Willingness to pay for a QALY vs. Cost-effectiveness threshold

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The Cost-effectiveness Threshold
(Johannesson and Meltzer, 1998)

• Without a monetary valuation of the effectiveness unit (e.g. QALYs), a cost-effectiveness analysis does not say anything about whether a program should be implemented or not
  – Other than to identify dominated alternatives that should never be implemented
• An intervention is considered “cost-effective” if the cost-effectiveness ratio is below the threshold
• The cost-effectiveness threshold is an implicit way of putting a monetary value on QALYs
  – How that threshold is determined says something about what CEA is optimizing

Common approaches to the cost-effectiveness threshold
• Comparison to a specific intervention that has become widely accepted
• League table approach
• Arbitrary thresholds (i.e., $50,000 per QALY)
• If incomes do not vary, it is possible to make a coherent theoretical argument in favor of cost-effectiveness analysis using a constant WTP per QALY gained. [Pratt and Zeckhouser, 1996]
  – Assumes a veil of ignorance
    • Same risk
    • Same wealth
• If incomes do vary, then different WTP per QALYs can be used (like in Garber-Phelps)
  – So what is the WTP per QALY?
The optimal marginal cost-effectiveness ratio derived from utility maximization:

\[
\left( \frac{dC}{dQ} \right)_i = \frac{u}{U_0}
\]

- The ratio of incremental costs \( dC \) to incremental QALYs \( dQ \) from further investment in intervention \( i \) is proportional to the reciprocal of the marginal utility of consumption in the initial period

\[ \Rightarrow \text{A single optimal CE ratio applies to all interventions for an individual} \]

Summary of WTP per QALY estimates (2003 Dollars):

- Dialysis Standard: $84,500 to $108,000
- Value of Life Literature (Hirth in 2003 $):
  - Human Capital: $28,300
  - CV: $184,000
  - Revealed pref: $381,500
- Proposed Threshold value of $50,000 per QALY proposed in 1982 is $95,000 in 2003 dollars
- Studies of WTP/QALY using contingent valuation:
  - Byrne: $1221 to $5690 for osteoarthritis of the knee
  - King: $12,000 to $32,000 for neurosurgical conditions
  - $1709/QALY for dentofacial deformity
  - $8000/QALY for psoriasis
  - 12,900 Euro's for general societal valuation (Bobinac, 2010)

Summary of Hirth et al. Willingness to Pay for a QALY

- Converted results from the value-of-life literature to derive the implied value of a QALY
- Tremendous variation exists
- No consensus exists
- High values may point to biases in value of life literature or a genuinely high WTP for a QALY
- (But much lower when contingent valuation WTP/QALY is estimated)
Why do the studies eliciting WTP/QALY estimates seem too low?

• Simplifying assumptions have undervalued WTP per QALY
  – The dynamics of health changes are not considered
  – They did not ask how long the subject expects to live
• It is difficult to get appropriate answers when the market for paying for health care rarely involves the subject paying out of pocket for the full costs of treatment

Do thresholds really link CEA and CBA?

• If same risk and same wealth then WTP per QALY view of a threshold would make that link
• How can this work when there is a single payer?
• How is a fixed health service budget different that a WTP per QALY?

Can a universal coverage system accommodate preference heterogeneity?

• Consider a system with mandated minimum coverage by competing insurers
  – Different health plans could choose different thresholds
• Single payer
  – Vary threshold by condition to address social and personal preferences (e.g. end of life) (Mason, 2008)
    • Life-saving threshold: £70,000
    • Live-extending threshold: £35,000
    • Quality of life enhancing threshold: £10,000
Thresholds in practice

• As more countries use cost-effectiveness analysis to help guide resource-allocation decisions, defining an acceptable threshold will improve transparency and consistency
• But no country has an explicit threshold
  — Politically sensitive
  — Reluctance to base decision making on single summary measure
• However, can be inferred retrospectively by analysis of decision-making patterns
  — 20,000-30,000 pounds/QALY

NICE

• According to NICE methodology document,
  — Recommending a technology if ICER<20,000 is normally based on Cost-effectiveness
  — Above that threshold other criteria come into play
    • Uncertainty, innovation, non-health outcomes, end of life considerations, and stakeholder perspectives (Rawlins, 2009)
    • Technologies aimed at children, disadvantaged populations, and severe diseases given special consideration.
• NICE acts as ‘agent’ for NHS
  — NHS decision seldom based exclusively (or at all) on cost per QALY (Appleby, 2009)
  — NHS often uses a broader notion of benefit

Dakin (2006)
approval correlated with threshold
Brouwer and Koopmanschap: On the economic foundations of CEA...

- Welfarist approach:
  - Recommendations based on individualistic welfare economic models
- Decision-maker’s approach:
  - Recommendations from societal values for health and pragmatic assumptions
- These very different points of view lead to different recommendations with respect to many of the debated aspects of CEA
  - QALYs as utilities vs. health capabilities
  - Equity
  - Time costs and productivity costs
  - Informal care
  - Discounting

Welfarist Approach

- Social welfare is a function of only individual welfare (or utility) where welfare is a function only of goods and services consumed
- Use CBA which typically involves contingent valuation of WTP or use CEA and interpret QALYs as utilities and rely on (Garber-Phelps/Meltzer)
  - Results reflect ability to pay
  - Concerns about reliability and consistency of WTP
  - WTP per QALY can vary depending on wealth and size of risk-reduction

Decision-maker’s approach (extra-welfarism):

- Rejects utility based notion of welfare
- Replaces utility with health as the primary outcome of interest
  - QALYs represent health capabilities rather than utilities. Assigns an equal value to these capabilities for all
- Maximizing health effects from a given budget
  - Health care system should maximize health output (as valued by society) from available resources
- A common sense approach
- Informs rather than prescribes
- Recognizes that transfer necessary for pareto improvement doesn’t happen
- A tool for decision makers who would also need non-health information to make their decision
- Still, this decision maker is maximizing a social welfare function
Is it really possible to build a bridge between CBA and CEA? (Dolan and Edlin)

- CEA can not depart from the focus on health itself rather than individual preferences
  - Therefore it is impossible to make the theoretical link between CEA and CBA with a WTP per QALY
- A single WTP per QALY threshold can never be consistent with individual preferences because different individuals are likely to value the tradeoff between health and income differently
- However, when a program would treat anyone clinically eligible, CEA and CBA should still arrive at the same conclusion when WTP per QALY is used

Consider CEA Under Fixed budget

- Ignores costs outside the budget
  - some health is produced outside budget … lifestyle, education – this could increase threshold
- The size of the budget is politically determined rather than determined based on revealed preferences in a market
- A fixed budget ultimately assumes that spending money on one health intervention displaces health gained from spending money on another health intervention
  - Threshold under this situation is not WTP for QALY
    - based on marginal value of health and not consumption