

# **Cost-benefit evaluations with applications in pricing & reimbursement of pharmaceuticals and in traffic safety**

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# Outline

- 1. Health economic analysis – decision-making
- 2. Transport sector
- 3. Health care sector
- 4. The link between transport and Health care sectors
- 5. Discussion– policy implication

# 1. Health Economic Analysis – Decision-making

- **Transport**
  - Infrastructure investments and traffic safety measures
  - Large projects political decisions, small projects expert decisions
  - Implementation with relatively good compliance
- **Health Care**
  - Decisions on price of pharmaceuticals and volumes of patients treated, treatment guidelines
  - "Equity aspects" are important and multi-criteria analysis is used
  - Decisions with "arm lengths" approach
  - Compliance is an issue and results in "post code" prescription

# Health economic analysis

## From “closed” to “transparent” resource allocation

- Transport sector
  - The UK in the 1960 (Dept. of Transport)
  - Sweden in the 1970 (Swedish National Road Adm.)
- Health care sector
  - The UK 1999 (NICE)
  - Sweden 2002 (LFN)

## 2. Transport sector Consequences and their values

- Travel time savings
- **Safety gain**
- Transportation costs
- Infrastructure costs
- Etc

All compared within the same index, i.e. SEK, €, \$,

Cost-Benefit analysis

Market prices and experimental methods

# Value of Safety

## The Value of Risk Reduction in transport

- How many road traffic fatalities in a population of 100,000?.....
- Estimate your own risk (as X in 100,000)?.....
- What would you pay, at maximum, to reduce your own risk of fatal road accidents by 50 % in a year? SEK.....



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# Value of Risk Reduction Value of Statistical Life (VSL)

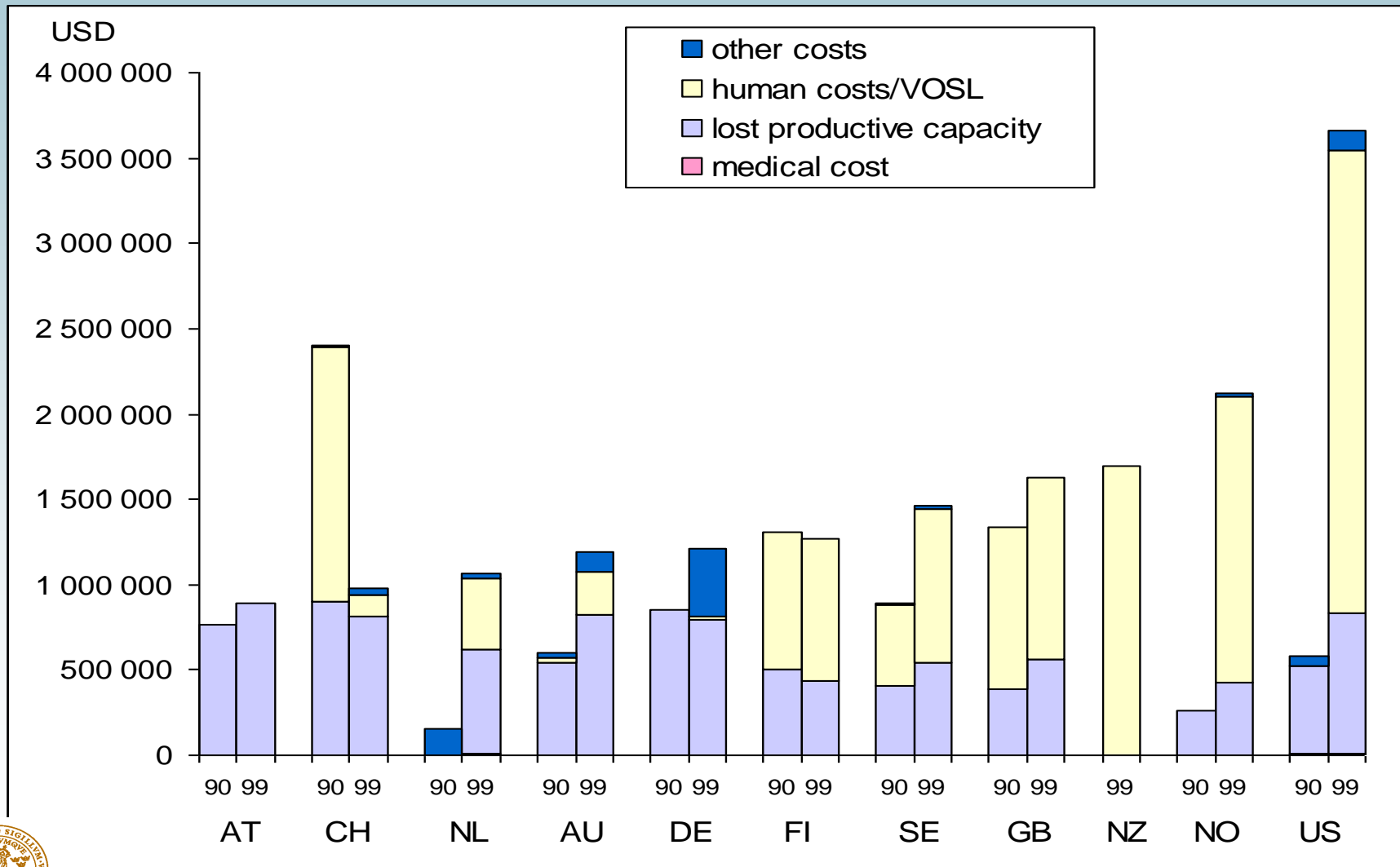
- Initial risk ( $p$ ) 10 in 100,000. Risk reduction ( $\Delta p$ ) 5/100,000
- Average WTP per individual SEK 1200
- Value of a statistical life (VSL) is then  $WTP/\Delta p = \text{SEK } 1200/5/100,000 = \text{SEK } 24.0 \text{ millions}$



