Cost-Benefit Analysis

- Costs: welfare sacrificed to bring about the new project
- Benefits: welfare gained because of the new project
- Benefits are converted into monetary units
  - The monetary valuation is based on the total value derived from the project by individual consumers

Can/should life be valued in money?

Issues with valuing health benefits (i.e., life):

- Viewed as unethical or cold-blooded
- “Life is priceless. It cannot be valued”
  - A distinction must be made between a risk of death and a death of a specific person.
    - People seem willing to accept increased risk of death for more money (driving to work)
    - WTP to increase survival may rise as survival probability falls
- There is no finite price I would accept to play Russian Roulette
Addressing Issue: A Statistical Life

• Schelling: “It is not the worth of human life that I shall discuss, but of ‘live-saving,’ of preventing death. And it is not a particular death, but a statistical death.”

➔ A statistical life is a way to make a distinction between a risk of death and a death of a specific person.
  • People seem willing to accept increased risk of death for more money (driving to work) even if they will not play Russian roulette at any price

Ideal money measure of health benefits: Willingness to Pay (WTP)

• WTP: individual’s maximum willingness to give up other goods to acquire the health benefit
  – Conceptually correct measure for determining Pareto improvement
  – Reflects individual’s preferences
• WTP in principle incorporates all factors affecting valuation:
  – multiple health outcomes
  – risk and risk preference

Consumer Surplus: Fundamental Measure of WTP

• Consumer surplus is the fundamental measure of willingness to pay or of consumer value for an intervention
• Demand curve
  – a schedule of marginal benefits
  – Indicates how much people are willing to pay for various quantities of a good
  – Downward sloping … each additional good is valued slightly less than the preceding unit
• Consumer surplus is (approximately) the area under the demand curve minus the amount paid
**Consumer Surplus**

- Single consumer case
  - Since the price at which I would buy the first unit is the value of that unit to me, etc., CS is the sum of my value for the first unit plus value for the second unit plus... up to $Q$
- Multiple consumer case for one unit
  - CS is the value to the person with the highest value plus the value to the person with 2nd highest value, etc., up to the value of the last person allowed to get the good
- CS is tricky if there are income effects

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**Consumer Surplus: Considering Income Effects**

- Consumer surplus gives an approximate measure of WTP because it includes income effects
- It is hard to back out income effects so for practical reasons, consumer surplus usually remains a good approximation
  - For a price increase, CS is an underestimate of WTP because it includes the income reduction from higher prices that reduces utility.
  - Conversely, for a price decrease CS is an overestimate
- The income effect can not always be ignored
  - Larger price changes
  - Good represents a fairly large part of consumption
**Definition of Willingness to Pay for survival**

- WTP for changes in survival ($\Pi$) (for someone trying to optimize their lifetime expected utility)
  - $\frac{\partial C}{\partial \Pi}$: rate at which you would be willing to trade units of consumption (C) against units of $\Pi$
  - that $\Delta C$ which just offsets some $\Delta \Pi$
  - Marginal rate of substitution
- “value of a human life”: willingness to pay for a marginal risk reduction

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**Linnerooth: Basic Model**

Lifetime expected utility at time 0 for a one-period life

$$E(U) = \Pi^*U(Y)$$

- $E(U)$ = expected lifetime utility
- $\Pi$ = probability of survival
- $Y$ = lifetime income

If no saving then income $Y$ = consumption $C$

- This is an expression for the concept that life is valued by the utility you derive from everything you consume

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**Linnerooth: Basic Model**

WTP comes from the optimization of lifetime expected utility

$$E'(U) = \Pi^*U'(C) + \partial \Pi U(C) = 0$$

$$\Pi U'(C) = -\partial \Pi U(C)$$

$$\Pi \partial C[U'(C)/\partial C] = -\partial \Pi U(C)$$

$$\frac{\partial C}{\partial \Pi} = \frac{U(C)}{\Pi \left[U'(C)/\partial C\right]}$$
### Linnerooth: Basic Model

\[ WTP = \frac{-\partial U/\partial \Pi}{\partial U/\partial C} \]

\[ \frac{\partial C}{\partial \Pi} = \frac{-U(C)}{\Pi \cdot MU(C)} \]

- utility of lifetime consumption
- marginal utility of expected consumption (additional utility from change in consumption)

### Implications of basic model:

There is an element of reality in this basic model because \( \partial C/\partial \Pi \) (or MRS) is likely to be nonlinear.

