in terms of an unweighted sum of willingness-to-pay values: distributional weights are always needed.

Arguments against distributional weights?

- Distributional weights normative, hence arbitrary? Unitary weights equally arbitrary. $\frac{\partial W}{\partial u_i}\frac{\partial u_i}{\partial y_i} = 1$ for (a) utilitarian social welfare function; with (b) identical linear utility functions in income.

- Taxation will take care of distribution? Holds only in first-best.
  - Pauly: “If we observe that society does not seem to be disposed to make further transfers from rich to poor, then we are not justified in asserting that the same society would value health benefits of a given money value more if they go to poor people than to rich people.”

- Kaldor-Hicks criterion?

Distributional weights and well-being

- In an individualistic, preferentialist approach, distributional weights cannot be specific for e.g. health or environment, as we have to consider all important dimensions of life.

  - "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).
  - "A state of affairs in which the WTP of those who are otherwise worse off get a larger weight in deciding about environmental policy 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 the WTP of all individuals get the same weights".

2. “Happiness” and “life satisfaction” do not respect preferences

Personal preference principle

- If we want to respect individual valuations of what is a good life, a minimal requirement is

  PERSONAL PREFERENCE PRINCIPLE:

  (ℓ, R, S) is at least as good as (ℓ', R, S) if $\ell R \ell'$ and strictly better if $\ell P \ell'$.

- Easy to see that objective measures cannot satisfy this principle.

- Subjective satisfaction measure does satisfy the personal preference principle, provided a consistency assumption is satisfied:

  $S_i(\ell_i) \geq S_i(\ell'_i)$ if and only if $\ell_i R_i \ell'_i$.

What about subjective satisfaction/welfarism?

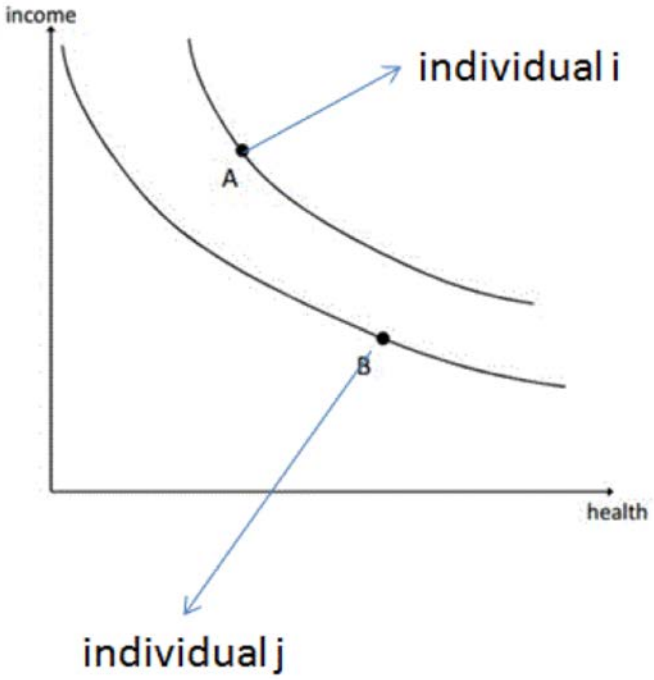
- But this is NOT sufficient to say that it does respect preferences, because the scaling of satisfaction can be different for different individuals (Sen's criticism about "physical condition neglect").

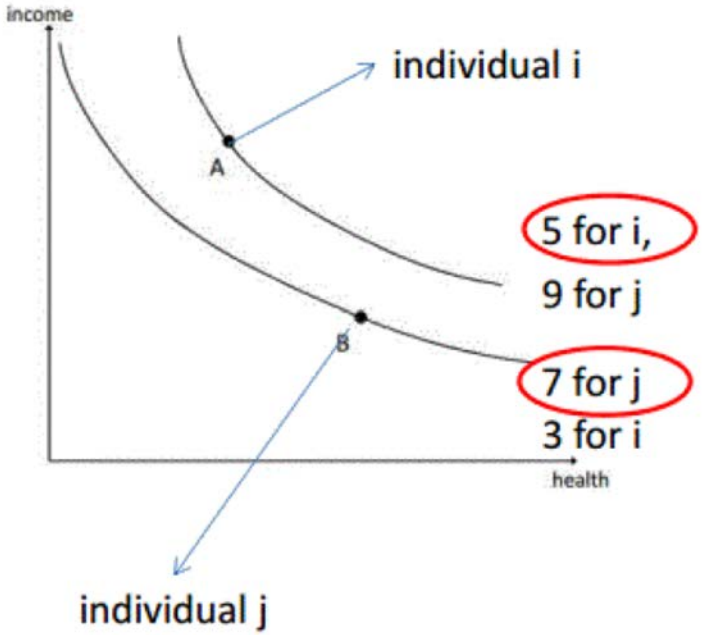
- SAME-PREFERENCE PRINCIPLE

  (ℓ, R, S) is at least as good as (ℓ', R, S') if $\ell R \ell'$ and strictly better if $\ell P \ell'$.

- Welfarism (life satisfaction) does NOT satisfy the same-preference principle.

Happiness measures do not respect preferences




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

A striking example: locked-in syndrome

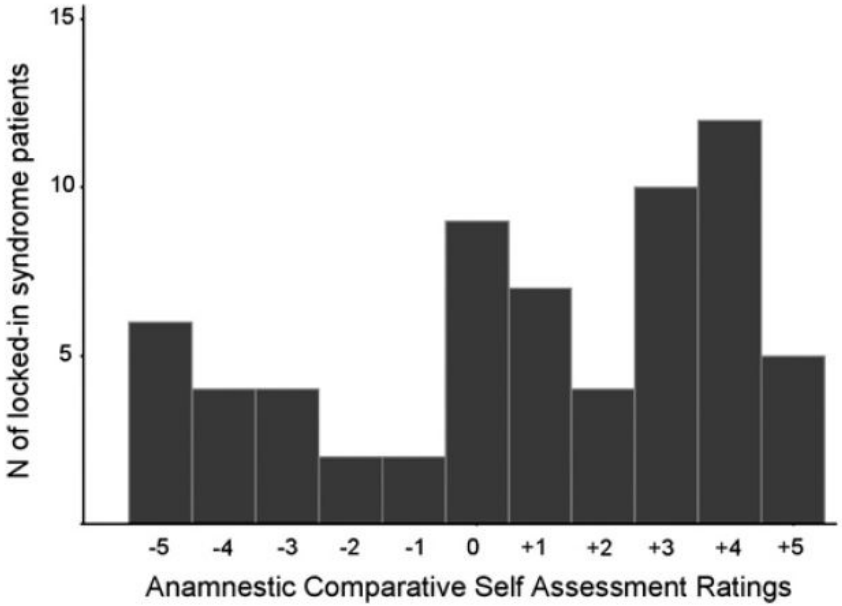


Figure 3 Distribution of Anamnestic Comparative Self-Assessment ratings in locked-in syndrome.

