Perspective and multi-sectoral effects

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All effects of social value should count

- Costs and benefits fall on different sectors
- Budget set by a socially legitimate higher authority
- No consensus on how trade off
  - Health, consumption and other social arguments
  - No complete, legitimate and explicit SWF
- Even if willing to impose a SWF
  - Non marginal effects
  - Displaced wider effects
  - Dynamic effects
  - Social consensus and other social objectives
- Multi sector effects and compensation tests
Conceptual framework

• Two sectors
  – Budget constrained Health system
  – Rest of the economy

• Impacts on the health care system
  – Health gained \( \Delta h \)
  – Costs falling on the health care system \( \Delta c_h \)
  – Health forgone \( \Delta c_h \)
  \[ k \]

• Wider impacts
  – Costs falling on patients carers \( \Delta c_c^c \)
  – External effects on the wider economy \( \Delta c_c^e \)
  – Net consumption costs/benefits \( \Delta c_c = \Delta c_c^c + \Delta c_c^e \)

• Social values
  – \( k = \) Cost effectiveness threshold (how much health give up within HCS)
  – \( \nu = \) How much (individual) consumption willing to give up to improve their health
Questions of fact and questions of value?

- When costs displace health ($\Delta c_h$)

\[
\Delta h - \frac{\Delta c_h}{k} \geq 0 \quad \Rightarrow \quad v.\Delta h - \frac{v}{k} \Delta c_h \geq 0, \quad \text{or} \quad \frac{\Delta c_h}{\Delta h} \leq k
\]

- When costs displace consumption ($\Delta c_c$)

\[
\Delta h - \frac{\Delta c_c}{v} \geq 0 \quad \Rightarrow \quad v.\Delta h - \Delta c_c \geq 0, \quad \text{or} \quad \frac{\Delta c_c}{\Delta h} \leq v
\]

- Costs fall on both

\[
\Delta h - \frac{\Delta c_h}{k} - \frac{\Delta c_c}{v} \geq 0 \quad \Rightarrow \quad v.\Delta h - \frac{k}{\Delta h} \Delta c_h - \frac{\Delta c_c}{\Delta h} \geq 0, \quad \text{or} \quad \frac{\Delta c_h - k \Delta c_c}{v \Delta h} \geq 0
\]

**Fact:** $k$ = how much health displaced by increased HCS costs?

**Value:** $v$ = how much consumption should we give up for health?
## Effects outside health - spectrum of policies

<table>
<thead>
<tr>
<th>Possible Policy</th>
<th>Net health benefit</th>
<th>ICER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ignore effects (NICE 2008)</td>
<td>( \Delta h - \frac{\Delta c_h}{k} &gt; 0 )</td>
<td>( \frac{\Delta c_h}{\Delta h} &lt; k )</td>
</tr>
</tbody>
</table>
### Biases of policies (marginal changes)

<table>
<thead>
<tr>
<th>Type of Technology</th>
<th>A. Ignore wider costs</th>
<th>B. Costs on budget</th>
<th>C. Ignore constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bias</td>
<td>Decision</td>
<td>Bias</td>
</tr>
<tr>
<td>More effective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net consumption costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive costs (NHS)</td>
<td>+</td>
<td>FP</td>
<td>-</td>
</tr>
<tr>
<td>Cost saving (NHS)</td>
<td>+</td>
<td>FP</td>
<td>-</td>
</tr>
<tr>
<td>Less effective</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Net consumption benefits</td>
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<td>Positive costs (NHS)</td>
<td>-</td>
<td>FN</td>
<td>+</td>
</tr>
<tr>
<td>Cost saving (NHS)</td>
<td>-</td>
<td>D</td>
<td>+</td>
</tr>
</tbody>
</table>

- **Bias in different directions depending on context**
- **Incentive for technologies to have positive health care costs**
  - Positive bias due to non marginal change
  - Policy D may no longer be the best (A when benefits, B when costs)
Implications for policy

- Questions of value
  - Formal prescription
    - Requires specification of a complete SWF
    - $v$ is the measure of social welfare and presupposes a complete SWF
    - $k$ is simply an inefficient nuisance preventing welfare maximisation
  - Deliberative approach
    - Trade-offs still need to be made
    - $k$ is an expression of social value of collective health care
    - $v$ is how much of their consumption individuals are willing to give up to improve their own health
    - So good reasons why $k \neq v$
Implications for policy

• Questions of fact
  – Cost-effectiveness threshold
  – Is a change non marginal?
    • Impact relative to budget (single and a series of decisions)
    • How does k change with budget impact?
  – Consumption value of health
    • Requires social and scientific value judgements
  – Net consumption benefits
    • Cost of care not borne by NHS
    • Effects on wider economy (external to patient and carers)
    • QALYs include consumption effects?
    • Measurement and valuation requires social and scientific value judgements
Other critical considerations

• Displaced external effects
  – Compare to external benefits forgone
  – Danger of doubly false positive decisions
  – Improved health on average offers benefits to the wider economy
  – On average a HCS perspective is sufficient!
  – Is a proper assessment of exceptions possible?

