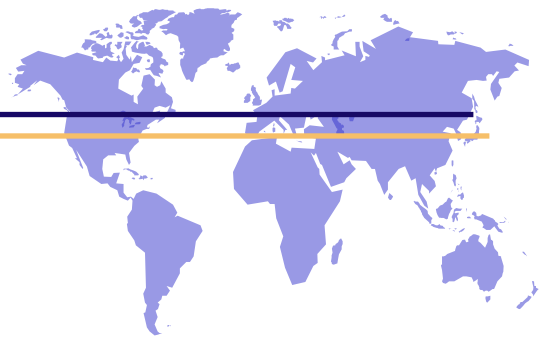
IQWiG Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen

# Reflections on Meaning and Measures of **Efficiency** in Health Care



IQWiG Autumn Symposium
Cologne, November 28, 2009

**Michael Schlander**

Please note that, in most of the presentation charts following hereafter, the terms *cost effectiveness*, *cost utility*, and *the logic of cost effectiveness* will be used to refer to cost effectiveness analyses using QALYs and (some sort of) cost-per-QALY benchmarks

INNOVAL HC
Institute for Innovation & Valuation in Health Care
*and*
**University of Heidelberg** / *Mannheim Medical Faculty*
/ Hochschule für Wirtschaft (FH) Ludwigshafen

## *BRIEF BACKGROUND*

- Personal
- Institutional

IV

## Personal

- **Institute for Innovation & Valuation in Health Care**
  - Founder and Chairman of INNOVAL$^{HC}$, since 2005
- **Hochschule für Wirtschaft Ludwigshafen**
  - Professor of (Health Care and Innovation) Management, since 2002
- **University of Heidelberg**
  - Visiting Scientist (Health Economics, Mannheim Institute of Public Health)
- **Ph.D. (Venia legendi) in Health Economics**
  - **University of Heidelberg 2007**
- **Diploma in Health Economics**
  - **Stockholm School of Economics** 2002
- **Master of Business Administration (M.B.A.)**
  - **City U of Bellevue/Washington**, Valedictorian of the class of 1994
- **M.D. (Dr. med.)**
  - **University of Frankfurt am Main**, summa cum laude 1985/87
- **Universities of Witten/Herdecke and Duisburg-Essen**
  - Scientific Steering Committee "Pharmaceutical Medicine" & Member of Medical Faculty, 1996-2005 and 2005-2007
- **Pharmaceutical Industry**
  - **General Management (Germany)** 1999-2002
  - **Strategic Marketing & Sales (in USA, Belgium, and Germany)** 1993-1999
  - **European New Product Development** 1987-1993
- **Experimental Brain Research**
  - **Academia (University of Frankfurt a.M.)** 1982-1987

## Institutional

- **Institute for Innovation & Valuation in Health Care (INNOVAL$^{HC}$)**
  - Office in Wiesbaden / Germany; founded in June 2005
  - Formally associated with the University of Applied Economic Sciences Ludwigshafen
  - Independent Not-For-Profit Research Organization (Not a Commercial Contract Research Organization)
  - Funding of Research Projects
    - Accepted under an "unrestricted educational grant" policy only
    - Receiving support from National Institutes of Mental Health (NIMH, Bethesda, Md.), Physician and Payer Organizations (~80% international projects – USA, Canada, United Kingdom, Sweden, Netherlands)
- Chairman: Professor Michael Schlander, M.D., Ph.D., M.B.A.
- Vice-Chairmen: Professor Oliver Schwarz, Ph.D. (Heilbronn)
  Professor G.-Erik Trott, M.D., Ph.D. (Aschaffenburg)

## *EFFICIENCY IN HEALTH CARE*

- Effectiveness and Efficiency
- Static and Dynamic Efficiency
- Technical, Production, and Allocative Efficiency

IV

**Introduction**

## Inefficiency in Health Care

- **Overutilization**
- **Misutilization**
- **Underutilization**
- **Variations in Treatment Patterns**
- **Prevalence of Medical Errors**
- **Flat of the Curve Medicine**
- **Market Failures**
- **Moral Hazard**
- **…**

**Introduction**

## Inefficiency in Health Care[1]

**Inefficiency in economics**
**means more than waste or sloth;**

**it means that mutual gains that could be achieved have not been achieved;**

there is money (or welfare)
left lying on the table,

and one would expect institutional arrangements to emerge in order to permit people to claim it.

[1]M.V. Pauly (2003)

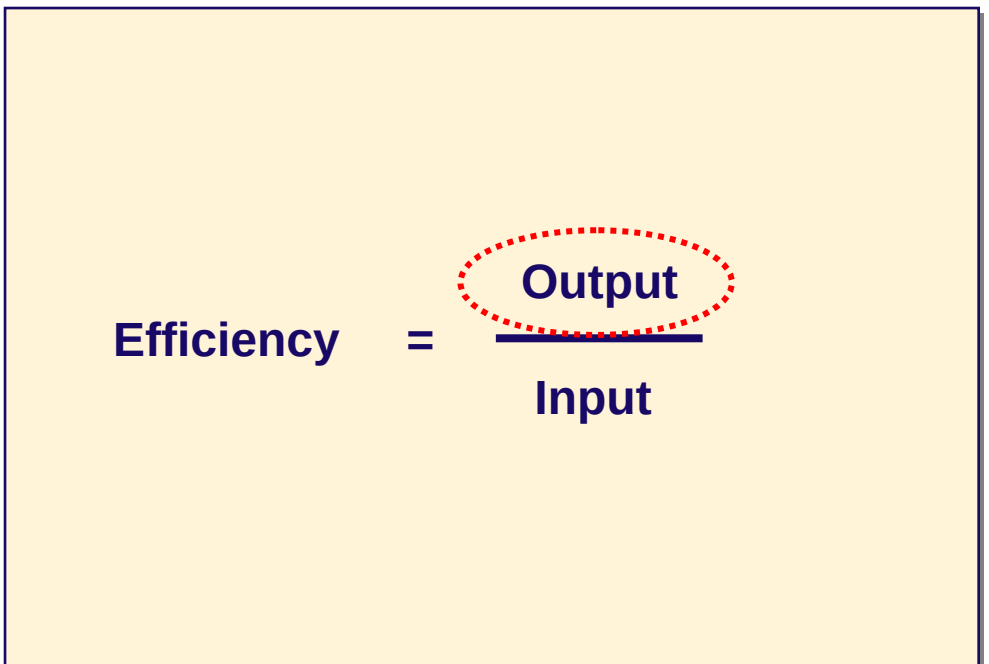
## A(n Almost) Trivial Concept

$$\text{Efficiency} = \frac{\text{Output}}{\text{Input}}$$

## A(n Almost) Trivial Concept

$$\text{Efficiency} = \frac{\Delta\ \text{Output} \uparrow}{\Delta\ \text{Input} \downarrow}$$