Source: Bruno et al., BMJ, 2011

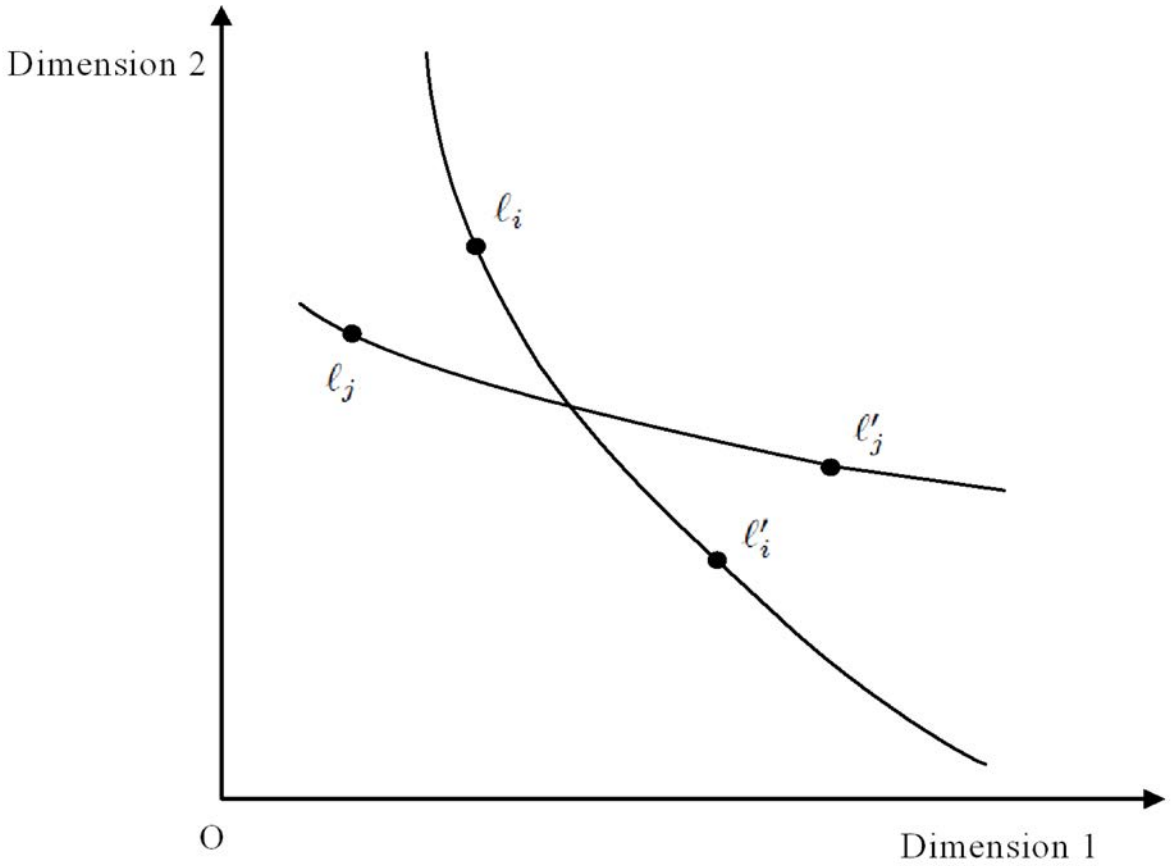
3. Equivalent incomes and the measurement of willingness-to-pay

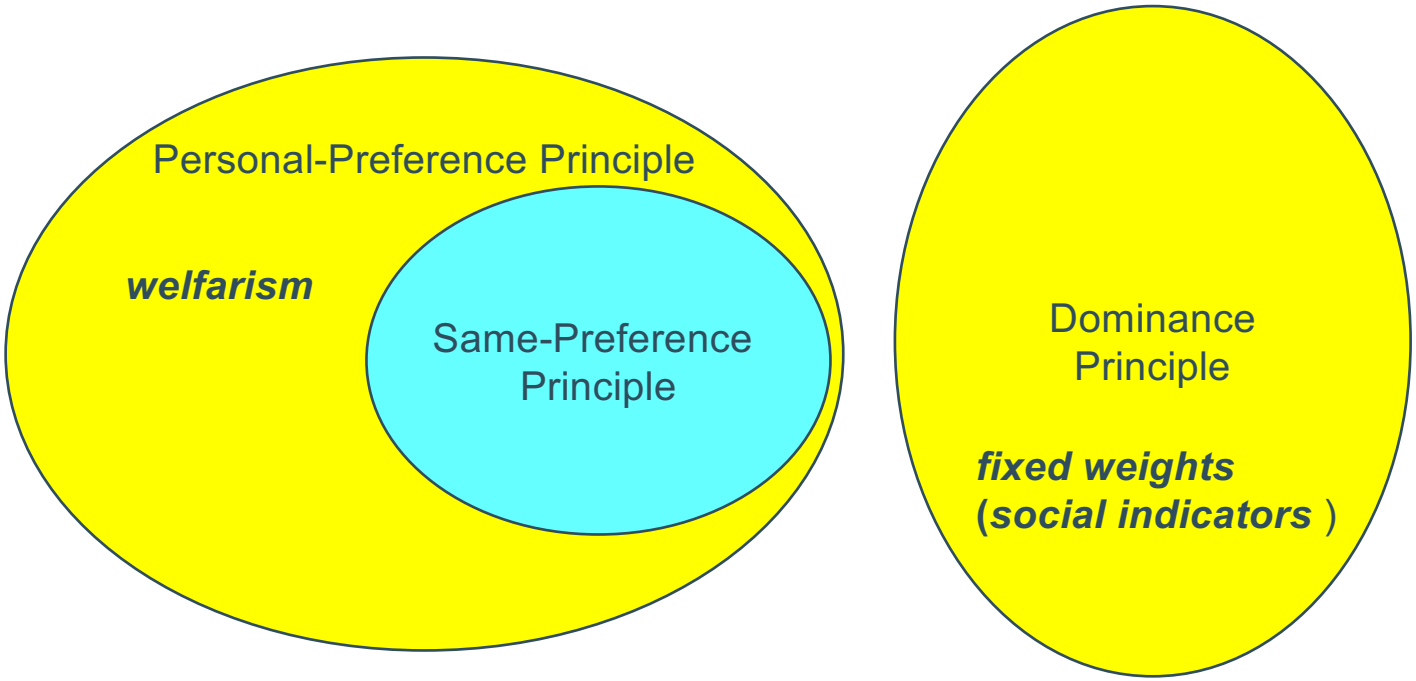
An unfortunate finding

- It has been shown (Brun and Tungodden, 2004; Pattanaik and Xu, 2007; Fleurbaey, 2007) that the personal preference principle clashes with Sen (1985)'s DOMINANCE PRINCIPLE:

  (ℓ', R', S') is at least as good as (ℓ'', R'', S'') if $\ell' R \ell''$ for all R and strictly better if $\ell' P \ell''$ for all R.

Conflict with dominance criterion



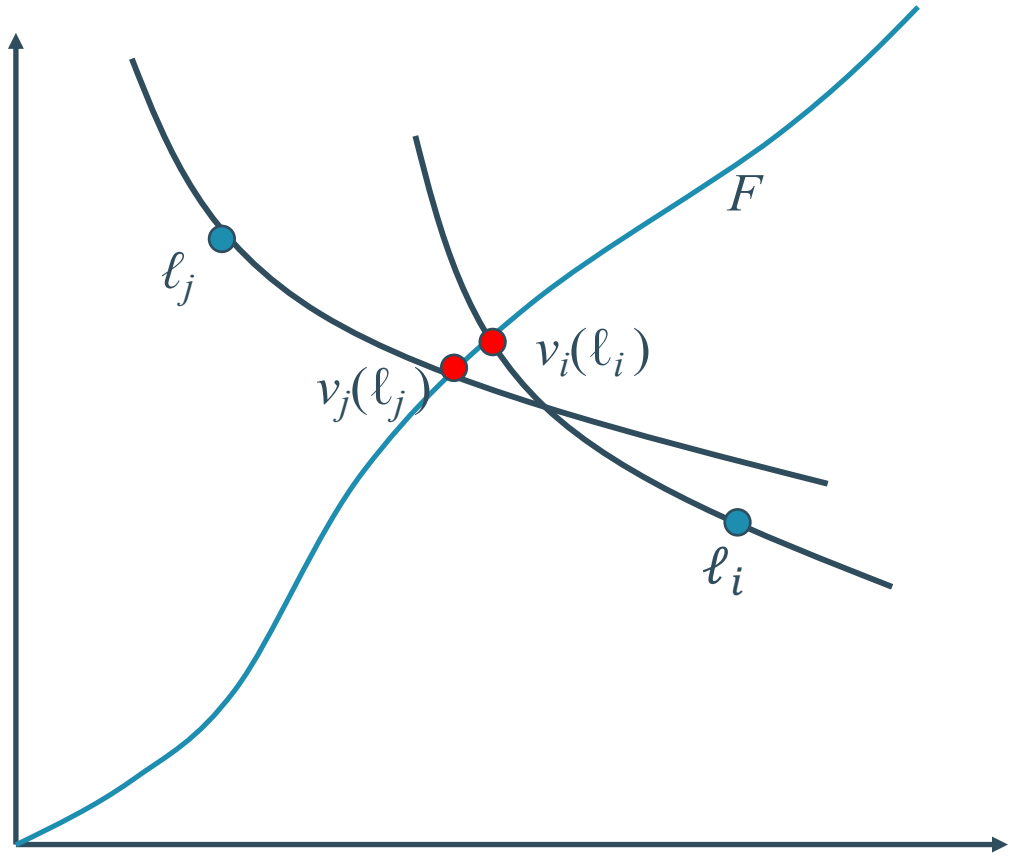

Personal-Preference Principle
welfarism
Same-Preference Principle
Dominance Principle
fixed weights
(social indicators)