- If \( \Pi \) high (i.e., high probability of survival) then WTP \( \partial C/\partial \Pi \) low. As survival chances decrease, WTP increases at an increasing rate
- The closer the risk is identified with the individual, WTP will rise at an increasing rate
- Resolves paradox: WTP allows for infinite value on life, but finite compensation for small probabilities of death.

### Aside: Broome’s paradox

- If a project is anticipated to kill one person (e.g., a risky construction project) it may pass a net-benefit test if the identity of the one person who would die was unknown.
  - But if the person was known, he might require infinite compensation and the project would fail the net-benefit test.
- The identity has no effect on social welfare, but changes the adoption decision
- Can be extended to knowing risk heterogeneity: I know the person or people who will face the risk reduction when I offer a WTP for a project rather than just know that there is an anonymous distribution of risk
Aside: Implications of risk heterogeneity:
How to value a project that might save the life of an identified person? (Hammitt and Treich, 2007)

• Society seems to spend more generously to save the lives of identified over anonymous victims
  – Is this inefficient and inequitable (“statistical murder”), or reflection of social values: compassion, solidarity, …
• This has implications for how we value treatment vs. prevention
• Should BCA systematically favor identified over anonymous lives?
  – This has implications for whether WTP when risk is highly heterogeneous overestimates the value of life

Back to Implications of Linnerooth:
Simple one period model – you survive and then you consume.
Model does not allow for uncertainty of consumption if you survive the initial risk.
– Usher and Conley address this limitation with a multiperiod model

Usher:
multi-period model; no bequests

\[ E(U) = \sum (1 - \prod t) u(U_t | c_0, c_1, \ldots, c_t) \]

\[ (1 - \prod t) = \text{mortality probability in period } t \]

\[ S_t = \text{probability of surviving to period } t \]

Suppose \( U_t = u(0) + u(1) + \ldots \)

Then reducing present consumption in order to buy an increase in the probability of surviving this period yields:

\[ \frac{\partial C_t}{\partial \pi_t} = \frac{-\pi_t u'(C_t) \sum S_t \pi_t}{\pi_t U'(C_t)} \]

\[ \frac{\partial C}{\partial \Pi} = \frac{-U(C)}{U'(C)} \]

The difference with the basic model is that now the numerator is the expected lifetime utility in the event of surviving the initial period rather than current lifetime utility.
Implications of Usher

- Implies that the value of life is directly related to lifetime utility of expected lifetime consumption
  - Double expected lifetime consumption and you double value of life
  - With no bequests, lifetime expected consumption equals lifetime earnings
  ➔ Implies that WTP can be derived entirely from information on lifetime earnings
- But can we determine if it is equal to, greater than, or less than lifetime expected earnings?

Empirical Strategies to measure benefits in money

1. Human Capital Approach
   - Relate additional years of survival to potential future consumption
   - (Linnerooth)

2. Revealed preferences
   - By measuring shadow (implicit) price from wage offsets, travel time costs, rent gradients
   - (Viscusi)

3. Direct measures of WTP
   - Contingent valuation
     - (Drummond)
     - (Klose)

1. The Human capital approach

- Views health as an investment in human capital
  - The return on investment is healthy time produced
- The VALUE of this time is determined by the market
  - The market values health based on the WTP for what health produces
- Human capital approach:
  - value of life=present value of future earnings
**Bottom line of human capital approach**

- Too low an estimate of willingness to pay to avoid illness
  - While it includes the preferences of those who benefit from the worker’s employment, it does not include worker preferences for avoiding illness
- A useful lower bound estimate of WTP

**Justification of human capital approach**

- How can lifetime earnings (human capital) be related to the value one places on their life?
- Life is valued by the utility you derive from everything you consume
- You consume everything you earn
  - The value of life is a function of earnings
- (argument does not hold for earnings in any subsegment of life)

**Issues with human capital approach (even as lower bound)**

- Assumes wages are indeed a reflection of marginal productivity
  - Not true when there are market imperfections
  - Not all “productive time” is sold in the market
- Implies that statistical life of retired people (or retirement period) has no value
- Implies life-years of children are worth less than adults
How is true WTP related to human capital measure?

