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……..
Value of Risk Reduction
Value of Statistical Life (VSL)

- Initial risk (p) 10 in 100,000. Risk reduction (Δp) 5/100,000
- Average WTP per individual SEK1200
- Value of a statistical life (VSL) is then WTP/Δp=SEK 1200/5/100,000=SEK 24.0 millions
Cost per fatality & Value of Statistical Life (VSL)
PPP adjusted 1999 USD, Official values for use in C/B-analysis

<table>
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<tbody>
<tr>
<td>Fatality</td>
<td>4,200</td>
<td>7,200</td>
<td>12,100</td>
<td>14,200</td>
<td>14,300</td>
<td>17,511</td>
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<tr>
<td>Severe injury</td>
<td>600</td>
<td>1,050</td>
<td>2,250</td>
<td>2,600</td>
<td>2,600</td>
<td>3,124</td>
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<tr>
<td>Slight injury</td>
<td>40</td>
<td>70</td>
<td>95</td>
<td>150</td>
<td>150</td>
<td>175</td>
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<tr>
<td>Property damage</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>13</td>
<td>13</td>
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</table>

The Swedish traffic safety program evaluated

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

Source: TFB & VTI research nr 7, 1991
3. Health Care sector
Consequences and their values –

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

- Life expectancy
- Quality of life

Market prices; SEK, €, $

QALYs, Experimental methods

Cost-effectiveness analysis
Cost-effectiveness analysis

Additional costs

Less effective
Higher costs

Less effective
Saving costs

More effective
Higher costs

More effective
Saving costs

Additional effects
Cost-Effectiveness Analysis

Unacceptable

Acceptable

Costs

Effects
**A threshold value**

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

A threshold value

A = £5,000-£15,000/QALY
B = £25,000-£35,000/QALY

Source: Rawlins & Culyer, BMJ 2004

Threshold value
4. The link between transport and health care sectors

WTP for a QALY

Value of a QALY = 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:
A threshold value (cont.)
Severity/"need" adjusted reimbursement decisions
compared with
a constant cost-effectiveness threshold

Cost/QALY

Threshold

Degree of severity/"need"

Adjusted threshold

EFSPI, Malmö, 7th June 2012
Cost per QALY and disease severity

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

EFSPI, Malmö, 7th June 2012
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:

Number of treated patients

Indication 1
Indication 2
Indication 3
Corresponding
Price, volume and consumer surplus in VBP

A = Consumer surplus, at price $P_2$ and $Q_2$
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 to high will result in inefficiently high levels of R&D spending.

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
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