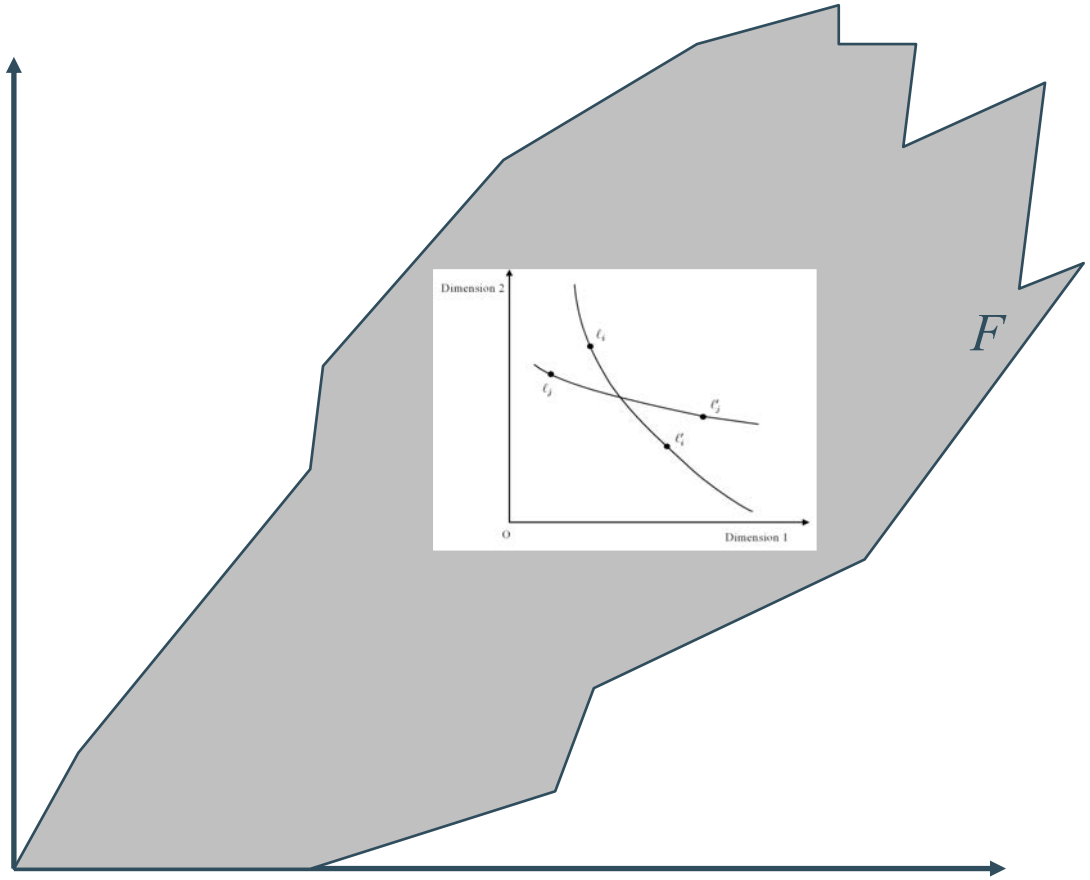
Weakening dominance

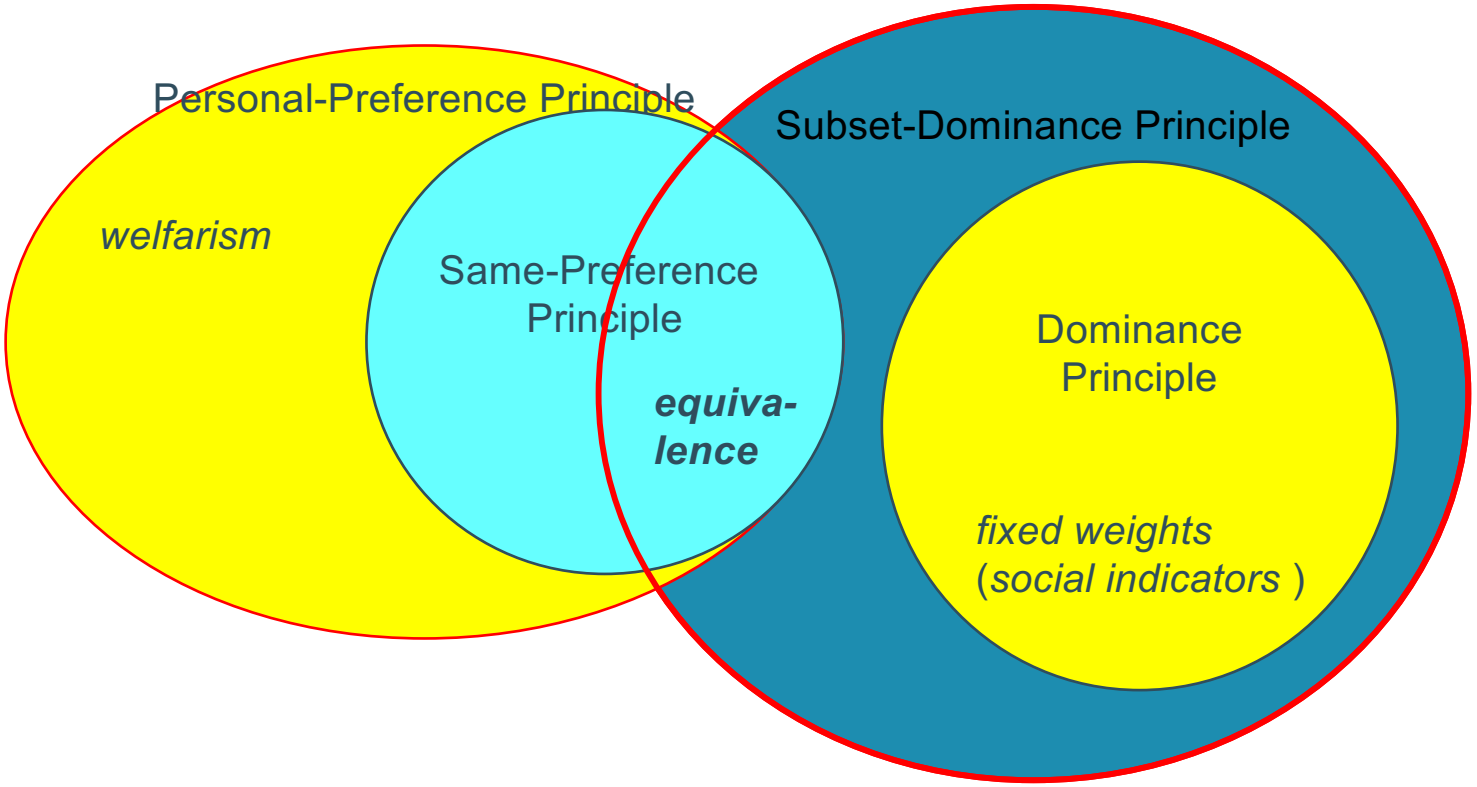
- SUBSET DOMINANCE PRINCIPLE

  Let F be a subset of possible functionings and let ℓ' and ℓ'' be in F. Then (ℓ', R', S') is at least as good as (ℓ'', R'', S'') if $\ell' R \ell''$ for all R and strictly better if $\ell' P \ell''$ for all R.