- Consider Conley model where consumption and survival are a choice (e.g., Safety decision), not pre-determined
  
  \[ V = \text{value of human life} \,= \, \frac{U_L}{\alpha} \, \text{where } U_L \text{ is lifetime utility.} \]
  
  - The value of human life is the same as the Usher model
  
- For \( \Pi \) approximately equal to one (i.e., low probability of death):
  
  \[ \alpha = \frac{\text{elasticity of lifetime utility with respect to lifetime expected consumption}}{\text{%change in utility/%change in consumption}} \]
  
  \( C = \text{discounted expected lifetime consumption} \)

Implications of Conley model:

\[ V = \frac{C}{\alpha} \]

1. Value of life differs from lifetime earnings only to the extent of the elasticity of lifetime utility with respect to lifetime expected consumption
   - Can be used to estimate \( V \) if you know lifetime expected consumption and \( \alpha \)

2. Lifetime expected earnings is a lower bound for value of life because \( \alpha < 1 \)

What is \( \alpha \)?

- \( \alpha = \text{elasticity of lifetime utility with respect to lifetime expected consumption (%change in utility/%change in consumption)} \)

- When is it less than 1? When do I get more from more life than from just the extra consumption?
  - If there are things I enjoy that are not consumable, then living longer is valued higher than from what I consume during that period.
  - Like the tradeoff if risk averse: Prefer lower expected return (i.e., lower consumption) because I value other things such as avoiding risk.
Summary of human capital method

Use human capital as a lower bound?

**Pro:**
- Value of life rises with lifetime income
- If lifetime utility is equivalent to utility of lifetime consumption

**Con:**
- Lower bound could be unrealistically low:
  - If the person values either non-purchased consumption (eg. beauty) or leisure
  - If cost of the survival risk reduction program reduces consumption below subsistence (consumption and survival probability are correlated)
- The human capital method does not work for subsegments of life because of the gap between future consumption and income productivity
  - The case of retirees
- Does not value morbidity risk

2. Revealed Preferences

**Market Based Approaches**

- The goal is to use the value of human life revealed by individual behavior in the market
- Since welfare economics believes individuals are the best source for valuation of their welfare this would provide a theoretically valid measure of value
- Where in the market are goods related to health risk traded?
  - Extra wages to accept a hazardous job
  - Reduced home value to live near environmental hazard
- The value of the health risk is called the “compensating differential”
- This theoretically valid measure of a statistical life obtains values indirectly.

Decision tree for airbag purchase

```
<table>
<thead>
<tr>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy Airbag</td>
</tr>
<tr>
<td>Not Buy Airbag</td>
</tr>
</tbody>
</table>
```
V(life) calculation

\[(p+w)V(\text{life}) - $300 = pV(\text{life})\]
\[(p+w)V(\text{life}) - pV(\text{life}) = $300\]
\[wV(\text{life}) = $300\]
\[V(\text{life}) = \frac{$300}{w}\]

If \(w = \frac{1}{10,000}\)
Then \(V(\text{life}) = \frac{$300}{(1/10,000)} = $3\ million\)

WTP for risk reduction derived directly from utility maximization

If the consumption of \(X\) affects the probability of survival and our utility depends on both the good and survival \((\pi)\) then we want to:

\[
\text{Max } U(\pi(X),X) \text{ s.t. } PX = y
\]

WTP for risk reduction determined from FOC:

\[
\left( \frac{\partial U}{\partial \pi} + \lambda \right) = P + \frac{\partial U}{\partial X}
\]

\(\pi = \text{survival probability}\)
\(X = \text{good that affects } \pi\)
\(P = \text{price of } X\)
\(\lambda = \text{marginal utility of income}\)

(from example: \(P = $300\) and \(\frac{\partial U}{\partial \pi} = \frac{1}{10000}\))

Hedonic Wage Function
(Viscusi and Aldy, 2003)

