Why Are We Here?
A Quick Review of Valuation Methods

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ISPOR Educational Symposium
WILLINGNESS TO PAY, ABILITY TO PAY, AND MONEY-EQUIVALENT VALUE: MEASURING AND USING MONETIZED HEALTH BENEFITS
Tuesday, May 21, 2013
A personal perspective

• Willingness to Pay?
  – Been there, done that
  – Swore I’d never do it again

• Twenty years later …
  – Economists have revisited it, with vigor
  – And that’s what led to today’s symposium

Why not get prices the normal way?

• Market-based valuation
  – Possible with unrestricted/non-distorted supply and demand for the individual good of interest
  – Leads to easily observed, market-clearing, allocatively efficient prices
  – E.g., aspirin prices
Here’s why not …

- Health care markets can have many distortions
  - Insurance
  - Imperfect information
  - Single buyer and/or single seller
- All of these inhibit the normal workings of supply and demand

What else to do?

- Another economist’s favorite: Revealed preference
  - Works when goods are “bundled” and bundle prices are known
    - E.g., value of a house being near a school
  - Prices of individual goods can be estimated given a variety of “bundle” prices and bundles have varying characteristics
    - “Hedonic price” measures
- But - there still has to be a reasonable market for the “bundles”
- Let’s try again
Stated preference

- Based on individual responses to questions about how they value goods with certain characteristics
  - Not based on observed behaviors and their consequences

- Two main types:
  - Contingent valuation
  - Discrete choice experiments

Contingent valuation

- Response to a direct question about how much you value a given product

- Willingness to pay:
  - “You just caught a cold:
    - What’s the maximum you would be willing to pay for a product that would completely cure your cold in one day?” or
    - Would you be willing to pay $100 for a product that would completely cure your cold in one day?”

- Willingness to accept:
  - “You’re waiting to board a plane to New Orleans for your favorite conference:
    - “What’s the minimum you would be willing to accept to give your seat on this plane?” or
    - “Would you be willing to accept $200 to give up your seat on this plane?”
Discrete choice experiment

• Here you are shown a set of products with varying attributes – possibly including price - and asked which one you would choose

• Product attributes are varied in systematic ways across respondents

• Analyzing the responses allows calculation of the marginal values of various attributes

• In health care, could be used to rate such things as insurance plan offerings

A brief step back

• Limited attention was given to the stated preference area till the 1989 Exxon Valdez spill and the resulting lawsuits

• Since then the methods work has exploded and some big-time economists have been involved

• For those interested in further reading, the Fall 2012 issue of Journal of Economic Perspectives has several excellent review articles
I have always been struck by the criticism that health economics ... is the only application of economics that does not use the discipline of economics. If it did, ... it would measure health outcomes using ... willingness to pay.

Money equivalence of a health Improvement

What should we call it?

The phrase ‘willingness to pay’ implies an absolute, not a relative value. Normally we think of willingness to do something as ranging from ‘not at all willing’ to ‘extremely willing to do it’.

- Value to patient
- Money-equivalent benefit
Symposium Survey

- Link sent out to HealthEconomics.com subscribers and to ISPOR registrants
- Received 112 usable responses
- Root canal scenario:

Your dentist tells you that you need an immediate root canal … . Unfortunately, your insurance company recently decided not to cover the cost of anesthesia for dental procedures. You will have to decide whether you would rather have the root-canal without anesthesia or pay for the anesthesia yourself.

Contingent-Valuation Question Format
Double-bounded dichotomous choice with open-ended followup

- If the personal cost to you was $X, would you pay for the anesthesia?
- If the cost was ($X/2), would you pay for the anesthesia?
- If the cost was (2*$X), would you pay for the anesthesia?
- What is the highest cost you would pay for anesthesia?
- What is the highest cost you would pay for anesthesia?
- What is the highest cost you would pay for anesthesia?
Data from CV Pain Survey

Interval Regression Analysis (N=112)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
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<tbody>
<tr>
<td>Constant</td>
<td>$1,544</td>
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<tr>
<td>Male</td>
<td>−$556</td>
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<tr>
<td>Age</td>
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<td>College</td>
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<tr>
<td>Some graduate</td>
<td>−$384</td>
</tr>
<tr>
<td>Graduate</td>
<td>−$173</td>
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<tr>
<td>Income ($1000)</td>
<td>$2</td>
</tr>
</tbody>
</table>

Mean predicted money-equivalent benefit = $1140

Open-ended responses
Range 0 to $8000
Mean $1,572
Median $905
St Deviation $1,729

Mean $1,572
Median $905
St Deviation $1,729
A Simple Cost-Effectiveness Example
Anesthetic for root-canal surgery

- Utility without anesthetic = 0.10
- Utility with anesthetic = 1.00
  \[ \Delta HSU = (1 - 0.10) = 0.90 \]

- Painful part of surgery lasts 20 minutes
  Number of Years = \[ \frac{20 \text{ Minutes}}{365 \text{ Days} \times 24 \text{ Hrs} \times 60 \text{ Mins}} \]
  QALYS Gained = 0.000034

- Threshold value = $62,500/QALY
- Swedish willingness to reimburse = $2.14

(Bala & Zarkin, Health Economics, 2000)
Theoretical Validity of Cost Estimates
Hepatitis B discrete-choice experiment

- No perceived difference between €0 and €10 per month.
- Slope (marginal disutility of cost) is equal in both arms.
- Disutility of €150 is about twice as large as €75.
- Slope (marginal disutility of cost) is constant in both arms.