## A(n Almost) Trivial Concept?



**Foundations:**
**Economic efficiency**

## Effectiveness

- **Goals (objectives) can be defined as a desired future state of affairs.**
- **Effectiveness then is the degree to which an organization realizes its goals (objectives).**
- **Effectiveness may take into consideration a range of variables, and hence evaluate the extent to which multiple goals are attained.**

## Efficiency

- **Efficiency can be defined as the amount of resources required to produce a unit of output:**

**Resources**
**=> productivity**
**=> outcomes (objectives)**

*For example:*

- Achieve given levels of health at minimum cost.
  *or:*
  Maximize improvements in health within a finite budget.

**Foundations:**
**Economic efficiency**

| Effectiveness | Efficiency |
|---|---|
| **Realized Output** / **Intended Output** | [Realized] **Output** / [Realized] **Input** |
| (Value[s], Objective[s]) | By definition, efficiency is a secondary objective |

**Foundations:**
**Economic efficiency**

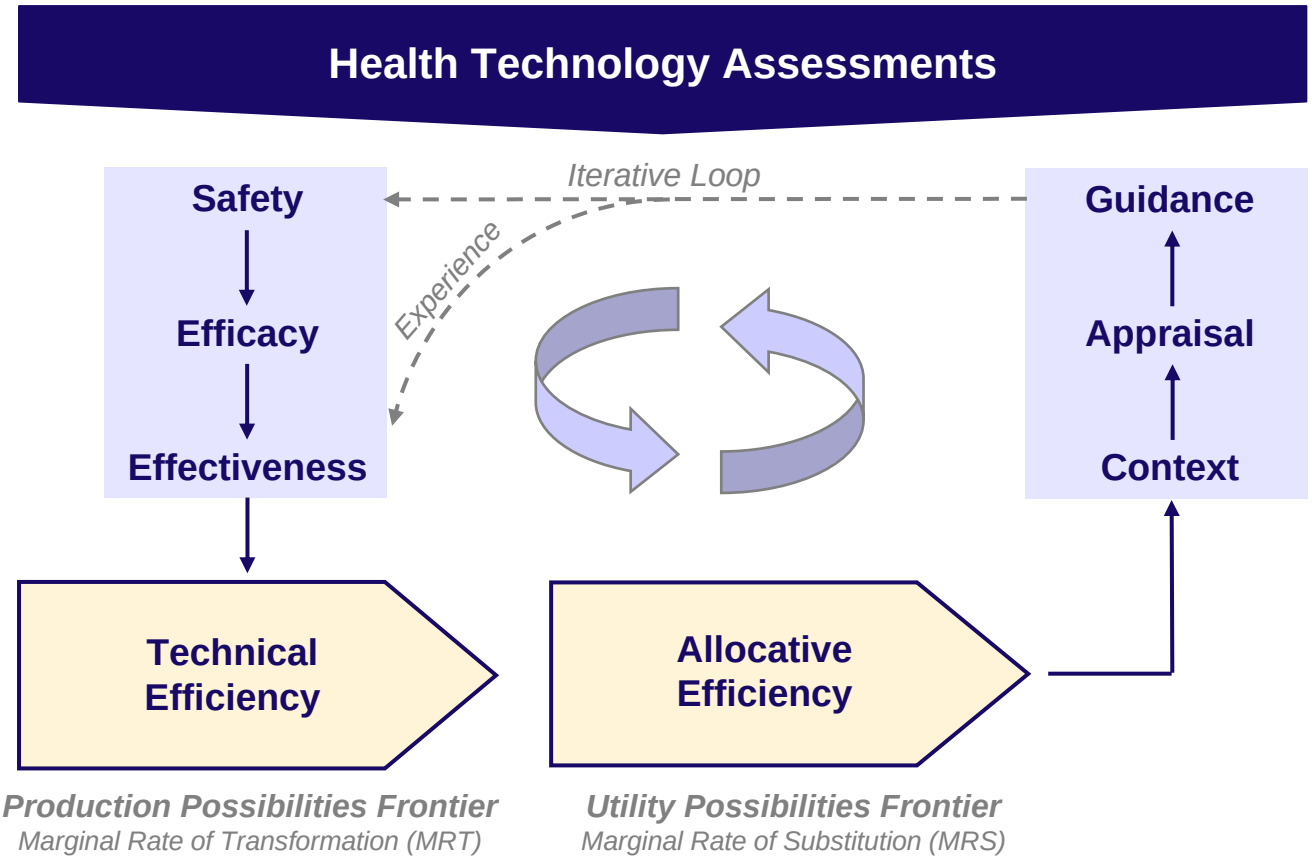
## Technical Efficiency

- **Ability to produce the maximum possible output from a given set of inputs**
- **<u>Does not</u> routinely imply choosing between different patient (group)s**
  *– hence individual persons*

## Allocative Efficiency

- **Choosing the most cost-effective set of programs for the given level of expenditure**
  (i.e.,optimal choice of input proportions, given their respective prices)
- **<u>Does</u> imply allocating resources across different patient (group)s**
  *– hence individual persons*

## Economic Evaluation as an Integral Part of Health Technology Assessments




Principle Common to Evidence-Based Medicine and Economic Evaluation:

**Using Best Currently Available Evidence**

## Economic Evaluation as an Integral Part of Health Technology Assessments

### Health Technology Assessments

**Clinically Relevant Metric**

**Clinical? QALYs?**

**Technical Efficiency**

***Production Possibilities Frontier***

*Marginal Rate of Transformation (MRT)*

**Comprehensive and Universal Metric**

**WTP? QALYs?**

**Allocative Efficiency**

***Utility Possibilities Frontier***

*Marginal Rate of Substitution (MRS)*

Principle Common to Evidence-Based Medicine and Economic Evaluation:

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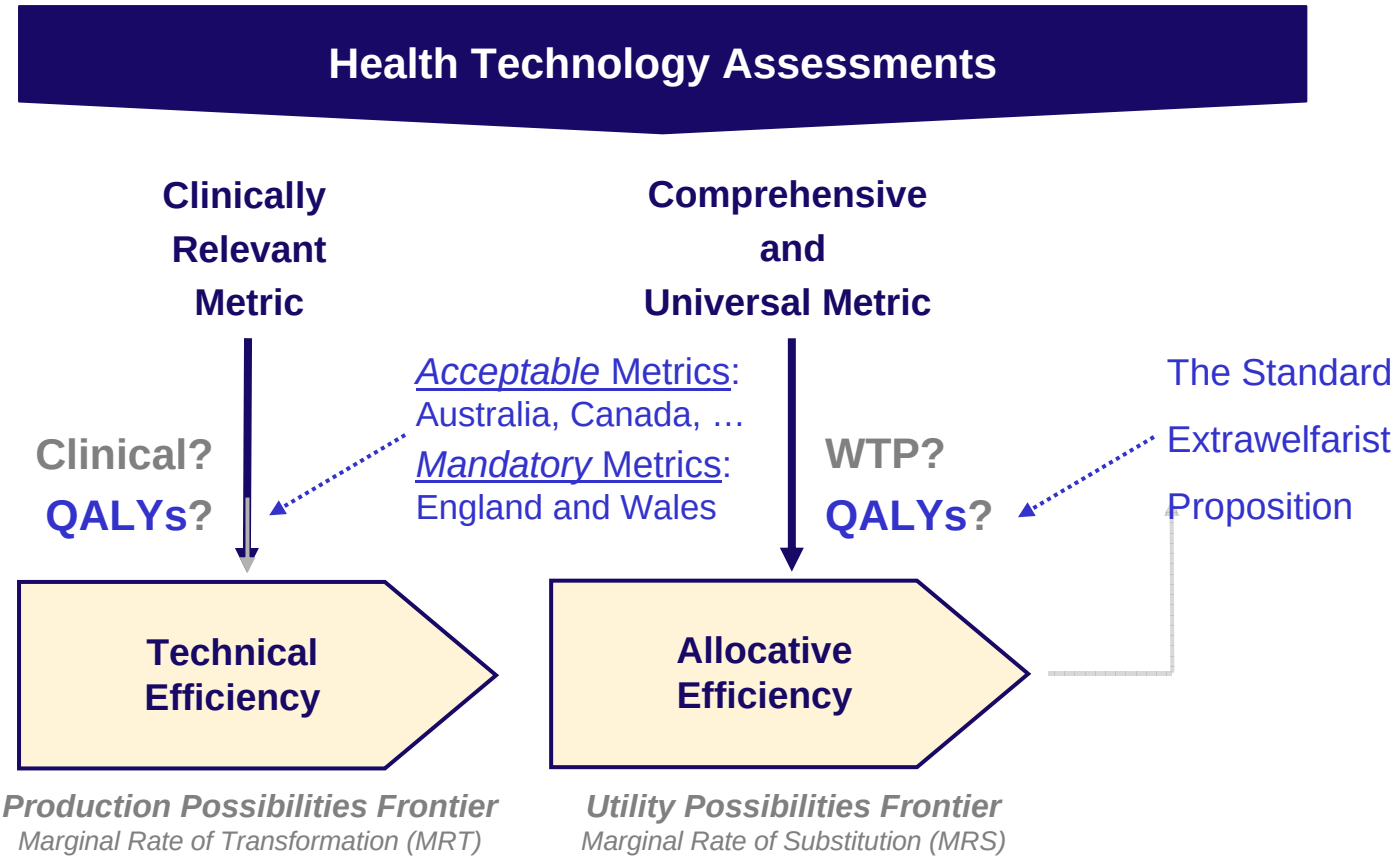
## Economic Evaluation as an Integral Part of Health Technology Assessments



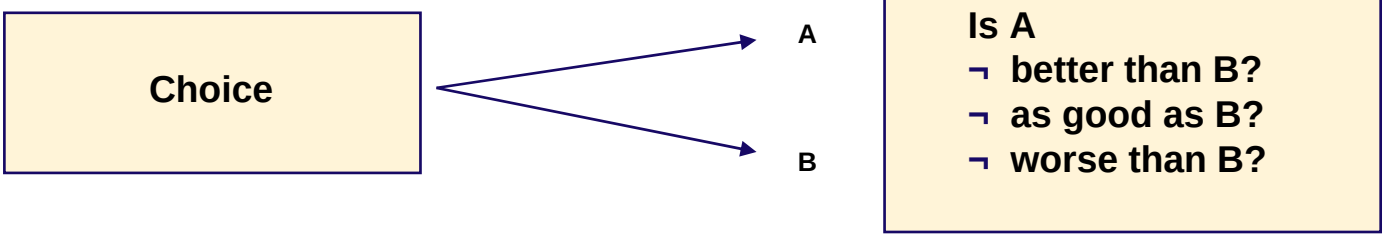

Principle Common to Evidence-Based Medicine and Economic Evaluation:

**Using Best Currently Available Evidence**

# *ECONOMIC WELFARE THEORY*

- Key Principles of Economic Thinking
- Cost-Benefit Analysis
- Pareto Efficiency
- Some Key Issues