- There is an inherent risk in a job and the firm has a wage offer curve for that job that increases with risk (it is a curve because the firm faces a tradeoff between costly safety measures and offering a higher wage).
- A worker will accept a wage/risk combination that maximizes expected utility:
  - A worker (independent of preference for risk), values being healthy more than being injured.
  - Higher utility is derived from more wage for a given risk.
- Questions:
  - Are these studies relevant estimates for people with less preference for risk?
  - Is there a cognitive bias for perceived risk of low-probability “bad” events?
  - Do we really know the fatality risks?
Worker accepts wage/risk combination that maximizes expected utility

Empirical Equation using large individual datasets:

\[ W = F(X, J, \pi, q) \]

- \( X \) = personal characteristics (safety preference controls, and marginal product)
- \( J \) = job characteristics (other job controls)
- \( \pi \) = mortality risk
- \( q \) = non-fatal risks

- coefficients on \( \pi \) and \( q \) give the risk premium
- from these coefficients one can infer the value of a statistical life

What does Market Price-Risk Locus Really Measure?
**Value of a statistical Life: buyer beware**

- The trade-off of market price and risk reflects distribution of tastes and supply conditions
  - Not the preferences of the median person
- Risk premium for a Volvo: does it represent value of safety for average car buyer?
- If people self-select into risky jobs, does their WTP apply to me?

**Value of a statistical Life: statistical problems**

- Selection bias
  - May underestimate value of a statistical life for society
- Omitted variable bias
  - Must control for education and skill and proxies for marginal product so that wage variation captures risk variation

**Revealed value of life may vary across studies**

- Voluntary (equilibrium) vs. involuntary
- Varies by level of baseline risk
- Person’s (demand/taste) characteristics (e.g., age, income)
- Size of change in risk
- Cannot be summed across programs
- Housing and product market estimates usually less than labor market estimates
Viscusi and Aldy (2003):

- Value of a statistical life: $4-9 Million
- (in 2000 dollars)
- The literature has a wide range of estimates but there is a cluster of values in the $4-9 M range
- The value of a statistical life is lower in developing countries
  - If safety is a normal good, the value of life will rise with wealth

Convert to value of a life year

- Value of a life-year is the constant annual amount over a person’s remaining life span that has a discounted value equal to her value of a statistical life: $4-9 Million
- Using average remaining life of 40 years and discount rate of 3.5%, and VSL of $4 M:
  - $187,309
- Method implies that VSL declines with age
- Might VSL increase with scarcity?

Summary of market based approaches

Strengths:
- Related to WTP
- Based on actual choices involving health versus money
- Does not involve hypothetical scenarios or statements about preferences

Weaknesses:
- Estimates vary widely
- Estimation seems to be very context and job-specific
- Often hard to observe the relevant health outcome being compensated
- Depends on market revealing preferences in a rational way
  - Imperfections in labor market
  - Limitations on how individuals perceive risk
3. Direct measures of WTP: Contingent valuation studies

- Survey-based studies to elicit a money value for the benefits from a program
- Asks consumers what they would be willing to pay for a health program benefit
  - The hypothetical question should elicit the value of what they would be willing to sacrifice in terms of other consumption if the health program could be purchased in the market
- The aggregation of all the consumer surplus represents total benefits in the cost-benefit calculation

3. Direct measures of WTP: Contingent valuation studies

- Although, behavior in markets is the best way to observe individual valuation of goods and services
  - Economists are more comfortable with revealed preferences rather than statements about preferences
- For some goods there are poor market proxies for inferring preferences from observation
  - water quality at recreation sites
  - sports stadiums
  - reductions in the volume of hazardous wastes
  - preservation of wetland ecosystems

Willingness to Pay (WTP) vs. Willingness to Accept (WTA)

- In a typical experiment, a subject is given a good, like a coffee mug, and asked how much he would sell it for. This is his willingness to accept (WTA), also called compensation demanded or willingness to sell.
- Another subject is not given a mug and asked how much he would pay for one, his willingness to pay (WTP).
- Willingness-to-accept is almost always higher than WTP, around seven times as much on average (Horowitz and McConnell).
- This anomaly is a challenge to the consumer model which assumes that buying and selling price should be the same
  - Is it status quo bias?
**Willingness to Pay (WTP) vs. Willingness to Accept (WTA)**