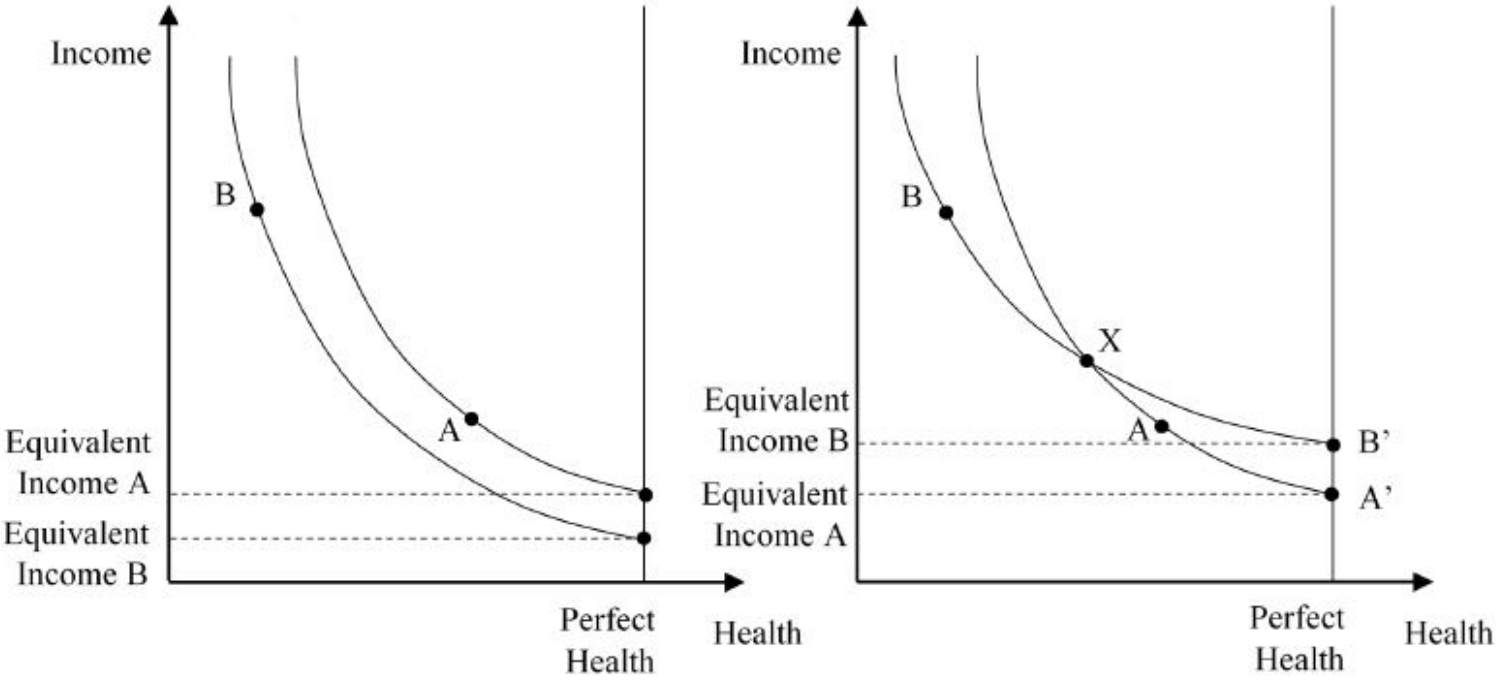
- PROPOSITION (Decancq, Fleurbaey, Schokkaert, Economica 2015). Let F be a subset of $\mathbb{R}_+^m$ such that for every (ℓ_i, R_i, S_i), there is a ℓ_i^* in F such that $\ell_i I_i \ell_i^*$. The subset dominance principle restricted to F, in conjunction with the personal preference principle, implies the equivalence approach (and also implies the same-preference principle).


F
ℓ_j
$v_i(\ell_i)$
$v_j(\ell_j)$
ℓ_i


Dimension 2
Dimension 1
O
F


Personal-Preference Principle
welfarism
Same-Preference Principle
equiva-lence
Subset-Dominance Principle
Dominance Principle
fixed weights (social indicators)

Equivalent income as a possible measure



Definition

- Choose reference values $\tilde{x}$ for all the non-income dimensions (with $\ell = (y, x)$).
- The equivalent income y_i^* for individual *i* is then defined as the solution to the equation

$$(y_i, x_i) I_i (y_i^*, \tilde{x})$$

- The equivalent income $y_i^*(y_i, x_i)$ is a specific cardinalization of the utility function.
- Another interpretation:

$$y_i^* = y_i - WTP_i(x_i \to \tilde{x}; y_i, x_i)$$

Interpretation of WTP in this setting

- WTP captures the trade-offs between the different dimensions of life as they follow from informed judgments about what is good or bad for someone in his/her own life project.

- Since these well-informed judgments will not always guide behaviour, “revealed preferences” may be misleading.
- We are focusing on important dimensions of life.
  - what we are after is the WTP for better health, not the WTP for a specific treatment in health evaluation.
  - what we are after is the WTP for biodiversity, not the WTP for a specific environmental protection measure.

How to “measure” equivalent income?

- Methods to measure preferences:
  - “revealed” preferences – see, e.g., Decoster and Haan (IntTaxPubFin 2015).
  - using a satisfaction equation (e.g. Decancq, Fleurbaey, Schokkaert, Economica, 2015, 2017).
  - “stated” preferences (e.g. contingent valuation) – see, e.g., Luchini, Fleurbaey, Mueller, Schokkaert (HE, 2013).

4a. Application 1: satisfaction data - identifying the poor in a happy country, Colombia (joint with Koen Decancq and Blanca Zuluaga, forthcoming 2019)

Estimating equivalent incomes with satisfaction data

- Estimate a satisfaction equation:

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

- Implement the definition of equivalent income and put the previous expression equal to

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

to get

WTP

DEVIATIONS FROM "BEST" OUTCOME

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

- Scaling variables and (idiosyncratic) disturbances do not appear in this expression.

Identifying the poor in Colombia

- How to identify the poor? Does the choice of well-being measure matter?
- The country: Colombia (always very high in all happiness rankings…)
- Focus on the rural-urban distinction.

- Data: Colombian Encuesta Nacional de Calidad de Vida (ECV).
- Subsample of 13,057 respondents for which we have all the information about five well-being measures. I will focus here on equivalized income, subjective well-being and equivalent income.

Summary statistics: rural-urban distinction

Variables	All	Rural	Urban	Rural-Urban
life satisfaction	6.314	5.791	6.674	-0.882***
income	650,000	390,000	830,000	-440,000***
health	2.687	2.600	2.746	-0.147***
education	1.423	1.014	1.704	-0.689***
house	51,000	31,000	64,000	-33,000***
unemployment	0.03	0.02	0.04	-0.01***
security	0.88	0.86	0.90	-0.04***
age	47.34	47.76	47.05	0.710***
male	0.69	0.79	0.63	0.16***
widowed	0.09	0.08	0.09	-0.01***
divorced	0.13	0.10	0.16	-0.06***
single	0.11	0.08	0.13	-0.06***
literate	0.90	0.84	0.94	-0.11***
urban	0.59	0	1	

Estimation results

	satisfaction	
income (in logarithm)	0.276***	(0.0257)
health [1,4]	0.326***	(0.0385)
education [0,3]	0.126***	(0.0371)
house (in logarithm)	0.642***	(0.0518)
unemployment (binary)	-0.309+	(0.162)
security (binary)	0.145*	(0.0706)
income × urban	0.0219	(0.0336)
health × urban	0.125*	(0.0490)
education × urban	-0.0537	(0.0447)
house × urban	0.127+	(0.0671)
unemployment × urban	-0.204	(0.197)
security × urban	0.0772	(0.0973)
age	0.00154	(0.00582)
age squared	-0.00000891	(0.0000570)
male	-0.0352	(0.0441)
widowed	-0.0824	(0.0675)
divorced	-0.387***	(0.0544)
single	-0.318***	(0.0560)
urban	-1.941**	(0.685)
Atlantica	0.0692	(0.0714)
Oriental	-0.132+	(0.0696)

