

Economic evaluation: measurement of gains



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Approaches in economics

(including health economics)

□ Positive economics

- “How things are”
- e.g. microeconomics (e.g. theory of choice, theories of demand and supply...)

□ Normative economics

- “How things ought to be”
- e.g. welfare economics; economic evaluation...
- *Note! Connection to ethics*

Cost-benefit approach

- A group of analytical tools to investigate **efficiency** of actions
 - Cost-benefit analysis
 - Cost-effectiveness analysis
 - Cost-utility analysis
 - (cost analysis)
 - (cost-consequences analysis)
- NB. Only efficiency, but **NOT** (fairness, equity, equality of) ***distribution***

Principles

- "Measure gains and losses to individuals", (using money as the measuring rod of gains and losses) (Pearce)
- "Aggregate (the money) valuations of the gains and losses of individuals and expressing them as a net social gains or losses" (Pearce)
- Societal viewpoint

Why cba?

- Basically, (according to textbook economics, under certain conditions) markets allocate resources efficiently
 - Markets may not work well, e.g. in
 - Some (large) investments → no perfect competition → market failure
 - Remarkable public interest (e.g. equity in health care)
 - Public goods, Externalities
- CBA offers information on efficiency in these cases

What's "Economics" about?

- The science of choices
- Ultimate goal: highest utility (or welfare) with given resources
- Two approaches: positive and normative
- Normative economics:
 - "What actions are good?" (from max utility point of view)
→ Welfare theory

Welfare economics 1/2

- NG on welfare economics: "... the branch of study which endeavours to formulate propositions by which we can say that the social welfare in one economics situation is higher or lower than in another."
- How to compare situations?
 - Need a measuring rod!

Welfare economics 2/2

- The conflict between “value-free” (or positive) science and welfare economics:
 - Value judgements are unavoidable.
- Avoiding (explicit) value judgements:
 - Societal goals taken as given:
 - *“Society aims at achieving condition Y”, i.e. Y is important argument in societal welfare function*
 - *If act A produces a higher improvement in Y than B (with similar resources), then A is better than act B”*

Basically, everything is about *utility*

- Basic (ethical) choice for “goodness” of actions (e.g in the theory of choice): **Utility**
- Utility?
- Either “... properties of any objects to produce benefits, pleasure or happiness..”, or prevent the contrary (Bentham)
- or: “... the value of a function that represents a persons preferences..” (Broome)

Utility?

- Following Broome's notion, the theory of choice may be termed: "... the logical theory of **rational choice**" (Gerrard)
- Measurable?
 - Marginalists: "No". Order of preferences indicate utility (ordinal utility)
 - Cardinalists: "Yes". Strength of preferences matters (cardinal utility)
- NB: vonNeuman-Morgenstern's Expected Utility Theory (EUT): utility values are observed

Utility?

- Benthamian utility: pleasure and absence of pain
 - i.e. utility consists of sensational consequences of actions
- Marginalists' utility: Individual desires and preferences and their fulfilment matter
- Conclusion: different utility-concepts produce different definitions for *rationality*
 - *Rational choice: max utility – but what utility?*

Utilitarianism (act u.) 1/4

- An ethical rule beyond welfare theory
- Acts are judged according to their consequences:
 - *"Two sovereign masters"* Happiness is *"Good"* and unhappiness *"Bad"*
 - basic value judgements *"in themselves"* (Bentham)
 - Actions are good or bad according their ability to produce happiness (or prevent the contrary)

Utilitarianism.. 2/4

- Utilitarianism is a part of humanism: in evaluation of acts, "God's Will" not needed (first expressed perhaps by *Leibniz*)
- *Utilitarian calculus*: Happiness derived from an action is contrasted against any unhappiness or pain created by the action
- Consequences aggregated over the whole population
 - total or average
- Criterium for Goodness of a choice: max net happiness

Utilitarianism... 3/4

- Critics to utilitarianism as a moral guideline:
 - other important values besides happiness (e.g. Human Rights), not interchangeable to greatest happiness (e.g. Kantian ethics)
 - Justice: "Right" is the fundamental principle, not "Goodness" (Kantian ethics)

Utilitarianism... 4/4

- Technical critics:
 - how to measure individual "happiness" (utility)?
 - how to compare happiness over individuals or in one individual over time (ex ante v.s. ex post)?
 - present v.s. future generations?
- In practical evaluation studies, these problems must be solved (or disregarded...)