- Hanemann explained these differences using neoclassical economics [Hanemann, W. M. (1991), Willingness to pay and willingness to accept: How much can they differ? American Economic Review 81, 635-647].
- WTP and WTA will differ if:
  1. Income effects are large
  2. The good in question is a poor substitute for other goods
- Health is probably in the "low substitution" category, especially when the program makes a large change in health stock.
- Intuition: Suppose I asked you for your WTP for not being shot ("your money or your life"). Then, WTP = your income. Suppose I asked you "What is your WTA for being shot?" Presumably, there is no monetary compensation.
- Given these differences, a contingent valuation study should be sure to illicit WTP rather than WTA.

**How should the health benefit for WTP valuation be defined?**

<table>
<thead>
<tr>
<th>W</th>
<th>A certain health outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>W*</td>
<td>A treatment with uncertain outcome</td>
</tr>
<tr>
<td>W**</td>
<td>Access to a treatment program where future use and treatment outcomes are uncertain</td>
</tr>
</tbody>
</table>

- Consequences of health care programs are inherently uncertain
- Illness and demand for health care programs are also uncertain

These three WTP estimates could be connected by measuring the risk preferences of the respondents.

If risk averse: W* = pW and W** = qW*

- Where p is the probability of health outcome and q is the probability of contracting the disease.

**Example**

O’Brien, Pauly, et al., 1998

Purpose: to estimate W* and W**

- for growth-colony-stimulating factor (GCSF) to treat neutropenia for people receiving chemotherapy for cancer

Chemotherapy causes a condition called neutropenia that makes people susceptible to infections. When that happens, chemo is stopped.

Consequences of neutropenia

- Treatment of infection
- Possible reduction in survival for less aggressively treated patients
- Patient distress and worry
Example
O’Brien, Pauly, et al., 1998

- The hypotheses:
  - WTP for GCSF is positive and significant
  - WTP can either be measured as conditional WTP (W*) or marginal insured WTP (W**)
  - W** > qW*

- Main Questions:
  - W*: What would you pay out of pocket for filgrastim (GCSF) if your HMO didn’t cover it?
  - W**: What additional premium would you pay (for yourself) if your HMO covered GCSF. (Your risk of cancer is 1 in 100 or 1 in 200)

- Hypotheses were confirmed, but issues arose when measuring WTP
  - Sensiveness of answers sometimes questionable
  - Dealing with variation and extreme values
  - Difficulty to understand probabilities

Application of the Contingent Valuation Method:

- Step 1: Define the valuation problem
  - What services are being valued (GCSF)
  - Who is the relevant population (enrollees)

- Step 2: Survey format
  - mail, phone or in person; sample size; who will be surveyed, … (in person)
  - Will depend on the importance of the valuation issue, the complexity of the question being asked, and the size of the budget

Application of the Contingent Valuation Method:

- Step 3: Survey design
  - Is the description of the hypothetical situation understood?
  - What approach to valuation should be used?
  - How can “protest” bids or other problem answers be identified?

  (use video and decision boards with pie charts to show risks)
  (Use bidding algorithms to structure the search for a respondent’s maximum WTP. Test for starting point bias)
  (pretest questions)
Application of the Contingent Valuation Method:

• Step 4: Survey implementation
• Step 5: Compile, analyze and report the results of average WTP in sample
  – Identify any responses that may not express the respondent’s value for the treatment
  – Deal with possible non-response bias
• Step 6: Extrapolate sample to population of interest
  – Is sample generalizable to population?

Contingent Valuation is a measurement technique for WTP

• Its usefulness depends entirely on the details of measurement
• The WTP measured from a study is specific to the situation posed in the study
• Should all consequences of a program or just those related to the health benefit be measured?
  – Future health care cost savings?
    • Production gains and income effects?
      – These two effects could be measured by market prices so a restricted WTP may be asked
      – Must avoid double counting!
  – Is the situation realistic and representative of the market from which these decisions are made?