Portrait of the worst-off decile

	all	income	SWB	SISBEN	CMPI	equivalent income
income	650,000	47,000	274,000	256,000	255,000	110,000
health	2.69	2.34	2.38	2.50	2.41	1.98
education	1.42	0.92	1.05	0.84	0.58	0.68
house	51,000	35,000	34,000	24,000	24,000	21,000
unemployment	0.03	0.09	0.06	0.05	0.04	0.11
security	0.88	0.84	0.84	0.82	0.68	0.79
age	47.34	51.19	47.40	46.69	49.90	50.80
male	0.69	0.56	0.67	0.64	0.69	0.69
widowed	0.09	0.14	0.09	0.11	0.12	0.11
divorced	0.13	0.17	0.17	0.16	0.13	0.12
single	0.11	0.14	0.12	0.09	0.07	0.09
literate	0.90	0.78	0.81	0.74	0.56	0.68
urban	0.59	0.44	0.47	0.33	0.30	0.32

Source: Own computations on data from ECV 2008 (subsample of household heads)

Non-market goods and the identification of the poor

- The choice of well-being measure is of crucial importance for the identification of the worst-off in society.
- Non-market goods have a strong influence on equivalent incomes.
- The importance of non-market goods is less clearly captured by subjective well-being measures.

4b. Application 2: contingent valuation and healthy-equivalent incomes (joint with Luchini, Fleurbaey, Dormont, Samson, Thébaut, Vande Voorde, HE 2018)

French questionnaire study, 2009

- 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

Preferences elicitation 1

Introductory text

During the first part of the questionnaire, you provided us information about your health in the past 12 months and your current health. You also provided us information on your financial resources. We now would like to evaluate with you the burden of your health problems in the past 12 months and the way you compare health gains and income.

(respondent is given a brief summary on his/her responses to the health and financial resources questions)

Preferences elicitation 2

Participation question

If no health problems had occurred in the past 12 months and you would therefore have been in perfect health, you would have saved the health expenditures that you stated earlier. Moreover, you would have benefited from a better quality of life. Without accounting for health expenditures, would you have preferred a lower income in the last 12 months without any of the health problems that you had?

(**Answer: Yes / No / Don't know**)

Preferences elicitation 3

Valuation question (if yes to the previous question)

*Indicate the monthly decrease in your **personal** consumption in the last 12 months that you would have accepted to forgo in order to be in perfect health (during the same period of time) on top of health expenditures that you would have saved.*

(**Payment card: intervals on a grid from less than €15 to more than €1500**)

Self-reported health and WTP for perfect health

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

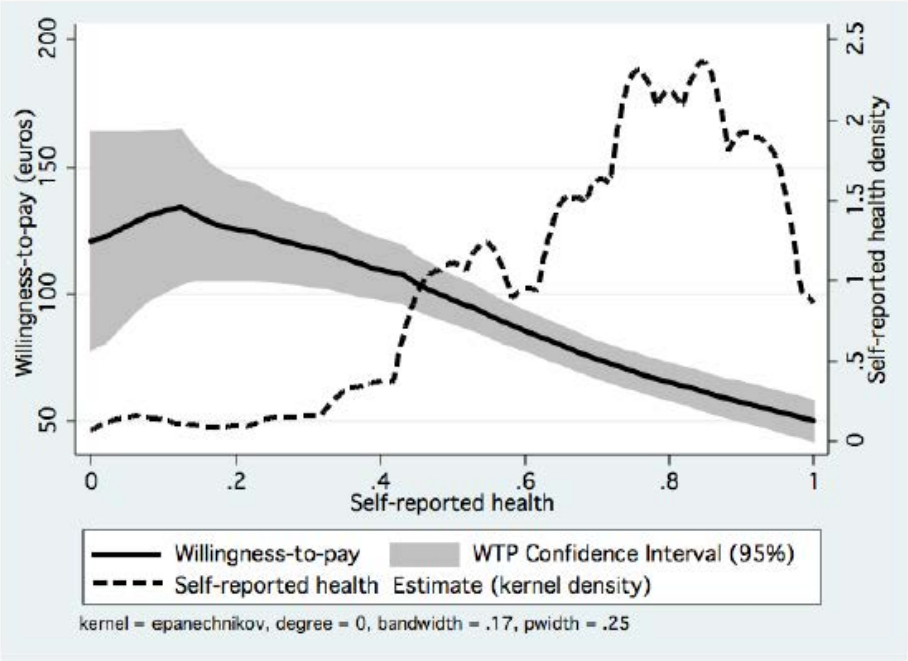


Figure 2: Distribution of self-reported health and relationship with WTP for perfect health

Income and WTP for perfect health

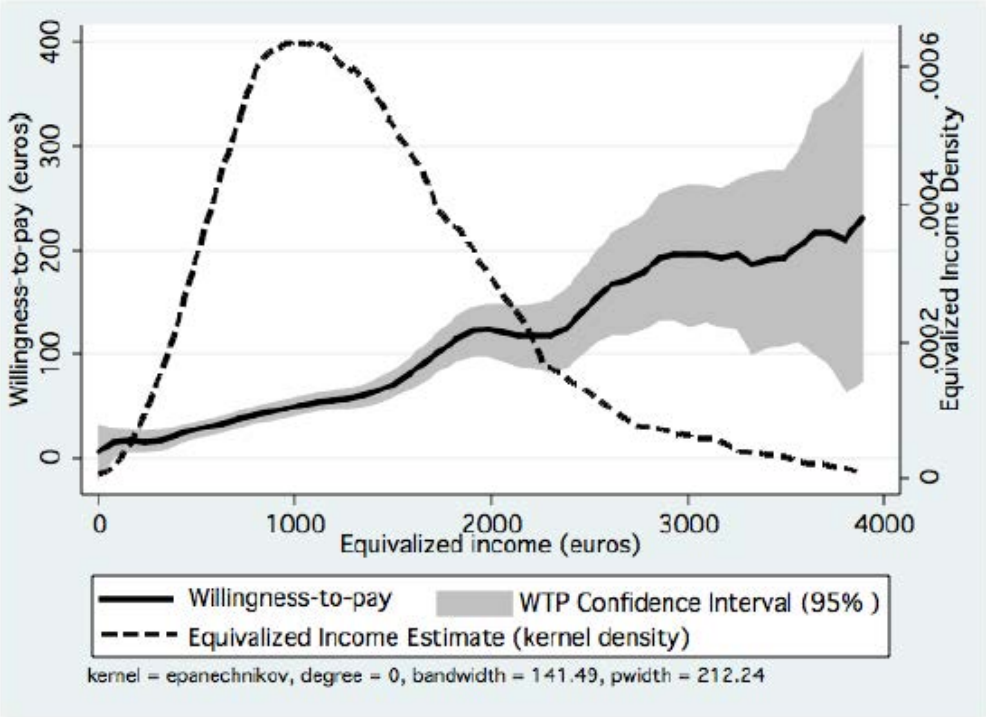


Figure 3: Distribution of income and relationship with WTP for perfect health

Estimating preferences

- Ideally, we would like to estimate a specific "utility" function $y_i^*(y_i, h_i)$ for every individual.

- We have only information on two "bundles": (y_i, h_i) and $(y_i - WTP_i, \bar{h})$ which are on the same indifference curve.