## Economic Assessment Relates to Social Choice




**Normative Approach:**

**Objective to maximize "social utility"**

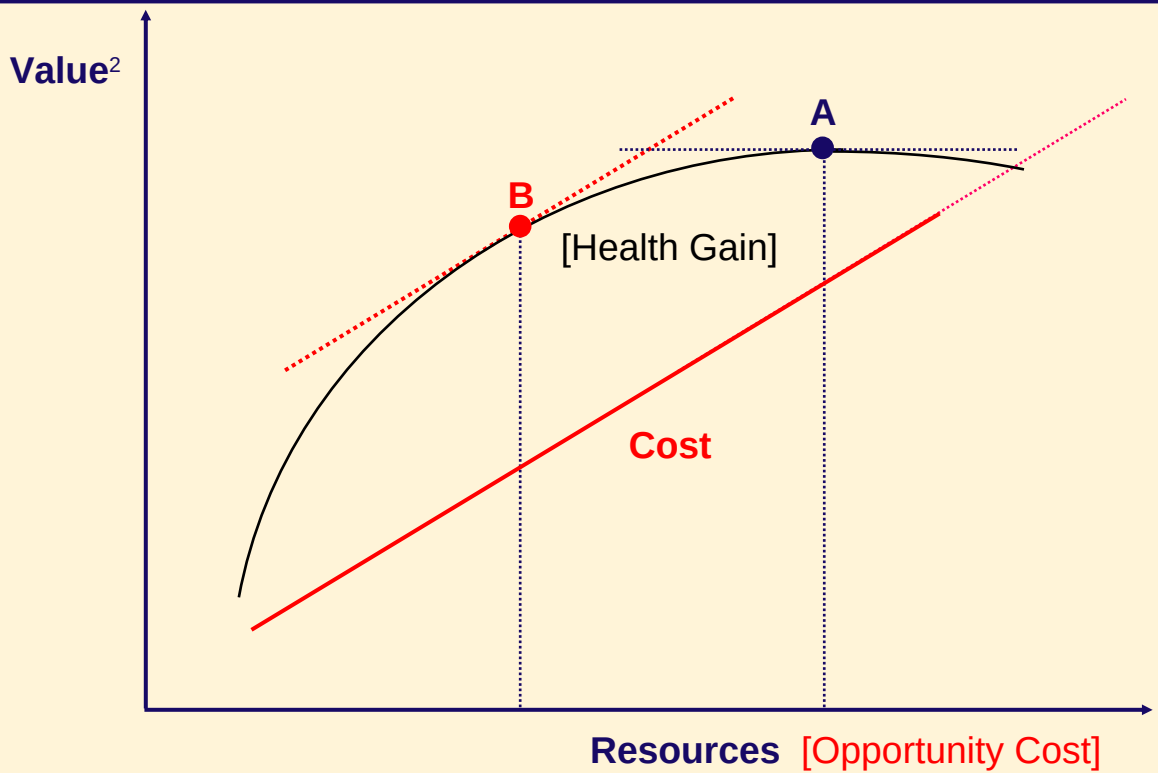
# Key Concepts[1]

- **Scarcity of resources**
  - Desires exceed resources
  - Hence **choices** need to be made among competing objectives
- **Opportunity cost**
  - Everything and everyone has alternatives; resources used to satisfy one set of desires cannot be used to satisfy another set
  - The cost of any decision is measured in terms of the **value** placed on the opportunity foregone
- **Marginal analysis**
  - Choices are seldom made on an all-or-nothing basis – they are made "**at the margin**"
  - Consideration is given to the incremental effects and incremental costs of a decision – not average effects and costs

[1] J.W. Henderson, *Health Economics & Policy*, Mason, OH: 2nd ed., 2002

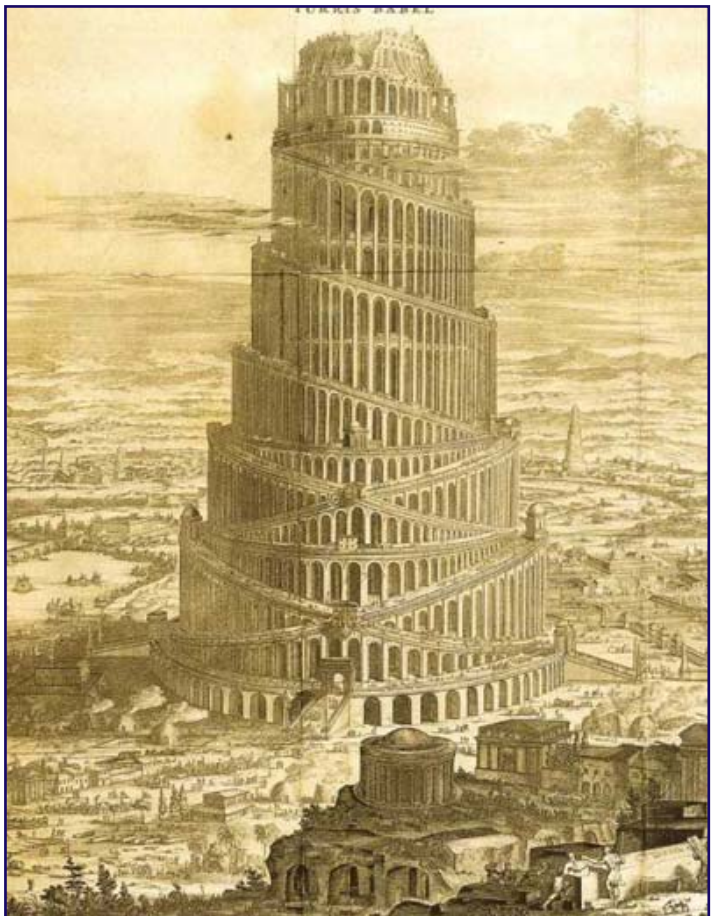
## Some Foundations of Economics: Marginal Analysis and Opportunity Costs

# Evidence Based Medicine (A) & *Economic* Evaluation[1] (B)




[1]cf. Victor R. Fuchs: "Health Care and the United States Economic System", *The Milbank Memorial Fund Quarterly*, April 1972: 211-237.
[2]Note different definitions of "value".

**A Canadian Policy Analysis**[1]



## A Tower of Babel …

- Referral to many different and often incommensurate things…
- **A key paradox**:

  The discourse about values is both very important and very ambiguous…
- Stakeholders may be tempted to react to this problem with either

  **reductionism**
  (focusing on one particular definition of values to the neglect of other relevant types)

  or

  **nihilism**…
  (either rejecting all values analyses as equally unreliable, or accepting all as equally credible)





Illustration by Athanasius Kircher

[1]M. Giacomini et al. (2004)

**A Normative Claim**

**"For economists (as economists) wishing to influence policy, welfare economics is the only real game in town."**[1]

[1] **Mark V. Pauly (2003)**

# Welfare Economics

$$U = f(H, W, \ldots)$$

$$U(\text{healthy, wealthy, } \ldots) > U(\text{sick, poor, } \ldots)$$

# What We Teach Our Students (1)

"Political economy has to take as the ***measure of utility*** of an object the *maximum* sacrifice which each consumer would be willing to make in order to acquire the object

…

**the only real utility is that which people are *willing to pay* for."**[1]

[1] **Jules Dupuit (1844)**

# What We Teach Our Students (2)

"Political economy has to take as the ***measure of utility*** of an object the *maximum* sacrifice which each consumer would be willing to make in order to acquire the object

…

**the only real utility is that which people are *willing to pay* for."**[1]

- **Contemporary Textbooks of Microeconomics:**
  - "The **value** [of a product] to a given consumer is defined as the maximum amount that the consumer would be **willing to pay** for that [product]."[2]

[1] **Jules Dupuit (1844)**

[2] Steven E. Landsburg: *Price Theory and Applications*, 5th ed., Mason, OH: South-Western 2002, p. 238.