Contingent valuation Outline

• Methods for measurement
  (i) Direct elicitation
  (ii) Dichotomous choice
• Issues
  (i) Potential for bias
  (ii) Hypothetical situations
  (iv) WTP studies are limited
• validation
  (i) Criterion Validity: Brookshire
  (ii) Construct Validity: Jacobs, Smith(2005)
Contingent valuation methods

- Direct Elicitation Methods
  - Open-ended
  - Closed-ended iterative bidding method
- Dichotomous choice Method

CV Methods - Direct elicitation: Open-ended Method

Open-ended format: respondents are asked to state their maximum willingness to pay for the health care treatment.

Open-ended questions pose a difficult cognitive task for most respondents because we are typically not used to thinking about the maximum we would pay for something.

- Prompts may promote bias as viewed as less bias
- Very imprecise with widely varying responses and many non-responses or protest responses
- Those with small valuations often state a value of zero
- Sometimes possible ranges are provided (payment cards) to help with this difficult cognitive task
  * could create range bias

CV Methods - Direct elicitation: Closed-ended iterative bidding

Closed-ended format: respondents are asked whether or not they would be willing to pay a particular amount for the health care treatment

Format tries to make the cognitive task of maximum willingness to pay easier through within-person bidding games

- Predetermined search algorithm to bid the respondent up or down, conditional on how they respond to prompted values

Big Issue: Starting point bias (Framing)
CV Methods – Dichotomous Choice Method

• “Take-it-or-leave-it” between-person surveys
  – Would you be willing to pay an extra $X per month on your taxes for this program? [Like a referendum]
  – Each respondent receives one randomly drawn price
  – Bidding curve estimated from probability of yes answer across large cross section given randomly chosen value for $X
  – Closest to real market decisions – do you buy the good at that price or not
  – The choice situation faced by referendum voters
  – Cognitive simplicity
• Issues
  – What is relevant range to consider for the randomly drawn prices
  – A large sample size is needed

CV Methods – Dichotomous Choice Method

• Steps to get WTP from this method
  – Predict probability of acceptance based on price (and other control variables)
  – Average WTP is area under curve of predicted relationship between price and probability of acceptance
  – This average can be estimated for separate group and then extrapolated to population
• Variant: Double bounded dichotomous choice
  – Depending on initial response, a follow-up offer is made that is either double (if yes) or half (if no)
  – Reduces sample size, but reintroduces framing issues and strategic responses

Contingent valuation

ISSUES

• Methods for measurement
  (i) Direct elicitation
  (ii) Dichotomous choice
• Issues
  (i) Potential for bias
  (ii) Hypothetical situations
  (iii) WTP studies are limited
• Validation
  (i) Criterion Validity: Brookshire
  (ii) Construct Validity: Jacobs, Smith(2005)
(i) Potential for Bias

- **Sample bias:** Survey respondents should be representative of the population being studied.
- **Question order bias:** Different answers result from different preceding questions.
  - Willingness to pay for interventions will depend on the order they are introduced.
  - Examples include:
    - Pain treatment for cancer patients
    - Heart operations
    - Community care


(ii) Hypothetical Situations

**Attitude vs. behavior**

- The link between attitude and behavior is made only when the individual takes action and purchases the product.
- However, hypothetical questions and their answers may still be of use in public decision making.

But then the hypothetical situation should be a familiar context:
- Hard to make a determination of value if unfamiliar with commodity or the context from which to value it.
- The market context within which the commodity is offered and valued is therefore fundamental to the veracity of the WTP results.
(ii) Hypothetical Situations (2)

Guide when constructing hypothetical situation
- Simulate plausible real-life situation
  - Respondent should know they face a budget constraint
  - Respondent must believe that specified outcome would occur if money paid
  - The mechanism of payment must be understood
- The context should be stated explicitly and understood
  - Specify whether comparable services are available from other sources, when the good is going to be provided, and whether the losses or gains are temporary or permanent
- The market situation should be plausible
  - Respondents should understand the frequency of payments to achieve the duration of the quantity or quality change

(iii) WTP studies are limited

Olsen and Smith (2001)
A review of 71 WTP studies

1. WTP can represent a more comprehensive valuation of benefits, but not seen in practice
   - Nearly 80% of the studies did not attempt to value anything beyond health outcomes
   - Health outcomes can be described over three dimensions health state, duration, and probability
     • Yet only 25% of the studies described health outcomes in terms of more than one health dimension.
     • Only 6% were comprehensive enough to make an estimation in QALY terms