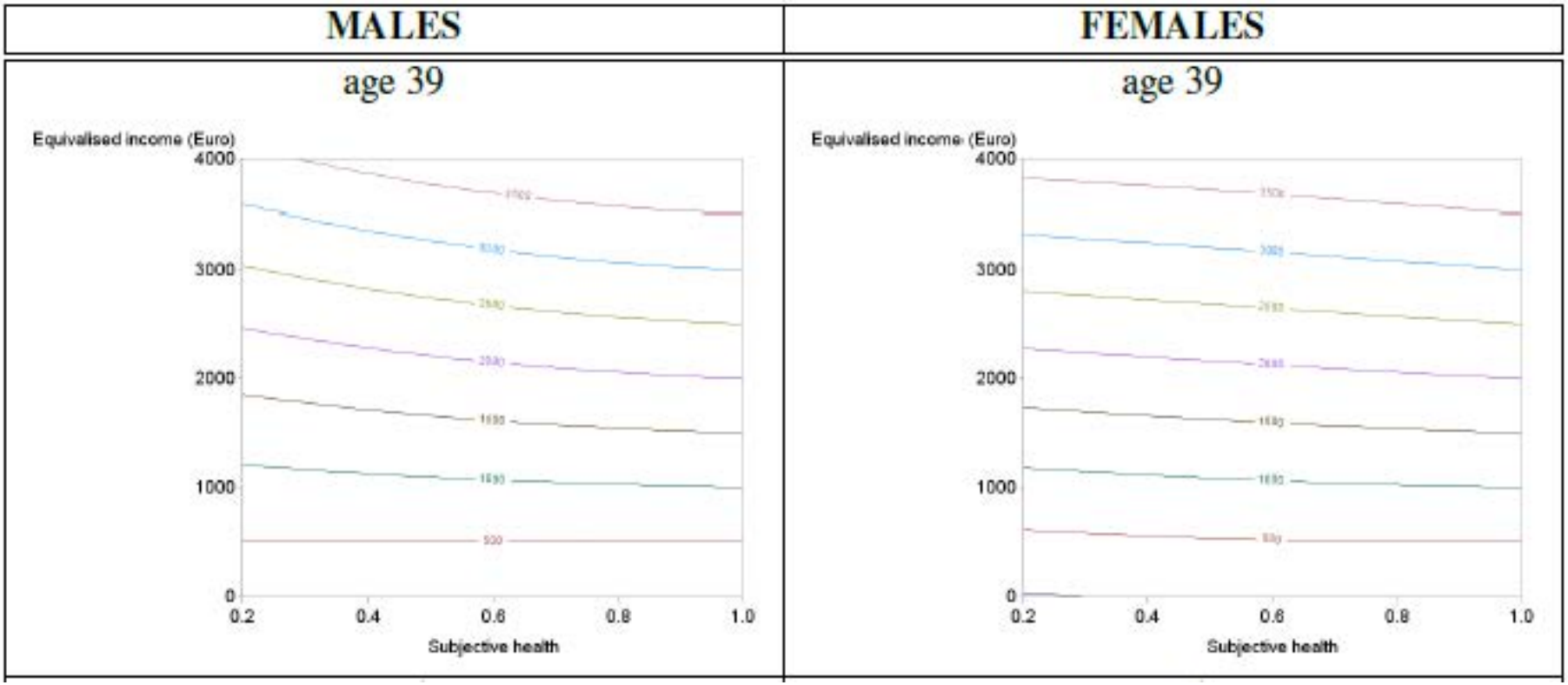
- We estimated a flexible functional form (no restrictions on utility function) for WTP allowing interindividual differences in the MRS between income and health according to age and gender.

Specification

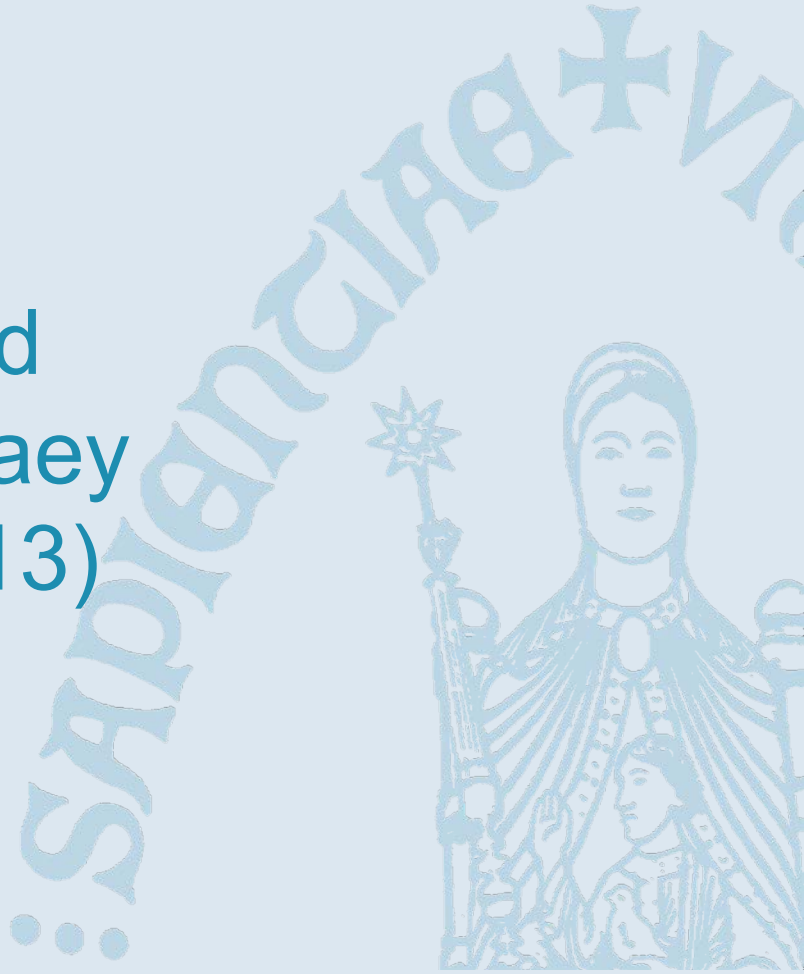
$$WTP_i = \alpha_i(1-h_i) + \beta_i(1-h_i)^2 + \gamma_i y_i(1-h_i) + \delta_i y_i^2(1-h_i) + \mu_i y_i(1-h_i)^2 + \varepsilon_i$$

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

Indifference curves



5. Equivalent incomes, WTP and incomplete preferences (Fleurbaey and Schokkaert, AEJ: Micro 2013)



Behavioral economics: shaking preferences?

- OBSERVATION: behavioral anomalies
  - Default option
  - Endowment effect
  - Loss aversion
  - Hyperbolic discounting (lack of self-control?)

- Traditional revealed preference approach breaks down – in some circumstances *x* can be chosen from *(x,y)*, in other circumstances *y*

- *Do well-defined preferences exist? Perhaps for consumption goods, but not for environment or health?*

Possible reactions

1. Go back to “experience utility” instead of “decision utility” (e.g. Kahneman, Dolan, Layard, Frey) - goes against preference principle
2. Try to recover information about preferences, taking into account the “behavioral anomalies”
3. Live with the idea that the preference relation is incomplete (Bernheim, Rangel, 2009):