Welfare economics & utilitarianism 1/2

- Pearce: Moral judgements can (and should) contain elements from economic rationality, but due to other moral elements such as human rights or equity, economic rationality and moral judgement coincide only occasionally.
- Hence, note the difference between "best" and "most efficient" choice!

Welfare economics & utilitarianism 2/2

- Economic rationality (efficiency) is important, but not the only factor that matters in social choices
- There are attempts to generate sophisticated methods for incorporating the other factors into economic evaluations, such as distributional issues
 - see e.g. Harsanyi (equity weights)
- But: no common agreement of criteria for e.g. equity (because these are highly political..!)

”Fair Innings” (Alan Williams)

	choice A		choice B		choice A	choice B
	young	old	young	old	sum	sum
QALY's equity weight Y = 1 O = 1	7	9	9	6	16	15
QALY's equity weight Y = 2 O = 1	14	9	18	6	23	24

Measurement of gains and losses

- In measurement of gains (benefits), a WTP-procedure is applied
 - WTP = "prices" of the output
- Losses: Opportunity costs,
 - i.e. WTP of the alternative action, which was rejected
- Net present value (NPV)
 - simply: gains – losses
 - Discount future gains & losses to present value

Measurement of costs

- Mishan: "... the opportunity costs of the current use of some good or some input is its worth in some alternative use"
- From numerous alternative uses of resources, the benefits foregone due to rejection of best alternative are the opportunity costs.

Measurement of gains

(positive consequences)

- The Benthamian approach:
 1. it is possible to measure pleasures and pains
 2. and determine their actual amounts
- Seven measures (=dimensions) for estimating goodness of actions
 - 1. Intensity, 2. Duration, 3. Certainty, 4. Propinquity (closeness), 5. Fecundicity (fruitfulness?), 6. Purity, and 7. Extent of pleasure.
- hedonic calculus
- Bentham: from ethics to science

Measurement of gains

(positive consequences)

- The Paretian criterion: social welfare is some aggregation of individual utilities
 - positive (or negative) consequences of actions are individual valuations of changes
- CBA attempts to follow Paretian principles in order to indentify potential Pareto-improvements
- CEA / CUA: health maximation / health related utility max.

Effectiveness

- A wide variety of instruments for its measurement
- Often, instruments assess e.g. health related factors without any direct reference to individual desires or preferences
 - Researcher must presuppose that measured issues are important arguments in individual welfare function
 - e.g. changes in blood pressure? In most cases, we do not even feel changes in it!

Effectiveness of discharge practices, RCT (Hammar et al.)

	Before hospital admission			6-months follow-up		
	Intervention (n=214-259)	Control (n=193-226)	p ²	Intervention (n=214-258)	Control (n=194-226)	p ²
EQ-5D² , mean (sd)	0.6 (0)	0.5 (0)	0.001	0.6 (0)	0.5 (0)	0.024
-with deceased	0.6 (0)	0.5 (0)	0.002	0.5 (0)	0.4 (0)	0.021
NHP³ , mean (sd)						
Energy level	61 (25)	64 (24)	ns	43 (36)	51 (38)	0.039
Sleep	42 (32)	38 (32)	ns	37 (30)	33 (31)	ns
Pain	37 (24)	40 (23)	ns	31 (28)	36 (28)	0.018
Physical mobility	50 (23)	51 (20)	ns	44 (20)	48 (22)	ns
Emotional reactions	21 (24)	22 (25)	ns	13 (20)	18 (24)	0.022
Social isolation	15 (21)	20 (24)	0.034	13 (18)	18 (22)	0.002

Effectiveness of a rehabilitation program for elderly, RCT (Kehusmaa et al)

Outcome	Time	Intervention group (IG)	Control group (CG)
FIM™	Baseline	115,85	115,38
	12 months	112,44	111,03
HRQOL (15D)	Baseline	0,735	0,735
single imputation	12 months	0,719	0,72
HRQOL (14D)	12 months	0,679	0,679

Effectiveness

- Decision maker's role in CEA:
 - forced to *value* the observed effectiveness (in terms of social welfare?)
 - Thus, role of decision maker is more demanding in CEA than in CBA (and CUA)
- CEA produces information on productive efficiency, while (CBA and) CUA (ideally) on allocative efficiency

Utility

- Utility measurement has become a widely used technique in health economics
- All health gains measured by using the same common currency, the *utility* as the *numéraire*
 - Allows comparison of (outcomes in) different medical treatments (like in GDP –accounts)
 - Helps priority setting for different conditions and interventions