Money-Equivalent Benefit
Increased probability viral load is undetectable from 70% to 95%
True or False?

**Benefit-cost analysis...**

- puts a price on human life  **T**
- will limit health care provided to poor people  **F**
- has nothing to say about fairness  **T**
- is based on unproven and unreliable methods  **F**
- replaces professional judgment with rules  **F**
- will increase the price of drugs  **?**

**Benefits and Costs of Protecting Desert Tortoise Habitat, 1978**
WTP for a QALY
Swedish Experiences

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Valuation of life and health

• Transport sector – Value of a Statistical Life (VSL)
  – Sweden in the 1970s (Swedish National Road Adm.)

• Health care sector - Value based pricing (VBP) & reimbursement
  – Sweden 2002 (LFN / TLV) (the Pharmaceutical Benefit Board)
Price and value

“Price is what you pay, value is what you get”

Warren Buffet
Investor

Key principles of Value Based Pricing (VBP) of pharmaceuticals in Sweden

1. **Societal perspective** in order to consider cost offset in other sectors/budgets than the health care

2. **A threshold value**, e.g. maximum willingness-to-pay for a QALY gained, reflects the health forgone.

3. **Marginal decreasing utility** of treatment, e.g. the benefit varies by indication or by degree of severity
Marginal decreasing utility of drug treatment

Benefit of health:

Value Based Pricing (VBP)

Price, volume and consumer surplus

A = Consumer surplus, at price $P_2$ and $Q_2$
Severity/"need" adjusted reimbursement decisions compared with a constant cost-effectiveness threshold

Cost/QALY

Threshold

Degree of severity/"need"

Adjusted threshold

WTP for a QALY, ISPOR New Orleans, May, 2013

Cost-effectiveness (cont.)
Cost per QALY and disease severity

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

WTP for a QALY, ISPOR New Orleans, May, 2013
ICER
No official threshold
What can we learn from earlier decision?

On average the cost/QALY was US$ 47,000.

For more severe conditions the TLV/LFN has accepted cost per QALY in the area of US$ 150,000

TLV rejected the following drugs because they were considered to costly per QALY:
- Zytiga, in prostate cancer, ICER US$170,000, May 2012

Price premium for innovations was awarded
Some examples from diabetes (insulin)

• NPH insulin € 1.50 per day
• Insulin analogs (Lantus, Levemir) € 1.90 per day:
  – Similar HbA1c, but less weight gain and lower risk for hypoglycemia¹
• GLP-1 analog (Byetta) € 3.20 per day
  – Similar HbA1c, but reduce weight¹ and postpone diabetes progression

¹WTP study estimates
Two approaches for estimating the Value of a QALY

1. Modeling from accepted Values of Statistical Life (VSL)
2. Empirical studies of individuals willingness-to-pay for health improvements

WTP for a QALY estimated from the VSL in transport

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

VSL in Sweden SEK22 million (about US$ 3.5 million, 2010 prices),

This corresponds to a value of SEK 845,000 (about US$ 133,000 per QALY)
Empirical studies of the value of a QALY in the Health Care sector
A Pilot Study from Sweden

Background:
Based on economic theory – ex ante valuation (insurance perspective)

Results, 2005 prices
Estimated values of a QALY are in the magnitude of US$ 33,000 – US$ 86,000 (n=133).

Average estimates with:
DCE (discrete choice experiment) (n=46)
WTP/QALY US$ 50,000
CV (contingent valuation) (n=87)
WTP/QALY US$ 58,000
EuroVaQ

- EU-project, 13 universities in 10 countries, three years
- 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 CV, DCE.

- A survey estimated the value of a QALY in Sweden to SEK 400,000 about $62,000 (2010 prices)

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.

Why Is This Important to Us?
A Brief Industry Perspective

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In the crystal ball

• Increasing strain on government health care budgets suggests …
  – Higher OOP costs & high deductible plans (esp. in the US but everywhere)
  – More “discretionary” treatments won’t be reimbursed
  – Pressures on specialty and oncology treatments will accelerate

• More and more health care will become sensitive to individual patient demand considerations
Many considerations have been put forward as potentially affecting CE thresholds

– E.g., Patient severity, end of life, innovation, member of disadvantaged group, rare disease, unmet need, less risky intervention, … *

How is each consideration valued?

How are they aggregated?

* Sussex J, Towse A, Devlin N. Operationalizing Value-Based Pricing of Medicine. Pharmacoeconomics 2013

Ultimately, new developments in medicine should be aimed at satisfying patient-based preferences and demand for health care

Willingness-to-pay methods provide a useful way – and possibly the only way – to provide patient-based valuation signals

These signals are important to both payers and to life sciences companies to help efficiently channels resources into the most desired new treatments
Thank you for your attention!