• Dynamic effects
  – Price to appropriate any net consumption benefits
    • External benefits become internal costs
  – Investment Incentives (technologies, disease and populations)
    • Impact relative to budget (single and a series of decisions)
  – Spend less of on health care more on payment of rent (reduce health)

• Social consensus
  – Potential conflict and long run credibility
  – Static and dynamic conflicts with social policies and NHS principles
Benefits and costs on multiple sectors?

- **Multiple sectors**
  - Health (H) and Education (E)
  - choose proportion \( x \) of population \( i \) that receives intervention \( j \) within programme \( k \)
  - Each \( jk \) impact on outcomes and costs in each sector

- **Need a SWF**
  - Arguments H and E
  - Weights

- **Welfarist CBA**
  - Compensation (WTP)
  - Not shadow price costs

- **Problems for CEA and CBA**
  - Full information
  - Estimates of respective thresholds

\[
\max \psi \left( \sum_{k=1}^{K} \sum_{j=1}^{J_k} \sum_{i=1}^{I_k} (H_{ijk} + \delta E_{ijk})x_{ijk} \right) \\
\psi = (x_{ijk}, i = 1...I_k, j = 1...J_k, k = 1...K) \\
or \]
\[
\max \psi \left( \sum_{k=1}^{K} \sum_{j=1}^{J_k} \sum_{i=1}^{I_k} (B_{ijk}^H + B_{ijk}^E)x_{ijk} \right) \\
\psi = (x_{ijk}, i = 1...I_k, j = 1...J_k, k = 1...K) \\
sto \]
\[
\sum_{k=1}^{K} \sum_{j=1}^{J_k} \sum_{i=1}^{I_k} c^H_{ijk} x_{ijk} \leq C_H \\
\sum_{k=1}^{K} \sum_{j=1}^{J_k} \sum_{i=1}^{I_k} c^E_{ijk} x_{ijk} \leq C_E \\
0 \leq x_{ijk} \leq 1 \quad i = 1...I_k, j = 1...J_k, k = 1...K \\
\sum_{j=1}^{J_k} x_{ijk} = 1 \quad i = 1...I_k, k = 1...K \]
What can we know?

• How much does it cost to produce health or education outputs
  – Estimate the shadow prices, i.e., sector specific thresholds

• Specify a complete SWF?
  – Value health and education output in terms of consumption
  – Account for the constraints in project selection

• Complete and legitimate SWF not possible?
  – Allocation of resource though legitimate social process reveals something about a latent welfare function
  – Interpret shadow prices as revealed but partial expression of social value

• Common numeraire(s)
  – Sector specific output
  – Sector specific resources
  – Private consumption (individual preferences)
### A multi sectoral perspective

<table>
<thead>
<tr>
<th>Sector</th>
<th>Net benefit</th>
<th>Outputs</th>
<th>Resources</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>$\Delta NB_H$</td>
<td>$\Delta H - \Delta C_H /k_H$</td>
<td>$\Delta H.k_H. - \Delta C_H$</td>
<td>$v_H(\Delta H - \Delta C_H /k_H)$</td>
</tr>
<tr>
<td>Education</td>
<td>$\Delta NB_E$</td>
<td>$\Delta E - \Delta C_E /k_E$</td>
<td>$\Delta E.k_E. - \Delta C_E$</td>
<td>$v_E(\Delta E - \Delta C_E /k_E)$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Health</th>
<th>Education</th>
<th>Decision</th>
<th>Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\Delta NB_H &gt; 0$</td>
<td>$\Delta NB_E &gt; 0$</td>
<td>$\Delta NB_H + \Delta NB_E &gt; 0$</td>
<td>Accept</td>
</tr>
<tr>
<td>2</td>
<td>$\Delta NB_H &gt; 0$</td>
<td>$\Delta NB_E &lt; 0$</td>
<td>..</td>
<td>Jamie's school dinners</td>
</tr>
<tr>
<td>3</td>
<td>$\Delta NB_H &lt; 0$</td>
<td>$\Delta NB_E &gt; 0$</td>
<td>..</td>
<td>Ritalin for ADHD</td>
</tr>
<tr>
<td>4</td>
<td>$\Delta NB_H &lt; 0$</td>
<td>$\Delta NB_E &lt; 0$</td>
<td>$\Delta NB_H + \Delta NB_E &lt; 0$</td>
<td>Reject</td>
</tr>
<tr>
<td>5</td>
<td>$\Delta NB_H &gt; 0$</td>
<td>$\Delta NB_E &lt; 0$</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>6</td>
<td>$\Delta NB_H &lt; 0$</td>
<td>$\Delta NB_E &gt; 0$</td>
<td>..</td>
<td>..</td>
</tr>
</tbody>
</table>

- Sector specific effects at values implied by resource allocation
- Pay compensation for each project?
- Some accounting to inform next round of public expenditure decisions