EQ-5D/3: Describing your health TODAY

Under each heading, please tick the ONE box that best describes your health TODAY

Mobility (walking about)

- I have no problems walking about
- I have some problems walking about
- I have a lot of problems walking about

Looking after myself

- I have no problems washing or dressing myself
- I have some problems washing or dressing myself
- I have a lot of problems washing or dressing myself

Doing usual activities (for example, going to school, hobbies, sports, playing, doing things with family or friends)

- I have no problems doing my usual activities
- I have some problems doing my usual activities
- I have a lot of problems doing my usual activities

Having pain or discomfort

- I have no pain or discomfort
- I have some pain or discomfort
- I have a lot of pain or discomfort

Feeling worried, sad or unhappy

- I am not worried, sad or unhappy
- I am a bit worried, sad or unhappy
- I am very worried, sad or unhappy

Utility

- How to formulate a unique and widely accepted basic value (such as money in GDP)?
- Ethical and theoretical properties of the utility measurements are essential
- What utility?
 1. must accept cardinal utility concept
 2. utility concept: individual desires or Benthamian utility?

Utility

- Two basic problems in measurement of preference-based utilities
 1. How to measure the strength of preferences?
 2. How to aggregate utilities over individuals?

Utility measurement

- ❑ Two approaches: Choice-based approach and choiceless approach
- ❑ Choice-based approaches
 - EUT / Standard gamble taken as the Gold Standard
 - Time Trade Off (TTO)
 - Person Trade Off (PTO)
- ❑ Critics:
 - is EUT verified? Is it empirically flawed (Hargraves Heap et al; Anand; McQuire)
 - Perhaps EUT is not a positive, but a normative theory?

Utility measurement

- Choiceless methods
 - Magnitude estimation
 - Rating scale (e.g. application of VAS in valuations)
- Critics to choiceless methods
 - resource allocation inevitably involve choice
→ relevance to decision making?

Dimensions of utility

- Concensus: pain, mobility and functional ability should be included in health related utility measurement
- Problem: not only can importance of dimensions differ individually, but also the content of the vector of dimensions!
 - Solution 1: take the utility instrument as a social welfare function (e.g. Samuelsson-type)
 - Solution 2: Accept Benthamian utility

Aggregation of utility

- Theory: consumer surplus is the measure of utilities (how to measure this? how to compare gainers and losers?)
 - in health care, in most cases, observation of market demand curve not possible
 - redistribution (compensation to losers) between individuals possible in terms of money, but not in health
 - asymmetric information ignored (typical in health care)

In sum: utility measurement

- Choice ought to maximise utility, but what utility?
- No unique definition of utility
- No natural basis for its measurement either
 - each instrument for utility measurement produces its own utility and – consequently – its own rationality (i.e. efficiency)

In sum: utility measurement

- Even though not proper utility measures, the typical utility instruments (like QALY's) are better health indicators than e.g. morbidity or mortality
- Rationality behind CUA might not be utility maximation i.e. welfarist rationality, but at least health maximation, i.e. extra-welfarist rationality

Measuring gains in terms of money: human capital approach

□ Human capital approach

- capacity of human capital to produce (i.e. marginal product) varies, eg. due to education, health conditions etc.
 - health care gains: improvement in health and thus, in capacity to produce
- must measure changes in productivity,
- in practice, should measure participation in production valued by wages