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# Cost per fatality & Value of Statistical Life (VSL)

PPP adjusted 1999 USD, Official values for use in C/B-analysis



Source: Trawén et al, AAP (2002)





# Costs per Casualty

Thousands SEK, Current Prices

	1985	1990	1993	1997	1999	2001
Fatality	4,200	7,200	12,100	14,200	14,300	17,511
Severe injury	600	1,050	2,250	2,600	2,600	3,124
Slight injury	40	70	95	150	150	175
Property damage only	9	12	15	13	13	13

**Source: SNRA (1999) and SIKA (2002)**



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# The Swedish traffic safety program evaluated

Traffic safety measure	Cost per fatality avoided, million SEK, 2006 prices
Pedestrian underpassings	0.5
Barriers between driving lanes	2.5
Snow and cleaning of pedestrian and bicycle lanes	5.9
Roundabouts	8.1
Highway with separate lanes	16.0
Traffic signals in build up areas	32.6

Source: TFB & VTI research nr 7, 1991

### 3. Health Care sector Consequences and their values –

- Pharmaceuticals
- Outpatient care
- Inpatient care
- Home care
- Productivity loss



Market prices; SEK, €, \$

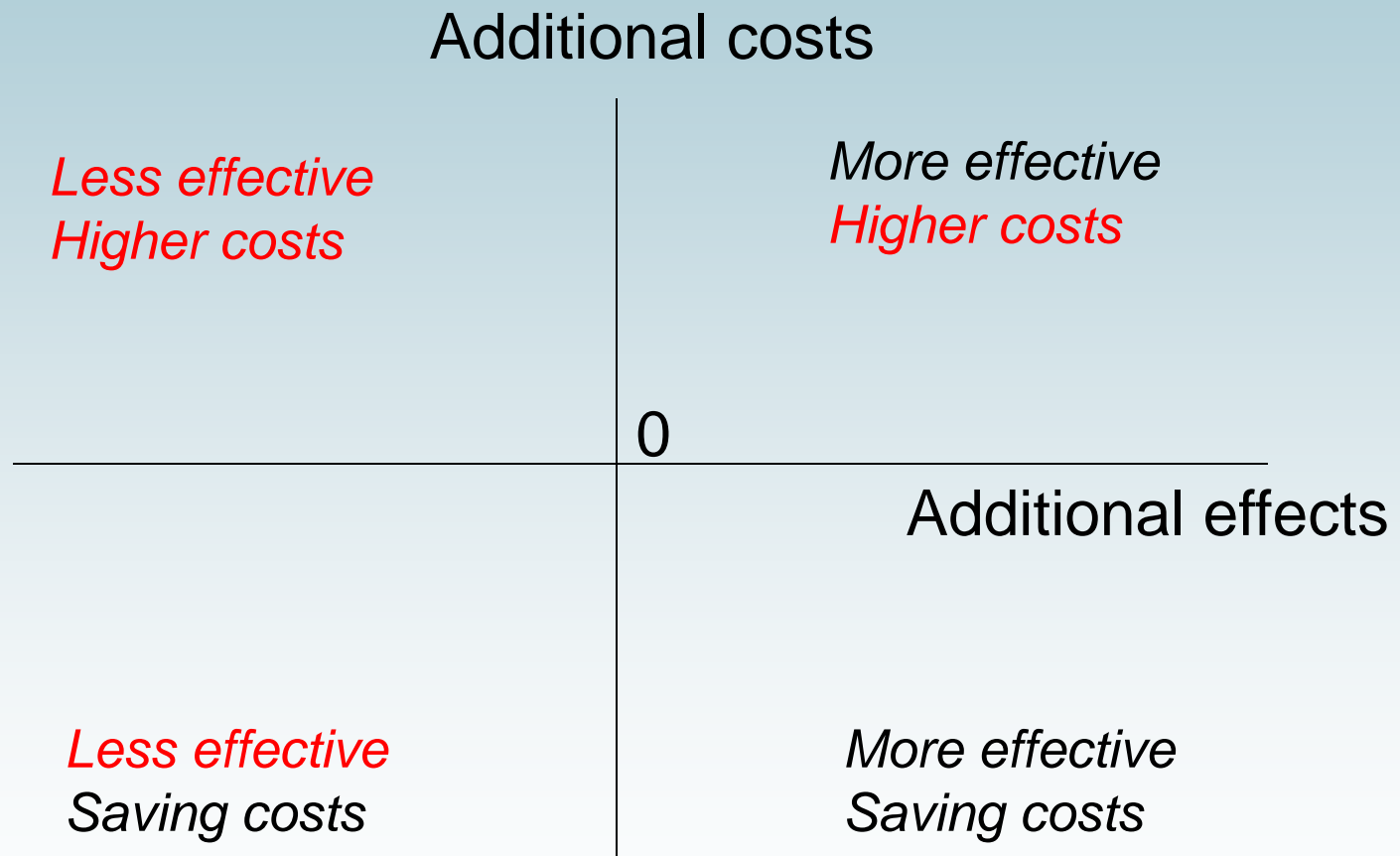
- Life expectancy
- Quality of life



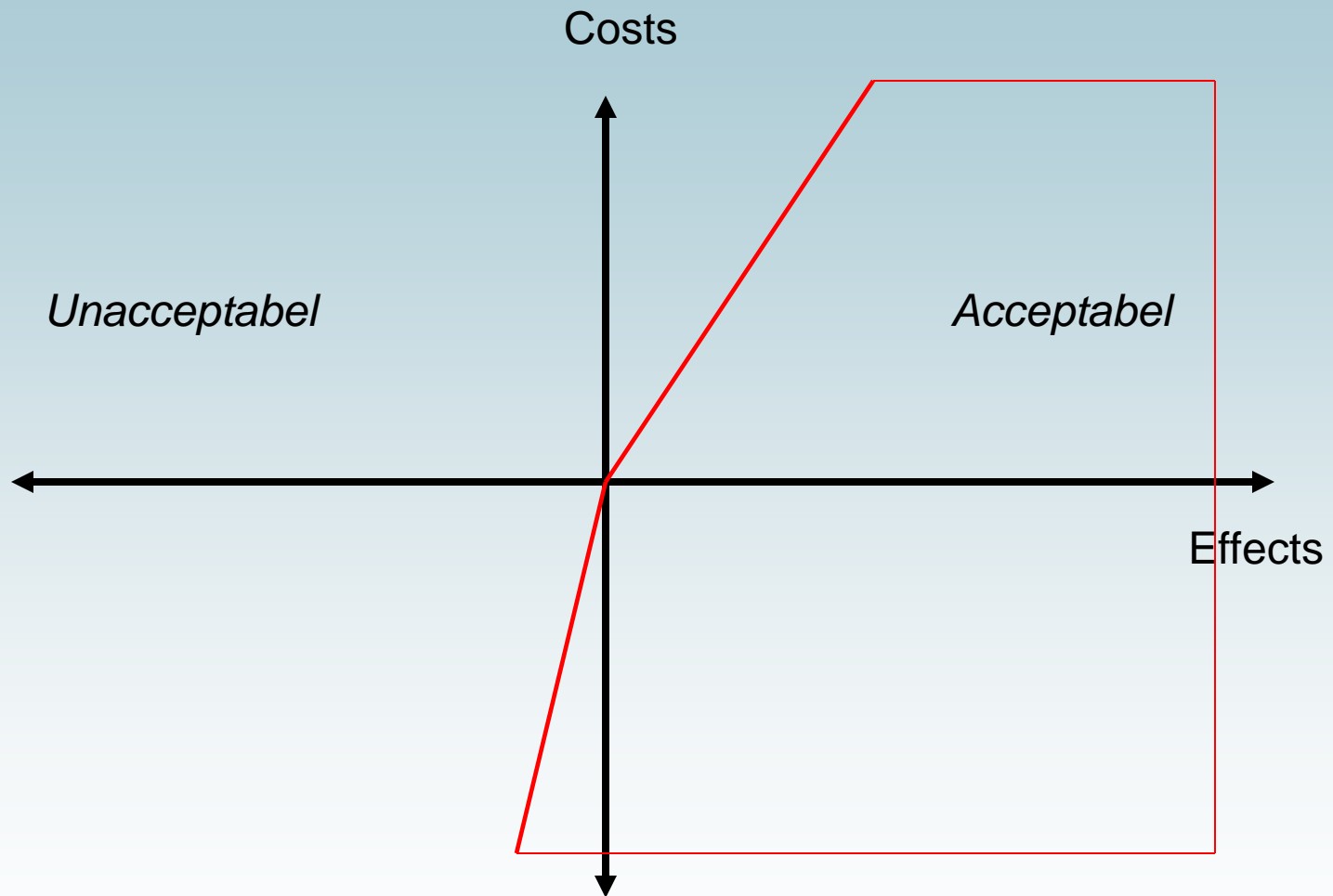