(ii) WTP studies are limited (2)

2. WTP involves the valuation of benefits in the same unit as costs which is required for decisions to improve allocative efficiency
   - The method of provision and the budget constraint were rarely mentioned.
   - Costs were mentioned in only 35% of the studies.
   - A comparator existed in only 33% of the studies
Contingent valuation
VALIDATION

• Methods for measurement
  (i) Direct elicitation
  (ii) Dichotomous choice

• Issues
  (i) Potential for bias
  (ii) Hypothetical situations
  (iv) WTP studies are limited

• validation
  (i) Criterion Validity: Brookshire
  (ii) Construct Validity: Jacobs, Smith (2005)

Validation of WTP:

(i) Criterion validity: compare predicted WTP from CV studies against what consumers would actually pay. Difficult when actual markets do not exist

(ii) Construct Validity: to determine whether the data are consistent with theoretical constructs that should be presented if the WTP responses are measuring the value we intend
  – Smith (2005)
  – Ryan and Watson (2009)

(i) Criterion validity
Payment Card (PC) vs. Dichotomous Choice (DCE)
(Ryan and Watson, 2009)

• DCE produced larger WTP estimates than PC.
  – More open ended methods result in lower WTP estimates

• Tested External validity – hypothetical data overestimate actual take-up of test
  – They offered Chlamydia screening identical to one of the scenarios in the CV studies. Test would be conducted during consultation with doctor at zero monetary cost.
  – Was WTP from PC > 0 for those who accepted the test?
    • Agreement 99% of the time. 18% say no even though their PC response said they should.
  – Was the Chlamydia screening offer accepted by those who stated they would be screened under the zero cost DCE scenario?
    • Agreement 0% of the time.
(ii) Construct Validity

- Determine whether the data are consistent with theoretical constructs that should be presented if the WTP responses are measuring the value we intend
  - Higher respondent incomes should be associated with higher WTP
  - The more of a positively valued good that is supplied, the greater a person’s WTP
- Study of construct validity related to incomes:
  - Jacobs: Valuation of Symptomatic Hepatitis A in Adults
    - WTP related to income.
    - Problems with ranges and ordering of bids
    - Modest correlation with time-tradeoff responses
  - Ryan and Watson
    - Income > $15,000 were willing to pay £25.90
    - Income < $15,000 were willing to pay £22.20

Studies of Construct Validity show a lack of sensitivity of WTP to the magnitude of the benefit

  - Could be from a difficulty in communicating small risk changes because opinions change after discussion and deliberation
  - Smith (2005) suggests that the perceived low construct validity could be generated by income constraint
    - The higher the proportion of income that WTP represented, the greater the insensitivity of WTP to changes in the scale of the good
- Philips, Whynes and Avis (2006)
  - They design an experiment for valuations of a cervical cancer screening program
  - They find a higher WTP when greater benefits are perceived and when the program is improved
  - This example is not subjected to income constraint of Smith

OVERVIEW OF DIRECT MEASURES OF WTP

Strengths: “theoretical glory”

- Can be applied to specific context
  - Context should be meaningful to respondent
- Directly related to the theoretical concept of WTP
  - Should measure the theoretical concept
- Facilitates the use of CBA
  - But CV studies must be done carefully
- Straightforward aggregation of benefits
  - Caution: Voluntary vs. mandatory program
OVERVIEW OF DIRECT MEASURES OF WTP

Weaknesses:
• Did respondents understand?
  • numerical probabilities vs. visual aids
  • insurance coverage
  • test for consistent responses
• Did bias enter response?
  – Value cues, starting points, ranges
• Are hypothetical tradeoffs valid?
  – Is budget constraint considered?
• Is response sensitive to framing of question?
  – risk of death vs. probability of survival

Bottom line: Most existing studies are experimental and explore measurement feasibility issues.
• Rarely used in a full CBA. Proceed with caution.
• See editorial Smith and Sach (2009)
• Used more in other areas such as transportation economics and environmental economics
  – They compare health and non health benefits more frequently
  – They don’t have cost-effectiveness as an alternative
  – Is the methodology in these other areas even transferable to health?