Measuring gains in terms of money: human capital approach

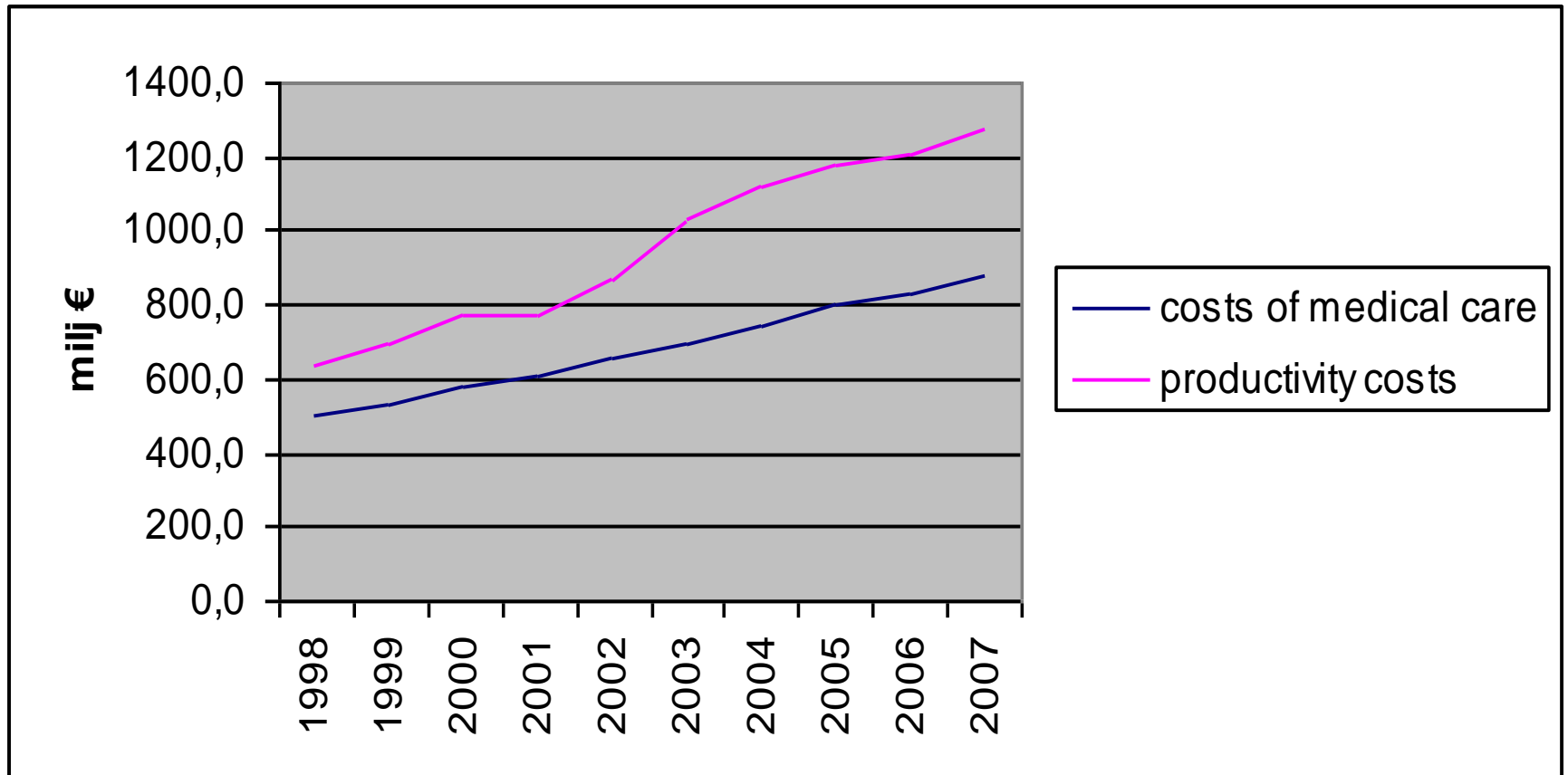
□ Assumptions

- wages reflect marginal product correctly
- full employment, no reserves of labour
- volume of production (i.e. Δ GDP) is an appropriate description of welfare

□ Critics

- reality of assumptions?
- is health only an input to production? or is it the other way round (i.e. GDP is only an instrument in creating health and welfare?)
- ethical consequences?

Costs of diabetes in Finland in 1998-2007, (2007 prices)



Measuring gains in terms of money: friction cost method

- Human capital method easily produces overestimates of production costs
 - in most cases, excess labour exists
 - unemployment, longer daily worktime, ...
- productivity loss mainly depends on the friction time during which the absent worker is replaced with another
 - friction time depends e.g. on labour market conditions, profession etc.
- Thus, if gains are measured by human capital approach, then these are overestimated

Measuring gains in terms of money: wtp-approach

- wtp approach: measure peoples willingness to pay for (expected) health gains
 - theoretically solid
 - in line with theories of consumer behaviour
- Measurements:
 - direct method: questioning patients / population, no actual payments required
 - undirect observations of willingness to pay for e.g. health risk reductions

Measuring gains in terms of money: wtp-approach

□ critics:

- "choice" (in direct method) not really a choice (because no actual payment),
 - thus, provides only hypothetical monetary valuation
 - cannot be used in CBA (see previous argument)
- ## □ difficult to generate a reliable wtp-instrument for health measurements
- e.g. framing and wording easily influence results → no consistency