QALYs, Experimental methods

Cost-effectiveness analysis

# Cost-effectiveness analysis

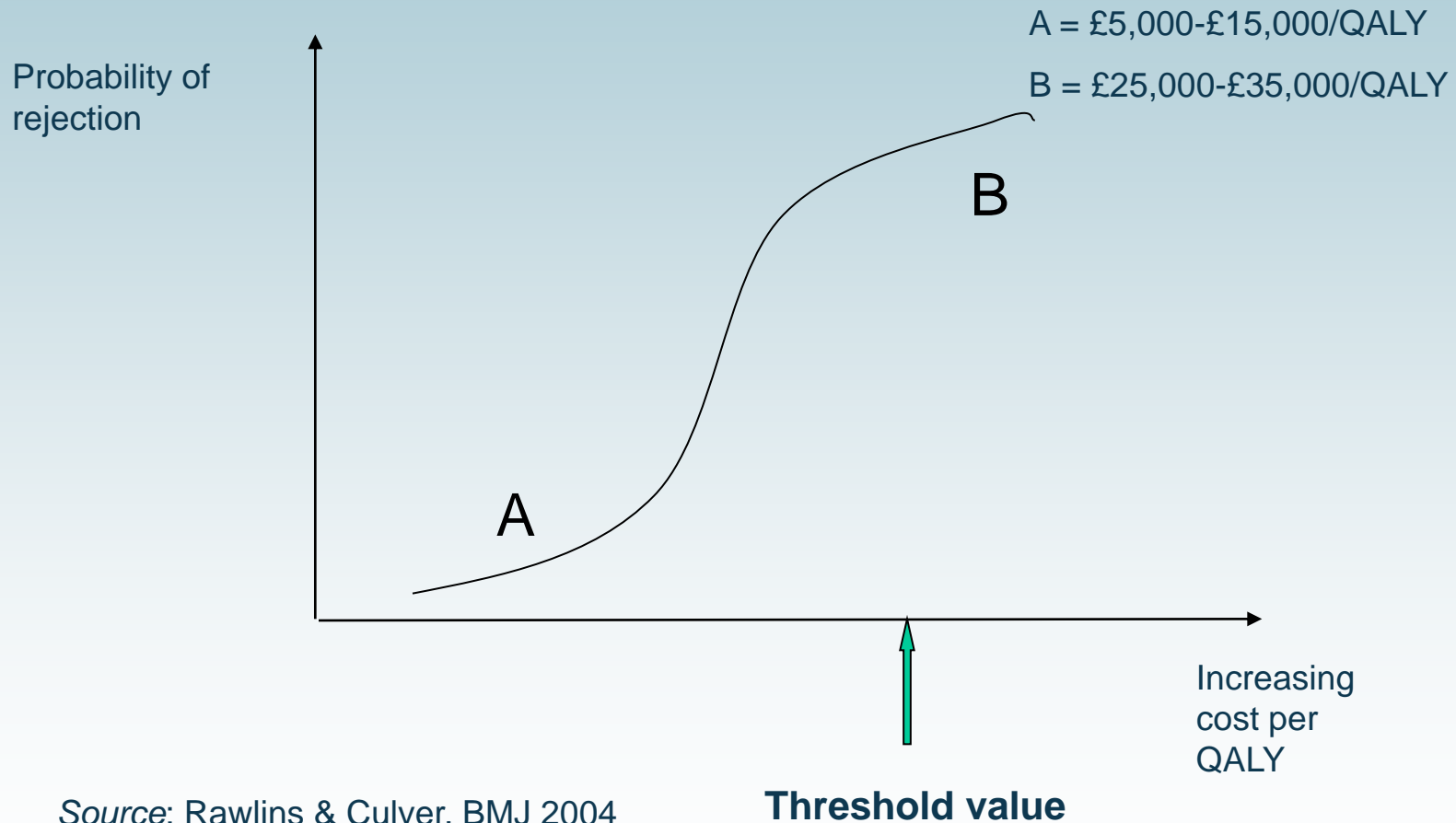


# Cost-Effectiveness Analysis



# ***A threshold value***

## **National Institute for Clinical Excellence (NICE) and its value judgments**



## 4. The link between transport and health care sectors

### WTP for a QALY

VSL

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Value of a QALY =  $\frac{\text{VSL}}{\text{Number of Quality Adjusted life Years Lost}}$

In Sweden SEK 21,0 million (2006 prices) is an accepted VSL in the transport sector.