## Welfare Economics[1]

- **Key Assumptions:**
  - Social welfare is made up from the welfare ("utilities") of each individual member of the society.
  - Individuals are the best judges of their own welfare.
  - If state A is ranked higher than state B for one person, and all other persons rank state A at least as high as B, then A should be ranked higher than B in the social ordering.
- **Applied Welfare Economics: Cost Benefit Analysis**
  - Measure of benefit (utility): Willingness-to-Pay (WTP)
  - Absolute no loser constraint: Pareto principle in theory
  - Kaldor Hicks Criterion: No loser constraint in practice (hypothetical [or "potential"] compensation in terms of goods [benefits in kind] or in terms of money)

[1]Given time constraints of this presentation, the following necessarily is an incomplete account of the theoretical frameworks discussed. In particular, attention should be given to the difference between production possibilities frontiers and the concept of the grand utility frontier and social welfare functions (which of course need not to be of the act utilitarian type).

**A Normative Interpretation**

**("What We Teach Our Students", cont'd.)**

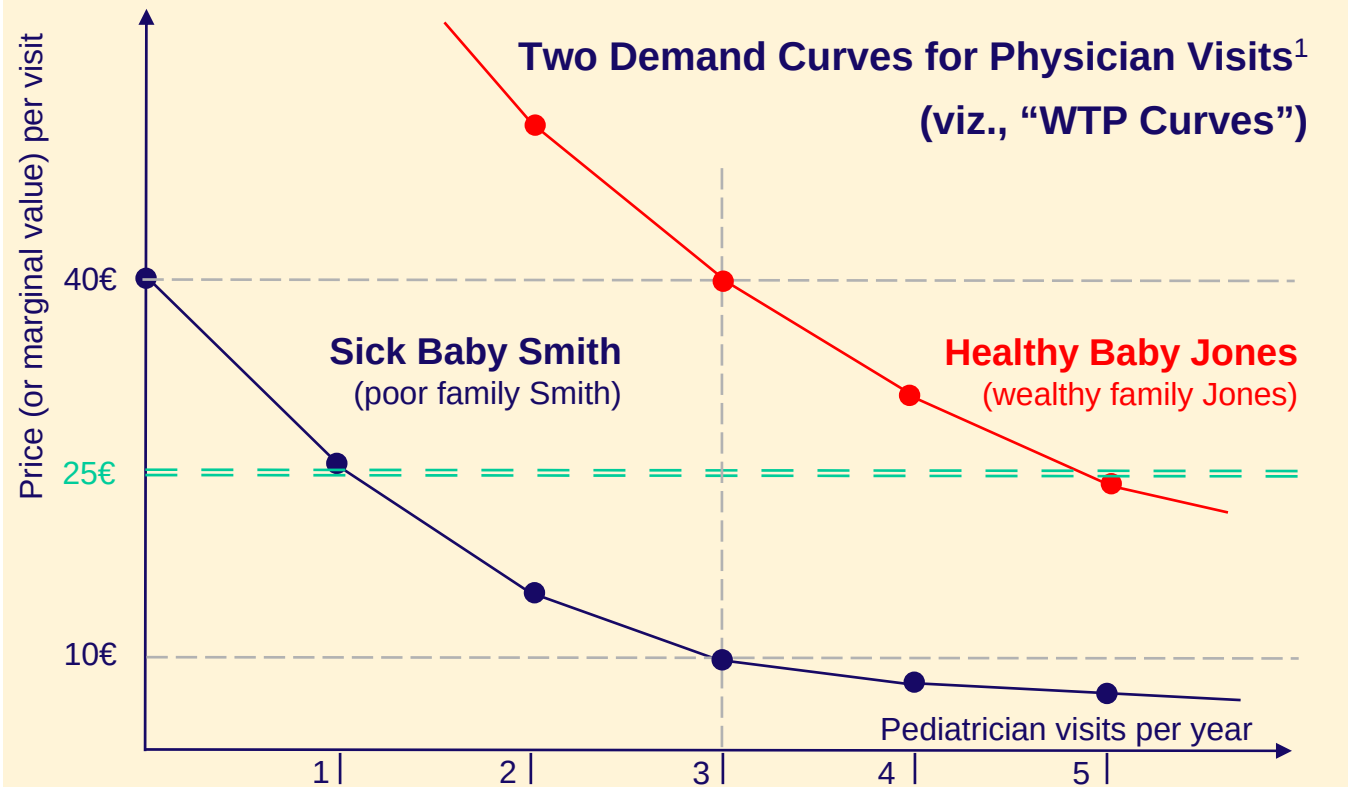
## What We Teach Our Students (3)

- "The **efficiency criterion** is an example of a consequentialist **normative theory**. … It pronounces that between two policies, we should always prefer the one that yields the higher social gain."[1]
- "A change is a good thing if it would be possible in principle for the winners **to compensate the losers** for their losses and still remain winners. If a policy increases Jack's income by $10, reduces Jill's by $5, and has no other effects, … the policy is a good one … according to the efficiency criterion."[1]
- "The mere fact that it is **possible to create potential Pareto improving redistribution possibilities** is enough to rank one state over another on efficiency grounds."[2]

[1]Steven E. Landsburg: *Price Theory and Application*, 5th ed., Mason, OH: South-Western 2002, pp. 293ff.
[2]Robin Broadway and Neil Bruce, *Welfare Economics*, Oxford: Basil Blackwell 1984, p. 97.
The question arises whether there exist compensation possibilities (in money or else) in core areas of "essential" health care.
This includes, in other words, the issue: is there a meaningful and acceptable "marginal rate of substitution" across the full spectrum of health (care)?

**Can Efficiency (in Health Care) be Left to the Market?**

## WTP as a Measure of Utility: U (H;W) > U (S;P) and ATP




[1]stylized example, source: U.E. Reinhardt (1998)

## Efficiency / Pareto Optimality

"A definition is just a definition, but when the *definiendum* is a word already in common use with highly favorable connotations,

it is clear we are really trying to be persuasive; we are implicitly recommending the achievements of optimal states."