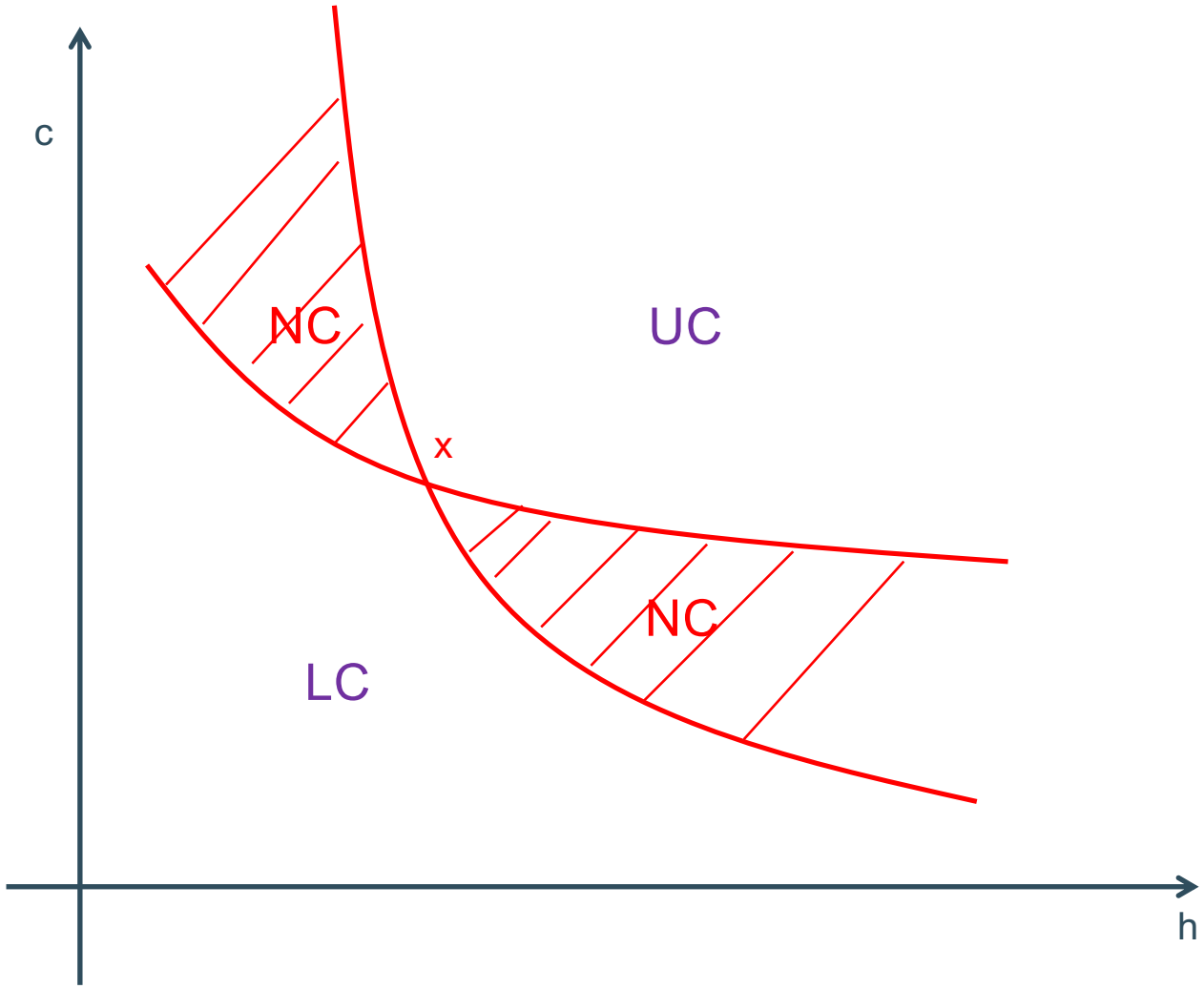
   xP_i^*y if and only if y is never chosen when x is available.

   P_i^* is acyclic, and transitive for almost all popular behavioral approaches

What about “authentic” preferences?

- Likely that some of the anomalies remain relevant: “authentic” preferences also discovered through “well-informed” choices.
- Both health and the environment are emotionally laden issues.

- 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?


c
NC
UC
x
NC
LC
h

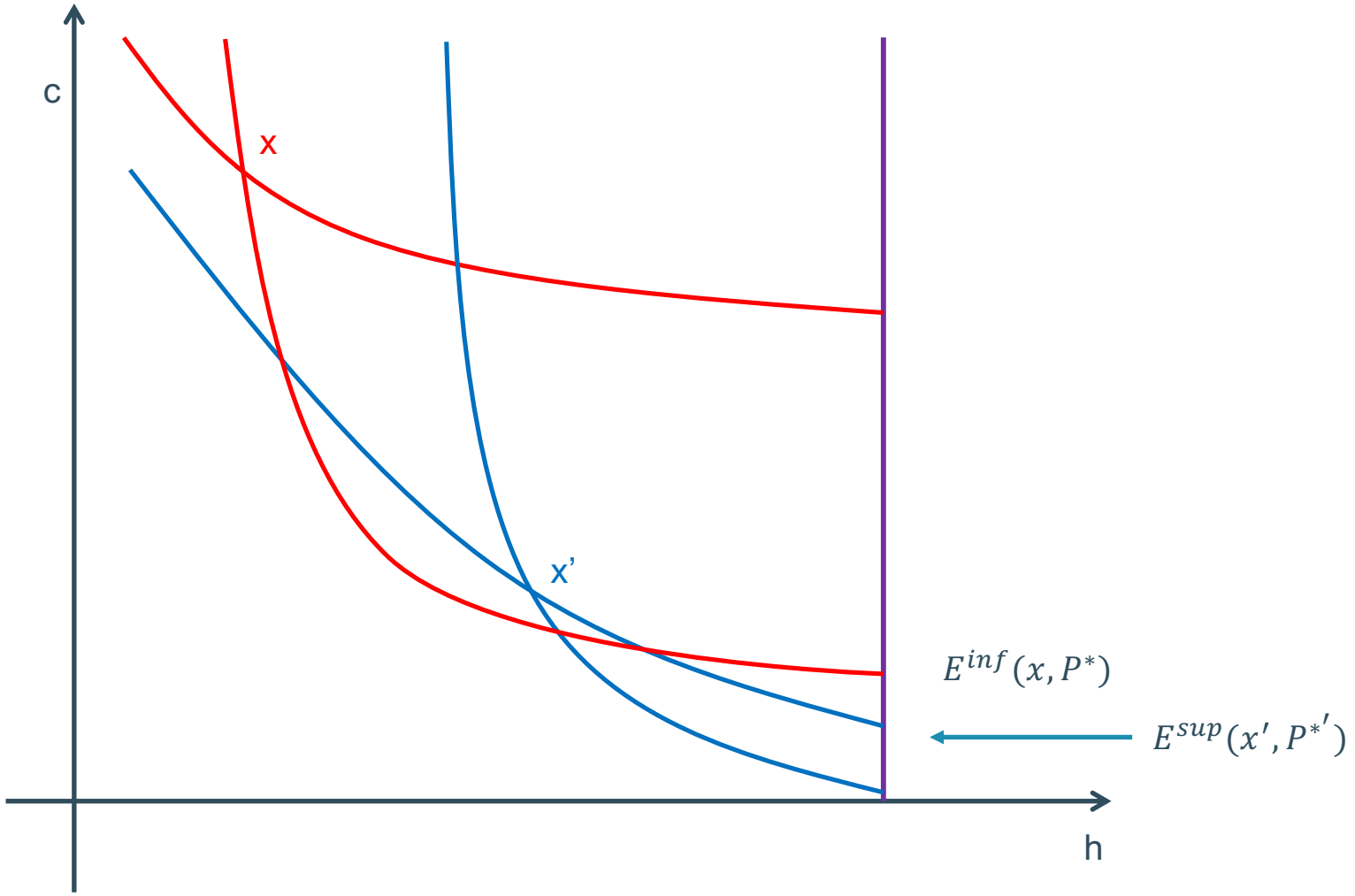
Interpersonal comparisons with incomplete preferences

Restricted Dominance Principle: For all $x, x' \in F$, $(x, P^*) \succcurlyeq (x', P^{*\prime})$ if $x \geq x'$; $(x, P^*) \succ (x', P^{*\prime})$ if $x \gg x'$.

Preference principle $(x, P^*) \succ (x', P^*)$ if xP^*x'.