Using the methods by Persson & Hjelmgren (2003), this corresponds to a value of SEK 845,000 per QALY gained

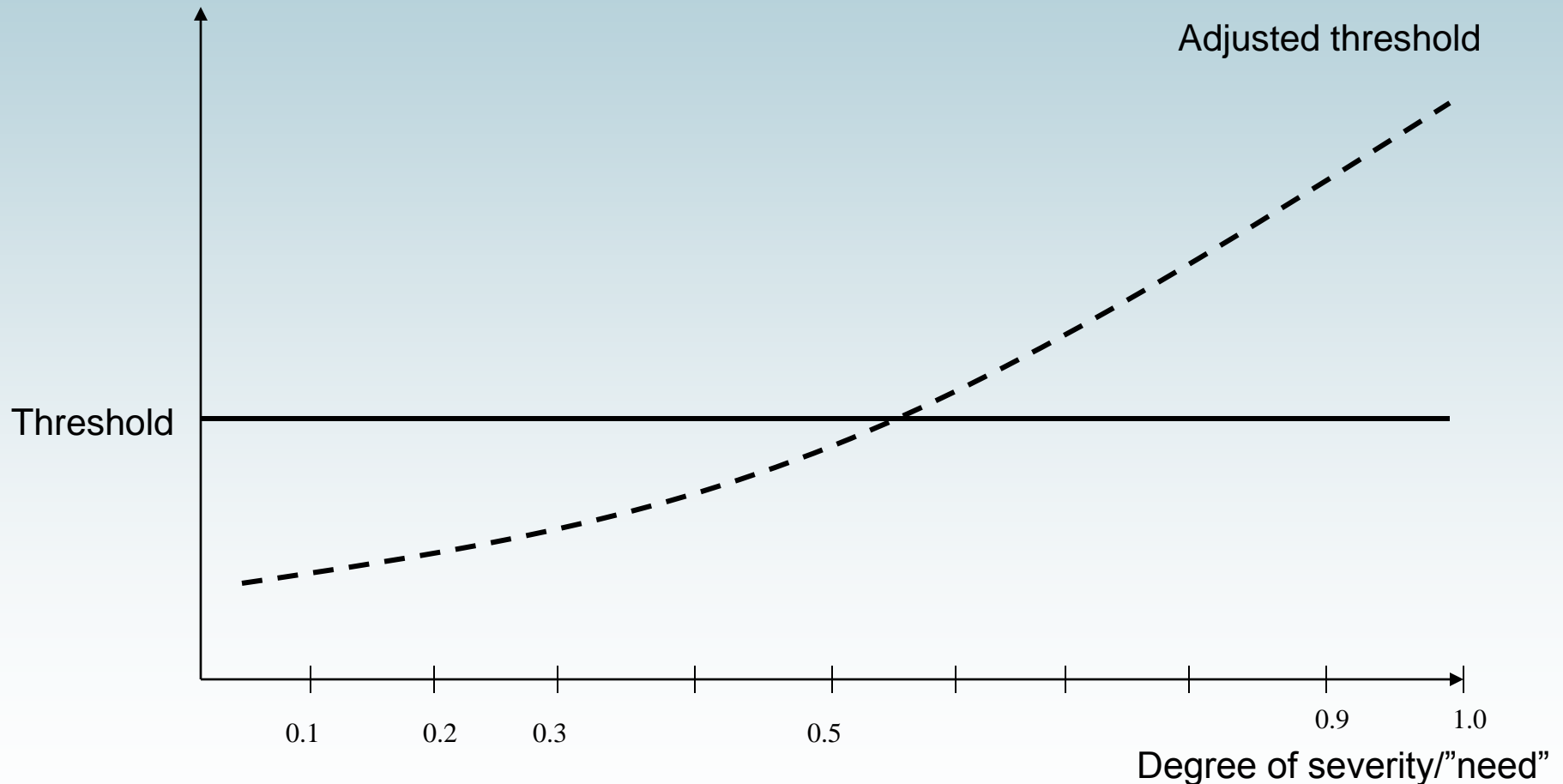
Se also:

Mason H, Jones-Lee M, Donaldson C. Modeling the monetary value of a QALY: A new approach based on UK data. Health Economics, 2009;18:933-950.