**Kenneth Arrow (1963) –**
*Uncertainty and the Welfare Economics of Medical Care*, p. 942

K. Arrow also observed: "If, on the contrary, the actual market differs significantly from the competitive model, or if the assumptions of the two optimality theorems are not fulfilled, the separation of allocative and distributional procedures becomes, in most cases, impossible" (ibid., p. 942)

## *THE EXTRAWELFARIST PROPOSITION*

- Health as an Independent Argument of the Social Welfare Function
- The Assumed Objective of Collectively Financed Health Care: Maximization of Health Gains
- QALYs as a Measure of Benefit (Health-Related “Utility”?)
- Some Normative and Empirical Issues

# The Extrawelfarist Proposition

$$U = f(H) + f(W) + f(\ldots)$$

or

$$U = U_H + U_W + \ldots$$

instead of

$$U = f(H, W, \ldots)$$

**The logic of cost-effectiveness:**
**a promise and a premise**

**"A QALY is a QALY is a QALY – regardless of who gains and who loses it."**[1]

**"The principal objective of the *National Health Service* ought to be to maximize the aggregate improvement in the health status of the whole community."**[2]

[2]**Anthony J. Culyer (1997)**

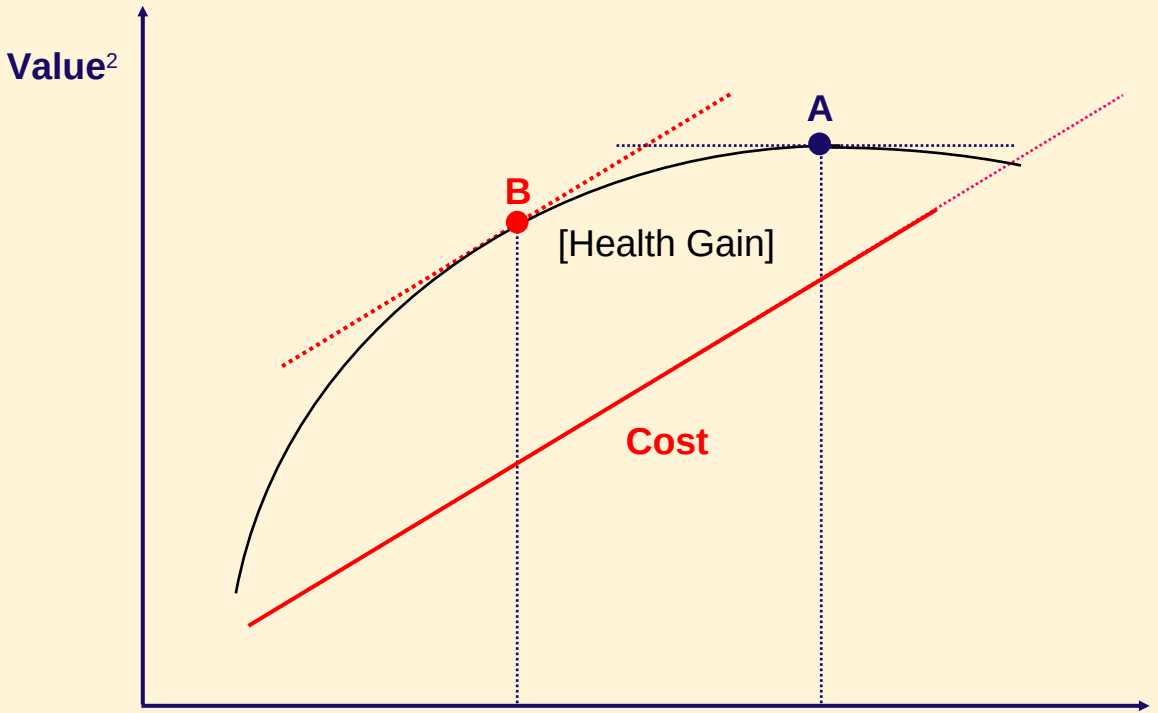
"The underlying premise of CEA in health problems is that for any given level of resources available, society (or the decision-making jurisdiction involved) wishes **to maximize the total aggregate health benefit** conferred."[3]

[1]**D. Feeney and G.W. Torrance (1989)**
but there is evidence that the utility of health states may be influenced by wealth – cf. C. Donaldson et al. (2002)

[3]**M.C. Weinstein and W.B. Stason (1977)**

## Some Foundations of Economics: Marginal Analysis and Opportunity Costs

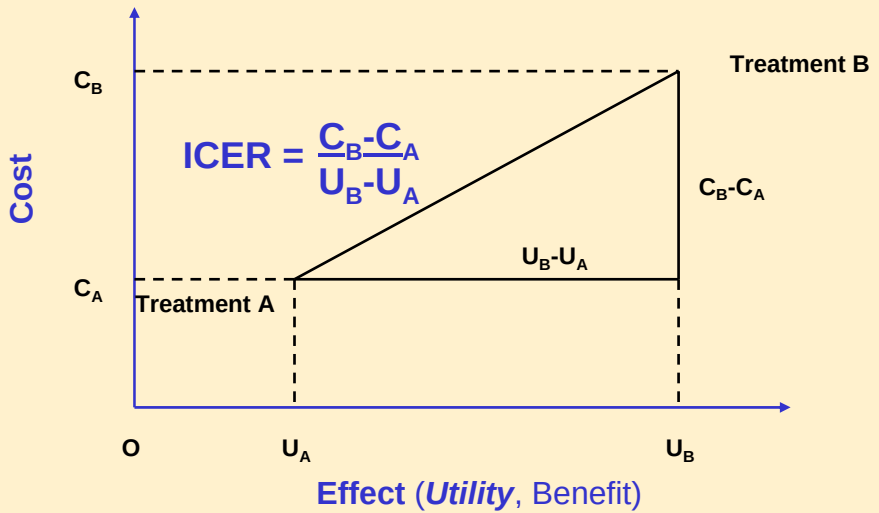
### Evidence Based Medicine (A) & *Economic* Evaluation[1] (B)




[1]cf. Victor R. Fuchs: "Health Care and the United States Economic System", *The Milbank Memorial Fund Quarterly*, April 1972: 211-237.
[2]Note different definitions of "value".