RESULT (simplified)

$(x, P^*) \succ (x', P^{*\prime})$ whenever $E^{inf}(x, P^*) > E^{sup}(x', P^{*\prime})$


c
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$E^{inf}(x, P^*)$
$E^{sup}(x', P^{*\prime})$
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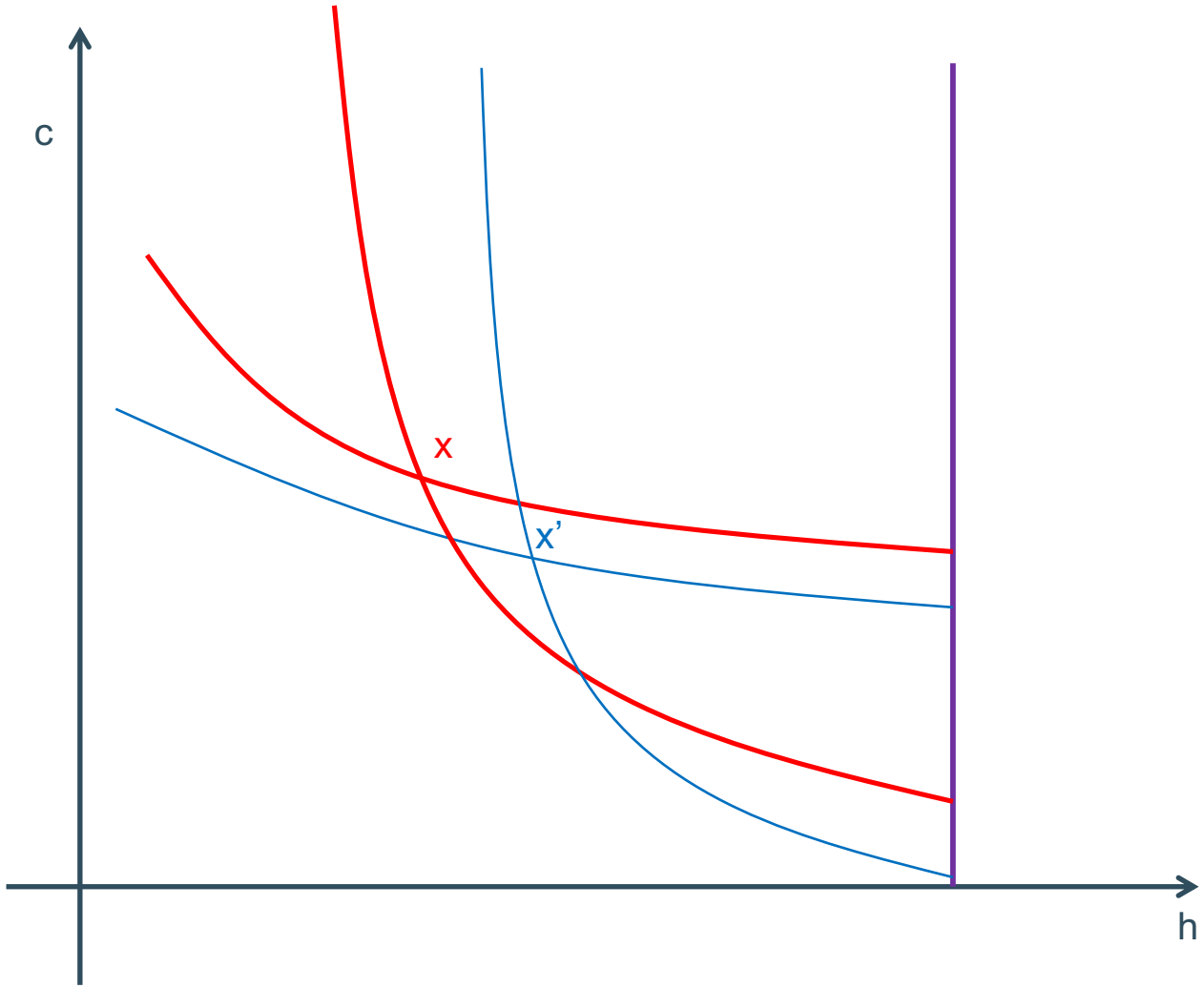
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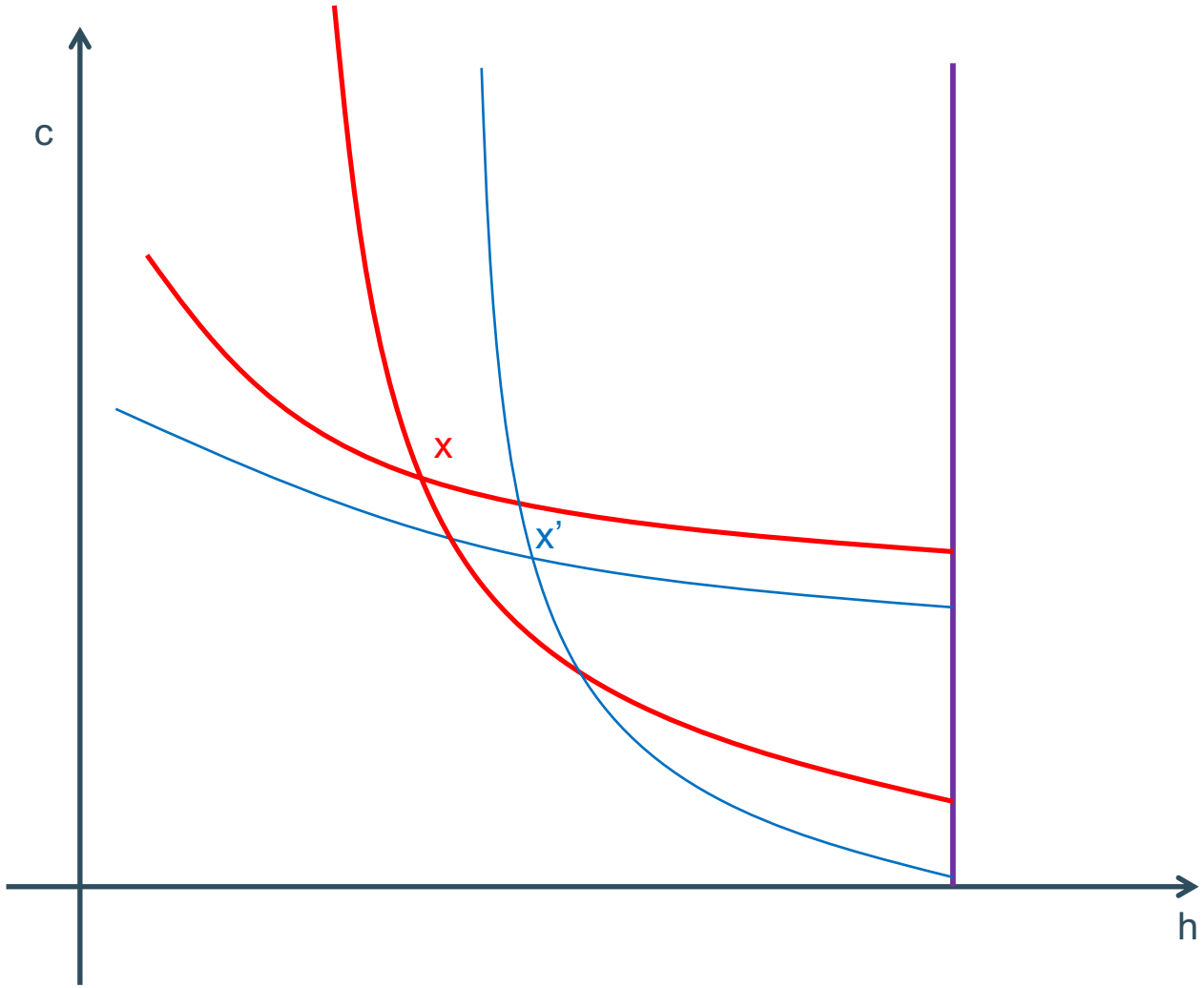
Safety principle

Safety Principle: $(x, P^*) \succ (x', P^{*\prime})$ if there exists $\overline{P^*}' \supset P^{*\prime}$ such that for all $\overline{P^*} \supset P^*$, $(x, \overline{P^*}) \succ (x', \overline{P^*}')$.

RESULT (simplified)

$(x, P^*) \succ (x', P^{*\prime})$ whenever $E^{inf}(x, P^*) > E^{inf}(x', P^{*\prime})$


c
x
x'
h

Conclusion

Conclusion

- Measurement of individual well-being needed for adequate policy evaluation.
- Non-market valuation needed for measurement of individual well-being.