# A threshold value (cont.)

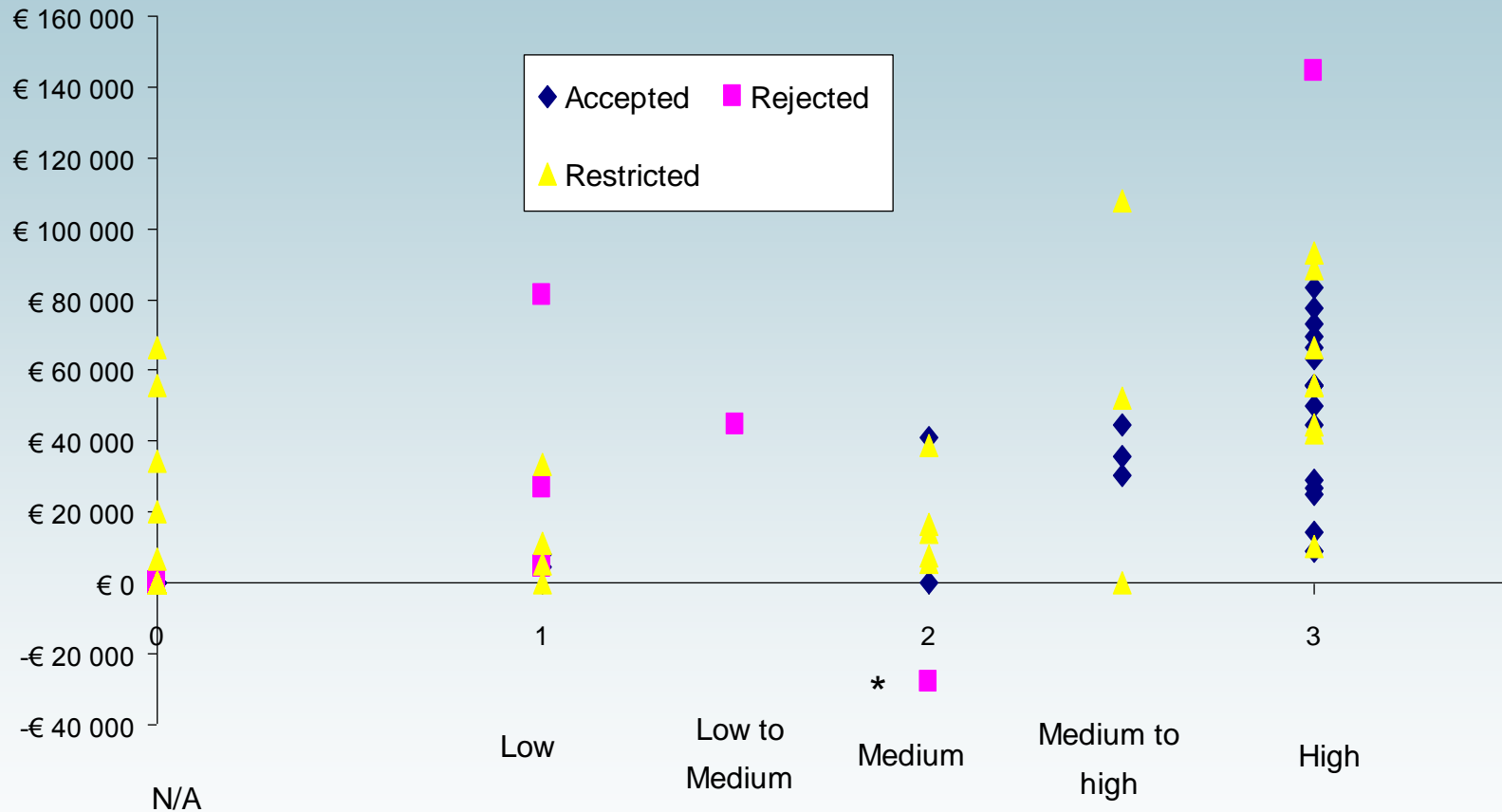
## Severity/"need" adjusted reimbursement decisions compared with a constant cost-effectiveness threshold

Cost/QALY





## Cost per QALY and disease severity



**\*Lower effect and lower cost than the comparator. Thus a saving per QALY lost**

## **5. Discussion**

### **The importance of threshold values in health care**

- Volumes in pricing and reimbursement decisions – Value based Pricing (VBP)
- Volumes in treatment guidelines
- Price premium for innovative new products
- Signals influencing firms R&D decisions