Economic evaluation of new medical technologies

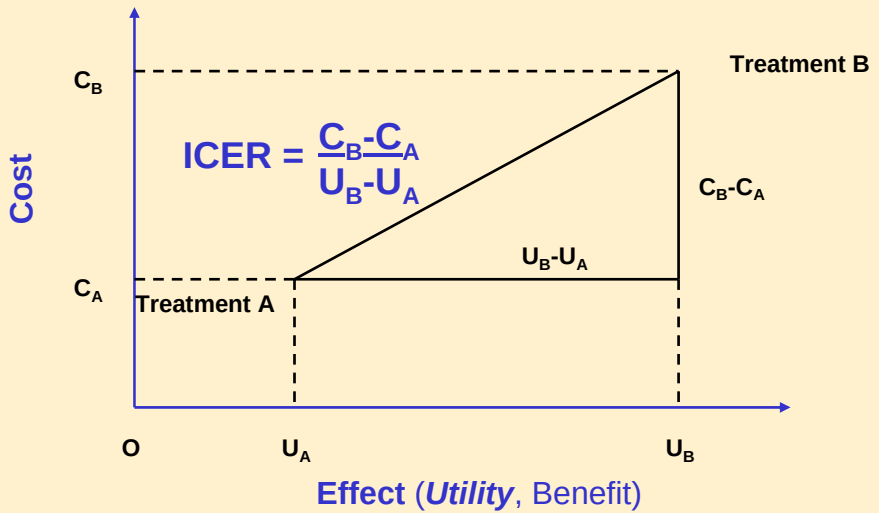
## Incremental Analysis




**ICER: *Incremental Cost-Effectiveness Ratio***

**Economic evaluation of new medical technologies**

## Incremental Analysis




**ICER: *Incremental Cost-Effectiveness Ratio***

**or "*Information Created to Evade Reality*"?**

[1]S. Birch and A. Gafni (2006)

**Need for a cost-effectiveness benchmark**

## The Cost-Effectiveness Decision Rule

$$ICER = \frac{\Delta C}{\Delta E} \stackrel{!}{=} \frac{\Delta C}{\Delta QALY} < \lambda$$

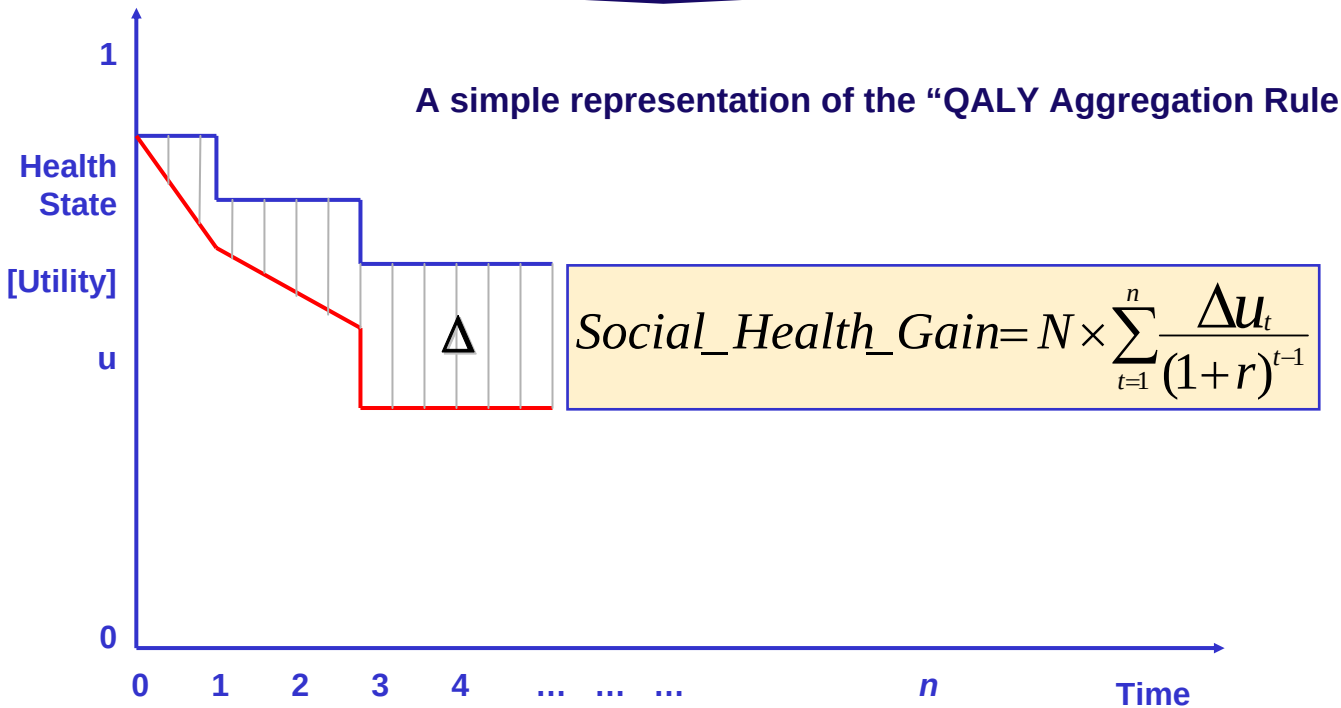
"I sentence you to five years in prison. For your information, that's fifteen thousand billable hours."

© THE NEW YORKER (1990)