# Value Based Pricing (VBP) of pharmaceuticals

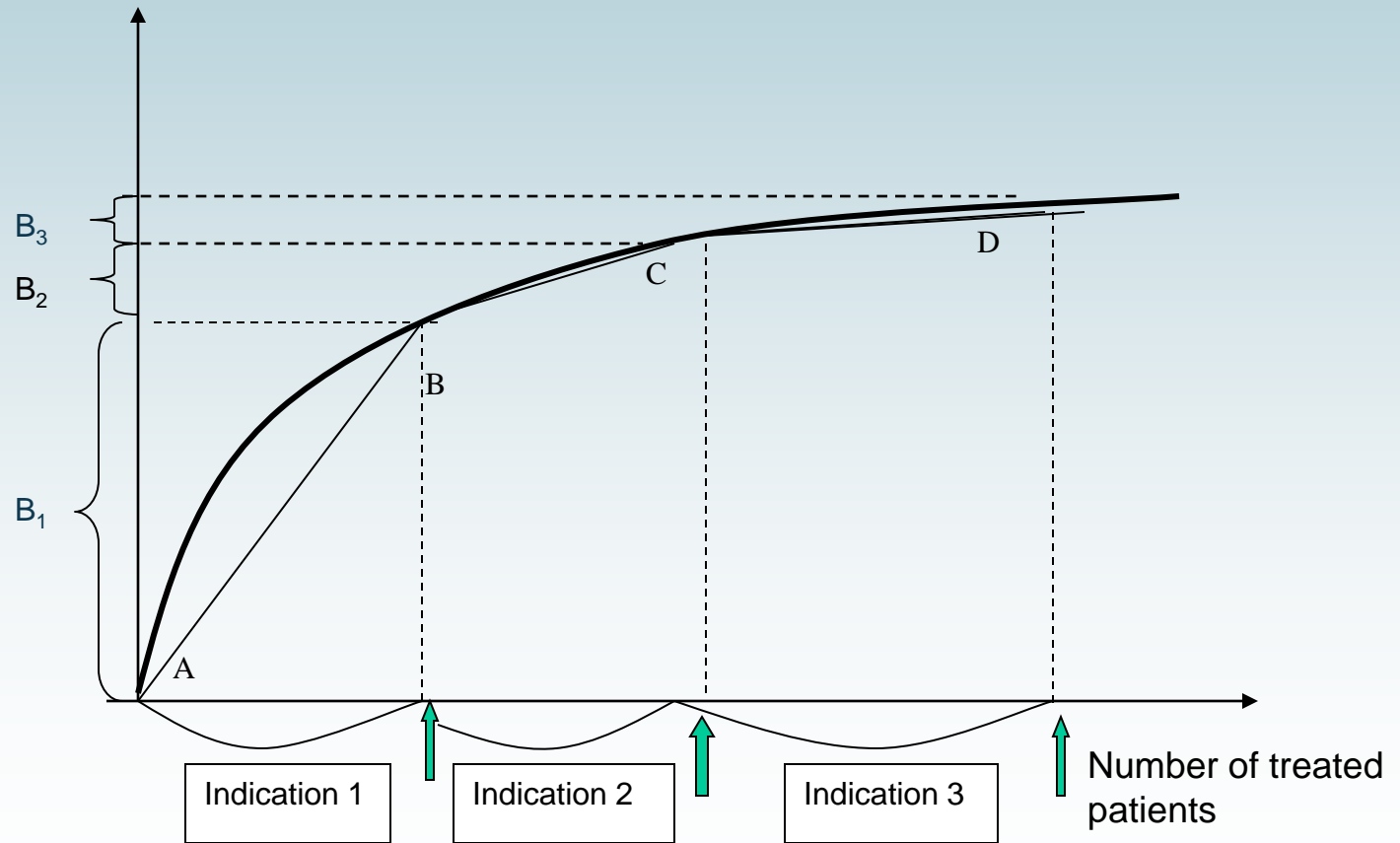
”Value Based Pricing or Value optimized pricing is a business strategy. It sets selling prices on the perceived value to the customer, rather than on the actual cost of the product, the market price, competitors prices, or the historical price.” (Ref. Wikipedia)

The goal of VBP is to align price with value delivered.

VBP is dependent upon an understanding of how customers measure value.