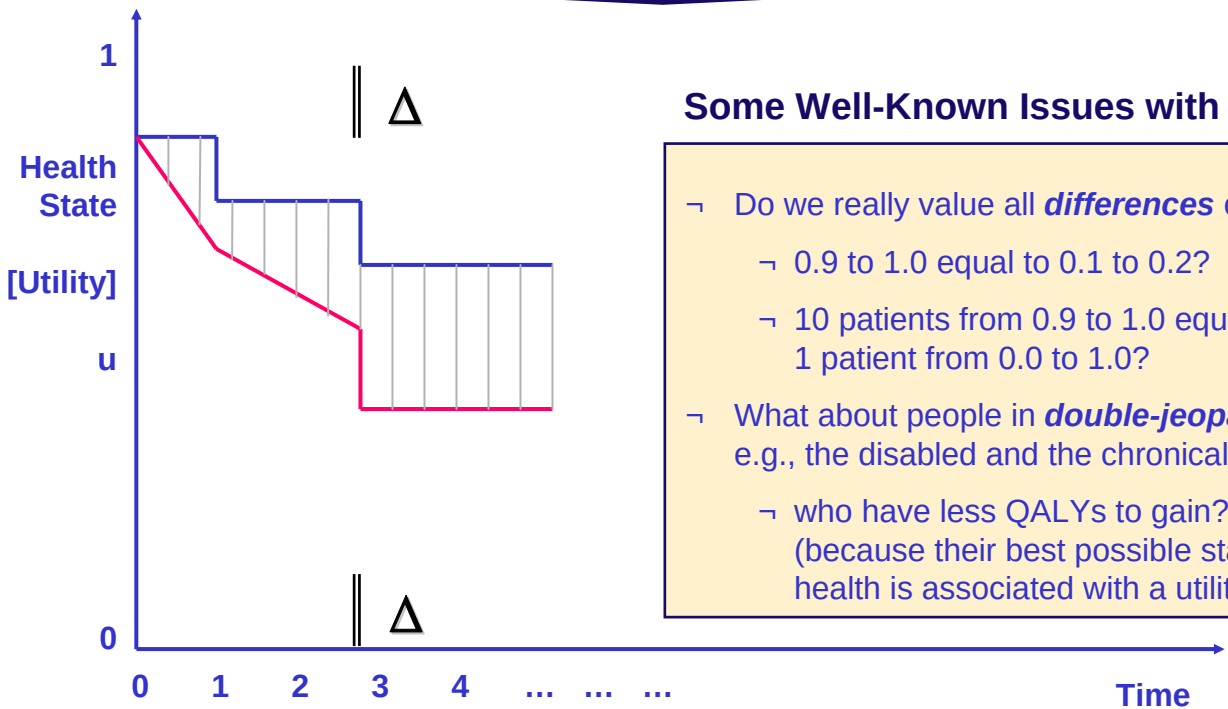
**Not *so* new:**

**The evaluation of human life time in economic / monetary terms**

# QALY Maximization



# Simple QALY Maximization?




## Some Well-Known Issues with QALYs

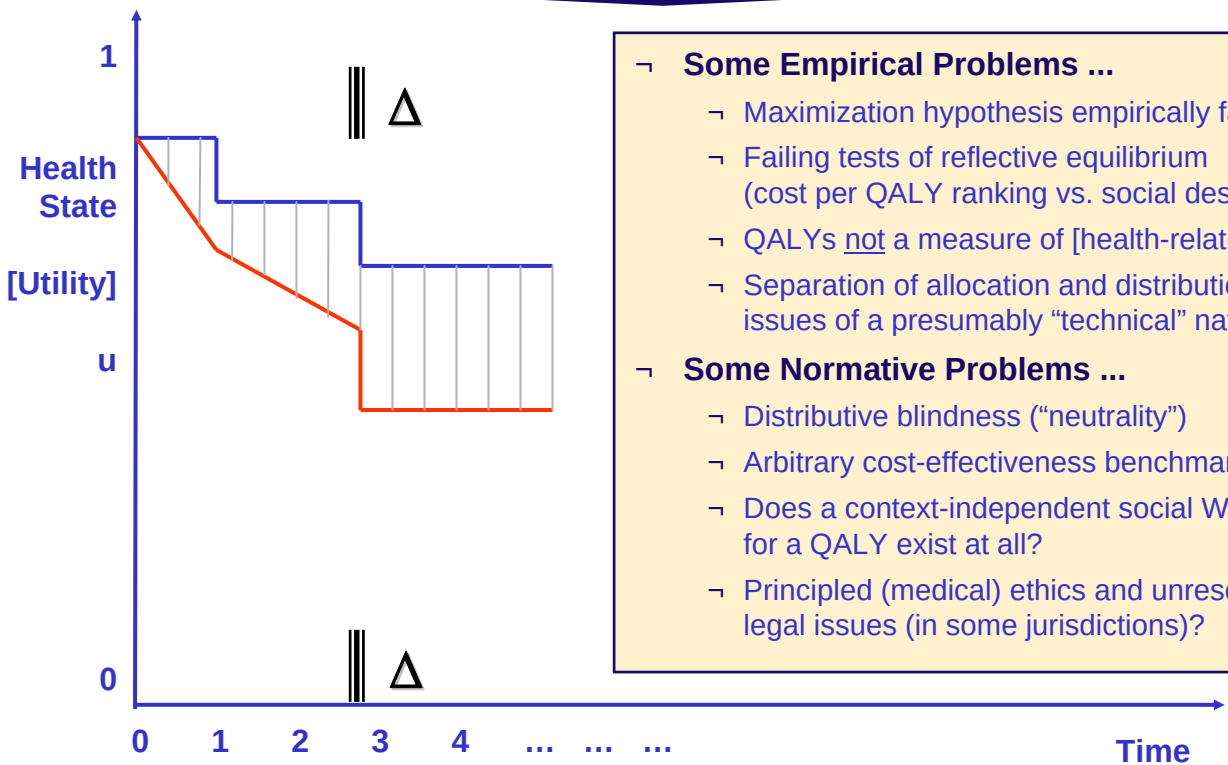
- Do we really value all ***differences*** equally?
  - 0.9 to 1.0 equal to 0.1 to 0.2?
  - 10 patients from 0.9 to 1.0 equal to 1 patient from 0.0 to 1.0?
- What about people in ***double-jeopardy***, e.g., the disabled and the chronically ill,
  - who have less QALYs to gain? (because their best possible state of health is associated with a utility u<1)

**The QALY aggregation rule is "descriptively flawed"[1].**

[1]cf. reviews by P. Dolan et al. (2005), Schlander (2005)

Extrawelfarism

# Simple QALY Maximization?




- **Some Empirical Problems ...**
  - Maximization hypothesis empirically falsified[1]
  - Failing tests of reflective equilibrium (cost per QALY ranking vs. social desirability)
  - QALYs not a measure of [health-related] utility
  - Separation of allocation and distribution; issues of a presumably "technical" nature
- **Some Normative Problems ...**
  - Distributive blindness ("neutrality")
  - Arbitrary cost-effectiveness benchmarks
  - Does a context-independent social WTP for a QALY exist at all?
  - Principled (medical) ethics and unresolved legal issues (in some jurisdictions)?



[1] P. Dolan (2005), M. Schlander (2005)

# *CONCLUSION?*

**Economic evaluation of new medical technologies**


**"The drug itself has no side effects – but the number of health economists needed to prove its value may cause dizziness and nausea."**

# *THANK YOU FOR YOUR ATTENTION!*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