# Diminishing marginal utility of drug treatment

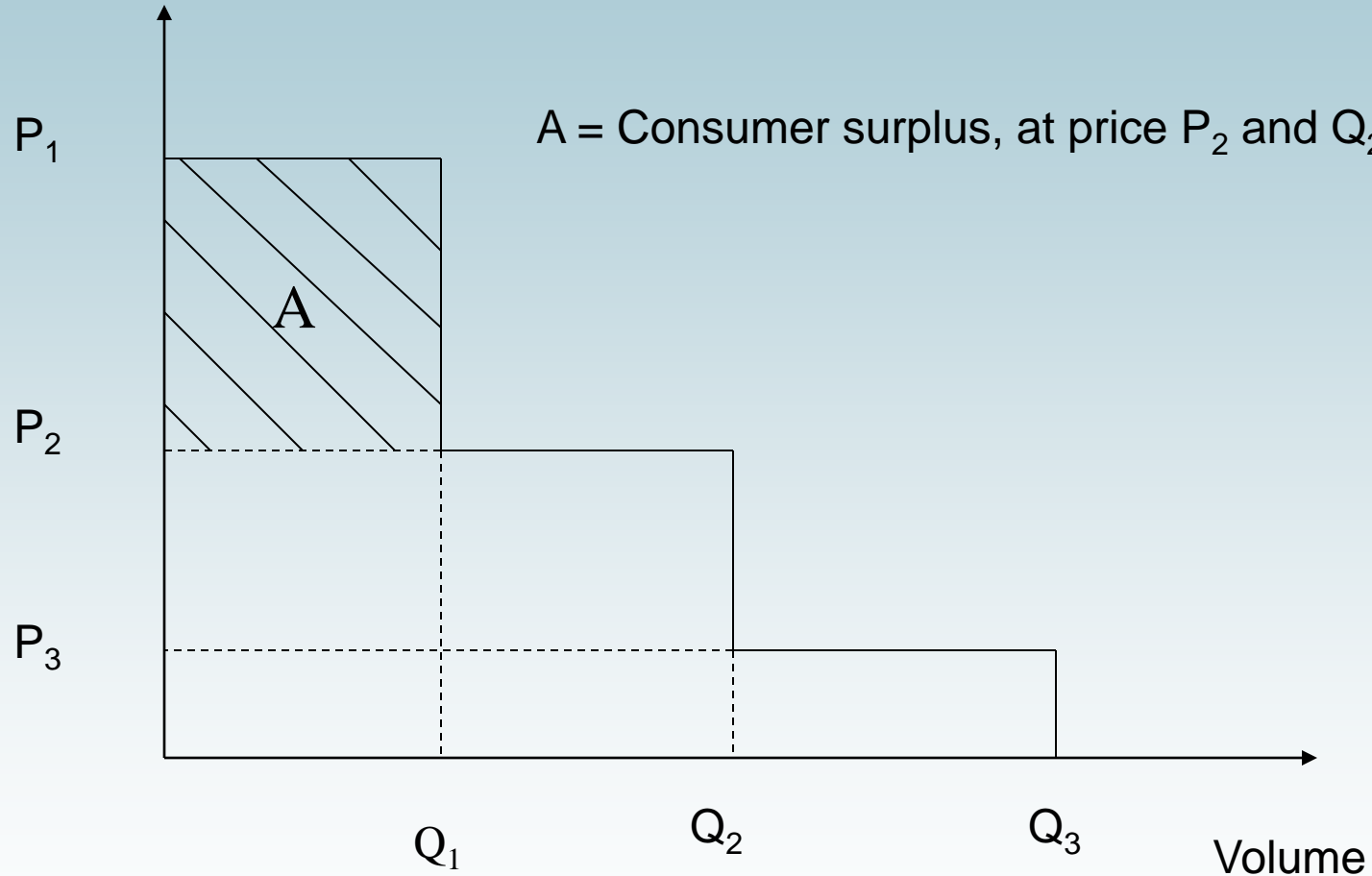
Benefit of health:



# Corresponding

## Price, volume and consumer surplus in VBP

Price



# Signals influence firms R&D investment decisions

- Cost-effectiveness thresholds, whether they are set explicitly or observed implicitly via historical reimbursement decisions, serve as a signal to firms about the commercial viability of their R&D projects.
- Thresholds set too low (below the economic value of the health benefit) will result in R&D investment that are too low.
- Similarly, thresholds set too high will result in inefficiently high levels of R&D spending.

Source: Vernon et al. Economic Evaluation and Cost-Effectiveness Thresholds. *Pharmacoeconomics* 2009;27:797-806

# EuroVaQ

- EU-project, 13 universities in 10 countries, three years
- Three approaches:
  - Modeling the value of QALY from accepted VSL in each country
  - A survey in each country to estimate the value of a QALY, using stated preference methodology
  - Q-methodology, in order to estimate impact of additional criteria



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# Valuation of safety and health

## Transport

- Transparent, 2006 prices:
  - VSL=21 million SEK
  - Severe casualty: 3.5 million SEK
  - Slight casualty: 133 000 SEK
- On-going research and revisions of the values

## Health Care

- Value of a QALY exist in Sweden but is not explicit outside the TLV board
- Some research, e.g. EuroVaQ
- NICE £30,000 per QALY gained



# Thank you



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EFSPi, Malmö, 7<sup>th</sup> June 2012

